Draft
Environmental Impact Statement / Environmental Impact Report for the Edwards AFB Solar Project

Appendices

SCH# 2017111079

Volume 2
Appendices B4 through B21

Edwards AFB Solar Project
(PP18136)

Kern County
Planning and Natural Resources Department
Bakersfield, California

Department of the Air Force
Headquarters 412th Test Wing (AFMC)
Edwards Air Force Base California

June 2019

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Kern County Planning and Natural Resources Department
Public Services Building
Attn: Craig Murphy, Division Chief
2700 M Street, Suite 100
Bakersfield, CA 93301-2370
(661) 862-8600

412 CEG/CEVA
Attn: Andrea Brewer-Anderson
120 N. Rosamond Blvd.
Building 3735, Suite A
Edwards AFB, CA 93524-8600
(661) 277-4948

Technical Assistance by:
ESA
626 Wilshire Boulevard, Suite 1100
Los Angeles, CA 90017
(213) 599-4300

June 2019

B4. Biology Technical Report – Gen-Tie Routes, OVSP Bio Tech Report

FINAL

Biological Resources Technical Report for the Gen-Tie Routes for Edwards Air Force Base (AFB) Solar EUL Project

Prepared for:

Edwards AFB Solar, LLC
11512 El Camino Real, Suite 370
San Diego, California 920130
Contact: Simon Day

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Megan Enright

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
ACOE	U.S. Army Corps of Engineers
amsl	above mean sea level
APLIC	Avian Power Line Interaction Committee
BCC	Bird of Conservation Concern
BNSF	Burlington Northern Santa Fe
BTR	biological resources technical report
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CNPS	California Native Plant Society
County	County of Kern
CRPR	California Rare Plant Rank
CUP	Conditional Use Permit
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EKAPCD	Eastern Kern Air Pollution Control District
EUL	Enhanced Use Lease
FP	fully protected
FT	federally threatened
gen-tie	generation tie
GIS	geographic information system
GPS	Global Positioning System
kV	kilovolt
NEPA	National Environmental Policy Act
O&M	operations and maintenance
OHWM	Ordinary High Water Mark
PV	photovoltaic
ROWs	rights-of-way
RWQCB	Regional Water Quality Control Board
SR-	State Route
SSC	Species of Special Concern
ST	state threatened
SWPPP	Stormwater Pollution Prevention Plan
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
WEAP	Worker Environmental Awareness Program

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1 INTRODUCTION

1.1 Project Description Overview

A Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) is being prepared by the U.S. Air Force (USAF) and the County of Kern, California (County) to evaluate, at a project level, the impacts of the Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project (formerly known as Oro Verde Solar Project). A Request for Qualifications was issued on February 3, 2017, by the USAF for solar development through the EUL program. Edwards AFB Solar, LLC has been selected by the USAF as the Highest Rate Offeror. Edwards AFB Solar, LLC will construct, operate, and maintain a utility-scale solar photovoltaic (PV) energy-generating facility on the Edwards AFB property. Edwards AFB Solar, LLC will file an application with the County for a franchise agreement and/or Conditional Use Permit (CUP) for routing a generation tie (gen-tie) transmission line from the proposed solar facility to the privately owned Westwind Substation in the first phase of the project and to Southern California Edison Windhub Substation in subsequent phases. For purposes of this report, the project is referred to as the Gen-Tie Routes for Edwards AFB Solar EUL Project or proposed project.

A biological resources technical report (BTR) was prepared for the solar facility (Ecorp Consulting Inc. 2013) and a previously identified gen-tie route. However, since this document was prepared, the gen-tie route has changed, and there are now three gen-tie route options that need to be evaluated for biological resources under the California Environmental Quality Act (CEQA). The purpose of this BTR is evaluate these three gen-tie route options and to: (1) document the biological resources that are present in the study area identified to address the gen-tie route options, (2) analyze the potential direct and indirect impacts to special-status biological resources resulting from construction and operation of the gen-tie, (3) describe the significance of the potential impacts, and (4) identify recommended mitigation measures for consideration by the USAF, the Lead Agency under NEPA, and Kern County, the Lead Agency under CEQA.

1.2 Proposed Gen-Tie Line Corridor

A 230-kilovolt (kV) gen-tie would connect the Edwards AFB solar generation site with the existing and privately owned electrical substation, the Westwind Substation, in the first phase of the project, and to the Southern California Edison Windhub Substation in subsequent phases of the project (Figures 1-1 and 1-2). The proposed gen-tie may be a shared facility with other solar projects in the future. In general, the gen-tie route can be broken down in to two categories based on the direction of the corridor: a north–south connection and an east-west connection. There are three options for the north–south gen-tie connection, and the proposed project would include only one of these three north-south route options. There are two options for the east–west gen-tie connection, and the proposed project would include only one of these two east–west route options (Figure 1-2). The three options for the north–south gen-tie routes are described first, and the two options for the east–west gen-tie routes are described second.

North–South Gen-Tie Routes

From the proposed solar generation site to the approximate intersection of Purdy Avenue and United Street, there are two gen-tie route options, and from the proposed solar generation site to the intersection of Holt Street and Purdy Avenue, there is a third gen-tie route option. These north–south route options include the following: (1) North–South Gen-Tie Route Option 1: an approximately 5.6-mile-long gen-tie route on the east that generally runs from the Edwards AFB solar generation site north adjacent to 20th Street, west adjacent to East Reed Avenue, north adjacent to 15th Street, then generally follows the north side of the Burlington Northern Santa Fe (BNSF) Railway and finally runs west to the intersection of Purdy Avenue and the BNSF; (2) North–South Gen-tie Route Option 2: an approximately 4.5-mile-long gen-tie route that generally runs from the northwestern edge of the Edwards AFB solar generation site north on Lone Butte Road, west on West Reed Avenue, and north on United Street where it intersects with Purdy Avenue; (3) North–South Gen-tie Route Option 3: an approximately 6-mile-long gen-tie route that generally runs from the northwestern edge of the Edwards AFB solar generation site directly west to Sierra Highway, and runs along Sierra Highway to the intersection with Silver Queen Road; the gen-tie route runs directly west along Silver Queen Road for 1.8 miles and heads north of Gold Town Road, which turns into Holt Street, where the route intersects with Purdy Avenue.

Figure 1-2 shows the approximate location of each the north–south gen-tie route options; the North–South Gen-Tie Route Option 1 is shown in yellow; the North–South Gen-Tie Route Option 2 is shown in blue; and the North–South Gen-Tie Route Option 3 is shown in red.

East–West Gen-Tie Routes

Figure 1-2 shows the approximate location of the east–west gen-tie route in black and includes two route options, Options A and B, along Oak Creek Road. The proposed project would include only one of these options for the east–west gen-tie route. More specifically, from the intersection of the North–South Gen-Tie Option 1 and Purdy Avenue, the east–west gen-tie is approximately 9.8 miles in length and would run west along Purdy Avenue for approximately 5.5 miles, and then would run south of Purdy Avenue, but north of Decatur Avenue, for approximately 2.9 miles and then turn north back to Purdy Avenue. From Purdy Avenue, the east–west gen-tine line would run north and northwest for approximately 1.3 miles to Oak Creek Road. Along Oak Creek Road for 0.6 miles there are two options for the east–west gen-tie route: Option A would run north of Oak Creek Road, and Option B would run south of Oak Creek Road. From these two options, the east–west gen-tie route would run 0.4 miles before jogging northwest for 0.4 miles and connecting to the Westwind Substation or Windhub Substation. Because Options A and Options B only vary slightly, these options are typically evaluated together in this document.

Table 1-1 provides a brief description of the three north–south route options and the two east–west route options.

Table 1-1
Proposed Gen-Tie Route Options

Direction from Solar Generation Site to Substations	Option	Description
North–South	1	5.6-mile-long gen-tie route; runs from the Edwards AFB solar generation site north to the intersection of Purdy Avenue and the BNSF.
	2	4.5-mile-long gen-tie route; runs from the northwestern edge of the Edwards AFB solar generation site to the intersection of United Street and Purdy Avenue.
	3	6-mile-long gen-tie route; runs from the northwestern edge of the Edwards AFB solar generation site to the intersection of Holt Street and Purdy Avenue.
East–West	1-A	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 miles there are two options for the east–west gen-tie route: Option A would run north of Oak Creek Road.
	1-B	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 miles there are two options for the east–west gen-tie route: Option B would run south of Oak Creek Road

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2 METHODS

Endangered, rare, or threatened species, as defined in CEQA Guidelines Section 15380(b) (14 CCR 15000 et seq.), are referred to as "special-status species" in this BTR and include (1) endangered or threatened species recognized in the context of the California Endangered Species Act and the federal Endangered Species Act; (2) plant species with a California Rare Plant Rank (CRPR) (CDFW 2017a) (Lists 1A, 1B, and 2); (3) California Species of Special Concern (SSC), as designated by the California Department of Fish and Wildlife (CDFW; CDFW 2017b); (4) mammals and birds that are fully protected (FP) species, as described in Fish and Game Code, Sections 4700 and 3511 (CDFW 2017b); and (5) Birds of Conservation Concern (BCC), as designated by the U.S. Fish and Wildlife Service (USFWS; USFWS 2008; CDFW 2017b). Vegetation communities are considered sensitive natural communities or special-status vegetation communities if they have a conservation status of S1, S2, or S3 (CDFG 2010).

The study area, as shown in Figure 2-1, is 1,053 acres and includes: (1) a 250-foot buffer on the East–West Gen-Tie Routes (or 500-foot-wide corridor); a 250-foot buffer on the North–South Gen-Tie Route Option 1 (or a 500-foot-wide corridor); and (3) a 50-foot buffer on the North–South Gen-Tie Route Options 2 and 3 (or a 100-foot-wide corridor). Surveys were conducted along the gen-tie routes noted in the subsequent sections and on approximately 1,800 acres of adjacent lands associated with a separate project.

2.1 Vegetation Mapping

In September 2010, the California Department of Fish and Game (CDFG)[1] published the *List of Vegetation Alliances and Associations: Natural Communities List Arranged Alphabetically by Life Form* (Natural Communities List; CDFG 2010) based on the *Manual of California Vegetation*, Second Edition (Sawyer et al. 2009), which is the California expression of the National Vegetation Classification Standard, Version 2 (FGDC 2008). These classification systems focus on a quantified, hierarchical approach that includes both floristic (plant species) and physiognomic (community structure and form) factors as currently observed (as opposed to predicting climax or successional stages). The nomenclature for vegetation communities in the study area follows the *Manual of California Vegetation* and the Natural Communities List (CDFG 2010). Natural vegetation communities were mapped in the field using the *Manual of California Vegetation* and Natural Communities List. Each natural community was mapped to

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1 The California Department of Fish and Game (CDFG) was officially renamed the California Department of Fish and Wildlife (CDFW) as of January 1, 2013. Where references in this document are made to the department for background information, documents, permits, consultations, etc. (guidance) prior to January 1, 2013, the title CDFG is used and for references to guidance after January 1, 2013, CDFW is used.

the association level, with a few exceptions. Non-native grasslands were not mapped by semi-natural stand[2] type because none of these stand types are considered high priority for inventory, or special status, by CDFW (CDFG 2010). Non-natural land covers (including disturbed habitats and urban/developed) were classified as described in Section 3.2.5.

Vegetation mapping was conducted in April and May 2017 by Dudek biologists Callie Amoaku, Britney Strittmater, and Patricia Schuyler (Table 2-1). Vegetation communities were either mapped using a Trimble Geo XT Global Positioning System (GPS) unit with sub-meter accuracy or delineated on field maps with a true-color orthorectified aerial photographic base (Dudek 2017). The maximum scale of the field maps was 400-scale (1 inch = 400 feet). In combination with the GPS data, geographic information system (GIS) analysts digitized the delineated vegetation community boundaries from field maps to create a base vegetation layer using ArcGIS.

The minimum mapping unit was 1 acre or less for communities that are considered high priority for inventory in the Natural Communities List (CDFG 2010). Data were collected for representative vegetation communities and land covers, including aspect, dominant layer, structure of dominant layer, associated species and estimated absolute cover, total vegetative cover of each strata, approximate stand size, disturbance information, other observations, and photographs.

Table 2-1
Survey Information for Vegetation Mapping

Date	Personnel	Field Hours	Survey Conditions
04/24/017	Britney Strittmater, Callie Amoaku	8:54 AM–5:17 PM	54°F–63°F; 80%–90% cc; 1–17 mph wind
04/25/017	Britney Strittmater, Callie Amoaku	8:15 AM–5:20 PM	58°F–62°F; 0%–10% cc; 3–18 mph wind
04/26/017	Britney Strittmater, Callie Amoaku	7:37 AM–2:30 PM	55°F–67°F; 30%–60% cc; 8–22 mph wind
05/02/2017	Callie Amoaku	8:15 AM-5:27 PM	74°F–90°F; 0%–20% cc; 0–1 mph wind
05/30/2017	Callie Amoaku, Patricia Schuyler	7:25 AM–6:03 PM	74°F–79°F; 30% cc; 0–3 mph wind
05/30/2017	Callie Amoaku, Patricia Schuyler	7:08 AM–3:36 PM	53–73°F; 100% cc; 3–20 mph wind

Legend
°F = degrees Fahrenheit; cc = cloud cover; mph = miles per hour.

2 Semi-natural stands are invasive naturalized plant groups where "plants are sufficiently dominant to have replaced most of the natives, and, in many situations, the associates are themselves non-native species" (Sawyer et al. 2009).

2.2 Jurisdictional Delineation

2.2.1 Literature Review

For the jurisdictional delineation, Dudek reviewed aerial maps from Bing (2017), the USFWS National Wetlands Inventory (USFWS 2017a), the U.S. Geological Survey National Hydrography Dataset (USGS 2017), the State List of Hydric Soils (USDA 2017), and historical aerials and topographic maps (Google Earth 2017; Historic Aerials Online 2017). The National Hydrography Dataset contains water features such as lakes, ponds, streams, rivers, canals, dams, and stream gages (USGS 2017). The USFWS created the National Wetlands Inventory to "provide biologists and others with information on the distribution and type of wetlands to aid in conservation efforts" (USFWS 2017a). Potential wetlands and waters are mapped by the USFWS based on aerial images, and that data is provided to the public. This compilation of data was reviewed to gain a better understanding of the hydrologic setting of the study area and identify areas potentially under the jurisdiction of the U.S. Army Corps of Engineers (ACOE).

2.2.2 Jurisdictional Delineation

A formal (routine) jurisdictional delineation of waters, including wetlands, was conducted in April and May 2017 within the study area (Table 2-2). Through previous jurisdictional delineations within the Antelope Valley watershed, in which the study area is located, ACOE determined drainages to be nonjurisdictional. To date, the ACOE has determined that Cache Creek, located approximately 8 miles northeast of the study area, to be nonjurisdictional (File No. SPL-2013-00545-TS). Additionally, ACOE determined all tributaries to Rosamond, Buckhorn, and Rogers Lakes, excluding Lake Palmdale and tributaries to Lake Palmdale, to be nonjurisdictional due to the Antelope Valley watershed being an isolated, intrastate watershed without any surface water related commerce (File No. SPL-2011-01084-SLP). Rosamond, Buckhorn, and Rogers Lakes are located approximately 11 to 16 miles south and southeast of the study area. Therefore, based on these previous determinations, all features within the study area were considered to be nonjurisdictional under the ACOE because surface flows either dissipate into the desert floor evaporating or infiltrating into the groundwater basin or continue to flow to Rogers Lake during larger storm events; however, biologists confirmed that no ACOE-jurisdictional areas were present during the jurisdictional delineation.

All of the study area was surveyed on foot for waters of the United States, including wetlands, under the jurisdiction of ACOE, pursuant to Section 404 of the federal Clean Water Act. Non-wetland waters of the United States are delineated based on the presence of an ordinary high-water mark (OHWM), as determined using the methodology in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western*

United States, A Delineation Manual (ACOE 2008a) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (ACOE 2010). Wetland waters of the United States are delineated based on methodology described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (ACOE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (ACOE 2008b). The ACOE and U.S. Environmental Protection Agency Rapanos Guidance states that the ACOE will regulate: (i) traditional navigable waters of the United States and (ii) their adjacent wetlands as well as (iii) non-navigable tributaries to traditional navigable waters that are relatively permanent and (iv) wetlands that directly abut such tributaries (ACOE and EPA 2008). In addition, if a significant nexus has been determined, the ACOE may also assert jurisdiction over (i) non-navigable tributaries that are not relatively permanent and (ii) their adjacent wetlands, as well as (iii) wetlands that are adjacent to but that do not directly abut a relatively permanent non-navigable tributary (ACOE and EPA 2008). The Rapanos Guidance was used to conduct the delineation. Rogers Lake and tributaries to Rogers Lake were not considered jurisdictional as this lake is isolated and does not contain any surface water related commerce.

Areas regulated by the Regional Water Quality Control Board (RWQCB) are generally coincident with the ACOE, but can also include isolated features that have evidence of surface water inundation pursuant to the state Porter Cologne Act. These areas generally support at least one of the three ACOE wetlands indicators but are considered isolated through the lack of surface water hydrology/connectivity downstream.

CDFW asserts jurisdiction over rivers, streams, lakes, and riparian vegetation associated with these features. Waters of the state were delineated based on watercourse characteristics present in the field, which include surface flow, sediment transportation and sorting, physical indicators of channel forms, channel morphology, and riparian habitat associated with a streambed. These characteristics are based on the CDFW guidance document, *A Review of Stream Processes and Forms in Dryland Watersheds* (Vyverberg 2010) and the *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* (CEC 2014).

Table 2-2
Survey Information for Jurisdictional Delineation

Survey Date	Personnel	Field Hours	Survey Conditions
04/24/017	Britney Strittmater, Callie Amoaku	8:54 AM–5:17 PM	54°F–63°F; 80%–90% cc; 1–17 mph wind
04/25/017	Britney Strittmater, Callie Amoaku	8:15 AM–5:20 PM	58°F–62°F; 0%–10% cc; 3–18 mph wind
04/26/017	Britney Strittmater, Callie Amoaku	7:37 AM–2:30 PM	55°F–67°F; 30%–60% cc; 8–22 mph wind

Table 2-2
Survey Information for Jurisdictional Delineation

Survey Date	Personnel	Field Hours	Survey Conditions
05/30/2017	Callie Amoaku, Patricia Schuyler	7:25 AM–6:03 PM	74°F–79°F4; 0%–3 mph wind
05/31/2017	Callie Amoaku, Patricia Schuyler	7:08 AM–3:36 PM	53°F–73°F; 100% cc; 3–20 mph wind

Legend
°F = degrees Fahrenheit; cc = cloud cover; mph = miles per hour.

To assist in the determination of jurisdictional areas on site, data was collected at 15 data stations (Appendix A). The site was also evaluated for evidence of OHWM indicators, surface water, saturation, wetland vegetation, and nexus to a traditional navigable water. The extent of any identified jurisdictional areas was determined by mapping the areas with similar vegetation and topography to the sampled locations.

The limits of jurisdictional areas were collected in the field using a Trimble GeoXT GPS unit with sub-meter accuracy. The jurisdictional extents were digitized in GIS based on the GPS data and data collected directly onto field maps into a project-specific GIS using ArcGIS software.

2.3 Special-Status Plant Surveys

Special-status plant surveys were conducted to determine the presence or absence of plant species that are considered endangered, rare, or threatened under CEQA Guidelines, Section 15380 (14 CCR 15000 et seq.).

2.3.1 Literature Review

Prior to field surveys, special-status plants present or potentially present within the study area were identified through queries of the California Natural Diversity Database (CNDDB) (CDFW 2017c), the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Vascular Plants (CNPS 2017), USFWS Information for Planning and Consultation (IPaC) (USFWS 2017b), USFWS species occurrence data (USFWS 2017c), and USFWS critical habitat data (USFWS 2017d). The CNPS Inventory and the CNDDB were queried based on the U.S. Geological Survey 7.5-minute quadrangles in which the study area is located (Monolith, Mojave, Sanborn, Bissell, and Soledad Mountain) and the 14 surrounding quadrangles (i.e., nine-quad search). The USFWS species occurrence and critical habitat data were queried using GIS software based on a 5-mile buffer around the study area. USFWS IPaC data was generated by the USFWS using a shapefile of the project site.

2.3.2 Reference Population Checks

Plant species bloom at slightly different times each year depending on temperature, rainfall patterns, elevation, and other environmental factors. Reference population checks involve locating known special-status plant species populations during a time frame when they are known to be blooming or exhibit other phenological characteristics that allow for species identification. Observations of reference populations during peak phenology ensure that these species would be identifiable if they were present in the study area.

In May, Dudek staff conducted reference population checks for some of the special-status plants that had the potential to occur on the study area. Data gathered from the reference population checks were used to confirm that the species would have been detectable during the surveys. Table 2-3 includes a list of the focal special-status plants that were observed at the reference sites, as well as the observation date and distance of the reference population from the study area.

Table 2-3
Summary of Special-Status Reference Site Checks

Scientific Name	Common Name	Status	Date Observed	Distance from Study Area
California macrophylla	round-leaved filaree	None/None/1B.2	05/04/2017	32 miles
Calochortus striatus	alkali mariposa lily	None/None/1B.2	05/04/2017	2 miles
Cymopterus deserticola	desert cymopterus	None/None/1B.2	05/09/2017	16 miles
Delphinium recurvatum	recurved larkspur	None/None/1B.2	05/04/2017	2 miles
Eriophyllum mohavense	Barstow woolly sunflower	None/None/1B.2	05/17/2017	40 miles
Layia heterotricha	pale-yellow layia	None/None/1B.2	05/10/2017	13 miles
Navarretia setiloba	Piute Mountains navarretia	None/None/1B.1	05/04/2017	33 miles

Status Legend:
CRPR: California Rare Plant Rank
1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
Threat Rank
0.1 – Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
0.2 – Moderately threatened in California (20%–80% occurrences threatened/moderate degree and immediacy of threat

2.3.3 Field Survey

Focused plant surveys were floristic in nature and conformed to the *CNPS Botanical Survey Guidelines* (CNPS 2001), *Protocols for Surveying and Evaluating Impacts to Special Status Native Populations and Natural Communities* (CDFG 2009), and the *General Rare Plant Survey Guidelines* (Cypher 2002). The plant species detected during the field surveys were identified to subspecies or variety, if applicable and feasible, to determine sensitivity status. Latin and common names for plant species with a CRPR (formerly CNPS List) follow the CNPS *Inventory of Rare, Threatened, and Endangered Plants of California* (CNPS 2016). For plant species without a CRPR, Latin names follow the Jepson Interchange List of Currently Accepted Names of Native and Naturalized Plants of California (Jepson Flora Project 2016), and common names follow the List of Vegetation Alliances and Associations (CDFG 2010) or the U.S. Department of Agriculture Natural Resources Conservation Service Plants Database (USDA 2016).

The survey was conducted by walking 20-meter transects to detect special-status species. The 20-meter transects were imported into ESRI Collector application, and digital devices were used in the field to navigate along the survey transect lines. Special-status plant species observed were mapped in the field using the ESRI Collector application. The field survey included the East–West Gen-Tie Routes, both Options A and B, and the North–South Gen-Tie Route Options 1 and 2.

Table 2-4
Special-Status Plant Species Survey Information

Survey Date	Personnel	Field Hours	Survey Conditions
05/01/2017	Heather Moine, Paul Keating, Russell Sweet	8:30 AM–5:00 PM	64°F–88°F; 0% cc; 1–9 mph wind
05/02/2017	Heather Moine, Janice Wondolleck, Paul Keating, and Russell Sweet	7:50 AM–4:30 PM	63°F–90°F; 0%–10% cc; 1–4 mph wind
05/03/2017	Callie Amoaku, Heather Moine, Janice Wondolleck, Paul Keating, and Russell Sweet	7:50 AM–4:45 PM	68°F–91°F; 0%–25% cc; 1–2 mph wind
05/03/2017	Andrea Dransfield, Britney Strittmater, Kathleen Dayton, and Monique O'Conner	8:00 AM–4:35 PM	71°F–94°F; 0%–50% cc; 2–4 mph wind
05/04/2017	Callie Amoaku, Heather Moine, and Janice Wondolleck	7:15 AM–1:30 PM	67°F–88°F; 0% cc; 1–5 mph wind
05/04/2017	Andrea Dransfield, Britney Strittmater, Kathleen Dayton, Monique O’Conner	7:28 AM–4:31 PM	70°F–93°F; 0%–20% cc; 1–3 mph wind
05/05/2017	Andrea Dransfield, Kathleen Dayton, and Monique O’Conner	6:44 AM–12:04 PM	72°F–86°F; 20%–50% cc; 1–3 mph wind
05/08/2017	Andrea Dransfield, Heather Moine, Kyle Matthews, and Russell Sweet	7:30 AM–4:15 PM	54°F–73°F; 25%–50% cc; 1–6 mph wind
05/09/2017	Andrea Dransfield, Heather Moine, Kyle Matthews, and Russell Sweet	7:30 AM–2:00 PM	61°F–81°F; 0%–50% cc; 4–5 mph wind
05/10/2017	Heather Moine and Russell Sweet	10:00 AM–3:15 PM	65°F–77°F; 0%–5% cc; 2–10 mph wind
05/19/2017	Andrea Dransfield, Heather Moine, Janice Wondolleck, and Russell Sweet	7:30 AM–3:00 PM	59°F–80°F; 0% cc; 2–3 mph wind
05/30/2017	Callie Amoaku, Patricia Schuyler	10:51 AM–2:04 PM	79°F–82°F; 30% cc; 0–2 mph wind

Legend
°F = degrees Fahrenheit; cc = cloud cover; mph = miles per hour.

2.4 Special-Status Wildlife

2.4.1 Desert Tortoise

Surveys for desert tortoise (*Gopherus agassizii*) were conducted within North–South Gen-Tie Route Options 1 and 2, and the main East–West Route Option (Options A and B). Surveys were conducted in accordance with the USFWS pre-project field survey protocol (USFWS 2010). Surveys included 10-meter-wide (approximately 33-feet-wide) belt transects covering the entire area of potential impacts (but note that surveys were not conducted in North–South Gen-Tie Route Option 3). Surveys were completed during the desert tortoise's most active period during the spring (April and May, when temperatures are below 40° Celsius (104° Fahrenheit)), to maximize the possibility of detecting tortoises above ground. Biologists recorded all locations where desert tortoises or their sign (burrows, scat, carcasses, etc.) were observed. Biologists also recorded temperatures during surveys, measuring air temperature approximately 5 centimeters (approximately 2 inches) above the soil surface in an area of full sun, but while shaded by the observer (Table 2-5). Data were recorded was consistent with the requirements of the USFWS 2010 Desert Tortoise Pre-Project Survey Protocol Data Sheet (USFWS 2010).

Table 2-5
Survey Information for Desert Tortoise

Survey Date	Personnel	Field Hours	Survey Conditions (Start–End)	Wind Speed (Start–End)
4/24/2017	Holly Hill, Dilip Mahto, Michelle Jordan, Sedona Maniak, and Carrie Anderson	6:05 AM–7:25 PM	57°F–67°F	6–28 mph
4/25/2017	Holly Hill, Dilip Mahto, Michelle Jordan, Sedona Maniak, and Carrie Anderson	7:00 AM–4:00 PM	50°F–64°F	25–25 mph
4/26/2017	Holly Hill, Dilip Mahto, Michelle Jordan, Sedona Maniak, and Carrie Anderson	6:30 AM–5:00 PM	53°F–63°F	15–25 mph
4/27/2017	Holly Hill, Dilip Mahto, Sedona Maniak, Teresa Ray, and Carrie Anderson	6:30 AM–1:30 PM	48°F–62°F	17–44 mph
4/28/2017	Holly Hill, Dilip Mahto, Sedona Maniak, and Teresa Ray	6:30 AM–4:15 PM	52°F–95°F	15–5 mph
5/1/2017	Holly Hill, Sedona Maniak, Carrie Anderson, Susan Carlton, and Teresa Ray	6:30 AM–7:00 PM	61°F–91°F	0–7 mph
5/2/2017	Holly Hill, Sedona Maniak, Carrie Anderson, Susan Carlton, and Teresa Ray	6:15 AM–3:56 PM	65°F–74°F	3–3 mph

Table 2-5
Survey Information for Desert Tortoise

Survey Date	Personnel	Field Hours	Survey Conditions (Start–End)	Wind Speed (Start–End)
5/3/2017	Holly Hill, Sedona Maniak, Carrie Anderson, and Amy Anderson	6:00 AM–4:36 PM	64°F–82°F	0–4 mph
5/4/2017	Holly Hill, Sedona Maniak, and Carrie Anderson	6:35 AM–12:23 PM; 1:57 PM–4:20 PM	65°F–84°F	0–3 mph
5/5/2017	Holly Hill, Dilip Mahto, Sedona Maniak, and Carrie Anderson	6:51 AM–4:07 PM	75°F–78°F	3–3 mph
5/8/2017	Holly Hill, Dilip Mahto, Michelle Jordan, and Amy Anderson	7:00 AM–12:30 PM	48°F–68°F	1–4 mph
5/9/2017	Holly Hill, Dilip Mahto, Michelle Jordan, and Amy Anderson	6:30 AM–4:36 PM	55°F–82°F	2–7 mph
5/10/2017	Amy Anderson, Dilip Mahto, and Holly Hill	6:30 AM–4:07 PM	50°F–78°F	3–4 mph
5/11/2017	Amy Anderson, Dilip Mahto, and Holly Hill	7:00 PM–4:30 PM	56°F–84°F	2–13 mph
5/12/2017	Amy Anderson and Holly Hill	6:31 AM–9:30 AM	56°F–74°F	4–10 mph
5/15/2017	Holly Hill, Dilip Mahto, and Amy Anderson	7:07 AM–4:18 PM	44°F–61°F	3–5 mph
5/16/2017	Dilip Mahto, Holly Hill, Youssef Atallah, and Amy Anderson	7:00 AM–4:00 PM	54°F–67°F	5–7 mph
5/17/2017	Amy Anderson, Holly Hill, Dilip Mahto, and Youssef Atallah	6:45 AM–7:45 PM	51°F–52°F	35–44 mph
5/18/2017	Amy Anderson, Holly Hill, Dilip Mahto, and Youssef Atallah	7:00 AM–4:00 PM	48°F–75°F	1–12 mph
5/19/2017	Dilip Mahto and Holly Hill	6:30 AM–2:34 PM	53°F–72°F	0–1 mph
5/24/2017	Dilip Mahto and Sedona Maniak	7:00 AM–4:30 PM	78°F–93°F	7–13 mph
5/25/2017	Dilip Mahto and Sedona Maniak	6:00 AM–10:00 AM	70°F–74°F	12–10 mph

Legend
°F = degrees Fahrenheit; mph = miles per hour.

2.4.2 Swainson's Hawk

Swainson's hawk surveys conformed with the CDFW-endorsed *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, California* (CEC and CDFG 2010). Per protocol requirements, Dudek conducted one survey during the pre-arrival period (Period 1: January–March 31 survey period), three surveys during the arrival and nest-building period (Period 2: April 1–30 survey period), and three surveys during the fledging period (Period 4: June 1–July 15 survey period) (Table 2-6).

Surveys covered all accessible areas within 5 miles of potential project impacts, to determine potential nesting locations and become familiar with the survey area. The North–South Gen-Tie Route Option 3 was not considered in determination of the survey area based on a 5-mile buffer. However, because of the large area encompassed by the buffers of the other gen-tie route options, all areas encompassing North–South Gen-Tie Route Option 3 and within approximately 4.1 miles of that route were included in the survey area. During the initial survey, Dudek biologists drove the entire survey area, noting areas where Swainson's hawk nesting habitat occurred and familiarizing themselves with the survey area. Biologists recorded locations of all nest structures observed that were suitable for Swainson's hawks, although a thorough search for suitable nest structures was not completed during this survey. Biologists also noted any raptors (the orders Accipitriformes, Falconiformes, Strigiformes) observed during the survey. As Swainson's hawks may begin arriving during this period, biologists recorded the locations and behaviors of any Swainson's hawks observed.

During subsequent surveys, in survey periods 2 and 4, biologists surveyed the entire survey area described above, searching for Swainson's hawks and Swainson's hawk nests. All Swainson's hawk behaviors observed were noted; the locations of any observations of Swainson's hawks or Swainson's hawk nests were recorded; and the location of any potential Swainson's hawk nests, other raptor nests, and common raven (*Corvus corax*) nests (whether occupied or not), were recorded. All other raptor observations were also noted. Biologists drove slowly through or walked the entire survey area during each survey. The biologists stopped frequently while driving, to scan for Swainson's hawks and Swainson's hawk nests. Biologists used high-quality binoculars and spotting scopes for scanning, but also searched the area visually without the assistance of optics, while driving, walking, or occupying a stationary observation point. The latter were used where large habitat areas could be observed from a single location, especially when private property resulted in restricted access. Nest searching included all potential nests trees within the survey area. These included ornamental trees (trees of the genera *Pinus, Tamarix, Eucalyptus*, and *Populus*, among others), trees within windbreaks, and/or Joshua trees (*Yucca brevifolia*). Any suitable native trees were also examined.

During survey period 2 (April surveys), biologists focused particularly on identifying the locations of suitable nests and behaviors indicative of nesting (territorial or courtship displays, carrying nesting material and building nests, copulation). Surveys were conducted at any time during daylight hours. During survey period 4 (June 1 to July 15), biologists increasingly focused on searching for Swainson's hawk adults soaring, calling, or perching near nests or Swainson's hawk fledglings active in the nest vicinity. Surveys during this period were conducted in daylight hours prior to 12:00 pm and after 4:00 pm.

Table 2-6
Swainson's Hawk Survey Information

Survey Period/No.	Date	Personnel	Field Hours	Survey Conditions
1/1	3/30/2017	Dave Compton, Russell Sweet	7:20 AM–6:20 PM	55°F–62°F, 0%–50% cc, 5–43 mph wind
2/1 (day 1)	4/7/2017	Dave Compton, Russell Sweet	9:19 AM–5:00 PM	66°F–73°F, 50%–80% cc, 1–18 mph wind
2/1 (day 2)	4/21/2017	Dave Compton, Russell Sweet	6:20 AM–7:40 PM	48°F–74°F, 0%–5% cc, 3–21 mph wind
2/2 (day 1)	4/24/2017	Dave Compton, Russell Sweet	6:19 AM–6:27 PM	55°F–65°F, 40%–70% cc, 8–22 mph wind
2/2 (day 2)	4/25/2017	Dave Compton, Russell Sweet	7:00 AM–4:20 PM	48°F–73°F, 15%–85% cc, 5–20 mph wind
2/3 (day 1)	4/27/2017	Dave Compton, Russell Sweet	6:20 AM–6:15 PM	54°F–65°F, 5%–80% cc, 5–16 mph wind
2/3 (day 2)	4/28/2017	Dave Compton, Russell Sweet	7:05 AM–4:10 PM	42°F–70°F, 5%–80% cc, 5–20 mph wind
4/1 (day 1)	6/5/2017	Dave Compton, Russell Sweet	5:50 AM–12:00 PM; 4:00 PM–7:43 PM	65°F–98°F, 0% cc, 1–10 mph wind
4/1 (day 2)	6/6/2017	Dave Compton, Russell Sweet	5:50 AM–12:00 PM; 4:00 PM–6:30 PM	61°F–94°F, 5%–30% cc, 2–10 mph wind
4/2 (day 1)	6/19/2017	Dave Compton, Russell Sweet	5:50 AM–12:00 PM; 4:00 PM–7:55 PM	71°F–109°F, 0% cc, 4–9 mph wind
4/2 (day 2)	6/20/2017	Dave Compton, Russell Sweet	5:45 AM–12:00 PM	74°F–100°F, 0% cc, 1–3 mph wind
4/3 (day 1)	7/6/2017	Dave Compton, Russell Sweet	5:58 AM–11:59 PM; 4:00 PM–7:55 PM	76°F–103°F, 5%–20% cc, 1–15 mph wind
4/3 (day 2)	7/7/2017	Dave Compton, Russell Sweet	5:52 AM–11:45 PM	79°F–101°F, 0%–2% cc, 3–12 mph wind

Legend
°F = degrees Fahrenheit; cc = cloud cover; mph = miles per hour.

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3 ENVIRONMENTAL SETTING

3.1 Regional Setting

The study area is located in the southern portion of Kern County, in central California as shown in Figure 1-1. The study area is located southeast of the Tehachapi Mountains and at the western edge of the Antelope Valley, in the southeastern portion of Kern County, approximately 12 miles north of Los Angeles County, and directly south of the community of Mojave. The lowest elevation of the study area is approximately 2,350 feet above mean sea level (amsl) in the southeast, and the highest elevation in the study are is approximately 3,500 feet amsl in the west.

The study area is located directly south of the community of Mojave, approximately 11 miles southeast of the City of Tehachapi, approximately 3 miles southwest of California City, and approximately 47 miles southeast of the City of Bakersfield. Other communities within the vicinity include Rosamond in Kern County, and the Cities of Lancaster and Palmdale in Los Angeles County, which are roughly 7 miles south, 18 miles south, and 25 miles south of the project site, respectively. Edwards AFB is located directly south of the project site.

Land usages in the study area consist of a mix of agricultural grazing, undeveloped land, scattered single-family residences, and several approved or proposed large-scale solar facilities. Several commercial wind projects are also operating in the vicinity. Topography across the study area is relatively flat as the site is south of the Tehachapi Mountains on lands that gradually slope downward from the northwest to the southeast. Desert vegetation dominates the region. The major north–south roadway in the region is State Route (SR-) 14, a four-lane highway that bisects the gen-tie lines. SR-58 is north and northeast of the project site and is approximately 2 miles from North–South Gen-Tie Route Option 1. The project site is located approximately 45 miles east of Interstate 5. The study area is primarily accessible by exiting SR-14. The study area would be accessed from gates off of Purdy Avenue and East Silver Queen Road.

3.2 Vegetation Communities

The acreages of the mapped vegetation alliances and other land covers within the study area are presented in Table 3-1, including those that are considered sensitive biological resources by CDFW under CEQA per the Natural Communities List (CDFG 2010). The term semi-natural stands versus alliance is used in the *Manual of California Vegetation* to distinguish between natural vegetation communities and vegetation types dominated by non-native plants (Sawyer et al. 2009). The alliances and other land covers are grouped in Table 3-1 by the generalized habitat. The locations of the vegetation community alliances and land covers within the study area are shown on Figures 3-1 and 3-1A through 3-1AA and are briefly described by generalized habitat type in Sections 3.2.1 through 3.2.5.

Table 3-1
Vegetation Communities in the Study Area

General Habitat	Alliance	Association/Vegetation Community	East–West	North–South Option 1	North–South Option 2	North–South Option 3	Grand Total
Chenopod Scrub	Allscale Scrub	Allscale	57	239	5	6	306
		Chenopod Scrub Total	*57*	*239*	*5*	*6*	*306*
Great Basin Scrub	Rubber Rabbitbrush Scrub	N/A	1	—	—	1	2
		Great Basin Scrub Total	*1*	—	—	*1*	*2*
Non-native Grassland	N/A	N/A	84	—	—	—	84
		Non-native Grassland Total	84	—	—	—	84
Sonoran and Mojavean Desert Scrub	Cheesebush Scrub	Cheesebush	—	—	—	1	1
		Cheesebush–Creosote Bush		26	—	—	26
	Creosote Bush Scrub	Creosote Bush	363	8	14	26	411
		Creosote Bush–Allscale		9	1	—	10
	Creosote Bush Scrub–White Burr Sage Scrub	Creosote Bush Scrub–White Burr Sage	—	—	1	3	4
	Joshua Tree Woodland	Joshua tree	17	18	—	—	35
	White Bursage	White Bursage	—	12	—	<0.5	12
		Sonoran and Mojavean Desert Scrub Total	*380*	*73*	*16*	*30*	*499*
Disturbed and Developed	N/A	Disturbed Habitat	57	13	33	18	121
	N/A	Urban/Developed	21	1	—	19	40
		Disturbed and Developed Total	*78*	*14*	*33*	*36*	*161*
		Grand Total	**600**	**326**	**54**	**73**	**1,053**

3.2.1 Chenopod Scrub

Allscale Scrub Alliance

The allscale scrub alliance has an open to continuous shrub canopy cover with shrubs less than 3 meters (10 feet) in height with a variable ground layer (Sawyer et al. 2009). For a stand of vegetation to be classified as allscale scrub, allscale (*Atriplex polycarpa*) must be greater than 50% relative cover[3] in the shrub canopy. The allscale scrub alliance occurs in the Sierra Nevada foothills, and along the central California Coast Ranges, southeastern great basin, and the Mojave, Sonoran, and Colorado Deserts. This alliance occurs at elevations ranging from 75 meters (246 feet) below sea level to 1,500 meters (4,921 feet) amsl. The allscale scrub alliance occurs on alluvial fans, washes, playas, lakebeds, and shores, and along upper terraces and edges of washes (Sawyer et al. 2009).

Study Area-Specific Information

The allscale scrub alliance is present within the East–West Gen-Tie Routes (Options A and B) and the North–South Gen-Tie Route Options 1 and 3, with a majority of this alliance occurring within the North–South Gen-Tie Route Option 1.

Within the study area, the allscale scrub alliance is characterized as having greater than 75% relative cover of allscale in the shrub canopy, including 15% to 25% absolute cover. Emergent Joshua tree is present at a low cover. The understory of this alliance is characterized by Arabian schismus (*Schismus arabicus*) and redstem stork's bill (*Erodium cicutarium*). Other native species noted in this association include Anderson's boxthorn (*Lycium andersonii*) and Cooper's goldenbush (*Ericameria cooperi* var. *cooperi*). In the study area, there is one association in the allscale scrub alliance—allscale association.

Status

The allscale scrub alliance and its associations are ranked as G5S4 and, thus, CDFW does not consider the allscale scrub alliance a sensitive biological resource under CEQA (CDFG 2010).

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3 Relative cover refers to the amount of the stand sampled that is covered by one species as compared to (relative to) the amount of the stand covered by all species (in that group). Thus, 50% relative cover means that half of the total cover of all species is composed of the single species. Relative cover values are proportional numbers and, if added, total 100% for each stand (CNPS and CDFG 2007).

3.2.2 Great Basin Scrub

Rubber Rabbitbrush Scrub Alliance

The rubber rabbitbrush alliance has a continuous or open shrub canopy cover with shrubs less than 3 meters (10 feet) in height with a sparse or grassy ground layer (Sawyer et al. 2009). For a stand of vegetation to be classified as rubber rabbitbrush scrub, rubber rabbitbrush (*Ericameria nauseosa*) must be greater than 50% relative cover in the shrub canopy. The rubber rabbitbrush scrub alliance occurs along the central and northern California Coast Ranges, Southern California mountains and valleys, southern Cascades, Klamath mountains, Modac Plateau, Mono, Sierra Nevada, southeastern great basin, northwestern basin range, and the Mojave Desert. This alliance occurs at elevations ranging from sea level to 3,200 meters (10,498 feet) amsl. The rubber rabbitbrush scrub alliance occurs on all topographic locations and is commonly found in disturbed areas (Sawyer et al. 2009).

Study Area-Specific Information

The rubber rabbitbrush scrub alliance is present within the East–West Gen-Tie Routes (Options A and B) and the North–South Gen-Tie Route Option 3. Within the East–West Gen-Tie Routes, rubber rabbitbrush scrub alliance occurs around the Westwind Substation; one small patch occurs within the North–South Gen-Tie Route Option 3; one patch occurs north of Silver Queen Road; and a few patches occur along Silver Queen Road at the SR-14 interchange.

Within the study area, the rubber rabbitbrush scrub alliance is characterized as having greater than 75% relative cover of rubber rabbitbrush in the shrub canopy, including 25% to 55% absolute cover. The understory of this alliance is characterized by Arabian schismus, red brome (*Bromus madritensis* ssp. *rubens*), yellow pincushion (*Chaenactis glabriuscula*), and Menzies' fiddleneck (*Amsinckia menziesii*).

Status

The rubber rabbitbrush scrub alliance is ranked as G5S5; therefore, CDFW does not consider the rubber rabbitbrush scrub alliance a sensitive biological resource under CEQA (CDFG 2010).

3.2.3 Sonoran and Mojavean Desert Scrub

Cheesebush Scrub Alliance

The cheesebush alliance has an open to intermittent shrub canopy cover with shrubs less than 2 meters (7 feet) in height with a sparse or seasonally present ground layer (Sawyer et al. 2009).

For a stand of vegetation to be classified as cheesebush scrub, cheesebush (*Ambrosia salsola*) must be greater than 5% absolute cover[4] in the shrub canopy. The cheesebush scrub alliance occurs in the great valley, along the central California Coast Ranges, southeastern great basin, Southern California mountains and valleys, and the Mojave, Sonoran, and Colorado Deserts. This alliance occurs at elevations ranging from sea level to 1,600 meters (5,249 feet) amsl. The cheesebush scrub alliance occurs on valleys, flats, or rarely flooded low-gradient deposits, or can be found in washes or intermittent channels (Sawyer et al. 2009).

Study Area-Specific Information

The cheesebush scrub alliance is only present within the North–South Gen-Tie Route Option 3. Small patches of cheesebush scrub alliance occur immediately south of Silver Queen Road at the SR-14 interchange.

Within the study area, the cheesebush scrub alliance is characterized as having greater than 50% relative cover of cheesebush in the shrub canopy, including 5% to 15% absolute cover. The understory of this alliance is characterized by Arabian schismus. Other native species noted in this association include creosote bush (*Larrea tridentata*), peach thorn (*Lycium cooperi*), white bursage (*Ambrosia dumosa*), rayless goldenhead (*Acamptopappus sphaerocephalus*) and allscale. In the study area, there are two associations in the cheesebush scrub alliance: cheesebush association and cheesebush-creosote bush association.

Status

The cheesebush scrub alliance and its associations are ranked as G5S4; therefore, CDFW does not consider the cheesebush scrub alliance a sensitive biological resource under CEQA (CDFG 2010).

Creosote Bush Scrub Alliance

The creosote bush scrub alliance has an open to intermittent shrub canopy cover with shrubs less than 3 meters (10 feet) in height with a open to intermittent ground layer containing seasonal annuals or perennial grasses (Sawyer et al. 2009). For a stand of vegetation to be classified as creosote bush scrub, creosote (*Larrea tridentata*) must exceed other shrubs in cover including emergent small trees and taller shrubs except for white bursage (*Ambrosia dumosa*). The creosote bush scrub alliance occurs in the Mojave, Sonoran, and Colorado Deserts; southeastern great basin; and Southern California mountains and valleys. This alliance occurs at elevations ranging from 75 meters below

[4] Absolute cover refers to the actual percentage of the ground that is covered by a species. For example, cheesebush covers between 5% and 15% percent of the stand. Absolute cover of all species if added in a stand or plot may total greater or less than 100% because it is not a proportional number (CNPS and CDFG 2007).

sea level to 1,000 meters (3,280 feet) amsl. The creosote bush scrub alliance occurs on upland slopes, alluvial fans, bajadas, and intermittent washes (Sawyer et al. 2009).

Study Area-Specific Information

The creosote bush scrub alliance is present within the East–West Gen-Tie Routes (Options A and B) and the North–South Gen-Tie Route Options 1 and 3, with a majority of this alliance occurring within the East–West Gen-Tie Routes.

Within the study area, the creosote bush scrub alliance is characterized as having greater than 50% relative cover of creosote bush in the shrub canopy, including 1% to 5% absolute cover. The understory of this alliance is characterized by red brome and Menzies' fiddleneck. Other native species noted in this association include allscale and Cooper's goldenbush. In the study area, there are two associations in the creosote bush scrub alliance: creosote bush association and creosote bush-allscale association.

Status

The creosote bush scrub alliance and its associations are ranked as G5S5; therefore, CDFW does not consider the creosote bush scrub alliance a sensitive biological resource under CEQA (CDFG 2010).

Creosote Bush Scrub-White Burr Sage Scrub Alliance

The creosote bush scrub-white burr sage scrub alliance has an open to intermittent shrub canopy cover with shrubs less than 3 meters (10 feet) in height that may be two tiered with an open to intermittent ground layer containing seasonal annuals (Sawyer et al. 2009). For a stand of vegetation to be classified as creosote bush scrub-white burr sage scrub, both creosote bush and white bursage must be greater than or equal to 1% absolute cover in the shrub canopy. The creosote bush scrub-white burr sage scrub alliance occurs in the Mojave, Sonoran, and Colorado Deserts; southeastern great basin; and Southern California mountains and valleys. This alliance occurs at elevations ranging from 75 meters below sea level to 1,200 meters (3,937 feet) amsl. The creosote bush scrub-white burr sage scrub alliance occurs on upland slopes, alluvial fans, bajadas, and minor washes (Sawyer et al. 2009).

Study Area-Specific Information

The creosote bush scrub-white burr sage scrub alliance is present within the North–South Gen-Tie Route Options 2 and 3. Within the North–South Gen-Tie Route Option 2, this alliance occurs in one patch located immediately east of United Street. Creosote bush scrub-white burr sage scrub within the North–South Gen-Tie Route Option 3 occurs in two patches immediately west of SR-14.

Within the study area, the creosote bush scrub-white burr sage scrub alliance is characterized as having greater than 75% relative cover of creosote bush and white bursage in the shrub canopy, including 15% to 25% absolute cover of creosote bush and 5% to 15% absolute cover of white bursage. The understory of this alliance is characterized by Arabian schismus, red brome, and pygmy poppy (*Eschscholzia minutiflora*). In the study area, there is one association in the creosote bush scrub-white burr sage scrub—creosote bush scrub-white burr sage association.

Status

The creosote bush scrub-white burr sage scrub alliance and its associations are ranked as G5S5; therefore, CDFW does not consider the creosote bush scrub-white burr sage scrub alliance a sensitive biological resource under CEQA (CDFG 2010).

Joshua Tree Woodland Alliance

The Joshua tree woodland alliance has an open to intermittent tree canopy cover with trees less than 14 meters (46 feet) in height with a open to intermittent shrub canopy and ground layer containing perennial grasses and seasonal annuals (Sawyer et al. 2009). For a stand of vegetation to be classified as Joshua tree woodland, Joshua trees must be evenly distributed at greater than or equal to 1% cover. The Joshua tree woodland alliance occurs in the Mojave Desert, Sierra Nevada mountains, southeastern great basin, and Southern California mountains and valleys. This alliance occurs at elevations ranging from 750 meters (2,460 feet) to 1,800 meters (5,905 feet) amsl. The Joshua tree woodland alliance occurs on gentle to moderately steep slopes, along ridges, and alluvial fans (Sawyer et al. 2009).

Study Area-Specific Information

The Joshua tree woodland alliance is present within the East–West Gen-Tie Routes (Options A and B) and the North–South Gen-Tie Route Option 1. Within the East–West Gen-Tie Routes, this alliance occurs around the Westwind Substation and also south of Oak Creek Road. Joshua tree woodland scrub occurs within the southern portion of the North–South Gen-Tie Route Option 1, north of East Trotter Avenue.

Within the study area, the Joshua tree woodland scrub alliance is characterized as having greater than 100% relative cover of Joshua tree in the tree canopy, including 1% to 5% absolute cover. The understory of this alliance is characterized by red brome. Other native species noted in this association include creosote bush, white bursage, Anderson’s boxthorn, and winterfat (*Krascheninnikovia lanata*). In the study area, there is one association in the Joshua tree woodland alliance—Joshua tree woodland association.

Status

The Joshua tree woodland alliance and its associations are ranked as G4S3; therefore, CDFW considers the Joshua tree woodland alliance and its associations a sensitive biological resource under CEQA (CDFG 2010).

White Bursage Scrub Alliance

The white bursage scrub alliance has an open to intermittent shrub canopy cover with trees less than 1 meter (3 feet) in height with an open to intermittent ground layer containing seasonal annuals (Sawyer et al. 2009). For a stand of vegetation to be classified as white bursage scrub, white bursage must be greater than two times as much absolute cover as creosote bush, with white bursage exceeding the cover of all other shrubs in the shrub layer. The white bursage scrub alliance occurs in the Mojave, Sonoran, and Colorado Deserts, and Southern California mountains and valleys. This alliance occurs at elevations ranging from sea level to 1,700 meters (5,577 feet) amsl. The white bursage alliance occurs on upland slopes, rocky hillsides, alluvial fans, washes and river terraces, and sand fields (Sawyer et al. 2009).

Study Area-Specific Information

The white bursage scrub alliance is present within the North–South Gen-Tie Route Options 1 and 3, with a majority of this alliance occurring within the North–South Gen-Tie Route Option 1. This alliance occurs in several patches within the southern portion of North–South Gen-Tie Route Option 1, immediately north of East Trotter Avenue and east of 15th Street. One small patch of white bursage scrub alliance occurs along Holt Street within the North–South Gen-Tie Route Option 3.

Within the study area, the white bursage scrub alliance is characterized as having greater than 25% relative cover of white bursage in the shrub canopy, including 1% to 5% absolute cover. The understory of this alliance is characterized by Arabian schismus and whitestem blazingstar (*Mentzelia albicaulis*). Other native species noted in this association include creosote bush, Anderson's boxthorn, peach thorn, Cooper's goldenbush, and rayless goldenhead. In the study area, there is one association in the white bursage scrub alliance—white bursage scrub association.

Status

The white bursage scrub alliance is ranked as G5S4; therefore, CDFW does not consider the white bursage scrub alliance a sensitive biological resource under CEQA (CDFG 2010).

3.2.4 Non-native Grassland

As noted in Section 2.1, non-native grasslands were mapped to the general habitat type because CDFW does not consider any of the semi-natural stands sensitive biological resources under CEQA (CDFG 2010).

Non-native grassland has a sparse to dense cover of annual grasses that is typically 0.2 meter (0.7 feet) to 0.5 meter (1.6 feet) tall and can be up to 1 meter (3 feet) tall. Grasses that occur in non-native grassland include wild oats (*Avena* spp.), bromes (*Bromus* spp.), fescue (*Vulpia* spp.), and Italian ryegrass (*Festuca perennis*). Forbs that occur with these grasses include California poppy (*Eschscholzia californica*), stork's bill (*Erodium* ssp.), goldfields (*Lasthenia* spp.), phacelias (*Phacelia* ssp.), gilias (*Gilia* spp.), and baby blue eyes (*Nemophila menziesii*) (Holland 1986). Non-native grassland also includes land that is used as pasture for grazing purposes. Grasses such as barley (*Hordeum* spp.) and wild oats may grow in these areas. This land has very few native species.

Study Area-Specific Information

Non-native grasslands are only present within the East–West Gen-Tie Routes (Options A and B), occurring south of the Westwind substation to Oak Creek Road and in several patches north and south of Oak Creek Road.

Within the study area, non-native grasslands are characterized as having an understory dominated by non-native grasses including Arabian schismus, red brome, cheatgrass (*Bromus tectorum*), and hare barely (*Hordeum murinum* ssp. *leporinum*).

Status

Non-native grasslands are not considered a sensitive biological resource under CEQA (CDFG 2010).

3.2.5 Disturbed and Developed

Disturbed Habitat

Areas mapped as disturbed habitat include primarily dirt roads, but also include areas where disturbance (e.g., grading/disking) has occurred and that has resulted in a lack of vegetation. Disturbed habitat occurs in the East–West Gen-Tie Routes (Options A and B) and the North–South Gen-Tie Route Options 1, 2, and 3.

Status

Disturbed habitat typically does not support any vegetation; therefore, disturbed habitats are not considered a sensitive biological resource under CEQA (CDFG 2010).

Urban/Developed

Areas mapped as urban/developed land include SR-14, paved roads, substations, Southern Pacific Railroad, and rural residences. Urban/developed land occurs in the East–West Gen-Tie Routes (Options A and B) the North–South Gen-Tie Route Options 1 and 3.

Status

Urban/developed land typically does not support any vegetation or is a landscaped area; therefore, urban/developed lands are not considered a sensitive biological resource under CEQA (CDFG 2010).

3.3 Jurisdictional Delineation and Determinations

Dudek performed a formal jurisdictional delineation within the 1,053-acre study area (Figure 2-1) in April and May 2017, with methods described in detail in Section 2.2. A total of 15 data stations were collected throughout the study area (Appendix A). Representative photographs are included in Appendix B; and the results of the delineations are shown on Figures 3-1 and Figures 3-1A through Figure 3-1B.

The study area is located east of the Tehachapi Mountains and south of Sugarloaf Mountain and is relatively flat, gradually sloping downward from the northwest to the southeast. Rogers Lake, a closed drainage basin, together with the adjacent smaller Rosamond and Buckthorn Lake, make up the largest water feature in the study area vicinity. Drainages within the study area originate from flows from the Tehachapi and Sugarloaf Mountains, road runoff, or sheet-flow, and either dissipate into the desert floor evaporating or infiltrating into the groundwater basin or continue to flow to Rogers Lake during larger storm events. The results of the jurisdictional delineation concluded there are non-wetland jurisdictional waters within the study area. Details regarding the findings from the formal jurisdictional delineations for the study area are discussed below.

3.3.1 Federal Jurisdiction

The study area does not contain any streams, wetland waters, or other waters that are subject to federal jurisdiction under Section 404 of the Clean Water Act. Wetland hydrology indicators were not present (i.e., hydrophytic vegetation, hydric soils, or surface water). More specifically, as discussed in Section 2.2, the ACOE determined that all tributaries to Rogers Lakes are not waters of the United States (File No. SPL-2013-00545-TS; File No. SPL-2011-01084-SLP). Drainages within the study area either dissipate into the desert floor evaporating or infiltrating into the groundwater basin or continue to flow to Rogers Lake during larger storm events. The Antelope Valley Watershed is considered a closed basin and functions as an isolated intrastate watershed system lacking the presence of a traditional navigable water. Therefore, based upon these previous determinations, all features within the study area were considered to be non-jurisdictional under the ACOE.

3.3.2 State Jurisdiction

Water resources are also subject to state laws administered by CDFW and the RWQCB. Resources subject to the jurisdiction of the CDFW pursuant to Section 1602 of the California Fish and Game Code include ephemeral, intermittent, and perennial stream channels. The resources on site subject to the jurisdiction of the RWQCB pursuant to the Porter–Cologne Water Quality Control Act overlap those under the jurisdiction of CDFW.

Approximately 2.16 acres (14,614 linear feet) of waters of the state occur within the study area (Figure 3-1). CDFW- and RWQCB-jurisdictional areas present include ephemeral stream channels and swales. Table 3-2 includes the acres and linear feet of CDFW- and RWQCB-jurisdictional non-wetland waters within the study area and also includes the periodicity of the non-wetland waters of the state on site (i.e., ephemeral or intermittent). The CDFW- and RWQCB-jurisdictional areas are shown on Figure 3-1 and 3-1A through 3-1AA.

Table 3-2
Jurisdictional Waters of the State in the Study Area

Jurisdiction	East–West Gen-Tie Route		North–South Gen-Tie Option 1		North–South Gen-Tie Option 2		North–South Gen-Tie Option 3		Total	
	Acres	*Linear Feet*	*Acres*	*Linear Feet*	*Acres*	*Linear Feet*	*Acres*	*Linear Feet*	*Acres*	*Linear Feet*
Non-wetland Waters of the State (RWQCB/ CDFW) – Ephemeral	1.78	10,630	0.27	2,161	<0.01	12	0.11	1,810	**2.16**	**14,614**

East–West Gen-Tie Route

A total of 10 features were recorded within the East–West Gen-Tie Route (Options A and B) totaling approximately 1.78 acres (10,630 linear feet) of CDFW- and RWQCB-jurisdictional non-wetland waters (See Appendix A, Data Station #1-10; Figures 3-1A, C-D, F-G, and J). The drainages tend to follow the existing topography and flow from northwest to southeast. All drainage boundaries were demarcated based on the presence of fluvial and erosion indicators, including change in vegetation cover, break in bank slope, drift and/or debris, surface relief/ drainage swale, sediment sorting, debris wracking, and scour. None contained hydrophytic vegetation or hydric soils.

North–South Gen-Tie Route Option 1

A total of two features were recorded within the North–South Option 1 Route totaling approximately 0.27 acres (2,161 linear feet) of CDFW- and RWQCB- jurisdictional non-wetland waters (See Appendix A, Data Station #11-12; Figures 3-1M–O). The two drainages follow the existing topography and flow from northwest to southeast and north to southeast. These features were swale-like exhibiting surface relief and contained hydrology indicators such as mudcracks, drift and/or debris, and wracking. None contained hydrophytic vegetation or hydric soils.

North–South Gen-Tie Route Option 2

One feature was recorded within the North–South Option 2 Route totaling approximately <0.01 acre (12 linear foot) of CDFW- and RWQCB- jurisdictional non-wetland waters. This drainage swale follows the existing topography, flowing northwest to southeast, and was recorded immediately adjacent to United Street, which has cut off connectivity. A culvert is located on the west/east sides of United Street; however, grading has appeared to cut off access, and these culverts are almost completely clogged by soil and vegetation (See Appendix A, Data Station #13; Figure 3-1J). This feature did not contain hydrophytic vegetation or hydric soils.

North–South Gen-Tie Route Option 3

A total of two features were recorded within the North–South Option 3 Route totaling approximately 0.11 acres (1,810 linear feet) of CDFW- and RWQCB- jurisdictional non-wetland waters. One man-made drainage swale was recorded immediately west of Holt Street, north of Silver Queen Road. This features flows north to south and outlets under Silver Queen Road through a culvert and continues outside of the study area. This feature contained fluvial and erosion indicators, such as cut banks, mudcracks, and drift and/or debris (See Appendix A, Data Station #14; Figure 3-1V). The second feature was mapped immediately south of Silver Queen Road, flowing west to east and dissipating along the road (See Appendix A: Data Station #15; Figure 3-1V-W). None contained hydrophytic vegetation or hydric soils.

3.4 Plant Resources

A total of 112 species of native or naturalized plants, 97 native (87%) and 15 non-native (13%), was recorded on the site (see Appendix C).

Special-status plants that are not expected to occur due to lack of suitable vegetation or because the site is outside of the known elevation range of the species are listed in Appendix D. These species are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed project. As described in Section 2.3, focused special-status plant surveys were conducted in the majority of the study area, with the exception of North–South Gen-tie Route Option 3, where focused surveys for special-status plants were not conducted. Table 3-3 evaluates the potential for special-status plants that are in the known elevation range of the species and that occur in the vegetation communities present in the study area. Where focused surveys for special-status plants have been conducted, the potential for special-status plants to occur is either not expected or low based on the results of the 2017 survey and other factors noted in Table 3-3. For North–South Gen-tie Route Option 3, because no focused surveys were conducted, the potential for the species to occur is based on a literature review and the information collected during other surveys conducted in the route (i.e., vegetation mapping and jurisdictional delineation). Based on the literature review and other surveys along North–South Gen-tie Route Option 3, the following special-status plants have a moderate potential to occur along the route: alkali mariposa lily (*Calochortus striatus*; California Rare Plant Rank (CRPR) 1B.2), recurved larkspur (*Delphinium recurvatum*; CRPR 1B.2), Barstow woolly sunflower (*Eriophyllum mohavense*; CRPR 1B.2), pale-yellow layia (*Layia heterotricha*; CRPR 1B.1), sagebrush Loeflingia (*Loeflingia squarrosa var. artemisiarum*; CRPR 2B.2), and Latimer's woodland-gilia (*Saltugilia latimeri*; CRPR 2B.2). The remainder of the species listed in Table 3-3 have a low potential to occur and are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed project.

3.5 Wildlife Resources

A total of 32 wildlife species were recorded on the gen-tie options, including 4 reptiles species, 21 bird species, and 7 mammal species (see Appendix E).

Several special-status wildlife species have the potential to occur in the study area (Table 3-4). Those that occur in the region but that are not expected to occur in the study area, due for example, to a lack of suitable habitat, for example, are included in Appendix F. These species are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed project. As noted in Section 2.4, focused surveys were conducted for Swainson's hawk throughout the study area and within a 5-mile buffer, and focused surveys for desert tortoise were conducted in the study area except for North–South Gen-Tie Route Option 3. Information was also recorded for special-status wildlife species detected incidentally during focused surveys. Table 3-4 evaluates the potential for special-status wildlife to occur in the study area. Where focused surveys did not result in detections of the focal species, species are considered "not expected to occur." But species such as Swainson's hawk that may have the potential to occur only during parts of their life cycles, such as for migration or foraging, are still addressed in the discussion below. For North–South Gen-tie Route Option 3, because no focused surveys were conducted, the potential for the species to occur is based on a literature review and the information collected during surveys conducted elsewhere.

Table 3-3
Special-Status Plants Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/State/ CRPR)	Primary Habitat Associations/ Life Form/Blooming Period/ Elevation Range (feet)	Potential to Occur	
				East-West and North-South Options 1 and 2	*North-South Option 3*
Astragalus preussii var. *laxiflorus*	Lancaster milk-vetch	None/None/1B.1	Chenopod scrub/perennial herb/Mar–May/2,295–2,295	Not observed. Not expected to occur. Conspicuous perennial herb that would have been detected during focused surveys if present.	Low potential to occur. Closest known occurrence is located 15 miles away on Edwards AFB. Likely would have been observed during vegetation mapping if present because the species is a perennial herb.
California macrophylla	round-leaved filaree	None/None/1B.2	Cismontane woodland, Valley and foothill grassland; clay/annual herb/Mar–May/45–3,935	Not observed. Not expected to occur. Species was detectable at time of focused survey based on reference population checks.	Low potential to occur. Closest known occurrence is located 15 miles away. Species is typically found on clay soils, and the majority of the soils along this route are sandy soils.
Calochortus striatus	alkali mariposa lily	None/None/1B.2	Chaparral, Chenopod scrub, Mojavean desert scrub, Meadows and seeps; alkaline, mesic/ perennial bulbiferous herb/Apr–June/225–5,235	Not observed. Not expected to occur. Species was detectable at time of focused survey based on reference population checks.	Moderate potential to occur. Observed approximately 3 miles from route, and suitable habitat is present.
Cymopterus deserticola	desert cymopterus	None/None/1B.2	Joshua tree woodland, Mojavean desert scrub; sandy/perennial herb/Mar–May/2,065–4,920	Not observed. Not expected to occur. Species was detectable at time of focused survey based on reference population checks.	Low potential to occur. Closest known occurrence is located 10 miles away on Edwards AFB. Likely would have been observed during vegetation mapping if present because the species is a perennial herb.
Delphinium recurvatum	recurved larkspur	None/None/1B.2	Chenopod scrub, Cismontane woodland, Valley and foothill grassland; alkaline/perennial herb/Mar–June/5–2,590	Not observed. Not expected to occur. Species was detectable at time of focused survey based on reference population checks.	Moderate potential to occur. Observed approximately 2 miles from route, and suitable habitat is present.

Table 3-3
Special-Status Plants Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/State/ CRPR)	Primary Habitat Associations/ Life Form/Blooming Period/ Elevation Range (feet)	Potential to Occur	
				East-West and North-South Options 1 and 2	*North-South Option 3*
Eriastrum rosamondense	Rosamond eriastrum	None/None/1B.1	Chenopod scrub (openings), Vernal pools (edges); Alkaline hummocks, often sandy/annual herb/Apr–May(June–July)/2,295–2,345	Not observed. Not expected to occur. Closest known occurrence is located 13 miles away. Species is typically found on hard packed sandy cryptogamic soil among low hummocks with dry pools, which is not present in the study area (Jepson Flora Project 2017)	Low potential to occur. Closest known occurrence is located 13 miles away. Species is typically found on hard packed sandy cryptogamic soil among low hummocks with dry pools, which is not present within the route (Jepson Flora Project 2017)
Eriophyllum mohavense	Barstow woolly sunflower	None/None/1B.2	Chenopod scrub, Mojavean desert scrub, Playas/annual herb/Mar–May/1,640–3,150	Not observed. Low potential to occur. Closest known occurrence is located 6 miles away and suitable habitat present. However, 2017 results were negative.	Moderate potential to occur. Known occurrence within 9 miles of route, and suitable habitat is present.
Eschscholzia minutiflora ssp. *twisselmannii*	Red Rock poppy	None/None/1B.2	Mojavean desert scrub (volcanic tuff)/annual herb/Mar–May/2,230–4,035	Not observed. Not expected to occur. Closest known occurrence is located 12 miles away on Edwards AFB. Volcanic tuff not present.	Low potential to occur. Closest known occurrence is located 15 miles away on Edwards AFB. Volcanic tuff not present.
Layia heterotricha	pale-yellow layia	None/None/1B.1	Cismontane woodland, Coastal scrub, Pinyon and juniper woodland, Valley and foothill grassland; alkaline or clay/annual herb/Mar–June/980–5,595	Not observed. Low potential to occur. Closest known occurrence is located 4 miles away and suitable habitat present. However, 2017 results were negative.	Moderate potential to occur. Known occurrence within 8 miles of route, and suitable habitat is present.
Loeflingia squarrosa var. *artemisiarum*	sagebrush loeflingia	None/None/2B.2	Desert dunes, Great Basin scrub, Sonoran desert scrub; sandy/annual herb/Apr–May/2,295–5,300	Not observed. Low potential to occur. Closest known occurrence is located 1 mile away and suitable habitat present. However, 2017 results were negative.	Moderate potential to occur. Known occurrence within 1 mile of route, and suitable habitat is present.

Table 3-3
Special-Status Plants Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/State/ CRPR)	Primary Habitat Associations/ Life Form/Blooming Period/ Elevation Range (feet)	Potential to Occur	
				East-West and North-South Options 1 and 2	*North-South Option 3*
Navarretia setiloba	Piute Mountains navarretia	None/None/1B.1	Cismontane woodland, Pinyon and juniper woodland, Valley and foothill grassland; clay or gravelly loam/annual herb/Apr–July/935–6,890	Not observed. Not expected to occur. Species was detectable at time of focused survey based on reference population checks.	Low potential to occur. Closest known occurrence is located 15 miles away. Species is typically found on clay or gravelly loam soils and the majority of the soils along this route are sandy soils.
Phacelia nashiana	Charlotte's phacelia	None/None/1B.2	Joshua tree woodland, Mojavean desert scrub, Pinyon and juniper woodland; usually granitic, sandy/annual herb/Mar–June/1,965–7,220	Not observed. Not expected to occur. Closest known occurrence is located 14 miles away. In the vicinity of the route, this species occurs in the Tehachapi Mountains and not in the desert.	Low potential to occur. Closest known occurrence is located 14 miles away. In the vicinity of the route, this species occurs in the Tehachapi Mountains and not in the desert.
Puccinellia simplex	California alkali grass	None/None/1B.2	Chenopod scrub, Meadows and seeps, Valley and foothill grassland, Vernal pools; Alkaline, vernally mesic; sinks, flats, and lake margins/annual herb/Mar–May/5–3,050	Not observed. Not expected to occur. Closest known occurrence is located 11 miles away on Edwards AFB. According to Twisselmann (1995), this species occurs on moist alkaline soils on alkali flats and around alkaline vernal pools, which is not present in the study area.	Low potential to occur. Closest known occurrence is located 13 miles away on Edwards AFB. According to Twisselmann (1995), this species occurs on moist alkaline soils on alkali flats and around alkaline vernal pools, which is not present on this route.
Saltugilia latimeri	Latimer's woodland-gilia	None/None/1B.2	Chaparral, Mojavean desert scrub, Pinyon and juniper woodland; rocky or sandy, often granitic, sometimes washes/annual herb/Mar–June/1,310–6,235	Not observed. Low potential to occur. Closest known occurrence is located 7 miles away and suitable habitat present. However, 2017 results were negative.	Moderate potential to occur. Closest known occurrence is located 13 miles away. Suitable soils and vegetation present.

Table 3-3
Special-Status Plants Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/State/ CRPR)	Primary Habitat Associations/ Life Form/Blooming Period/ Elevation Range (feet)	Potential to Occur	
				East-West and North-South Options 1 and 2	*North-South Option 3*
Senna covesii	Coves' cassia	None/None/2B.2	Sonoran desert scrub; Dry, sandy desert washes and slopes/perennial herb/Mar–June(Aug)/735–4,250	Not observed. Not expected to occur. Closest known occurrence is located 17 miles away on Edwards AFB.	Low potential to occur. Closest known occurrence is located 17 miles away on Edwards AFB. Likely would have been observed during vegetation mapping if present because the species is a perennial herb.

Status Legend:
CRPR: California Rare Plant Rank
1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
Threat Rank
0.1 – Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
0.2 – Moderately threatened in California (20%–80% occurrences threatened/moderate degree and immediacy of threat)

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
Reptiles					
Anniella pulchra	Northern California legless lizard	None/SSC	Stabilized dunes, beaches, dry washes, chaparral, scrubs, pine, oak, and riparian woodlands; associated with sparse vegetation and sandy or loose, loamy soils.	Not observed, and unlikely to be detected incidentally during surveys for other resources. Low potential to occur in most of the study area, as the study area is at the edge of the species range. However, this species was observed 1.0 mile south of East–West Route (Options A and B) during surveys for the Mojave West Solar Project (County 2014).	Not observed, although species is unlikely to be detected incidentally during other surveys. Low potential to occur, as the study area is at the edge of the species range. Recorded 5.0 miles to the west during surveys for the Mojave West Solar Project (County 2014), but this option is outside the known range of the species.
Gopherus agassizii	(Mojave) desert tortoise	FT/ST	Desert habitats; most common in desert scrub, desert wash, and Joshua tree woodland. Creosote bush scrub with annual wildflowers preferred. Requires friable soil for nests and burrows.	Scat (year old) and burrow showing recent sign of use north of Trotter Avenue and just east of North–South Route Option 1, during surveys in spring 2017 (Figure 3-2). Although not observed elsewhere, high to moderate potential to occur. Additional CNDDB occurrences are from as near as 0.3 miles from the route options (CDFW 2017c)	High potential to occur. The nearest CNDDB occurrence is 1.1 miles away (CDFW 2017c). Although the option follows existing rights-of-way (ROWs) through disturbed habitats for much of its course, suitable habitat is adjacent to most of the route.

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
Birds					
Aquila chrysaetos	golden eagle	BGEPA, BCC/FP	Open country, especially hilly and mountainous regions; grassland, coastal sage scrub, chaparral, oak savannahs, open coniferous forest.	Not observed. Moderate potential to occur during winter and dispersal. The nearest CNDDB occurrence is approximately 2.3 miles from Option 2 (1.8 miles southwest of the intersection of SR-14 and Silver Queen Road), although the location is not known to have been occupied since 1969 (CDFW 2017c). The next nearest occurrence is from 9.0 miles north of East–West Options (A and B). Generally expected to nest in the Tehachapis, to the north and west, and potentially occur in the vicinity in winter and during dispersal.	Not observed. Moderate potential to occur during winter and dispersal. Not expected to nest. The nearest CNDDB occurrence is from approximately 1.4 miles from the site (1.8 miles southwest of the intersection of SR-14 and Silver Queen Road), although the location is not known to have been occupied since 1969. The next nearest occurrence is 10.4 miles northwest of this option (CDFW 2017c).
Athene cunicularia	burrowing owl	BCC/SSC	Grasslands, open scrub, and agriculture, particularly with ground squirrel burrows.	Not observed, but focused surveys were not conducted. Moderate potential to occur. Although not seen in the study area, individuals were observed at 3 different locations between approximately 0.5 and 1.0 mile from North–South Route Option 1 during surveys. The nearest	Moderate potential to occur. Two CNDDB occurrences are from within 2.0 miles of the option. Although a large part of this option is within existing ROWs and already disturbed, plentiful suitable habitat occurs adjacent to the option.

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
				CNDDB occurrence is from within 0.5 miles of both Option 2 and the main East–West route, near United Street and Purdy Avenue. Suitable habitat is present in much of the study area.	
Buteo regalis (wintering)	ferruginous hawk	BCC/None	Open, dry country, grasslands, open fields, agriculture.	Surveys were not conducted at an appropriate time to detect this species. Moderate potential to occur on occasion. The nearest CNNDB occurrence is from approximately 6.8 miles to the south–southwest. However, this species is underreported in CNDDB.	Surveys were not conducted at an appropriate time to detect this species. Moderate potential to occur. The nearest CNNDB occurrence is from approximately 7.0 miles to the south. However, this species is underreported in CNDDB.
Buteo swainsoni (nesting)	Swainson's hawk	BCC/ST	Open grassland, shrublands, croplands.	Not expected to nest. Observed once, in April 2017, over the main East–West Option Route, during migration (Figure 3-4). Not expected to nest in the vicinity, and nesting not observed during surveys. The nearest CNDDB occurrences are 6.8 and 7.2 miles south–southwest (CDFW 2017c).	Not expected to nest. A single juvenile (not of breeding age) observed on one occasion, in April 2017, in Joshua tree woodland within the survey buffer, but away from all options, approximately 3.0 miles southeast of Option 3. The nearest CNDDB occurrences are 8.2 and 8.6 miles west–southwest (CDFW 2017c).

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
Falco mexicanus (nesting)	prairie falcon	BCC/None	Grassland, savannahs, rangeland, agriculture, desert scrub, alpine meadows; nest on cliffs or bluffs.	Not observed. Not expected to nest. Moderate potential to forage during the nesting season. Suitable nesting habitat likely occurs at Soledad Mountain, near North–South Option 3. CNDDB does not provide specific locations for occurrences of this species.	Not expected to nest. Moderate potential to forage during the nesting season. Suitable nesting habitat likely occurs at Soledad Mountain, near North-South Option 3. CNDDB does not provide specific locations for occurrences of this species.
Lanius lucovicianus (nesting)	loggerhead shrike	BCC/SSC	Grasslands; open shrublands with scattered shrubs, trees, fences, or other perches; riparian; and woodlands.	Observed along the main East–West Option (Options A and B), along North–South Route Option 1 (including and active nest), and regularly in the vicinity (Figure 3-3). Extensive suitable habitat is present in Joshua tree woodland.	High potential to occur; high potential to nest in Joshua tree woodland adjacent to this option. Extensive suitable nesting habitat occurs in the vicinity.
Spinus (Carduelis) lawrencei (nesting)	Lawrence's goldfinch	BCC/None	Valley foothill hardwood, valley foothill hardwood-conifer, desert riparian, palm oasis, pinyon-juniper and lower montane habitats.	Not observed. Moderate potential to occur, especially near existing development.	Moderate potential to occur, especially near existing development.
Toxostoma lecontei	LeConte's thrasher	BCC/SSC[1]	Open desert wash, creosote scrub, alkali desert scrub, desert succulent scrub.	Observed along North–South Option 1 and along the main East–West Route (Options A and B) during surveys. Also observed generally in Joshua tree woodland and other desert scrub communities in the vicinity during Swainson's hawk surveys.	Moderate potential to occur; high potential to occur adjacent to this option. Suitable habitat is relatively limited in disturbed areas occurring within much of this option, but extensive suitable habitat occurs in adjacent areas.

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
			Mammals		
Antrozous pallidus	pallid bat	None/SSC	Arid habitats, including grasslands, shrublands, woodlands and forests; for roosting, prefers rocky outcrops, cliffs and crevices with access to open habitats for foraging.	Focused bat surveys were not conducted. Not expected to roost, but high potential to forage. Although CNDDB includes no occurrences in the area, the species recorded during surveys of Soledad Mountain, southwest of the intersection of SR-14 and Silver Queen Road, in 1990 and 1996 (Brown-Berry 2007). Bats roosting in this area or in nearby human-made structures potentially forage over the study area.	Focused bat surveys were not conducted. Not expected to roost, but high potential to forage. Recorded at nearby Soledad Mountain, and suitable foraging habitat occurs along Option 3.
Corynorhinus townsendii	Townsend's big-eared bat	None/SSC	Mesic habitats characterized by coniferous and deciduous forests and riparian habitat, but also xeric areas; roosts in limestone caves and lava tubes, also man-made structures and tunnels; may roost in basal cavities of large trees.	Focused bat surveys were not conducted. Not expected to roost, but high potential to forage. The species has been detected roosting in abandoned mine shafts within approximately 0.6 mile of North–South Gen-Tie Route Option 3, as recently as 2006 (CDFW 2017c, Brown-Berry 2007).	Focused bat surveys were not conducted. Not expected to roost, but high potential to forage. Known to roost at nearby Soledad Mountain.
Euderma maculatum	spotted bat	None/SSC	Foothills, mountains, desert regions of southern California, including arid deserts,	Focused bat surveys were not conducted. Not expected to roost, and low potential to forage.	Not expected to roost, and low potential to forage. Suitable roosting habitat likely occurs

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
			grasslands, and mixed conifer forests; roosts in rock crevices and cliffs; feeds over water and along washes.	CNDDB includes no occurrences in the area, but the study area is within the range of the species. Suitable roosting habitat likely occurs nearby, such as at Soledad Mountain southwest of SR-14 and Silver Queen Road, and suitable foraging habitat is present in the study area.	nearby, such as at Soledad Mountain, and suitable foraging habitat is present along this option.
Perognathus alticolus inexpectatus	Tehachapi pocket mouse	None/SSC	Arid annual grassland and desert shrub communities, but also taken in fallow grain field and in Russian thistle.	Low potential to occur. Small mammals surveys were not conducted. This species is unlikely to be detected during the daytime surveys conducted. The nearest CNDDB occurrences are three occurrences between 1.8 and 2.2 miles north of East–West (Options A and B).	Not expected to occur. The nearest CNDDB occurrences are three occurrences between 5.6 and 5.7 miles to the northwest, in the Tehachapi foothills. However, this option is on the floor of the valley and outside the known range of the species.
Spermophlius (Xerospermophilus) mohavensis	Mohave ground squirrel	None/ST	Open desert scrub, alkali scrub and Joshua Tree woodland. Also feeds in annual grasslands restricted to Mojave desert.	Not observed, but protocol surveys not conducted. Moderate potential to occur, mostly east of SR-14. The nearest CNDDB occurrences are from 4.0 miles southeast of North-South Option 1, on Edwards AFB, and 4.6 miles of the main East–West Option and North-South Option 1. Most areas west of SR-14 are outside the species range.	Moderate potential to occur. The nearest CNDDB occurrences are 5.9 miles to the southwest and 6.6 miles to the north. Most of the area along Option 3 is disturbed, although extensive suitable habitat occurs in adjacent areas. The more westerly portions of this option may be outside the range of the species.

Table 3-4
Special-Status Wildlife Potential to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur	
				East–West and North–South Options 1 and 2	*North–South Option 3*
Taxidea taxus	American badger	None/SSC	Grasslands, agriculture, drier open stages of shrub, forest, and herbaceous habitats with friable soils.	Observed during Swainson's hawk surveys approximately 3.5 miles west southwest of East–West (Options A and B). High potential to occur. CNDDB includes an occurrence approximately 5.7 miles north of East–West (Options A and B), and suitable habitat is widespread in the vicinity.	Observed approximately 8.5 miles west during Swainson's hawk surveys. High potential to occur. CNDDB includes an occurrence approximately 6.2 miles north northwest. Abundant suitable habitat is present adjacent to the alignment, although much of the land along this option itself disturbed.
Vulpes macrotis arsipus	desert kit fox	None/None[2]	Open shadscale scrub, creosote bush scrub, and other desert scrub communities with a low ground cover, friable soils, and a suitable small mammal prey base.	A natal den and an additional burrow with sign were observed along North–South Gen-Tie Route Option 1 in the spring 2017. Suitable habitat is present elsewhere.	Moderate potential to occur. Surveys were not conducted. Much of the route occurs along existing ROWs, including paved roads. However, suitable habitat is present in the study area adjacent to existing ROWs.

1 According to *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California* (Shuford and Gardali 2008), only the San Joaquin Valley population of LeConte's thrasher is considered an SSC, which means that LeConte's thrashers in the study area would not be an SSC. However, LeConte's thrashers as a species are included in the current and previous versions of the Special Animals List (CDFW 2017b), and occurrences are included in CNDDB (CDFW 2017c). Therefore, for the purposes of this report, LeConte's thrashers are considered an SSC.

2 Desert kit fox is has no special status but is regulated by CDFW as a fur-bearing mammal.

Status Legend:

Federal: BCC = USFWS bird of conservation concern
BGEPA = Bald and Golden Eagle Protection Act
FT = federal threatened

State: SSC = California species of special concern
FP = fully protected
ST = state threatened

3.5.1 Reptiles

3.5.1.1 Desert Tortoise

The desert tortoise (*Gopherus agassizii*) is a Federally Threatened (FT) and State Threatened (ST) species that occurs through much of the Mojave (including the Antelope Valley) and Sonoran deserts in California. It also occurs in parts of southern Nevada, southwestern Utah, and northwestern Arizona. Desert tortoises occupy a wide variety of desert habitats. In most parts of the Mojave Desert, they occur primarily in gently sloping terrain, but in some parts of their range, they occur more commonly in upper alluvial fans and lower mountain slopes (USFWS 2011; Rautenstrauch and O'Farrell 1994). In lower to middle elevations, they tend to occupy habitats dominated by creosote and white bursage, where rainfall is from 2 to 8 inches, the diversity of perennial plants is relatively high, and high production of annuals occurs (USFWS 2011; Germano et al. 1994). Occupied habitats also include black bush scrub, juniper woodland, Joshua tree woodland, and other desert scrub communities (USFWS 2011; Germano et al. 1994). They feed largely on annuals, but also on a variety perennial plants. Desert tortoises spend most of their lives underground in burrows, and are most active during spring and fall, but often emerge in summer after rain storms (Nagy and Medica 1986). They are long-lived, reaching sexual maturity between 13 and 20 years of age, and have a low reproductive rate (USFWS 2011).

No desert tortoises were directly observed during surveys. However, sign of desert tortoise was observed twice along North–South Gen-Tie Route Option 1, near the southern end of the route (Figure 3-2). During surveys in spring 2017, biologists observed a desert tortoise burrow with sign of recent use, including tracks, and observed older scat at a separate location. Suitable habitat is present over much of the study area.

3.5.1.2 Northern California Legless Lizard

The Northern California legless lizard (*Anniella pulchra*) is a California Species of Special Concern (SSC). It occurs from Central California south to at least Santa Barbara County, as well as in the fringes of the Antelope Valley in the vicinity of the study area. Four other species of legless lizard occur in the intervening areas of Southern California and the southern San Joaquin Valley, but the species occurring in much of this area remains unclear (Papenfuss and Parham 2013). Northern California legless lizard occurs in stabilized dunes; beaches; dry washes; chaparral; scrub communities; and pine, oak, and riparian woodlands. It is also associated with sparse vegetation and requires sandy or loose loamy soils that retain moisture year-round. Northern California legless lizard was not observed in the study area during surveys. The nearest CNDDB occurrence is from approximately 9.7 miles southwest of East–West Route Options A and B. The westernmost extent of the gen-tie options, in the lower foothills of the Tehachapi Mountains, is at the boundary of the range for the species depicted in Papenfuss and Parham (2013). Suitable habitat occurs in the vicinity. The species is probably less likely to occur in locations farther east and south in the study area.

3.5.2 Birds

3.5.2.1 Burrowing Owl

The burrowing owl (*Athene cunicularia*) is an SSC and Bird of Conservation Concern (BCC) that inhabits the length of California. Burrowing owls prefer open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. They usually nest in the old burrow of a ground squirrel, badger, or other small mammal, although they may dig their own burrow in soft soil. Their prey consists mostly of insects, small mammals, reptiles, birds, and carrion. No focused surveys were conducted for burrowing owl, although the species is relatively detectable during the morning hours, when many surveys took place. No burrowing owls were detected in the study area during surveys, although several were detected within 1.0 mile of North–South Route Option 1, and CNDDB includes an occurrence within approximately 0.5 mile of North–South Route Option 2, near the intersection of United Street and Purdy Avenue. Suitable habitat is present in much of the study area.

3.5.2.2 Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) is a BCC for the wintering season and is not known to nest in California. It is an uncommon winter resident and migrant at lower elevations and open grasslands in the eastern deserts of California, the Modoc Plateau, the Central Valley, and the Coast Ranges. It is a fairly common winter resident of grasslands and agricultural areas in southwestern California. It roosts in trees (sometimes communally) and on utility poles and feeds on smaller to medium-sized mammals, such as cottontails (*Sylvilagus* sp.) and California ground squirrels (*Spermophilus (Otospermophilus) beecheyi*). No ferruginous hawks were observed during surveys of the study area, but surveys were not conducted at an appropriate time of year for detecting ferruginous hawks. CNDDB includes several occurrences in the vicinity, but this database greatly underrepresents reports of this species. Garrett and Dunn (1981) considered the Antelope Valley to be an important wintering area for the species in California, although most likely winter closer to agricultural areas, which are absent near the study area, and grasslands, which are sparse.

3.5.2.3 Golden Eagle

The golden eagle is a CDFW fully protected (FP) species that is also protected under the Bald and Golden Eagle Protection Act. It is an uncommon permanent resident and migrant throughout

California, except the center of the Central Valley. Golden eagles nest on secluded cliffs of all heights and in large trees in open areas. Nests are large platforms composed of sticks, twigs, and greenery. Golden eagles typically are found in rolling foothills, mountain areas, sage-juniper flats, and desert, and they avoid urban, agricultural, and heavily forested areas (Millsap 1981; Fischer et al. 1984; Craig et al. 1986; Marzluff et al. 1997). Golden eagles prey mainly on small to medium-sized mammals; they need open terrain for hunting and soar between 100 and 300 feet aboveground in search of prey. No golden eagles were observed during surveys. Focused surveys were not conducted, although it's likely the species would have been detected during surveys, particularly during Swainson's hawk surveys, if present within 5.0 miles of the study area. CNDDB includes an occurrence mapped generally in the Soledad Mountain area, approximately 1.4 miles from North–South Route Option 3 and 2.3 miles from Option 2. However, this territory was last known to be occupied in 1969. Currently, an open-pit heap-leach gold and silver mine operation occupies the north slope of Soledad Mountain, between all gen-tie route options and any remaining suitable nesting habitat in the area. The next nearest occurrences are from the Tehachapi Mountains (CDFW 2017c).

3.5.2.4 LeConte's Thrasher

The LeConte's thrasher (*Toxostoma lecontei*) is a BCC species that is resident in low to middle elevations in the deserts of eastern California and within a limited, disjunct range in the western San Joaquin Valley and adjacent smaller valley, from southwestern Fresno County southward (Grinnell and Miller 1944, Fitton 2008). They occur in open scrub habitats, usually with sandy soils or in alkaline terrain, including desert washes, creosote scrub, alkali desert scrub, desert succulent scrub, Joshua tree habitats, and (in the San Joaquin Valley) saltbush scrub (Grinnell and Miller 1944, Fitton 2008). They feed mostly on a variety of insects and arthropods, but also on lizards and other small vertebrates. LeConte's thrashers were observed regularly within desert scrub habitats with scattered Joshua trees during surveys, including along the main East–West Gen-Tie Route Option and North–South Gen-Tie Route Option 1. Suitable habitat also occurs within or near North–South Options 2 and 3.

3.5.2.5 Lawrence's Goldfinch

Lawrence's goldfinch (*Spinus lawrencei*) is a BCC that is locally common along the western edge of the southern deserts, from Santa Clara and Monterey counties south through coastal slopes, and occasionally surrounding the foothills of the Central Valley (Zeiner et al. 1990). This species is unusual in that it generally migrates in an east to west direction between breeding areas in California and wintering areas in northern Mexico, southern Arizona, and New Mexico. Lawrence's goldfinch primarily breeds in California, but also south into northern Baja California, Mexico. Breeding tends to be concentrated in the foothills of the southern Sierra Nevada through the southern coastal ranges, and southward into the transverse ranges. The Lawrence's goldfinch prefers valley foothill woodlands and hardwood conifer forests, Southern California desert riparian, palm oasis, pinyon–juniper, and lower montane areas. This species was not observed during surveys. It is relatively unlikely to nest in most of the study area, although it has moderate potential to nest near existing development, such as occurs near portions of the North–South Gen-Tie Route Options 1 and 2, where they may be attracted to moister areas around exotic plantings.

3.5.2.6 Loggerhead Shrike

The loggerhead shrike (*Lanius ludovicianus*) is an SSC during its nesting period that can be found in lowlands and foothills throughout California. It prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Highest density occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. Several were observed in the study area, along the main East–West Gen-Tie Route Option (where an adult was observed with a juvenile west of SR-14), along the northern portion of North–South Gen-Tie Route Option 1 (a family group near a nest structure), and regularly in the vicinity (Figure 3-3). Extensive suitable habitat, particularly in Joshua tree woodland, is present in the study area.

3.5.2.7 Prairie Falcon

The prairie falcon (*Falco mexicanus*) is a BCC that has a broad geographic range in the west and central United States and breeds in California primarily in the Coast, Transverse, and Peninsular Ranges; the eastern deserts; and the northeast. It also winters in the Central Valley, central coast, and Southern California coast. They primarily nest on sheltered ledges of cliffs and embankments at heights of 10 to more than 100 meters (33 to 328 feet) (Roppe et al. 1989; Steenhof 2013). They forage in open habitats with low vegetation. The feed on ground squirrels, birds that occupy open habitats (such as horned larks (*Eremophila alpestris*) and western meadowlark (*Sturnella neglecta*), and sometimes lizards and insects (Steenhof 2013). No prairie falcons were observed in the study area. Although focused surveys for this species were not conducted, it's likely it would have been detected during Swainson's hawk surveys, if nesting within 5.0 miles of the study area. Nesting habitat is absent in the study area, although suitable nesting sites likely occur nearby in the Soledad Mountain area, near North–South Gen-Tie Route Options 2 and 3. However, current gold and silver mining operations on the north slope of the mountain limit the likelihood of the species nesting there. However, prairie falcons have the potential to forage in the study area, especially during the non-nesting season.

3.5.2.8 Swainson's Hawk

The Swainson's hawk (*Buteo swainsoni*) is an ST species and a BCC. It nests in California in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. It breeds in stands with few trees in riparian areas, agricultural environments, near rural residents, in oak savannah, and in juniper-sage flats. In the Antelope Valley, Swainson's hawks also nest in Joshua trees. In many areas, alfalfa fields are their favored foraging areas, but they also forage in undisturbed grasslands, fallow agricultural fields, row crops, and a variety of desert scrub communities. Breeding Swainson's hawks rely heavily on vertebrates, especially California voles (*Microtus californica*) (Estep 1989) in their diets, but they also will take a variety of other small mammals, birds, and insects (CDFG 1993; Bechard et al. 2010).

Dudek biologists Dave Compton and Russell Sweet conducted all seven Swainson's hawk surveys under suitable conditions and according to the timing of surveys as outlined in the Swainson's hawk survey protocols (CEC and CDFG 2010). Although suitable nesting habitat was observed widely across the Swainson's hawk survey area, no Swainson's hawk nests and no evidence of Swainson's hawk nesting were observed. Swainson's hawks were observed on two occasions, and different locations, during surveys. On April 17, 2017, an adult intermediate morph was observed flying over the main East–West Gen-Tie Route Option, west of Mojave and within the existing wind farms (Figure 3-4). Behavior was consistent with a migrant, at a time of year when migrants are still passing through Southern California. The individual was first observed flying north between the wind turbines, before it began soaring and gaining altitude, and eventually flying off high and well to the northeast. Although the bird was in view for approximately 10 minutes, it showed no indication of foraging or stopping in the area. This individual was not detected subsequently, and no Swainson's hawks were detected in this area during any surveys after this date.

On April 28, 2017, a juvenile Swainson's hawk was briefly observed perched in a Joshua tree in the southern part of the Swainson's hawk survey area, in an area south of Backus Road, west of SR-14, north of Dawn Road, and east of Mojave-Tropico Road. This individual quickly left its perch and used the Joshua tree woodland to shield its departure from the area. The observer searched a wide area within the Joshua tree woodland, but did not find a suitable nest structure and did not immediately refind the juvenile Swainson's hawk. Approximately 1:15 later, a distant raptor was detected that was likely this individual, soaring over an area nearby. As a juvenile (just less than one year old), this individual was younger than this species is known to nest (Bechard et al. 2010). No Swainson's hawks were detected in this vicinity during subsequent surveys.

A variety of nests were observed during surveys that were potentially suitable for Swainson's hawks. Nearly all of these nests were confirmed to be nests of common raven. Several other nests were confirmed as being unoccupied during the nesting season. Suitable nests were observed in a variety of trees, including Joshua trees, pines (*Pinus* sp.), tamarisk (*Tamarix* sp.), and eucalyptus (*Eucalyptus* sp.). The majority of nests were near human habitation, and very few were within the wind farms within the northwestern and west-central parts of the Swainson's hawk survey area. No Swainson's hawks were observed in the vicinity of any suitable nest structure. The nearest CNDDB occurrences are 6.8 and 7.2 miles south–southwest of the study area at its nearest point. No agricultural lands suitable for foraging occur within 5.0 miles of the study area. Therefore, the potential for this species to nest in the study area is low. Furthermore, based on 2017 survey results, this species is currently absent as a breeder from the vicinity.

3.5.3 Mammals

3.5.3.1 American badger

The American badger (*Taxidea taxus*) is an SSC that is an uncommon, permanent resident throughout most of the state. It is most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, park lands, and cold desert areas. They need sufficient food, uncultivated ground, and burrowing rodents to support their prey base. No badgers were observed in the study area. A single badger was observed at burrow entrance approximately 3.5 miles west southwest of East–West Gen-Tie Route Options A and B in April 2017, and CNDDB includes an occurrences approximately 5.7 miles north of East–West Gen-Tie Route Options A and B. Suitable habitat is present throughout the study area.

3.5.3.2 Desert Kit Fox

Title 14, California Code of Regulations (CCR), Section 460, prohibits taking of desert kit fox (*Vulpes macrotis arsipus*) at any time. The desert kit fox is a year-round resident of the southwestern deserts of California. Its western boundary that separates it from the federally listed and isolated San Joaquin kit fox subspecies is the Antelope Valley in the west Mojave. The Tehachapi and Southern Sierra Mountain ranges form a physical barrier between desert kit fox and San Joaquin kit fox, although Mercure et al. (1993) suggest that the lower elevation Tehachapi range may be more permeable to movement than the Southern Sierra range. Desert kit fox primarily occurs in open desert scrub habitats on gentle slopes. Dens are an important resource for kit fox because they provide microclimate moderation and protection from predators, and may be a limiting resource for kit fox distribution (Arjo et al. 2003). Several studies in California, Arizona, and Utah, as summarized by Tannerfeldt et al. (2003), show that the primary food sources for kit foxes are rodents and lagomorphs, including jackrabbit (*Lepus* spp.) and cottontails (*Sylvilagus* spp.). Desert kit fox was observed once in the study area, when an active natal den was observed along North–South Gen-Tie Option 1 in the spring 2017. Desert kit fox sign (tracks) was observed around a suitable burrow at one other location along Option 1 in the spring 2017. Desert kit fox have a high potential to occur elsewhere in the study area, particularly within the East–West Gen-Tie Route.

3.5.3.3 Mohave Ground Squirrel

The Mohave ground squirrel (*Spermophlius (Xerospermophilus) mohavensis*) is an ST species with a limited distribution in the Mojave Desert. The known range of the species extends to Owens Lake and the Granite and Avawatz Mountains on the north, to the vicinity of the Mojave River on the east, to the north slopes of the San Gabriel Mountains on the south, and to approximately the SR-14/U.S. 395 corridor on the west (Leitner 2008, 2015). Mohave ground squirrels occur in a variety of desert scrub communities. They most often occur in creosote bush scrub, but also occur in desert saltbush scrub, desert sink scrub, desert greasewood scrub, shadscale scrub, Joshua tree woodland, and Mojave mixed woody scrub (Best 1995; 75 FR 22063–22070; MGSWG 2011). They feed primarily on plant material. Although no surveys were conducted for Mohave ground squirrel, a habitat assessment was conducted that covered the majority of the North–South Gen-Tie Route Option 1. Moderate quality suitable habitat was observed through much of this area. Suitable desert scrub habitats likely occur throughout the study area. However, Mohave ground squirrel is not known to occur west of SR-14 in the vicinity of the study area (Leitner 2008, 2015). Therefore, the species potentially occurs in desert scrub habitats in North–South Gen-Tie Route Options 1 and 2, the eastern portions of Option 3, and only the easternmost portions of the main East–West Gen-Tie Route.

3.5.3.4 Pallid Bat

The pallid bat *(Antrozous pallidus)* is an SSC that occurs throughout California, except at the highest elevations of the Sierra Nevada range. Although this species prefers rocky outcrops, cliffs, and crevices with access to open communities and land covers for foraging, it has been observed far from such areas (Hermanson and O'Shea 1983). A radio-tracking study in the central coastal region of California documented winter roosting in an unheated building, in trees (*Quercus lobata*, *Q. agrifolia*, *Umbellularia californica*, and *Platanus racemosa*), and in ground-level crevices. Foraging habitats for pallid bats are varied and include grasslands, oak savannahs and woodlands, riparian woodland, open pine forests, talus slopes, desert scrub, and agricultural areas. Focused surveys were not conducted for bats in the survey area. However, pallid bats have detected at Soledad Mountain, within 2.0 miles of North–South Gen-Tie Route Options 2 and 3, and it also has potential to roost in human-made structures in the area. Bats roosting in these areas potentially forage over suitable foraging habitat, which occurs throughout the study area.

3.5.3.5 Spotted Bat

Spotted bat (*Euderma maculatum*) is an SSC that in California occurs across the desert regions, the Klamath Mountains of northeastern California, the Sierra Nevada up to 9,600 feet amsl, and several locations along the coast in Ventura and San Diego counties (Pierson and Rainey 1998). Spotted bats use caves, cave-like structures, and crevices in rock outcrops and on cliffs for day roosts (Watkins 1977). Pierson and Rainey (1998) found that most observations of foraging spotted bats were within about 6 miles of cliffs composed of granite, limestone, basalt, or other sedimentary rock. Although rare throughout its range, the species occurs in a wide variety of habitat types ranging from low elevation deserts to high elevation forests (Watkins 1977; Pierson and Rainey 1998). Focused surveys were not conducted for bats in the survey area. Spotted bats could potentially roost in rock crevices near the study area, such as Soledad Mountain southwest of the intersection of SR-14 and Silver Queen Road, and forage over the study area. Suitable foraging habitat occurs throughout the study area.

3.5.3.6 Tehachapi Pocket Mouse

The Tehachapi pocket mouse (*Perognathus alticolus inexpectatus*) is an SSC that occurs from the Tehachapi Pass area (northwest of Mojave) southwest to the Mount Pinos area on the boundary of Kern and Ventura Counties and the Lake Hughes area in northern Los Angeles County. It apparently is associated with arid annual grassland and desert scrub communities (Williams 1986). Known occurrences are mostly above 3,400 feet amsl (CNDDB). CNDDB includes three occurrences between 1.8 and 2.2 miles north of East–West Gen-Tie Route (Options A and B) (CDFW 2017c). Except for the extreme westernmost areas, which are nearest the Tehachapi foothills, most of the study area is farther east and below the expected elevation of this species. Therefore, it is unlikely to occur in any of the north-south gen-tie route options. But suitable habitat occurs where the East–West options are nearest the known range.

3.5.3.7 Townsend's Big-eared Bat

Townsend's big-eared bat (*Corynorhinus townsendii*) is an SSC that occurs throughout California with the exception of alpine and subalpine areas of the Sierra Nevada, although it has been found in the subalpine zone in the White Mountains to the east of the Sierra Nevada (Szewczak et al. 1998). Townsend's big-eared bat is primarily associated with mesic areas characterized by coniferous and deciduous forests and riparian communities, although it also occurs in xeric areas (Kunz and Martin 1982). In California, it roosts in caves, mines, tunnels, buildings, and other human-made structures. Focused surveys were not conducted for bats in the survey area. However, during surveys of Soledad Mountain in 2006, Townsend's big-eared were detected at several locations, including within approximately 0.6 mile of North-South Gen-Tie Route Option 3 and 2.2 miles of Option 2. Townsend's big-eared bats roosting in this area potentially forage over the study area. Suitable foraging habitat occurs throughout the study area.

3.6 Wildlife Movement

Wildlife species generally inhabit suitable habitat patches distributed across a landscape. These habitat blocks, which may make up the species' home range or breeding territory, support most, if not all, of the species' life history needs (e.g., food resource, mates, refuge). For those species with wide ranges throughout a landscape, movement corridors are crucial for dispersal, to access food and/or shelter during the winter months, to escape catastrophic events (e.g., flood, fire, etc.), and to ward against genetic in-breeding (Rosenberg et al. 1997). In areas with open landscapes, wildlife has the potential to move across the landscape unimpeded and are not necessarily restricted to movement corridors. Where landscapes have movement constraints such as dense vegetation, steep slopes and canyons, or man-made impediments such as roads and human activity, wildlife may be restricted to wildlife corridors. Wildlife corridors are defined as areas that connect suitable wildlife habitat in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features, such as canyon drainages, ridgelines, or areas with vegetation cover, provide corridors for wildlife travel. Wildlife corridors contribute to population viability by (1) assuring the continual exchange of genes between populations, which helps maintain genetic diversity; (2) providing access to adjacent habitat areas, representing additional territory for foraging and mating; (3) allowing for a greater carrying capacity; and (4) providing routes for colonization of habitat lands following local population extinctions or habitat recovery from ecological catastrophes (e.g., fires).

Habitat linkages are patches of native habitat that function to join two larger patches of habitat. They serve as connections between habitat patches and help reduce the adverse effects of habitat fragmentation. The linkage represents a potential route for gene flow and long-term dispersal. Habitat linkages may serve as both habitat and avenues of gene flow for small animals such as reptiles and amphibians. Habitat linkages may be represented by continuous patches of habitat or by nearby habitat "islands" that function as "stepping stones" for dispersal.

A report prepared for the Wildlands Conservancy and the Bureau of Land Management (BLM) identifies the corridors within California's deserts that require maintenance or restoration in order to conserve the wildlife utilizing those corridors as linkages between habitat. The report, *A Linkage Network for the California Deserts*, is a finer-scale analysis based on the *California Essential Habitat Connectivity Project* (Spencer et al. 2010), which provides a statewide

Essential Habitat Connectivity Map designed to help to inform land-planning efforts across the state (Penrod et al. 2012). Since the Essential Habitat Connectivity Map was created at the state level, it was assumed that additional analysis of connectivity would be required at a more local level, and thus the California Desert Connectivity Project was formed. Unlike the statewide initiative, the California Desert Connectivity Project includes large military bases and areas managed by BLM. As described in *A Linkage Network for the California Deserts*, the California Desert Connectivity Project focuses on 22 linkages within the Mojave and Sonoran Deserts. The project addresses the habitat and movement requirements of 47 focal species (10 amphibians and reptiles, 13 mammals, 10 birds, 9 plants, and 5 invertebrates) (Penrod et al. 2012). Based on Figure 1, Linkage Planning Areas, of the report, the closest linkage planning area is located northwest of the study area and connects Edwards AFB with the Scodie Mountains and the southern tip of the Sierra Nevada mountain range. Therefore, the study area is located adjacent to, but outside of, any identified regional wildlife movement corridors.

As stated in Section 3.1, the study area consists of a mix of agricultural grazing, undeveloped land, scattered single-family residences, with several approved or proposed large-scale solar facilities located nearby and commercial wind projects operating in the vicinity. Topography across the study area is relatively flat as the site is south of the Tehachapi Mountains on lands that gradually slope downward from the northwest to the southeast. The study area is dominated by desert vegetation that, as described in Section 3.2, consists of open to intermittent shrub cover along with patches of non-native grassland. In addition to vegetated areas, the study area includes disturbed habitat (largely dirt roads) and urban/developed areas that include SR-14, other paved roads, substations, the BNSF, and rural residences.

Wildlife can move freely though open landscapes with minimal impediments such as paved roads and development. In denser landscapes where cover is harder for larger animals to penetrate, wildlife will often utilize man-made movement corridors such as scarcely travelled dirt roads and trails, as well as natural paths such as washes and small drainages. The study area is largely undeveloped with an open landscape and thus wildlife can move freely throughout the area. In addition, wildlife can utilize dirt roads within the study area can act to move throughout the area. Constraints to wildlife movement include SR-14, Oak Creek Road, several other paved roads, an existing substation, wind turbines, the Southern Pacific Railroad, and scattered rural residential areas. While these features may constrain wildlife movement, the low traffic volume, along with light human presence, likely does not preclude wildlife from utilizing the study area and surrounding areas.

4 IMPACTS AND MITIGATION MEASURES

4.1 Methods

4.1.1 Ground-Disturbing Activities

Because the East–West Gen-Tie Routes Options A and B are only slightly different, potential impact areas have been combined and these options are evaluated together. The precise location of ground-disturbing impacts of the gen-tie route are not known at this time. However, all ground-disturbing impacts will occur in the study area. In order to quantitatively address ground-disturbing impacts, the approximate acreage of impacts for each complete gen-tie option (including both the East–West Gen-Tie Route and North–South Gen-Tie Route) is provided in Table 4-1. A fiber-optic line would be installed along the gen-tie route, primarily in access roads. To avoid elevation conflicts with crossing the Los Angeles Department of Water and Power (LADWP) high-voltage lines, a short segment of the gen-tie may be installed underground at this crossing point. The ground-disturbance estimated in Table 4-1 includes the estimate of impacts associated with the fiber-optic line and the crossing at the LADWP transmission line.

Table 4-1
Potential Ground-Disturbing Impacts from Proposed Gen-Tie Routes

Summary of Assumptions for Impacts	Gen-Tie Option 1		Gen-Tie Option 2		Gen-Tie Option 3	
	Permanent (Acres)	*Temporary (Acres)*	*Permanent (Acres)*	*Temporary (Acres)*	*Permanent (Acres)*	*Temporary (Acres)*
Assumes poles to be spaced about 700 feet apart, each foundation requiring 50 feet by 50 feet temporary disturbance and 12 feet by 12 feet permanent disturbance	0.4	6.7	0.3	6.1	0.4	6.9
Maintenance Road (assumes improved, 22 feet wide road, 30 feet wide temporary disturbance)	41.0	55.8	38.1	52	42.4	70.2
Assumes 2 laydown/assembly areas at 2.5 acres each	—	5.0	—	5.0	—	5.0
String Pulling Sites (assumes 60 pulling sites 100 feet by 300 feet, not including pole disturbances listed previously)	—	41.0	—	41.0	—	41.0
Total	**41.4**	**108.5**	**38.4**	**104.1**	**42.8**	**123.1**

It assumed that it would take no more than 6 days to construct one pole.

4.1.2 Description of Impact Types

The definitions of the various impact types described herein are defined in this section.

4.1.2.1 Construction-Related Impacts

Construction-Related (Short-Term Temporary) Direct Impacts

Absent the recommended mitigation measures, potential construction-related direct impacts to biological resources could result from unintentional clearing, trampling, or grading outside of the proposed construction zone. Accidental clearing, trampling, or grading outside designated construction zones may occur during construction activities for various reasons, such as incorrect construction grading plans, human error in interpreting grading plans, human error or accidents in operating construction equipment, and misunderstandings by construction personnel in adhering to construction plan requirements, including avoidance of biological resources. Temporary ground-disturbing activities would occur from the proposed project, and the acreages are estimated in Table 4-1. Option 1 could result in 108.5 acres of temporary impacts; Option 2 could result in 104.1 acres of temporary impacts; and Option 3 could result in 123.1 acres of temporary impacts. Additionally, the permanent loss of or harm to individual special-status plant and wildlife species from construction-related activities is addressed as a construction-related direct impact.

Construction-Related (Short-Term Temporary) Indirect Impacts

For the proposed project, the construction-related (short-term temporary) impacts would primarily be indirect and include temporary effects that are immediately related to construction, such as the generation of construction-related dust or noise.

4.1.2.2 Operations-Related Impacts

Temporary impacts to vegetation communities or land covers from operations and maintenance (O&M) activities to previously undisturbed areas, or to revegetated areas where temporary impacts occurred during construction, are not addressed under operations-related impacts. O&M activities addressed are only those that occur within existing permanent disturbance. However, if new impacts to vegetation communities or land covers not previously disturbed are required for O&M, the mitigation measures that apply to construction-related impacts would apply to the O&M activity. Therefore, with application of the construction-related mitigation measures, new impacts to vegetation communities or land covers not previously disturbed during O&M would be less than significant.

Operations-Related (Long-Term Permanent) Direct Impacts

Operations-related (long-term permanent) direct impacts are permanent impacts that result in the direct loss of biological resources due to a project (e.g., the permanent loss of wildlife habitat or the permanent loss of or harm to individual special-status plant and wildlife species). Permanent ground-disturbing activities would occur from the proposed project, and the acreages are estimated in Table 4-1. Option 1 could result in 41.4 acres of permanent impacts; Option 2 could result in 38.4 acres of permanent impacts; and Option 3 could result in 42.8 acres of permanent impacts.

Operations-Related (Long-Term Permanent) Indirect Impacts

Operations-related (long-term permanent) indirect impacts could result from the proximity of the gen-tie to biological resources after construction. Operations-related (long-term permanent) indirect impacts from the proposed gen-tie routes are expected to be minimal. Examples of operations-related (long-term permanent) impacts to biological resources could include electrocution of raptors (absent mitigation).

4.1.3 Project Design Features

Increased risk of fire is a potential short-term and long-term indirect impact to biological resources that could result from implementation of the project. However, the potential impact would be less than significant because the proposed project would comply with all applicable wildland fire management plans and policies established by the California Department of Forestry and Fire Protection and the Kern County Fire Department. Additionally, all pesticide use will comply with the application restrictions mandated by the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation. Compliance with these regulations avoids and minimizes potential misuse of pesticides, such as requiring that pesticides be applied by a certified licensed pest control applicator trained in the type, amount, and schedule of application; thus, the use of pesticide would not result in a significant impact to biological resources. Also, hydromodification is a potential long-term indirect impact that could affect biological resources. However, the project will be required to prepare a drainage plan that is designed to minimize runoff and will include engineering recommendations to minimize the potential for impeding or redirecting 100-year flood flows, which will be addressed in the project EIR/EIS. Therefore, significant impacts from hydromodification would not occur as a result of the proposed project.

4.2 Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project could potentially have a significant effect if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS (**Threshold Bio-1**).
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS (**Threshold Bio-2**).
3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means (**Threshold Bio-3**).
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites (**Threshold Bio-4**).
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance (**Threshold Bio-5**).
6. Conflict with the provisions of an adopted HCP [habitat conservation plan], Natural Community Conservation Plan, or other approved local, regional, or state HCP (**Threshold Bio-6**).

4.3 Threshold Bio-1

Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

4.3.1 Special-Status Plants

As described in Section 3.5, the East–West Gen-Tie Route Options and North–South Gen-Tie Route Options 1 and 2 were surveyed for special-status plants, and no special-status plants were observed. Thus, significant long-term direct impacts to special-status plants are not anticipated from implementation of Gen-Tie Route Options 1 and 2.

The North–South Gen-Tie Route Option 3 was not surveyed and the following species have a moderate potential to occur in the alignment:

- alkali mariposa lily (None/None/1B.2)
- recurved larkspur (None/None/1B.2)
- Barstow woolly sunflower (None/None/1B.2)
- pale-yellow layia (None/None/1B.1)
- sagebrush Loeflingia (None/None/2B.2)
- Latimer’s woodland-gilia (None/None/1B.2)

4.3.1.1 Construction (Short-Term) Impacts

4.3.1.1.1 Direct

Absent the recommended mitigation measures, potential construction-related direct impacts to special-status plants could result during construction from unintentional clearing, trampling, or grading outside of the proposed construction zone. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. With respect to North–South Gen-Tie Route Option 3, there is a moderate potential that the following special-status plants could be directly impacted by the proposed gen-tie route: alkali mariposa lily, recurved larkspur, Barstow woolly sunflower, pale-yellow layia, sagebrush Loeflingia, and Latimer's woodland-gilia. The proposed project could potentially result in significant construction-related direct impacts to special-status plants.

With respect to all the project options, construction mitigation measures MM-BIO-1 (general construction-related avoidance and minimization measures) and MM-BIO-2 (WEAP training, biological monitoring, and compliance) would apply and these measures would avoid and minimize potential temporary direct impacts to special-status plants because they require the project biologist to conduct a Worker Environmental Awareness Program (WEAP) for all construction/contractor personnel to ensure compliance with the mitigation measures and they require ongoing biological construction monitoring. This includes demarcation of the construction area using highly visible materials in the field that minimize unintentional impacts to special-status plants and their habitat outside the designated construction area. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and special-status plants outside the designated construction zone would be avoided.

Additionally, MM-BIO-3 (pre-construction surveys for special-status plants) requires special-status plant pre-construction surveys for the North–South Gen-Tie Route Option 3, and, if special-status plants are found, direct impacts would be avoided, minimized, and mitigated. Also, areas that are directly but temporarily impacted shall be recontoured to natural grade and revegetated with application of a native seed mix in accordance with MM-BIO-4 (restoration of temporary impacts). The application of a native seed mix would promote passive restoration of temporary impact areas.

Construction-related direct impacts to special-status species would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, MM-BIO-3, and MM-BIO-4. These biological mitigation measures are described in full in Section 4.3.3.

4.3.1.1.2 Indirect

Special-status plants and suitable habitat for special-status plants may be indirectly impacted during construction. Potential short-term or temporary indirect impacts to special-status plants resulting from construction activities include: the generation of fugitive dust; changes in hydrology resulting from construction, including sedimentation and erosion; the release of chemical pollutants; and the adverse effect of invasive plant species. Potential short-term or temporary indirect impacts to special-status plants are considered significant absent mitigation.

MM-BIO-1 (general avoidance and minimization measures) would minimize the potential effects of construction-related impacts by requiring vehicle maintenance restrictions to avoid chemical spills. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would minimize the potential effects of construction-related impacts by requiring all construction/contractor personnel to attend WEAP training, conducting biological monitoring during construction activities, and requiring compliance with all environmental documents and permits. MM-BIO-4 (restoration of temporary impacts) would help prevent future adverse effects associated with leaving bare ground, such as increased dust and erosion, and would help prevent adverse effects of invasive plant species that may alter the composition of the habitat if introduced during restoration or allowed to passively colonize the area post-construction. MM-BIO-5 (preparation and implementation of a SWPPP) would require the implementation of best management practices, such as implementing fiber rolls and sand bags around drainage areas, if necessary. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the Eastern Kern Air Pollution Control District (EKAPCD) requirements.

These potential short-term or temporary indirect impacts to special-status plants would be less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-4, MM-BIO-5, and MM-BIO-6.

4.3.1.2 Operations (Long-Term) Impacts

4.3.1.2.1 Direct

As described in Section 3.5, the East–West Gen-Tie Route Options and North–South Gen-Tie Route Options 1 and 2 were surveyed for special-status plants, and no special-status plants were observed in the study area. Thus, significant long-term direct impacts to special-status plants are not anticipated from implementation of the East–West Gen-Tie Route Options or the North–South Gen-Tie Route Options 1 and 2.

With respect to North–South Gen-Tie Route Option 3, there is a moderate potential that the following special-status plants could be permanently and directly impacted by the proposed gen-tie route: alkali mariposa lily, recurved larkspur, Barstow woolly sunflower, pale-yellow layia, sagebrush Loeflingia, and Latimer's woodland-gilia. The proposed project would result in significant operations-related direct impact to special-status plants. MM-BIO-3 (pre-construction surveys for special-status plants) requires special-status plant pre-construction surveys for the North–South Gen-Tie Route Option 3, and, if special-status plants are found, direct permanent impacts would be avoided, minimized, and mitigated.

These potential long-term or permanent direct impacts to special-status plants would be less than significant with implementation MM-BIO-3.

4.3.1.2.2 Indirect

Potential long-term indirect impacts that could result from development near special-status plants or their suitable habitat include: chemical releases such as oils and grease from vehicles that could degrade habitat; increased invasive plant species that may degrade habitat; and trampling of vegetation and soil compaction by humans, which could affect soil moisture, water penetration, surface flows, and erosion. These potential long-term indirect impacts to special-status plants would be significant absent mitigation.

MM-BIO-1 (general avoidance and minimization measures) requires that vehicles and equipment will be limited to maintenance access roads and the minimal area necessary to perform the work to minimize chemical releases and trampling of vegetation and soils compaction by humans. MM-BIO-4 (restoration of temporary impacts) would help prevent adverse effects of invasive plant species that may alter the composition of the habitat if introduced during restoration or allowed to passively colonize the area post-construction if these areas are not revegetated.

These potential long-term indirect impacts to special-status plants would be less than significant with implementation of MM-BIO-1 and MM-BIO-4.

4.3.2 Special-Status Wildlife

As described in Table 3-4 and Section 3.6, several special-status wildlife species have at least a moderate potential to occur in the study area. These include desert tortoise, Northern California legless lizard, burrowing owl, ferruginous hawk, golden eagle, prairie falcon, Swainson's hawk, LeConte's thrasher, Lawrence's goldfinch, loggerhead shrike, Mohave ground squirrel, Tehachapi pocket mouse, American badger, desert kit fox, pallid bat, spotted bat, and Townsend's big-eared bat. Note, however, that golden eagle, prairie falcon, and Swainson's hawk are not expected to nest in the study area. Potential impacts to each are discussed under both short-term and long-term impacts. Species with similar life histories and similar potential to occur are discussed as groups: foraging raptors (ferruginous hawk, golden eagle, prairie falcon, Swainson's hawk) and bats (pallid bat, spotted bat, Townsend's big-eared bat).

4.3.2.1 Construction (Short-Term) Impacts

4.3.2.1.1 Direct

Two types of short-term direct impacts can potentially occur to special-status wildlife species: impacts to habitat and impacts to the species from injury or mortality of individuals of the species. Total short-term habitat impacts will occur to between 104.1 acres and 123.1 acres. It is not known what portion of these impacts will be to natural vegetation communities and what portion will be to previously disturbed areas, such as areas occurring within existing road, power line, and other easements. These impacts may not occur to all areas at the same time. Absent the proposed mitigation measures, impacts causing injury or mortality of individuals could include, for example, crushing of low-mobility species during grading, entombment of burrowing species during grading, collisions with construction equipment, and destruction of bird nests during vegetation removal or grading.

Reptiles

Desert Tortoise

Sign of desert tortoise was observed along North–South Gen-Tie Option Route 1 during surveys, and suitable habitat for desert tortoise occurs within all project options. Absent the recommended mitigation measures, potential construction-related direct impacts to desert tortoise could result from unintentional clearing, trampling, or grading outside of the proposed project impact area during construction. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. These impacts could result in temporary loss of desert tortoise habitat, permanent alteration of habitat, crushing of desert tortoise burrows, and entrapment or entombment of desert tortoises. Desert tortoise is an FT and ST species that has experienced significant declines throughout its range. Therefore, the proposed project would result in significant construction-related impacts to desert tortoise in all project options.

With respect to temporary habitat impacts in all project options (both unintentional and planned), areas that are directly but temporarily impacted shall be recontoured to natural grade and revegetated with application of a native seed mix in accordance with MM-BIO-4 (restoration of temporary impacts). The application of a native seed mix would promote passive restoration of temporary impact areas. Construction mitigation measures MM-BIO-8 (desert tortoise pre-construction surveys and avoidance/relocation plan) would result in identification of any desert tortoises within areas potentially impacted by the project, establishment of appropriate buffers, and avoidance of impacts to desert tortoise. MM-BIO-1 (general construction-related avoidance and minimization measures) would limit vehicles and construction equipment to identified impact areas and would limit ingress and egress to established roads. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require the project biologist to conduct a WEAP for all construction/contractor personnel and would require ongoing biological construction monitoring to ensure compliance with mitigation measures. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and impacts would not occur to desert tortoise outside the designated construction zone.

Construction-related direct impacts to desert tortoise would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, MM-BIO-4, and MM-BIO-8. These biological mitigation measures are described in full in Section 4.3.3.

Northern California Legless Lizard

Although no Northern California legless lizards were observed during surveys, the species has the potential to occur, particularly in the western portion of the study area (East–West Gen-Tie Route options). One Northern California legless lizard was observed near the East–West Gen-Tie Route options during surveys on the SEPV Mojave West Solar Project site (Kern County Planning and Natural Resources Department 2014).

Absent the recommended mitigation measures, potential construction-related direct impacts to Northern California legless lizard could result from unintentional clearing, trampling, or grading outside of the construction zone. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. These impacts could result in the temporary loss of Northern California legless lizard habitat, permanent alteration of habitat, and crushing of Northern California legless lizards. Short-term direct impacts to habitat would affect a relatively limited area at the edge of the species' range, and abundant available natural habitat would remain farther west. Therefore, short-term direct impacts to habitat would be less than significant. However, this low-mobility species would likely not be able to escape construction activity to occupy suitable adjacent habitats and therefore would be particularly susceptible to injury and mortality. In fact, impacts to a relatively small area could mean the loss of a population, which could substantially reduce the species' potential survival in the vicinity. This impact would be significant absent mitigation.

Short-term direct impacts from injury or mortality of individuals would be reduced through MM-BIO-9 (pre-construction clearance surveys), which will require pre-construction surveys for special-status wildlife species using appropriate methods; avoidance of these species, where possible; and relocation of individuals that may be captured. In addition, for any non-listed special-status wildlife species occurring in construction areas, buffers will be established or, if establishing buffers is not feasible, attempts will be made to move the individuals to safety through capture and relocation or through encouraging them to leave the site. MM-BIO-1 (general construction-related avoidance and minimization measures) would limit vehicles and construction equipment to identified impact areas and would limit ingress and egress to established roads. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require the project biologist to conduct a WEAP for all construction/contractor personnel and would require ongoing biological construction monitoring to ensure compliance with mitigation measures. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and impacts would not occur to Northern California legless lizard outside the designated construction zone.

Construction-related direct impacts to Northern California legless lizard would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-9.

Birds

Burrowing Owl

Burrowing owls were recorded adjacent to the study area on several occasions, and suitable habitat occurs widely in the study area. Focused surveys were not conducted within the study area; therefore, impacts are based upon the presence of suitable habitat and the potential for the species to occur. Since the exact location of the gen-tie route has yet to be determined, the extent of temporary impacts to burrowing owl habitat is not known. It is assumed that a portion of the impacts would be to existing easements and/or disturbed areas and that there would be some impacts to suitable burrowing owl habitat. Absent the recommended mitigation measures, potential construction-related direct impacts to burrowing owl could result from unintentional clearing, trampling, or grading outside of the construction zone. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. Since the extent of temporary habitat impacts would be limited, and because abundant habitat suitable for burrowing owl would outside construction zones, short-term habitat impacts would be less than significant. However, ground disturbances could potentially result in destruction of burrowing owl dens, destruction of nests, eggs, and young, and entombment of adults. Burrowing owl is an SSC that has experienced declines in California, and loss of individuals and destruction of nests is considered a significant impact.

Construction mitigation measure MM-BIO-10 (burrowing owl pre-construction surveys and avoidance/relocation plan) would result in identification of any burrowing owls within areas potentially impacted by the project, establishment of appropriate buffers, and avoidance of impacts to burrowing owl. MM-BIO-1 (general construction-related avoidance and minimization measures) would limit vehicles and construction equipment to identified impact areas and would limit ingress and egress to established roads. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would further ensure avoidance of impacts to burrowing owls.

Construction-related direct impacts to burrowing owl would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-10.

Foraging Raptors: Ferruginous Hawk, Golden Eagle, Prairie Falcon, Swainson's Hawk

Four special-status raptor species have the potential to forage in the study area, but are not expected or have a low potential to nest, as noted in Section 3.6. Ferruginous hawk is a BCC for wintering that does not nest in California. Golden eagle is a CDFW FP species and a BCC and is protected under the Bald and Golden Eagle Protection Act. It nests in the region and may forage occasionally in the study area, but nesting habitat is absent in the study area. Although potentially suitable nesting habitat occurs at Soledad Mountain, as close as 1.0 mile from North–South Gen-Tie Route Option 3, and the CNDDB includes a golden eagle occurrence from this area in 1969, the site is not known to have been occupied since then. In addition, the presence of an open-pit, heap-leach gold and silver mine on the north slope of Soledad Mountain (between the study area and remaining potential nesting habitat) greatly reduces the current likelihood of golden eagles reoccupying the area for nesting. Therefore, golden eagles have only a low potential to nest in the vicinity of the study area, and indirect impacts would not occur to nesting golden eagles. Prairie falcon, a BCC species, has not been recorded nesting in the vicinity, and suitable nesting sites are absent from the study area, which lacks suitable cliffs and rock ledges. The potential for prairie falcon to nest in the vicinity of the study area is also limited by current mining activities at Soledad Mountain. Swainson's hawk is a BCC and ST species that nests in Joshua tree woodland and planted trees (e.g., wind breaks, trees near residences) elsewhere in the Antelope Valley. Nesting surveys of the area within 5.0 miles of the study area in 2017 were negative for nesting Swainson's hawks, although one transient adult and one juvenile were seen once each during surveys. Swainson's hawks nesting in the Antelope Valley may forage in desert scrub; however, no agricultural land suitable for foraging occurs within 5.0 miles of the study area.

Because ferruginous hawk does not nest in the region, no suitable nesting habitat occurs in the study area for golden eagle and prairie falcon, and surveys for nesting Swainson's hawks within 5.0 miles of the study area were negative, the project would have no short-term direct construction-related impacts to nesting habitat. Temporary impacts would exclude these species from foraging in the study area only over small areas at any one time, and they would be able to reoccupy these areas after construction. Therefore short-term impacts to foraging habitat would be less than significant. In addition, because only adults and fully fledged juveniles and subadults are expected to be present in the study area, these highly mobile raptors would be able to avoid injury or mortality from short-term direct construction-related impacts.

Lawrence's Goldfinch

Although Lawrence's goldfinch was not observed during surveys, it has a moderate potential to occur in the study area, especially near existing development. The temporary loss of habitat is not expected to have a significant impact on the species, due to the limited extent of impacts and relative abundance of habitat in and surrounding the study area. Direct impacts to nesting Lawrence's goldfinch are relatively unlikely, as this species is more likely to nest near residences than in Joshua tree woodland or any other vegetation community likely to be directly impacted by the project. However, any impacts resulting in the loss of nests, eggs, or nestlings would be considered significant.

MM-BIO-11 (pre-construction nesting bird survey) would require nesting bird surveys prior to construction that will result in avoidance of impacts to native nesting birds, including Lawrence's goldfinch, and their nests, eggs, and young. MM-BIO-1 (general construction-related avoidance and minimization measures) will limit equipment access to identified impact areas, thus preventing accidental clearing of Lawrence's goldfinch habitat and destruction of nests. Implementation of MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all workers complete a WEAP training and would require continual biological monitoring and compliance with all biological resources permit requirements.

Construction-related direct impacts to Lawrence's goldfinch would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-11.

LeConte's Thrasher

As stated in Section 3.6.2.4, LeConte's thrasher was observed regularly within desert scrub habitats with scattered Joshua trees during surveys, including along the main East–West Gen-Tie Route Option and North–South Gen-Tie Route Option 1. Suitable habitat also occurs within or near North–South Options 2 and 3. The temporary loss of habitat is not expected to have a significant impact on the species due to the abundance of habitat in and surrounding the study area that will remain available to LeConte's thrasher during construction. Adults of this species are very mobile and not susceptible to direct impacts from construction-related activities. However, the proposed project could have a direct impact on bird nests, eggs, and young, should nesting occur within construction areas. This impact would be significant absent mitigation.

MM-BIO-11 (preconstruction nesting bird survey) would require pre-construction nesting bird surveys, establishment of buffers, and avoidance of nests, including nests of LeConte's thrasher. MM-BIO-1 (general construction-related avoidance and minimization measures) will limit equipment access to identified impact areas, thus preventing accidental clearing of LeConte's thrasher habitat and destruction of nests. Implementation of MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all workers complete a WEAP training, and would require continual biological monitoring and compliance with all biological resources permit requirements.

Construction-related direct impacts to LeConte's thrasher would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-11.

Loggerhead Shrike

Several loggerhead shrikes were observed during surveys, and surveys also noted signs of nesting within the study area, including an active nest along North–South Gen-Tie Route Option 1 (see

Section 3.6.2.6 and Figure 3-3). This species has the potential to occur throughout the study area. The temporary loss of habitat is not expected to have a significant impact on the species, as abundant suitable habitat would remain available to the species after construction. Also, adult loggerhead shrikes are highly mobile and would avoid construction equipment and construction activities. However, the proposed project could result in destruction of nests, eggs, or young, if the species nests in construction areas. This impact would be significant absent mitigation.

MM-BIO-11 (preconstruction nesting bird survey) would require pre-construction nesting bird surveys, establishment of buffers, and avoidance of nests, including nests of loggerhead shrike. MM-BIO-1 (general construction-related avoidance and minimization measures) will limit equipment access to identified impact areas, thus preventing accidental clearing of loggerhead shrike habitat and destruction of nests. Implementation of MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all workers complete a WEAP training and would require continual biological monitoring and compliance with all biological resources permit requirements.

Construction-related direct impacts to loggerhead shrike would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-11.

Mammals

American Badger

American badger was not observed in the study area, but has a high potential to occur. Potential construction-related direct impacts to American badger and suitable habitat for American badger could result from unintentional clearing, trampling, or grading outside of the proposed project impact area during construction. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. These impacts could result in the temporary loss of American badger habitat and direct impacts to occupied dens and injury or mortality of badgers. The temporary direct impacts to suitable habitat for American badger are considered less than significant because they are relatively small (i.e., 104.1 acres to 123.1 acres) compared to the abundant suitable habitat that would remain available adjacent to the impact areas. The potential impacts to dens and loss or injury to individual badgers are considered significant, absent mitigation.

MM-BIO-12 requires pre-construction surveys for winter and natal badger dens, and, if present, implementation of avoidance measures to minimize impacts to badgers. If natal dens are found, a 200-foot buffer shall be flagged or fenced to avoid inadvertent impacts to the den. Construction would be postponed or halted until the project biologist determines that the young are no longer dependent on the natal den. With respect to natal den avoidance, MM-BIO-12 ensures that badgers would be allowed to complete pupping and disperse to off-site habitat when the natal den is vacated. If winter dens are found, a 50-foot avoidance buffer shall be flagged or fenced to avoid inadvertent impacts to the den. If it is not feasible to avoid the wintering den during construction activities, an attempt would be made to trap or flush the individual and relocate it to suitable open space habitat. Additionally, badgers may be relocated by slowly excavating the burrow, either by hand or mechanized equipment, under the direct supervision of the project biologist. Therefore, MM-BIO-12 would avoid and minimize direct impacts to individual American badgers during winter construction when they may be in a torpid state in their dens. MM-BIO-1 (general construction-related avoidance and minimization measures) would require demarcation of the construction area using highly visible materials, so as to minimize unintentional impacts to surrounding resources. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require the project biologist to conduct a WEAP for all construction/contractor personnel and would require ongoing biological construction monitoring to ensure compliance with mitigation measures. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and impacts would not occur to America badger outside the designated construction zone.

Construction-related direct impacts to American badger would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-12. These biological mitigation measures are described in full in Section 4.3.3.

Desert Kit Fox

A desert kit fox natal den and an additional burrow with older sign were observed in the study area, along North–South Gen-Tie Route Option 1. Desert kit fox has a high potential to occur in most other parts of the study area, but only a moderate potential to occur in Option 3, where much of the route follows existing paved roads. Potential construction-related direct impacts to desert kit fox and suitable habitat for desert kit fox could result from unintentional clearing, trampling, or grading outside of the proposed project impact area during construction. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. These impacts could result in the temporary loss of desert kit fox habitat and direct impacts to occupied dens and injury or mortality of foxes. The temporary direct impacts to suitable habitat for desert kit fox are considered less than significant because they are relatively small (i.e., 104.1 acres to 123.1 acres) compared to the abundant suitable habitat that would remain available adjacent to the impact areas. The potential impacts to dens and loss or injury to individual desert kit foxes are considered significant, absent mitigation.

MM-BIO-9 requires pre-construction surveys for special-status wildlife species, including surveys for desert kit foxes and their dens, and, if present, implementation of avoidance measures to minimize impacts to foxes. If natal dens are found, a 500-foot buffer shall be established to avoid inadvertent impacts to the den. Construction would be postponed or halted until the project biologist determines that the young are no longer dependent on the natal den. With respect to natal den avoidance, MM-BIO-9 ensures that desert kit foxes would be allowed to complete pupping and disperse to off-site habitat when the natal den is vacated. If the biologist determines that the den is not occupied, the biologist may excavate the den by hand. For occupied non-natal dens or potential dens that may be occupied, the qualified biologist may place a one-way door over all entrances to the den for 7 days to exclude desert kit fox from the den. At the end of this period, the qualified biologist may excavate the burrow by hand to prevent future occupancy. Therefore, MM-BIO-9 would avoid and minimize direct impacts to individual desert kit foxes during construction. MM-BIO-1 (general construction-related avoidance and minimization measures) would limit vehicles and construction equipment to identified impact areas and would limit ingress and egress to established roads, thus avoiding inadvertent impacts to kit fox dens. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require the project biologist to conduct a WEAP for all construction/contractor personnel and would require ongoing biological construction monitoring to ensure compliance with mitigation measures. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and impacts would not occur to desert kit fox outside the designated construction zone.

Construction-related direct impacts to desert kit fox would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-9. These biological mitigation measures are described in full in Section 4.3.3.

Mohave Ground Squirrel

Mohave ground squirrel surveys were not conducted in the study area, although a habitat assessment within North–South Gen-Tie Route Option 1 determined habitat to be suitable for much of the route. Suitable desert scrub habitats likely occur elsewhere throughout the study area. However, Mohave ground squirrel is not known to occur west of SR-14 in the study area vicinity (Leitner 2008, 2015).

Absent the recommended mitigation measures, potential construction-related direct impacts to Mohave ground squirrel could result from unintentional clearing, trampling, or grading outside of the proposed project impact area during construction. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. These impacts could result in temporary loss of Mohave ground squirrel habitat, permanent alteration of habitat, crushing of Mohave ground squirrel burrows, and entrapment or entombment of Mohave ground squirrels. Mohave ground squirrel is an ST species that has a limited range. Therefore, the proposed project would result in significant construction-related impacts to Mohave ground squirrel in all project options.

With respect to temporary habitat impacts in all project options (both unintentional and planned), areas that are directly but temporarily impacted shall be recontoured to natural grade and revegetated with application of a native seed mix in accordance with MM-BIO-4 (restoration of temporary impacts). The application of a native seed mix would promote passive restoration of temporary impact areas. Construction mitigation measure MM-BIO-13 (Mohave ground squirrel pre-construction surveys and avoidance and monitoring plan) would result in identification of any Mohave ground squirrels within areas potentially impacted by the project, establishment of appropriate buffers, and avoidance of impacts to Mohave ground squirrel. MM-BIO-1 (general construction-related avoidance and minimization measures) would limit vehicles and construction equipment to identified impact areas and would limit ingress and egress to established roads, thus avoiding inadvertent impacts to Mohave ground squirrels. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require the project biologist to conduct a WEAP for all construction/contractor personnel and would require ongoing biological construction monitoring to ensure compliance with mitigation measures. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and impacts would not occur to Mohave ground squirrels outside the designated construction zone.

Construction-related direct impacts to Mohave ground squirrel would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, MM-BIO-4, and MM-BIO-13. These biological mitigation measures are described in full in Section 4.3.3.

Tehachapi Pocket Mouse

No small mammal trapping or nocturnal surveys were conducted, and Tehachapi pocket mouse is unlikely to be observed during daytime surveys. This species has a moderate potential to occur in the western part of the study area, the western portion of the East–West Option.

Absent the recommended mitigation measures, potential construction-related direct impacts to Tehachapi pocket mouse could result from unintentional clearing, trampling, or grading outside of the proposed project impact area during construction. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project; the acreages for each gen-tie option are estimated in Table 4-1. These impacts could result in temporary loss of Tehachapi pocket mouse habitat, permanent alteration of habitat, and crushing of Tehachapi pocket mouse, either above ground or in burrows. Short-term impacts to habitat would affect a relatively limited area at the edge of the species' range, and abundant available natural habitat would remain farther eastward and northward. Therefore, short-term direct impacts to habitat would be less than significant. However, if this low-mobility, burrowing mammal is present during construction, it would be particularly susceptible to injury and mortality. This impact is considered significant absent mitigation.

Short-term direct impacts from injury or mortality of individuals would be reduced through MM-BIO-9 (pre-construction clearance surveys), which will require pre-construction surveys for special-status wildlife species using appropriate methods, avoidance of these species where possible, and relocation of individuals that may be captured. In addition, for any non-listed special-status wildlife species occurring in construction areas during construction, buffers will be established or, if establishing buffers is not feasible, attempts will be made to move the individuals to safety through capture and relocation or through encouraging them to leave the site. MM-BIO-1 (general construction-related avoidance and minimization measures) would further reduced this impact by requiring demarcation of the construction area using highly visible materials, so as to minimize unintentional impacts to surrounding resources. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require the project biologist to conduct a WEAP for all construction/contractor personnel and would require ongoing biological construction monitoring to ensure compliance with mitigation measures. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and impacts would not occur to Tehachapi pocket mouse outside the designated construction zone.

Construction-related direct impacts to Tehachapi pocket mouse would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, and MM-BIO-9.

Bats: Pallid Bat, Spotted Bat, Townsend's Big-Eared Bat

Although pallid bat and Townsends's big-eared bat have been recorded at suitable roosting habitat in the Soledad Mountain area, and although spotted bat has a moderate potential to roost in the vicinity, no bat roosting habitat occurs in the study area. In addition, short-term foraging impacts would affect a small area at any one time, therefore limiting the areas that these species may not have access to for foraging. Also, only a small portion of the entire study area is within

1.0 mile of known roosting sites at Soledad Mountain, and most of the gen-tie route options are much farther away, and likely not important for foraging by these species. Therefore, the project would have no short-term direct impacts to roosting habitat, and short-term direct impacts to foraging habitat would be less than significant. As these species are highly mobile and highly maneuverable, and therefore able to avoid construction areas and equipment, no construction impacts would occur due to injury or mortality of individuals.

4.3.2.1.2 Indirect

Short-term indirect impacts to special-status wildlife species are those that occur during construction to species present near the site, but not within the construction zone. These include fugitive dust that can degrade habitat and result in health implications for wildlife species; noise and vibration that can stress wildlife species or cause them to leave an area of otherwise suitable habitat, or that can result in disruption of bird nesting and abandonment of nests; increased human presence, which can also disrupt daily activities of wildlife and cause them to leave an area; night-time lighting, which can disrupt the activity patterns of nocturnal species, including many mammals and some birds, amphibians, and reptiles; and release of chemical pollutants, such as from oil leaks from construction vehicles and machinery.

Reptiles

Desert Tortoise

Construction activities have the potential to result in indirect impacts to desert tortoises and their habitat. Desert tortoises are typically below ground at night, so impacts from lighting during night-time construction would be less than significant. Other potential short-term or temporary indirect impacts to desert tortoise include the generation of fugitive dust, noise and vibration, increased human presence, and the release of chemical pollutants. Potential short-term or temporary indirect impacts to desert tortoise are considered significant absent mitigation.

MM-BIO-8 (desert tortoise pre-construction surveys and avoidance plan) would result in identification of any desert tortoises within areas potentially impacted by the project, establishment of appropriate buffers, and avoidance of indirect impacts to desert tortoise, including noise, vibration, and increased human presence. MM-BIO-1 (general avoidance and minimization measures) would minimize the potential effects of construction-related impacts by requiring vehicle maintenance restrictions to avoid chemical spills. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would minimize the potential effects of construction-related impacts by requiring all construction/contractor personnel to attend WEAP training, conducting biological monitoring during construction activities, and requiring compliance with all environmental documents and permits. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on desert tortoise during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

These potential short-term or temporary indirect impacts to desert tortoise would be less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-8.

Northern California Legless Lizard

Construction activities have the potential to result in indirect impacts to Northern California legless lizards and their habitat. Legless lizards are typically below ground, so impacts from generation of fugitive dust, increased human presence, and from lighting during night-time construction would be less than significant. Other potential short-term or temporary indirect impacts to Northern California legless lizard include noise and vibration and the release of chemical pollutants. Potential short-term or temporary indirect impacts to Northern California legless lizard are considered significant absent mitigation.

MM-BIO-9 (pre-construction clearance surveys) would require buffers around special-status wildlife species, if possible, thus reducing the likelihood of impacts from noise and vibration. MM-BIO-1 (general avoidance and minimization measures) would minimize the potential effects of construction-related impacts by requiring vehicle maintenance restrictions to avoid chemical spills. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would minimize the potential effects of construction-related impacts by requiring all construction/contractor personnel to attend WEAP training, conducting biological monitoring during construction activities, and requiring compliance with all environmental documents and permits.

Potential short-term or temporary indirect impacts to Northern California legless lizard would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, and MM-BIO-9.

Birds

Burrowing Owl

Construction activities have the potential to result in indirect impacts to burrowing owls and their habitat. Those impacts could include dust, noise and vibration, increased human presence, chemical spills, and night-time lighting. These potential short-term or temporary indirect impacts to burrowing owls are considered significant absent mitigation.

MM-BIO-10 (burrowing owl pre-construction surveys and avoidance/relocation plan) would require burrowing owl surveys and result in establishment of construction buffers around burrowing owl dens, thus limiting effects from most short-term indirect impacts, including noise and vibration, increased human presence, and night-time lighting. MM-BIO-1 (general construction-related avoidance and minimization measures) would prohibit night-time work and lighting within 50 feet of habitat for special-status species. MM-BIO-1 would also minimize the potential effects of construction-related impacts by requiring vehicle maintenance restrictions to avoid chemical spills. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all workers complete a WEAP training and would require ongoing biological monitoring and compliance with all biological resources permit requirements. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on burrowing owl during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

Potential short-term or temporary indirect impacts to burrowing owls would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-10.

Foraging Raptors: Ferruginous Hawk, Golden Eagle, Prairie Falcon, Swainson's Hawk

As noted above, these species are not expected to nest in the study area. Raptors foraging in the area, which would include only adults and fully fledged subadults, are highly mobile and would be able to avoid any short-term indirect impacts from project construction.

Lawrence's Goldfinch

Construction activities have the potential to result in indirect impacts to Lawrence's goldfinches and their habitat. Generation of fugitive dust, noise and vibration, increased human presence, and night-time lighting could result in impacts to nesting Lawrence's goldfinches, resulting in nest abandonment and failure. These short-term indirect impacts are considered significant absent mitigation.

Several construction-related measures would reduce short-term indirect impacts. MM-BIO-11 (pre-construction nesting bird survey) would require nesting bird surveys, buffers to bird nests, and avoidance of impacts to nesting birds, and thus would minimize the effects of noise, vibration, and increased human presence on nesting birds. MM-BIO-1 (general construction-related avoidance and minimization measures) would prohibit night-time work within 50 feet of special-status species habitat, except in case of emergency. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all construction workers complete a WEAP and would also require biological monitoring and compliance with all biological resources permit requirements. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on nesting birds during construction, including Lawrence's goldfinch, by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

Potential short-term indirect impacts to Lawrence's goldfinches would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-11.

LeConte's thrasher

Construction activities have the potential to result in indirect impacts to nesting LeConte's thrashesr. Those impacts could include dust, noise and vibration, increased human presence, chemical spills, and night-time lighting. Potential short-term or temporary indirect impacts to LeConte's thrashers are considered significant absent mitigation.

Several construction-related measures would reduce short-term indirect impacts to LeConte's thrashers. MM-BIO-11 (pre-construction nesting bird survey) would require nesting bird surveys, buffers to bird nests, and avoidance of impacts to nesting birds, and thus would minimize the effects of noise, vibration, and increased human presence on nesting birds. MM-BIO-1 (general construction-related avoidance and minimization measures) would prohibit night-time work within 50 feet of special-status species habitat, except in case of emergency. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all construction workers complete a WEAP and would also require biological monitoring and compliance with all biological resources permit requirements. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on nesting birds during construction, including LeConte's thrashers, by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

Potential short-term indirect impacts to LeConte's thrashers would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-11.

Loggerhead Shrike

Construction activities have the potential to result in indirect impacts to nesting loggerhead shrikes. Those impacts could include dust, noise and vibration, increased human presence, chemical spills, and night-time lighting. Potential short-term or temporary indirect impacts to loggerhead shrikes are considered significant absent mitigation.

Several construction-related measures would reduce short-term indirect impacts to loggerhead shrikes. MM-BIO-11 (pre-construction nesting bird survey) would require nesting bird surveys, buffers to bird nests, and avoidance of impacts to nesting birds, and thus would minimize the effects of noise, vibration, and increased human presence on nesting birds. MM-BIO-1 (general construction-related avoidance and minimization measures) would prohibit night-time work within 50 feet of special-status species habitat, except in case of emergency. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all construction workers complete a WEAP and would also require biological monitoring and compliance with all biological resources permit requirements. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on nesting birds during construction, including loggerhead shrikes, by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD Regulation VIII.

Potential short-term indirect impacts to loggerhead shrikes would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-11.

Mammals

American Badger

Should American badgers occur in the study area, direct short-term impacts from construction could result. Potential short-term or temporary indirect impacts to American badgers include the generation of fugitive dust, noise and vibration, increased human presence, and night-time lighting. Potential short-term or temporary indirect impacts to American badgers are considered significant absent mitigation.

MM-BIO-12 (pre-construction surveys for American badger) would require surveys for American badger dens and result in establishment of construction buffers around dens, thus limiting effects from most short-term indirect impacts, including noise and vibration, increased human presence, and night-time lighting. MM-BIO-1 (general construction-related avoidance and minimization measures) would prohibit night-time work and lighting within 50 feet of habitat for special-status species, except in case of emergency. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all workers complete a WEAP training and would require ongoing biological monitoring and compliance with all biological resources permit requirements. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on badger during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

Potential short-term or temporary indirect impacts to American badgers would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-12.

Desert Kit Fox

Should desert kit foxes occur in the study area, direct short-term impacts from construction could result. Potential short-term or temporary indirect impacts to desert kit foxes include the generation of fugitive dust, noise and vibration, increased human presence, and night-time lighting. Potential short-term or temporary indirect impacts to desert kit foxes are considered significant absent mitigation.

MM-BIO-9 (pre-construction clearance surveys) would require surveys for desert kit foxes and their dens and would result in establishment of construction buffers around dens, thus limiting effects from most short-term indirect impacts, including noise and vibration, increased human presence, and night-time lighting. MM-BIO-1 (general construction-related avoidance and minimization measures) would prohibit night-time work and lighting within 50 feet of habitat for special-status species, except in case of emergency. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would require that all workers complete a WEAP training and would require ongoing biological monitoring and compliance with all biological resources permit requirements. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on desert kit fox during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

Potential short-term or temporary indirect impacts to desert kit foxes would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-9.

Mohave Ground Squirrel

Should Mohave ground squirrels occur in the study area, direct short-term impacts from construction could result. Potential short-term or temporary indirect impacts to Mohave ground squirrels include the generation of fugitive dust, noise and vibration, increased human presence, night-time lighting, and the release of chemical pollutants. Potential short-term or temporary indirect impacts to Mohave ground squirrels are considered significant absent mitigation.

MM-BIO-13 (Mohave ground squirrel surveys and avoidance plan) would require pre-construction Mohave ground squirrel surveys using methods approved by CDFW, and would result in identification of any Mohave ground squirrels within areas potentially impacted by the project, establishment of appropriate buffers, and avoidance of indirect impacts to Mohave ground squirrels, including noise, vibration, and increased human presence. MM-BIO-1 (general avoidance and minimization measures) would minimize the potential effects of construction-related impacts by requiring vehicle maintenance restrictions to avoid chemical spills, by prohibiting night-time construction within 50 feet of the outside edge of the construction in areas containing habitat for special-status species except in case of an emergency, and by requiring that night-time lighting, when necessary, be directed away from natural areas. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would minimize the potential effects of construction-related impacts by requiring all construction/contractor personnel to attend WEAP training, conducting biological monitoring during construction activities, and requiring compliance with all environmental documents and permits. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on Mohave ground squirrel during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

These potential short-term or temporary indirect impacts to Mohave ground squirrels would be less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, MM-BIO-13.

Tehachapi Pocket Mouse

Construction activities have the potential to result in indirect impacts to Tehachapi pocket mouse and its habitat. Although little is known of the habits of this subspecies, it is believed to be nocturnal and to feed on seeds and plant matter (Laabs 2008). Based on this, fugitive dust and chemical pollution have the potential to affect the species through degradation of habitat and impacts to the seeds and plant matter on which the species presumably feeds. Night-time lighting, noise and vibration, and increased human presence could affect the activity patterns of this nocturnal species, especially if work is conducted at night. Potential short-term or temporary indirect impacts to Tehachapi pocket mouse are considered significant absent mitigation.

MM-BIO-9 (pre-construction clearance surveys) would require buffers around special-status wildlife species, if possible, thus reducing the likelihood of impacts from noise and vibration and human presence. MM-BIO-1 (general avoidance and minimization measures) would minimize the potential effects of chemical pollution and night-time lighting by requiring vehicle maintenance restrictions to avoid chemical spills and by requiring that no night-time work take place within 50 feet of habitat for special-status wildlife species, except in case of emergency. BIO-2 (WEAP training, biological monitoring, and compliance) would generally minimize the potential indirect effects from construction by requiring all construction/ contractor personnel to attend WEAP training, conducting biological monitoring during construction activities, and requiring compliance with all environmental documents and permits. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust on Tehachapi pocket mouse during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with the EKAPCD requirements.

Potential short-term or temporary indirect impacts to Tehachapi pocket mouse would be reduced to less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-6, and MM-BIO-9.

Bats: Pallid Bat, Spotted Bat, Townsend's Big-Eared Bat

As noted above, none of these species are expected to roost near construction activities. However, they have some potential to forage in the area. Should construction occur at night, minor effects could result from night-time lighting and human presence. However, because these species are highly mobile and highly maneuverable, they would be able to avoid these short-term indirect impacts, which would therefore be less than significant.

4.3.2.2 Operations (Long-Term) Impacts

Long-term direct impacts to special-status wildlife species, as with short-term direct impacts, include habitat impacts and impacts resulting in injury or mortality of individuals. Habitat impacts are permanent impacts from loss of vegetation communities and land covers. As shown in Table 4-1, the project would result in permanent impacts to between 38.4 acres (Option 2) and 42.8 acres (Option 3) of land covers in the study area. The location of these impacts, and the proportion that would affect natural vegetation communities versus disturbed or developed land covers, is unknown. Long-term direct impacts from injury or mortality of individuals include impacts occurring from activities related to O&M. For example, occasional road grading could result in crushing of low-mobility wildlife species occurring along the existing road or entombment of burrowing species in previously disturbed areas (although some of the burrowing species occurring in the study area avoid such areas).

4.3.2.2.1 Direct

Reptiles

Desert Tortoise

As shown Table 4-1, the project would result in impacts to between 38.4 acres (Option 2) and 42.8 acres (Option 3) of vegetation communities or land covers in the study area. As the exact location of impacts is not known, it is unclear what portion of this area is suitable habitat for desert tortoise. However, as desert tortoise is an FT and ST species whose population has declined in its range within California, any loss of habitat could be considered a potentially significant impact. Direct loss or injury of desert tortoise during the operations period, such as from maintenance activity, could result from the project, which would also be a significant impact.

Once the final grading plan is prepared, implementation of MM-BIO-7 (off-site habitat mitigation lands) will require quantification of the loss of habitat for desert tortoise and compensatory mitigation at a 1:1 ratio. This will offset impacts from the loss of desert tortoise habitat. During the operations period, implementation of MM-BIO-8 (desert tortoise pre-construction surveys and avoidance plan) will include several requirements resulting in avoidance of loss or injury to desert tortoises. These include worker education, cessation of work if desert tortoises are found in work areas, relocation of desert tortoises by a qualified biologist, if necessary, and restriction of work to daylight hours, except in an emergency. MM-BIO-2 also incorporates worker education by requiring that operational staff shall complete WEAP training prior to deployment on the site.

These potential long-term direct impacts to desert tortoises would be reduced to less than significant with implementation of MM-BIO-2, MM-BIO-7, and MM-BIO-8.

Northern California Legless Lizard

As shown Table 4-1, the project would result in impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers in the study area. As the exact location of impacts is not known, it is unclear what portion of the impacts will be to suitable habitat for Northern California legless lizards. However, because of the relatively limited extent of permanent impacts, much of which would occur outside the range for Northern California legless lizards, direct impacts to legless lizard habitat would be less than significant. Long-term direct impacts from occasional road grading during O&M are not likely to result in injury or mortality of individuals. Work for this activity is expected to occur only within previously disturbed and compacted areas that are not suitable for this species, which occurs in sandy or otherwise loose soils. Also, because this species does not travel far and stays mostly underground, it is unlikely to wander onto roads. Therefore, long-term direct impacts to Northern California legless lizards would be less than significant.

Birds

Burrowing Owl

The proposed project has the potential to impact between 38.4 acres and 42.8 acres of vegetation communities or land covers, depending upon the option selected (Table 4-1). Currently, the exact location of permanent impacts stemming from the project is unknown. It is expected that a portion of project-related impacts would be to disturbed and developed areas, which may be within existing easements. Because of the limited area of permanent direct impacts and the abundant suitable habitat that would remain in the area after construction, direct permanent impacts to burrowing owl habitat would be less than significant. Most routine operation and maintenance activities are not likely to result in impacts to burrowing owls. Occasional grading of access roads is likely to occur, however. But these impacts would be limited to previously disturbed areas and are unlikely to affect burrowing owls. Therefore, permanent direct impacts to burrowing owls would be less than significant.

Foraging Raptors: Ferruginous Hawk, Golden Eagle, Prairie Falcon, Swainson's Hawk

The proposed project has the potential to result in permanent impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers, depending upon the option selected (Table 4-1). Because these impacts are relatively minor, much of the potential impact area is in existing rights-of-way (ROWs) that are previously disturbed, and abundant habitat similar to any natural habitat removed would remain in the area, impacts to raptor foraging habitat would be less than significant. Because these species are highly mobile, and the adults and fully fledged subadults potentially present would easily be able to avoid construction, impacts to individual raptors from injury or mortality of individuals would be less than significant.

Lawrence's Goldfinch

The proposed project has the potential to result in permanent impacts to between 38.4 acres and 42.8 acres, depending upon the option selected (table 4-1). Because the extent of these impacts is relatively minor, much of the potential impact area is in existing ROWs that are previously disturbed, and abundant habitat similar to any natural habitat removed would remain in the area, permanent direct impacts to Lawrence's goldfinch habitat would be less than significant. O&M impacts are unlikely to result in injury or mortality of Lawrence's goldfinch. As impacts from occasional grading are expected to remain within established roads or other disturbed area, no impacts are expected to nesting Lawrence's goldfinches. Adults and fledged juveniles would able to avoid machinery involved in grading. Therefore, direct permanent impacts to Lawrence's goldfinches would be less than significant.

LeConte's Thrasher

The proposed project has the potential to result in permanent impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers, depending upon the option selected (table 4-1). Because these impacts are relatively minor, much of the potential impact area is in existing ROWs that are previously disturbed, abundant habitat similar to any natural habitat removed would remain in the area, and the species is relatively common in the area, direct permanent impacts to LeConte's thrasher habitat would be less than significant. O&M impacts are unlikely to result in injury or mortality of LeConte's thrashers. As impacts from occasional grading are expected to remain within established roads or other disturbed areas, no impacts are expected to nesting LeConte's thrashers. Adults and fledged juveniles would able to avoid machinery involved in grading. Therefore, direct permanent impacts to LeConte's thrashers would be less than significant.

Loggerhead shrike

The proposed project has the potential to result in permanent impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers, depending upon the option selected (table 4-1). Because these impacts are relatively minor, much of the potential impact area is in existing ROWs that are previously disturbed, and abundant habitat similar to any natural habitat removed would remain in the area, direct permanent impacts to loggerhead shrike habitat would be less than significant. O&M impacts are unlikely to result in injury or mortality of loggerhead shrikes. As impacts from occasional grading are expected to remain within established roads or other disturbed areas, no impacts are expected to nesting loggerhead shrikes. Adults and fledged juveniles would able to avoid machinery involved in grading. Therefore, direct permanent impacts to loggerhead shrikes would be less than significant.

Mammals

American Badger

As described for other species, the proposed project has the potential to impact between 38.4 acres and 42.8 acres of vegetation communities or land covers, depending upon the option selected (Table 4-1), but it is expected that a portion of project-related impacts would be to disturbed and developed areas which may be within existing easements. Because of the limited area of permanent direct impacts and the abundant suitable habitat that would remain in the area after construction, direct permanent impacts to American badgers would be less than significant. Most routine O&M activities are not likely to result in impacts to American badgers. Occasional grading of access roads is likely to occur, but these impacts would be limited to previously disturbed areas and are unlikely to affect American badgers. Therefore, permanent direct impacts to American badgers would be less than significant.

Desert Kit Fox

As described for other species, the proposed project has the potential to impact between 38.4 acres and 42.8 acres of vegetation communities and land covers, depending upon the option selected (Table 4-1), but it is expected that a portion of project-related impacts would be to disturbed and developed areas which may be within existing easements. Because of the limited area of permanent direct impacts and the abundant suitable habitat that would remain in the area after construction, direct permanent impacts to desert kit foxes would be less than significant. Most routine O&M activities are not likely to result in impacts to desert kit foxes. Occasional grading of access roads is likely to occur, but these impacts would be limited to previously disturbed areas and are unlikely to affect desert kit foxes. Therefore, permanent direct impacts to desert kit foxes would be less than significant.

Mohave Ground Squirrel

As shown Table 4-1, the project would result in impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers. As the exact location of impacts is not known, it is unclear what portion of this area is suitable habitat for Mohave ground squirrels. In addition, some areas where impacts may occur to desert scrub in the western part of the study area may be outside the range of the species, or where it is unlikely to occur, such as the western portion of the East–West Gen-Tie Route. However, as Mohave ground squirrel is an ST species with a restricted range, any loss of habitat could be considered a potentially significant impact. Direct mortality or injury of Mohave ground squirrels during the operations period, such as from road grading, is relatively unlikely. A large portion of the study area is outside the known range of the species, and large parts of the gen-tie route options within the species' known range (from approximately SR-14 westward) are within disturbed areas within existing easements, mostly along established roads. In addition, access road maintenance requirements in the desert region are relatively minor and usually are associated with washouts during severe seasonal flooding. Maintenance equipment moves slowly, so aboveground Mohave ground squirrels, if any are present, likely would be able to avoid collisions with the equipment. Burrows are typically located under large shrubs (MGSWG 2011). It is unlikely that maintenance of existing access and spur roads would directly affect an occupied burrow. Therefore, impacts from operations would be less than significant.

Once the final grading plan is prepared, implementation of MM-BIO-7 (off-site habitat mitigation lands) will require quantification of the loss of habitat for Mohave ground squirrels and compensatory mitigation at a 1:1 ratio. This will offset impacts from the loss of Mohave ground squirrel habitat. Although impacts to Mohave ground squirrels from injury and mortality would be less than significant and no mitigation is required, implementation of MM-BIO-14 (speed limits and speed limit/sensitive species signage) would require establishment of a 15 mph speed limit and would require that vehicles stay on established roads, further reducing the possibility of impacts to Mohave ground squirrels. MM-BIO-2 requires that operational staff shall complete WEAP training prior to deployment on the site, thus further reducing the potential for impacts to Mohave ground squirrels during O&M.

Potential long-term direct impacts to Mohave ground squirrels would be reduced to less than significant with implementation of MM-BIO-2, MM-BIO-7, and MM-BIO-14.

Tehachapi Pocket Mouse

As shown Table 4-1, the project would result in impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers in the study area. As the exact location of impacts is not known, it is unclear what portion of the impacts will be to suitable habitat for Tehachapi pocket mouse. However, because of the relatively limited extent of permanent impacts, much of which would occur outside the range for Tehachapi pocket mouse, direct impacts to Tehachapi pocket mouse habitat would be less than significant. Long-term direct impacts from occasional road grading are not likely to result in injury or mortality of individuals. Work is expected to occur only within previously disturbed and compacted areas that are not suitable for this species. Therefore, long-term direct impacts to Tehachapi pocket mouse would be less than significant.

Bats: Pallid Bat, Spotted Bat, Townsend's Big-Eared Bat

As noted above, roosting habitat for these species is absent from the study area. However, as shown Table 4-1, the project would result in impacts to between 38.4 acres and 42.8 acres of vegetation communities or land covers in the study area, depending on the option selected. An unknown portion of this relatively small area would be to previously disturbed areas along existing easements. In addition, abundant habitat similar to any natural habitats removed would remain in the vicinity. Therefore, impacts to foraging habitat for special-status bat species would be less than significant. Project operations are not expected to result in any long-term direct impacts to bats. Should any such activities be conducted at night, when special-status bat species are active, these highly mobile and highly maneuverable species would be able to avoid loss or harm from O&M activities. Therefore, long-term direct impacts to special-status bats would be less than significant.

4.3.2.2.2 Indirect

Long-term indirect impacts to special-status wildlife species include impacts that could occur after construction is completed during O&M. These impacts occur because of the presence of O&M adjacent to areas occupied by special-status wildlife species. The primary potential long-term indirect impacts to special-status wildlife species from the proposed project are long-term habitat degradation from temporary impacts, vehicle collisions, and collision and electrocution from power lines. Habitat degradation can occur because the introduction of non-native plant species affects aspects of habitat structure and food resources that are essential to some species. Vehicle collisions have the potential to occur along access roads. Although vehicle traffic is expected to be low, the presence of moving vehicles on roads through occupied habitat could pose a hazard to low and moderate mobility mammals and reptiles and even to some birds. Power lines also provide collision hazards to some birds, such as raptors, or they can be an electrocution hazard to special-status birds perching on the structures.

Reptiles

Desert Tortoise

Potential long-term indirect impacts that could result from development within or adjacent to desert tortoise habitat include vehicle collisions during the operations phase, degradation of habitat from habitat fragmentation, and increased invasive plant species that may degrade habitat. Construction of access roads could result in vehicular traffic in suitable desert tortoise habitat, leaving the species vulnerable to collisions with vehicles. Temporary habitat impacts could facilitate the long-term increase in invasive plants and further habitat fragmentation. These potential long-term indirect impacts to desert tortoises would be significant absent mitigation.

MM-BIO-4 (restoration of temporary impacts) would help prevent adverse effects of invasive plant species and habitat fragmentation that may alter the composition of the habitat if allowed to passively colonize the area post-construction if these areas are not revegetated. Implementation of MM-BIO-14 (speed limits and sensitive resources signage) would result in the posting of speed limits and educational material along roads on the presence of desert tortoises and other sensitive species.

These potential long-term indirect impacts to desert tortoises would be less than significant with implementation of MM-BIO-4 and MM-BIO-14.

Northern California Legless Lizard

The project is unlikely to result in long-term indirect impacts to Northern California legless lizards. This species spends most of its time underground and is therefore unlikely to be vulnerable to vehicle collisions or night-time lighting.

Birds

Burrowing Owl

Potential long-term indirect impacts that could result from development within or adjacent to burrowing owl habitat include vehicle collisions during the operations phase and increased invasive plant species that may degrade habitat. Construction of access roads could result in vehicular traffic in suitable burrowing owl habitat, leaving the species vulnerable to collisions with vehicles. Vehicle traffic is expected to be very sparse and slow-moving, limiting the likelihood of collisions with burrowing owls, but even a small loss of individuals of this SSC that has experienced declines in California could be considered a significant impact. In addition, temporary habitat impacts could facilitate the long-term increase in invasive plants. Burrowing owls favor areas that include a substantial amount of bare ground, and increasing non-natives can lead to dense ground cover that constitutes a degradation of that habitat. These potential long-term indirect impacts to burrowing owls would be significant absent mitigation.

MM-BIO-4 (restoration of temporary impacts) would result in restoration of temporary impact areas that would limit the introduction of non-native species in burrowing owl habitat and avoid long-term habitat degradation. MM-BIO-14 (speed limits and sensitive species signage) would impose a 15 mph speed limit and require that this limit be posted along access roads and at the entrance to access roads, thus reducing the already low potential for vehicle collisions.

Potential long-term indirect impacts to burrowing owls would be reduced to less than significant with implementation of MM-BIO-4 and MM-BIO-14.

Foraging Raptors: Ferruginous Hawk, Golden Eagle, Prairie Falcon, Swainson's Hawk

Long-term indirect impacts to foraging raptors potentially include vehicle collisions and collisions and electrocution from power lines. Susceptibility to these impacts varies somewhat by species, but each species is at least somewhat subject to these impacts. Increased vehicle traffic has a minor potential to result in mortality to raptors, given traffic under any circumstances is likely to be very sparse and relatively slow. However, even the rare loss of one of these species due to vehicles traveling at an unexpectedly rapid rate could be considered a significant impact absent mitigation. Collisions with power lines and electrocution of birds perching on power lines is a substantial source of mortality for these species, if power lines are not designed to avoid these problems. Therefore, this would be a significant impact absent mitigation.

Implementation of MM-BIO-14 (speed limits and sensitive species signage) would require a speed limit of 15 mph and posting of this limit along and at the entrances to access roads, therefore further reducing the already low likelihood of vehicle collisions. MM-BIO-15 (Avian Power Line Interaction Committee (APLIC) guidelines) would require that power lines be constructed to minimize avian collisions and electrocution from power lines.

These potential long-term indirect impacts to foraging raptors would be less than significant with implementation of MM-BIO-14 and MM-BIO-15.

Lawrence's Goldfinch

Lawrence's goldfinches are relatively mobile and are not especially susceptible to impacts from vehicle collisions. Traffic is expected to be very sparse and relatively slow-moving on project access roads, and Lawrence's goldfinches should be able to avoid colliding with vehicles. Although this species in known to perch on wires, it is not susceptible to electrocution because its small size precludes the effects of arcing, in which larger current from nearby wires may travel through larger birds perched below. This species is also very maneuverable and unlikely to collide with power lines. Therefore, long-term indirect impacts to this species are considered less than significant.

LeConte's Thrasher

LeConte's thrashers rarely perch on wires and are not likely to be susceptible to impacts from electrocution and collision due to power lines. However, the species is potentially subject to long-term indirect impacts from vehicle collisions. LeConte's thrashers typically stay low to the ground, and increased vehicle traffic has some potential to result in direct mortality to this species, which could be a significant impact.

Implementation of MM-BIO-14 (speed limits and sensitive species signage) would require a speed limit of 15 mph and posting of this limit along and at the entrances to access roads, therefore reducing the already low likelihood of vehicle collisions.

The potential long-term indirect impacts to LeConte's thrashers from vehicle collisions would be less than significant with implementation of MM-BIO-14.

Loggerhead Shrike

Loggerhead shrikes are relatively mobile and are not especially susceptible to impacts from vehicle collisions. Traffic is expected to be very sparse and relatively slow-moving on project access roads, and loggerhead shrikes should be able to avoid colliding with vehicles. Although loggerhead shrikes frequently perch on power lines, this species is small and not subject to electrocution because of arcing while perched on power lines. Therefore long-term indirect impacts to loggerhead shrikes would be less than significant.

Mammals

American Badger

Potential long-term indirect impacts that could result from development within or adjacent to American badger habitat include vehicle collisions. Construction of access roads could result in vehicular traffic in suitable American badger habitat, leaving the species vulnerable to collisions with vehicles. While traffic is expected to be very sparse and relatively slow-moving on project access roads, potential loss of American badgers from long-term indirect impacts due to vehicle collisions would be significant absent mitigation.

Implementation of MM-BIO-14 (speed limits and sensitive species signage) would require a speed limit of 15 mph and posting of this limit along and at the entrances to access roads, therefore further reducing the already low likelihood of vehicle collisions. The potential long-term indirect impacts to American badger would be less than significant with implementation of MM-BIO-14.

Desert Kit Fox

Potential long-term indirect impacts that could result from development within or adjacent to desert kit fox habitat include vehicle collisions. Construction of access roads could result in vehicular traffic in suitable desert kit fox habitat, leaving the species vulnerable to collisions with vehicles. While traffic is expected to be very sparse and relatively slow-moving on project access roads, any potential loss of desert kit foxes would be significant absent mitigation.

Implementation of MM-BIO-14 (speed limits and sensitive species signage) would require a speed limit of 15 mph and posting of this limit along and at the entrances to access roads, therefore further reducing the already low likelihood of vehicle collisions. The potential long-term indirect impacts to desert kit foxes would be less than significant with implementation of MM-BIO-14.

Mohave Ground Squirrel

Potential long-term indirect impacts that could result from development within or adjacent to Mohave ground squirrel habitat include vehicle collisions during the operations phase, degradation of habitat from habitat fragmentation, and increased invasive plant species that may degrade habitat. Construction of access roads could result in vehicular traffic in suitable Mohave ground squirrel habitat, leaving the species vulnerable to collisions with vehicles. Temporary habitat impacts could facilitate the long-term increase in invasive plants and further habitat fragmentation. These potential long-term indirect impacts to Mohave ground squirrels would be significant absent mitigation.

MM-BIO-4 (restoration of temporary impacts) would help prevent adverse effects of invasive plant species that may alter the composition of the habitat, also resulting in habitat fragmentation, if allowed to passively colonize the area post-construction if these areas are not revegetated. Implementation of MM-BIO-14 (speed limits and sensitive resources signage) would result in the posting of speed limits and educational signage along roads on the presence of Mohave ground squirrels and other sensitive species.

These potential long-term indirect impacts to Mohave ground squirrels would be less than significant with implementation of MM-BIO-4 and MM-BIO-14.

Tehachapi Pocket Mouse

Long-term indirect impacts could result to Tehachapi pocket mouse from vehicle collisions after construction. Increased vehicle traffic has a minor potential to result in mortality to Tehachapi pocket mouse, given traffic under any circumstances is likely to be very sparse and relatively slow. However, even the rare loss of individuals of this rare species due to vehicle collisions could be considered a significant impact absent mitigation.

Implementation of MM-BIO-14 (speed limits and sensitive species signage) would require a speed limit of 15 mph and posting of this limit along and at the entrances to access roads, therefore further reducing the already low likelihood of vehicle collisions. The potential long-term indirect impacts to Tehachapi pocket mouse would be less than significant with implementation of MM-BIO-14.

Bats: Pallid Bat, Spotted Bat, Townsend's Big-Eared Bat

As these species are highly mobile and highly maneuverable, they are not susceptible to vehicle collisions or collisions with stationary power lines. Therefore, no long-term indirect impacts are expected to special-status bat species.

4.3.3 Mitigation Measures

MM-BIO-1 General Avoidance and Minimization Measures

The following avoidance and minimization measures shall be implemented during project construction and operations and maintenance (O&M). These measures have been organized into subcategories for ease of reading.

Work Hours

- Construction and O&M activities within 50 feet of the outside edge of the construction zone or work area containing habitat for special-status wildlife will be prohibited between sunset and sunrise, and all construction-related or maintenance-related lighting will be turned off during that period, with the exception of lighting for maintenance during O&M and emergencies (defined as an imminent threat to life or significant property) activities. If necessary, lighting for maintenance during O&M and emergencies within 50 feet of habitat for special-status wildlife will be directed away from natural areas.

Debris/Non-native Vegetation/Pollution

- Fully covered trash receptacles that are animal-proof will be installed and used during construction to contain all food, food scraps, food wrappers, beverage containers, and other miscellaneous trash. Trash contained within the receptacles will be removed at least once a week from the project site.
- No litter, construction materials, or debris will be discharged into state-jurisdictional waters.
- Construction work and O&M areas shall be kept clean of debris, such trash, and construction materials.

Vehicle and Equipment Restrictions and Maintenance

- Night-time construction should be minimized to the extent possible. However, if night-time activity (e.g., equipment maintenance) is necessary, then the speed limit shall be 10 mph.
- Vehicle operation within state-jurisdictional waters when surface water is present will be prohibited. Any equipment or vehicles driven and/or operated within or adjacent to a state-jurisdictional channel will be checked and maintained by the operator daily to prevent leaks of oil or other petroleum products that could be deleterious to aquatic life if introduced to the watercourse.
- During construction, vehicles and equipment access will be limited to the identified impact areas, and ingress and egress will be limited to existing roads. During O&M, vehicles and equipment will be limited to maintenance access roads and the minimal area necessary to perform the work.
- Staging and storage areas for spoils, equipment, materials, fuels, lubricants, and solvents will be located outside the state-jurisdictional channels and within the designated impact area. Stationary equipment, such as motors, pumps, generators, compressors, and welders, located within or adjacent to state-jurisdictional waters shall be positioned over drip-pans or other containment. Prior to refueling and lubrication, vehicles and other equipment shall be moved away from the state-jurisdictional channels.

Other Restrictions on Activities and Personnel

≠ No pets, such as cats or dogs, should be permitted on the project site during construction or O&M.

≠ Any contractor, employee, or agency personnel who is responsible for inadvertently killing, injuring, or trapping a listed species shall immediately report the incident to the project biologist during construction and the operations manager during O&M. The project biologist or operations manager shall contact the U.S. Fish and Wildlife Service (USFWS) (for federal Endangered Species Act species) and California Department of Fish and Wildlife (CDFW) (for California Endangered Species Act species) immediately in the case of a dead, injured, or entrapped listed species. The Sacramento USFWS Office and CDFW shall be notified in writing within 3 working days of the accidental death or injury to a listed species during project-related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The USFWS office that covers the desert portions of Kern County is located at 777 E. Tahquitz Canyon Way, Suite 208, Palm Springs, California, 760.322.2070. The CDFW Central Region office is located at 1234 East Shaw Avenue, Fresno, California 93710, 559.243.4005.

≠ To prevent inadvertent entrapment of special-status wildlife during construction, all excavated, steep-walled holes or trenches more than 2 feet deep shall be covered with plywood or similar materials at the close of each working day, or be provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they shall be thoroughly inspected for trapped wildlife. If trapped animals are observed, escape ramps or structures shall be installed immediately to allow escape.

≠ All pipes, culverts, or similar structures with a diameter of 4 inches or more that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for special-status wildlife or nesting birds before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If an animal is discovered inside a pipe, that section of pipe shall not be moved until the project biologist has been consulted and the animal has either moved from the structure on its own accord or until the animal has been captured and relocated by the project biologist. If a federally or state-listed species is discovered, that section of pipe shall not be moved until the USFWS and/or CDFW has been consulted. If necessary, under the direct supervision of the project biologist, the pipe may be moved once to remove it from the path of construction activity until the species has escaped.

MM-BIO-2 Environmental Awareness Training, Biological Monitoring, and Compliance

Worker Environmental Awareness Program and Ongoing Training

Prior to the initiation of any on-site grading, all construction/contractor personnel working on site must complete training through a Worker Environmental Awareness Program (WEAP). New construction workers engaged in construction activities (e.g., grading, utility installation, etc.) shall complete WEAP training within the first week of deployment on the site. Additionally, operational staff shall complete WEAP training prior to deployment on the site.

The traininig shall include the following:

≠ Provide the training materials for WEAP training. These materials shall include the measures and mitigation requirements for protected plant and wildlife species (e.g., avoidance and buffer requirements, night-time construction limitations, etc.); and the location and mitigation requirements for waters of the state. WEAP training will also include driver training to avoid and minimize collision risks with protected species, and reporting protocols in the event that any dead or injured wildlife are discovered.

≠ Copies of mitigation measures and permits from resource agencies, such as the CDFW and Regional Water Quality Control Board (RWQCB), will be made available.

Species-specific WEAP training for desert tortoise is described in MM-BIO-8.

Biological Monitoring and Compliance Documentation

The project biologist shall perform the biological monitoring and compliance documentation for the project during construction, including the following:

≠ Prior to the initiation of any on-site grading, the project biologist will document that required pre-construction surveys and/or relocation efforts have been implemented.

≠ The project biologist will periodically monitor activities during initial grading.

≠ The project biologist will note any evidence of trash or microtrash and, if present, communicate the presence and requirement to remove the trash to the construction manager.

MM-BIO-3 Pre-construction Surveys and Avoidance and Minimization Measures for Special-Status Plants

Pre-construction Surveys

Within the North–South Gen-Tie Route Option 3 impact area and prior to the commencement of construction activities in suitable habitat, a pre-construction survey shall be conducted in suitable habitat, determined by the project biologist, to determine whether special-status plants are present in the construction zone or within 50 feet of the construction zone boundary. Focused surveys for special-status plant species shall be conducted by a qualified biologist according to: the *CNPS Botanical Survey Guidelines* (CNPS 2001); *Protocols for Surveying and Evaluating Impacts to Special Status Native Populations and Natural Communities* (CDFG 2009); and *U.S. Fish and Wildlife Service General Rare Plant Survey Guidelines* (Cypher 2002). The pre-construction survey shall be conducted during a period when the target species would be observable and identifiable (e.g., blooming period for annuals). The target species list will include alkali mariposa lily, recurved larkspur, Barstow woolly sunflower, pale-yellow layia, sagebrush Loeflingia, and Latimer's woodland-gilia that have a moderate potential to occur in the construction zone or within 50 feet of the construction zone.

Avoidance, Minimization, and Mitigation Measures

If special-status plants are detected during pre-construction surveys, the location of the species will be mapped. If impacts to special-status plants cannot be avoided, the following measures will be implemented:

1. Special-status plants in the vicinity of the disturbance will be temporarily fenced or prominently flagged and a 50-foot buffer established around the populations to prevent inadvertent encroachment by vehicles and equipment during the activity;

2. Seeds/bulbs will be collected and stored in appropriate storage conditions (e.g., cool and dry), and dispersed/transplanted following the construction activity and reapplication of salvaged topsoil; and

3. The top 6 inches of topsoil will be salvaged, stockpiled, and replaced as soon as practicable after project completion. The salvaged topsoil shall be redistributed at the same depth and contoured to blend with surrounding grades.

Additionally, while it is not expected that a federally or state-listed plant would be observed during these surveys, the applicant shall consult with the applicable agency (i.e., CDFW and/or USFWS) and written concurrence for measures required for federally or state-listed plant species, if observed.

MM-BIO-4 Restoration of Temporary Impacts to Uplands with Non-invasive Species

Site construction areas subjected to temporary ground disturbance, including storage and staging areas, and temporary roads, shall be recontoured to natural grade (if the grade was modified during the temporary disturbance activity), and revegetated with an application of a native seed mix, if necessary, prior to or during seasonal rains to promote passive restoration of the area to pre-project conditions (except that no invasive plants will be restored). An area subjected to "temporary" disturbance means any area that is disturbed but will not be subjected to further disturbance as part of the project. This measure does not apply to situations that are urban/developed that are temporarily impacted and will be returned to an urban/developed land use. Prior to seeding temporary ground disturbance areas, the project biologist will review the seeding palette to ensure that no seeding of invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region, will occur.

MM-BIO-5 Stormwater Pollution Prevention Plan

Prior to issuance of a grading permit for construction, the applicant shall submit a Stormwater Pollution Prevention Plan (SWPPP) to the Kern County Engineering, Surveying, and Permit Services Department that specifies best management practices to prevent all construction pollutants from contacting stormwater, with the intent of keeping sedimentation or any other pollutants from moving off site and into receiving waters. The requirements of the SWPPP shall be incorporated into design specifications and construction contracts. Best management practices categories employed on site would include erosion control, sediment control, and non-stormwater (good housekeeping). Best management practices recommended for the construction phase shall include, but not be limited to, the following:

- Limiting grading to the minimum area necessary for construction, operation, and decommissioning of the project.
- Limiting vegetation disturbance/removal to the maximum extent practicable.
- Implementing fiber rolls and sand bags around drainage areas and the site perimeter.
- Stockpiling and disposing of demolition debris, concrete, and soil properly.
- Installation of a stabilized construction entrance/exit and stabilization of disturbed areas.
- Proper protections for fueling and maintenance of equipment and vehicles.
- Managing waste, aggressively controlling litter, and implementing sediment controls.
- Soil stabilization in disturbed areas by revegetation (see MM-BIO-4).

MM-BIO-6 Dust Control Plan

Prior to issuance of a grading or building permit, the project proponent shall submit the dust control plan to Eastern Kern Air Pollution Control District (EKAPCD) for review and approval, and shall provide the plan to Kern County, to demonstrate compliance with EKAPCD Rule 402. The plan shall address construction-related dust as required by EKAPCD.

MM-BIO-7 Off-Site Habitat Mitigation Lands

Once the final grading plan is prepared, permanent impacts to suitable habitat for Mohave ground squirrel and desert tortoise will be quantified. Permanent impacts to suitable habitat for Mohave ground squirrel and desert tortoise will be compensated at a 1:1 ratio either through one or a combination of the following:

1. Purchase off-site habitat mitigation lands that contain suitable habitat for Mohave ground squirrel and desert tortoise. The off-site habitat mitigation lands would be conserved through a conservation easement, managed in perpetuity by a suitable management entity, and funded by a non-wasting endowment.
2. Payment of an in-lieu fee to acquire habitat mitigation lands for desert tortoise and Mohave ground squirrel; and/or
3. Purchase of mitigation credits at a mitigation bank for desert tortoise and Mohave ground squirrel.

Prior to issuance of a grading permit or building permit, a document outlining the permanent impacts to Mohave ground squirrels and desert tortoises, and the compensatory mitigation plan will be provided to the Kern County Planning and Natural Resources Department for review and approval.

MM-BIO-8 Desert Tortoise Pre-construction Surveys and Monitoring

The applicant shall contract with a qualified desert tortoise biologist approved by the USFWS to conduct desert tortoise surveys in areas of suitable habitat within 500 feet of construction activities, following the USFWS (2010) protocol. In addition to construction activities, these measures shall apply to any O&M activities that have the potential to result in additional temporary impacts to areas within or adjacent to occupied or suitable desert tortoise habitat. When maintenance occurs within or adjacent to desert tortoise habitat, but is conducted within the existing disturbed areas, a qualified desert tortoise biologist shall provide a WEAP training for workers.

Desert Tortoise avoidance and monitoring shall include the following measures:

- Prior to initiation of construction activities, the applicant shall develop a WEAP, to be presented to all construction and contractor personnel that includes the following information for desert tortoise:
  - A description of the desert tortoise, including adults and juveniles.
  - Color photographs of desert tortoise.
  - Protections to the desert tortoise under the federal and California Endangered Species Acts and potential penalties for violating the federal and California Endangered Species Acts.
  - Measures implemented under the project to protect desert tortoises and to conserve their habitat.
  - Information for contacting the approved, qualified desert tortoise biologist in case personnel observe one or more desert tortoises on the project site.
- Timing of surveys. Because of the linear nature of the project, the applicant may have surveys conducted at any time of year, but shall avoid impacts to potential and known desert tortoise burrows, in addition to avoiding impacts to desert tortoises.

- A minimum buffer of 200 feet for any potential and known desert tortoise burrow observed.
- Continual monitoring for work conducted within or adjacent to occupied or suitable desert tortoise habitat.
- All trash that may attract desert tortoise predators shall be removed from the work site at the end of each day.
- In areas adjacent to suitable desert tortoise habitat, staking or other means of demarcation shall be implemented around all work areas, including staging areas, marking boundaries with desert tortoise habitat, which construction vehicles and equipment shall not cross. The qualified desert tortoise biologist shall determine the boundaries. All workers shall be advised that vehicles and equipment shall remain within staked boundaries at all times.
- The following guidelines shall apply when desert tortoise occur within a work area:
  - If desert tortoises occur in a work area, work will cease until the qualified desert tortoise biologist has determined that the desert tortoise has left the area. Once work resumes, the qualified desert tortoise biologist shall conduct clearance surveys daily in the work area until work has ceased. Relocation and/or take of a desert tortoise may not occur unless authorized pursuant to Incidental Take Permits from USFWS and CDFW.
  - The qualified biologist shall have the authority to stop work at all times, if proper avoidance measures are not in place and project activities may potentially result in impacts to desert tortoises.
  - A speed limit of 15 mph shall be maintained at all times except on county/state roads.
  - Work shall be restricted to daylight hours at all times when working within or adjacent to desert tortoise habitat, except in an emergency, to avoid vehicle traffic when tortoise may be on access roads at times of poor visibility.

Should the applicant obtain a permit for the incidental take of desert tortoise, the applicant shall develop a Desert Tortoise Survey and Relocation Plan, which shall include the same elements described above, but shall also include specifications that:

- ≠ Clearance surveys shall occur on a daily basis where construction activities occur within or adjacent to suitable desert tortoise habitat.
- ≠ Any desert tortoises found during clearance surveys or pre-construction surveys, if avoiding the tortoise(s) is not feasible, shall be placed in suitable, undisturbed habitat within 500 meters (1,640 feet) of their original location. The qualified desert tortoise biologist shall determine the best location for release, based on the condition of the vegetation, soil, other habitat features, and the proximity to human activities. If desert tortoises are found in a construction area where fencing was deemed unnecessary, work will cease until the qualified desert tortoise biologist moves the tortoise(s) within 500 meters (1,640 feet) of their original location.
- ≠ Relocation of any tortoises shall follow the Guidelines for Handling Desert Tortoises during Construction Projects (Desert Tortoise Council 1994, revised 1999).

MM-BIO-9 Pre-construction Clearance Surveys

Pre-construction clearance surveys for special-status wildlife shall be conducted by a qualified biologist within 14 days of the initiation of ground disturbance or vegetation clearing, within and adjacent to construction areas. Surveys shall be appropriate for detecting potentially occurring species, such as Northern California legless lizard, Tehachapi pocket mouse, and desert kit fox. Surveys need not be conducted in all areas simultaneously, as long as they are conducted within 14 days of the initiation of ground disturbance or vegetation clearing in each area individually. If special-status species are detected, appropriate buffers shall be established, as necessary and as appropriate for the species, unless it is not feasible to avoid the species. If possible, non-listed special-status wildlife species such as Northern California legless lizard and Tehachapi pocket mouse may be captured and relocated to suitable habitat nearby where they are safe from construction activities. Surveys and relocation of these species may only be conducted by the qualified biologist.

If desert tortoise is detected during pre-construction clearance surveys, measures for avoidance outlined in MM-BIO-8 (desert tortoise pre-construction surveys and avoidance and monitoring plan) shall be implemented. If American badger dens are detected, measures for avoidance outlined in MM BIO-12 (pre-construction surveys for American badger) shall be implemented. If Mohave ground squirrel is detected, measures for avoidance outlined in MM BIO-13 (Mohave ground squirrel pre-construction surveys and avoidance and monitoring plan) shall be implemented. If burrowing owl is detected during pre-construction clearance surveys, measures for avoidance outlined in MM-BIO-10 (burrowing owl surveys and avoidance/relocation) shall be implemented.

Surveys for desert kit fox shall be conducted in areas of suitable desert scrub. If potential dens or occupied dens cannot be avoided, or if natal dens are found, buffers shall be established as follows:

≠ 30 feet for potential dens (dens that are suitable for these species)

≠ 100 feet for occupied dens (non-natal dens only)

≠ 500 feet for natal dens

Construction will be postponed or halted in the buffer of natal dens until it is determined by the project biologist that the young are no longer dependent on the natal den. If it is not possible to avoid a potential den, and the project biologist determines that the den is not occupied, the biologist may excavate the den by hand. For an occupied den (non-natal dens only) or a potential den that may be occupied, the qualified biologist may place a one-way door over all entrances to the den for 7 days to exclude desert kit fox from the den. At the end of this period, the qualified biologist may excavate the burrow by hand to prevent future occupancy.

If non-listed special-status reptiles or small mammals are detected, buffers shall be erected and the species shall be avoided, if possible. Buffer distances shall be determined by the project biologist. The buffers shall be clearly demarcated to avoid construction workers accidentally removing or damaging the occupied habitat or the species. Results of the pre-construction clearance surveys shall be submitted to the Kern County Planning and Natural Resources Department and CDFW prior to initiation of ground disturbance or vegetation clearing.

The project biologist shall remain available at all times after initiation of ground disturbance or vegetation clearing, in case special-status wildlife species enter the construction area. If non-listed special-status species are detected in the construction area after initiation of ground disturbance or vegetation clearing, the qualified biologist shall take measures to move the species, or encourage it to move, to a safe place away from construction activities.

MM-BIO-10 Burrowing Owl Surveys and Avoidance/Relocation.

No less than 14 days prior to ground-disturbing activities (vegetation clearance, grading), a qualified wildlife biologist (i.e., a wildlife biologist with previous burrowing owl survey experience) shall conduct pre-construction take avoidance surveys on and within 200 meters (656 feet) of the construction zone to identify occupied breeding or wintering burrowing owl burrows. The take avoidance burrowing owl surveys shall be conducted in accordance with the Staff Report on Burrowing Owl Mitigation (2012 Staff Report; CDFG 2012) and shall consist of walking parallel transects 7 to 20 meters apart, adjusting for vegetation height and density as needed, and noting any burrows with fresh burrowing owl sign or presence of burrowing owls. As each burrow is investigated, biologists shall also look for signs of American badger and desert kit fox. Surveys may also be combined with desert tortoise pre-construction surveys, if surveys satisfy guidelines for surveys of each species. Copies of the burrowing owl survey results shall be submitted to the CDFW and the Kern County Planning and Natural Resources Department.

If burrowing owls are detected on site, no ground-disturbing activities shall be permitted within 200 meters (656 feet) of an occupied burrow during the breeding season (February 1 to August 31), unless otherwise authorized by CDFW. During the nonbreeding season (September 1 to January 31), ground-disturbing work can proceed near active burrows as long as the work occurs no closer than 50 meters (165 feet) from the burrow. Depending on the level of disturbance, a smaller buffer may be established in consultation with CDFW.

If avoidance of active burrows is infeasible during the nonbreeding season, then, before breeding behavior is exhibited and after the burrow is confirmed empty by site surveillance and/or scoping, a qualified biologist shall implement a passive relocation program in accordance with Appendix E (i.e., Example Components for Burrowing Owl Artificial Burrow and Exclusion Plans) of the 2012 CDFW Staff Report on Burrowing Owl Mitigation (CDFW 2012). Passive relocation consists of excluding burrowing owls from occupied burrows and providing suitable artificial burrows nearby for the excluded burrowing owls.

MM-BIO-11 Nesting Bird Pre-construction Surveys and Avoidance Plan.

This measure would protect these nesting special-status species and more common species protected under the Migratory Bird Treaty Act, which prohibits the "take" of any migratory bird or any part, nest, or eggs of any such bird. The Migratory Bird Treaty Act applies to over 800 species of birds, including rare and common species. Burrowing owl is addressed separately in a species-specific biological resource protection measure (MM-BIO-10).

The project biologist shall conduct pre-construction surveys no earlier than 7 days prior to any on-site grading and construction activities within each construction area and a 500-foot buffer that occurs during the nesting/breeding season of special-status bird species potentially nesting on the site, with the exception of burrowing owl, which is addressed in MM-BIO-10. The pre-construction surveys shall be conducted between March and September, or as determined by the project biologist.

The purpose of the pre-construction surveys will be to determine whether occupied nests are present in the construction zone or within 500 feet of the construction zone boundary.

If occupied nests are found, then limits of construction to avoid occupied nests shall be established by the project biologist in the field with flagging, fencing, or other appropriate barriers (e.g., 250 feet around active passerine nests to 500 feet around active non-listed raptor nests), and construction personnel shall be instructed on the sensitivity of nest areas. The project biologist shall serve as a construction monitor during those periods when construction activities are to occur near active nest areas to avoid inadvertent impacts to these nests. The project biologist may adjust the 250-foot or 500-foot setback at his or her discretion depending on the species and the location of the nest (e.g., if the nest is well protected in an area buffered by dense vegetation). Once a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, construction may proceed in the setback areas.

MM-BIO-12 Pre-construction Surveys for American Badger

Impacts to American badger individuals and wintering and natal dens shall be avoided and minimized during construction activities through the following measures.

Pre-construction Surveys (Wintering)

During the colder months (generally between November 1 and February 15, when daily temperatures do not exceed 45° Fahrenheit), when American badgers may use winter dens during torpid periods, pre-construction surveys shall be conducted by the project biologist in suitable habitat no earlier than 14 days prior to construction activities to determine whether American badger winter dens are present within construction zone or within 100 feet of the construction zone boundary.

Avoidance Measures (Wintering)

If an American badger winter den is occupied within the construction zone or within 100 feet of the construction zone, then the den location shall be clearly marked with fencing or flagging, in a manner that does not isolate the badger from intact adjacent habitat or prevent the badger from accessing the den, to avoid inadvertent impacts on the den. If it is not practicable to avoid the wintering den during construction activities, an attempt will be made to trap or flush the individual and relocate it to suitable open space habitat. Additionally, badgers can be relocated by slowly excavating the burrow, either by hand or mechanized equipment under the direct supervision of the project biologist, removing no more than 4 inches at a time. After necessary trapping, flushing, or burrow excavation is completed, construction may proceed and the vacated winter den may be collapsed. If trapping is required, trapping will be limited to November 16 through the last day of February in accordance with Section 461, Title 14 of the California Code of Regulations (14 CCR 461). A written report documenting the badger removal shall be provided to the CDFW within 30 days of relocation.

Pre-construction Surveys (Natal Dens)

During the late winter and summer (generally from March 15 through July 31), when American badgers may use natal dens for birthing and pup rearing, pre-construction surveys shall be conducted by the project biologist no earlier than 14 days prior to ground-disturbing construction activities to determine whether American badger natal dens are present within the project construction zone or within 200 feet of the construction zone.

Avoidance Measures (Natal Dens)

If active natal dens are located within these areas during pre-construction surveys, construction activities shall be postponed. If natal dens are detected during construction, construction activities shall be halted within 200 feet of the natal den. This buffer may be reduced based on the location of the den or type of construction activity, based on the direction of the project biologist. Construction activities shall not preclude the ability of the documented badgers to disperse to on-site open space or off-site habitat when the natal den is vacated (i.e., habitat suitable for dispersal must be maintained until dispersal occurs). Construction will be postponed or halted in these areas until it is determined by the project biologist that the young are no longer dependent on the natal den. To avoid inadvertent impacts during construction and to ensure that construction activities are at least 200 feet from active natal dens, any active natal dens within the survey area shall be clearly marked with fencing or flagging in a manner that will not inhibit normal behavioral activities (e.g., foraging and dispersing from the site) by the mother and pups.

MM-BIO-13 Mohave Ground Squirrel Pre-construction Surveys and Avoidance and Monitoring Plan

Pre-construction surveys for the Mohave ground squirrel shall be conducted within all suitable habitat, following methods approved by CDFW, prior to initial ground-disturbing activities along the selected gen-tie route. If a Mohave ground squirrel is found on the construction site, work shall be halted and redirected to areas not supporting this species, unless an Incidental Take Permit is obtained from CDFW. A written report shall be sent to CDFW within 5 calendar days of the sighting. The report shall include the date, time of the finding or incident (if known), and location of the animal. If a dead Mohave ground squirrel is encountered, the remains shall be collected, frozen as soon as possible, and CDFW shall be contacted to determine where the remains will be sent.

If Mohave ground squirrels are detected during any project surveys, the applicant shall prepare a Mohave Ground Squirrel Avoidance and Monitoring Plan. If it is determined from surveys that Mohave ground squirrels are not present, no further action is required.

The Mohave Ground Squirrel Avoidance and Monitoring Plan shall include, at a minimum:

- Specifications for designation of qualified biologists for conducting surveys and monitoring.
- Methods for excluding Mohave ground squirrels from the work area, such as fencing.
- Measures and procedures related to monitoring of construction for presence of Mohave ground squirrels.

- A requirement to cease work if a Mohave ground squirrel occurs in a work area.
- Requirements for worker education material as it pertains to Mohave ground squirrels.
- Reporting requirements.

Should the applicant obtain a permit for the incidental take of Mohave ground squirrel, the applicant shall develop a Mohave Ground Squirrel Relocation Plan, which shall include the same elements described above for the Avoidance and Monitoring plan, but shall also include:

- Methods for translocating Mohave ground squirrels occupying areas where avoidance is not feasible.
- Locations for relocating Mohave ground squirrels.

MM-BIO-14 Speed Limits and Sensitive Species Signage

The applicant shall post signs along project access roads designating speed limits and alerting drivers to the presence of sensitive species. Signs shall be placed facing out from access roads toward public roads and other entry points, and along the road approximately every 1.0 mile. Speed limit signs shall specify a limit of 15 mph. Signs shall include mention of the potential presence of sensitive wildlife species, and shall state that drivers are not allowed to leave established roads in the area. This does not apply to county/state roads.

MM-BIO-15 Avian Power Line Interaction Committee (APLIC) Guidelines

The applicant shall install power lines in conformance with Avian Power Line Interaction Committee (APLIC) standards for electrocution-reducing techniques as outlined in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006), and for collision-reducing techniques as outlined in R*educing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012), or any superseding document issued by APLIC. The applicant shall monitor for new versions of the APLIC collision and electrocution guidelines and update designs or implement new measures as needed during Project construction, provided these actions do not require the repurchase of previously ordered power line structures. Bird diverters and anti-electrocution features shall be maintained for the life of the project. Details of design components of bird diverters and anti-electrocution features shall be indicated on all construction plans.

4.4 Threshold Bio-2

Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS?

Sensitive Vegetation Communities

The only special-status or sensitive vegetation community in the study area is Joshua tree woodland. There are 17.2 acres of Joshua tree woodland in the East–West Gen-Tie Route and 18.0 acres of Joshua tree woodlands in the North–South Gen-Tie Route Option 1. There are no sensitive vegetation communities located in the North–South Gen-Tie Route Options 2 and 3; thus, no impacts to sensitive vegetation communities would occur from implementation of the North–South Gen-Tie Route Options 2 and 3

State-Jurisdictional Waters

As discussed in Section 3.4.2, there are 2.16 acres of CDFW- and RWQCB-jurisdictional areas in the study area; specifically, 1.78 acres in the East–West Gen-Tie Route, 0.27 acres in the North–South Gen-Tie Route Option 1, <0.01 acres in the North–South Gen-Tie Option 2, and 0.11 acres in the North–South Gen-Tie Option 3.

4.4.1 Construction (Short-Term) Impacts

4.4.1.1 Direct

Absent the recommended mitigation measures, potential construction-related direct impacts to CDFW- and RWQCB-jurisdictional areas and up to 35.2 acres of Joshua tree woodland could result from unintentional clearing, trampling, or grading outside of the proposed impact area during construction. Also, temporary ground-disturbing activities, such as pole placement, road maintenance, laydown/assembly areas, and string pulling sites, would occur from the proposed project and the acreages for each gen-tie option are estimated in Table 4-1. Potential short-term or temporary direct impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland are considered significant absent mitigation.

With respect to all the project options, construction mitigation measures MM-BIO-1 (general construction-related avoidance and minimization measures), MM-BIO-2 (WEAP training, biological monitoring, and compliance), MM-BIO-16 (Joshua Tree Avoidance), MM-BIO-17 (Joshua Tree Construction Activities Monitoring), and MM-BIO-19 (jurisdictional waters of the state mitigation) would apply. These measures would avoid and minimize potential temporary direct impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland because they require the project biologist to conduct a WEAP for all construction/contractor personnel to ensure compliance with the mitigation measures and require ongoing biological construction monitoring. This includes demarcation of the construction area using highly visible materials in the field that minimize unintentional impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland outside the designated construction area. Specifically, state-jurisdictional channels within 50 feet of the construction area would be demarcated in the field and avoided, and all Joshua trees not designated for removal and Joshua trees present immediately adjacent to construction work areas shall be protected through clear delineation and marking of construction work areas. Additionally, poles, maintenance roads, construction laydown/assembly areas, and string pulling sites would be located in areas to avoid removing Joshua trees. Training and ongoing monitoring would aid in enforcing the requirements that construction must be restricted to designated areas and CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland outside the designated proposed impact area would be avoided. Additionally, temporary impacts to CDFW- and RWQCB-jurisdictional areas will be restored on site.

Construction-related direct impacts to CDFW- and RWQCB-jurisdictional areas and sensitive natural communities would be less than significant with incorporation of MM-BIO-1, MM-BIO-2, MM-BIO-16, MM-BIO-17, and MM-BIO-19. These biological mitigation measures are described in full in Section 4.3.3 and 4.4.3.

4.4.1.2 Indirect

Construction-related indirect impacts could affect CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland. Potential short-term or temporary indirect impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland resulting from construction activities include: the generation of fugitive dust; changes in hydrology resulting from construction, including sedimentation and erosion; the release of chemical pollutants; and adverse effects of invasive plant species. Potential short-term or temporary indirect impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland are considered significant absent mitigation.

MM-BIO-1 (general construction-related avoidance and minimization measures) would minimize the potential effects of construction-related impacts by requiring vehicle maintenance restrictions to avoid chemical spills. MM-BIO-2 (WEAP training, biological monitoring, and compliance) would minimize the potential effects of construction-related impacts by requiring all construction/contractor personnel to attend WEAP training, conducting biological monitoring during construction activities, and requiring compliance with all environmental documents and permits. MM-BIO-4 (restoration of temporary impacts) would help prevent future adverse effects associated with leaving bare ground, such as increased dust and erosion, and would help prevent adverse effects of invasive plant species that may alter the composition of the habitat if introduced during restoration or allowed to passively colonize the area post-construction. MM-BIO-5 (preparation and implementation of a SWPPP) would require the implementation of best management practices. MM-BIO-6 (preparation and implementation of a dust control plan) would minimize the effects of dust during construction by implementing a dust control plan, which would require that construction-related dust is suppressed in compliance with Eastern Kern Air Pollution Control District (EKAPCD) requirements.

These potential short-term or temporary indirect impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland would be less than significant with implementation of MM-BIO-1, MM-BIO-2, MM-BIO-4, MM-BIO-5, and MM-BIO-6. These biological mitigation measures are described in full in Section 4.3.3.

4.4.2 Operations (Long-Term) Impacts

4.4.2.1 Direct

As discussed in Section 4.1, the precise location of ground-disturbing impacts of the gen-tie route are not known at this time; however, all ground-disturbing impacts will occur in the study area. Within the study area, there are approximately 35.2 acres of sensitive vegetation community; specifically, 17.2 acres of Joshua tree woodland in the East–West Gen-Tie Route and 18.0 acres of Joshua tree woodlands in the North–South Gen-Tie Route Option 1. Within the study area, there are 2.16 acres of CDFW- and RWQCB jurisdictional areas; specifically, 1.78 acres in the East–West Gen-Tie Route, 0.27 acres in the North–South Gen-Tie Route Option 1, <0.01 acres in the North–South Gen-Tie Option 2, and 0.11 acres in the North–South Gen-Tie Option 3. Therefore, the proposed project would result in significant operations-related direct impact to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland absent mitigation.

To the extent practicable, the project shall be designed to avoid impacts to the Joshua trees within the project site (e.g., MM-BIO-16 and MM-BIO-17); however, MM-BIO-18 (Joshua Tree Impact and Mitigation Plan) requires a Joshua Tree Impact and Mitigation Plan to be submitted 30 days prior to issuance of a building or grading permit if avoidance of Joshua trees is not feasible. This plan would include a compensatory mitigation approach consisting either of relocation of trees to an approved preserve, payment of an in-lieu fee or purchase of mitigation credit, or the purchase of preserved mitigation lands at a minimum 1:1 ratio of impacted Joshua tree woodlands.

To the extent practicable, the project shall be designed to avoid impacts to the jurisdictional waters of the state within the project site; however, MM-BIO-19 (Jurisdictional Waters of the State Mitigation) would include avoidance measures including locating all material/spoils away from jurisdictional areas, protection from stormwater runoff, storage of materials on impervious surfaces or use of plastic ground covers to prevent spills or leaks, and proper cleaning and disposal of contaminated materials for any spills. If jurisdictional areas cannot be avoided, necessary resource agency permits shall be obtained, and compensatory mitigation would occur off-site at a ratio no less than 1:1 for the impacts to jurisdictional waters.

These potential long-term or permanent direct impacts to CDFW- and RWQCB-jurisdictional areas and sensitive vegetation communities would be less than significant with implementation MM-BIO-18, and MM-BIO-19. These biological mitigation measures are described in full in Section 4.4.3.

4.4.2.2 Indirect

Potential long-term indirect impacts that could result from development near CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland include impacts such as: chemical releases such as oils and grease from vehicles that could degrade habitat; increased invasive plant species that may degrade habitat; and trampling of vegetation and soil compaction by humans, which could affect soil moisture, water penetration, surface flows, and erosion and increased fire risk that could degrade jurisdictional areas. These indirect impacts could degrade CDFW- and RWQCB-jurisdictional areas or sensitive vegetation communities over the long-term and would be avoided and minimized through implementation of the following measures.

MM-BIO-1 (general avoidance and minimization measures) requires that vehicles and equipment will be limited to maintenance access roads and the minimal area necessary to perform the work to minimize chemical releases and trampling of vegetation and soils compaction by humans. MM-BIO-4 (restoration of temporary impacts) would help prevent adverse effects of invasive plant species that may alter the composition of the habitat if introduced during restoration or allowed to passively colonize the area post-construction if these areas are not revegetated.

These potential long-term indirect impacts to CDFW- and RWQCB-jurisdictional areas and Joshua tree woodland would be less than significant with implementation of MM-BIO-1 and MM-BIO-4.

4.4.3 Mitigation Measures

MM-BIO-16 Joshua Tree Avoidance

Reasonable efforts will be made to site poles, maintenance roads, construction laydown/assembly areas, and string pulling sites to avoid removing Joshua trees.

MM-BIO-17 Joshua Tree Construction Activities Monitoring

The project biologist shall ensure that work remains within designated limits and shall monitor construction activities occurring where Joshua trees are within and adjacent to the proposed gen-tie route. All Joshua trees not designated for removal and Joshua trees present immediately adjacent to construction work areas shall be protected through clear delineation and marking of construction work areas under the supervision of the project biologist.

MM-BIO-18 Joshua Tree Impact and Mitigation Plan

Prior to issuance of building or grading permits and if avoidance of Joshua trees is not feasible, then a Joshua Tree Impact and Mitigation Plan shall be required. The plan shall be prepared in coordination with the Kern County Planning and Natural Resources Department. It shall detail the removal of Joshua trees/woodlands and outline a compensatory mitigation approach based on one or both of the following options: (1) the relocation of trees to an approved preserve; (2) payment of an in-lieu fee or purchase of mitigation credit; (3) or the purchase off-site mitigation lands at a minimum 1:1 ratio of impacted Joshua tree woodlands.

If purchase of off-site mitigation land is pursued, the following shall be completed: (1) a conservation easement shall be established on the mitigation land; (2) a habitat management plan to maintain habitat conditions on the site in perpetuity must be prepared and implemented; and (3) a non-wasting endowment sufficient to implement the habitat management plan in perpetuity must be provided. The mitigation lands shall provide habitat at a 1:1 ratio for impacted lands, comparable to habitat to be impacted by the project (i.e., similar abundance and size of Joshua trees, similar levels of disturbance or habitat degradation, etc.). The habitat management plan shall specify maintenance and monitoring requirements for the preserved land. Suitable mitigation lands provided for other species may be used for Joshua tree woodland mitigation (see MM-BIO-7).

MM-BIO-19 Jurisdictional Waters of the State Mitigation

Proof of compliance shall be submitted to the Kern County Planning and Natural Resources Department prior to issuance of building and grading permits.

a. To the extent practicable, the project shall be designed to avoid impacts to the jurisdictional waters of the state within the project site, and the following avoidance/minimization measures shall be implemented:

   i. Any material/spoils from project activities shall be located away from jurisdictional areas and protected from stormwater runoff using temporary perimeter sediment barriers such as berms, silt fences, fiber rolls, covers, sand/gravel bags, and straw bale barriers, as appropriate.

ii. Materials shall be stored on impervious surfaces or plastic ground covers to prevent any spills or leakage from contaminating the ground and generally at least 50 feet from the top of bank.

iii. Any spillage of material shall be stopped if it can be done safely. The contaminated area shall be cleaned and any contaminated materials properly disposed of. For all spills the project foreman or designated environmental representative shall be notified.

b. If jurisdictional waters cannot be avoided, minimization measures shall be applied and all necessary resource agency permits shall be obtained. This includes Individual or General Waste Discharge Requirements from the RWQCB and a Streambed Alteration Agreement from CDFW.

c. All temporary impacts to state-jurisdictional waters will be restored on site. Restoration will include recontouring and erosion control with a native seed mix. Prior to seeding temporary ground disturbance areas, the project biologist will review the seeding palette to ensure that no seeding of invasive plant species, as identified in the most recent version of the California Invasive Plant Inventory for the region, will occur.

d. Compensatory mitigation for permanent impacts shall occur off site, and would occur at a ratio no less than 1:1 for the impact to jurisdictional waters. A waters mitigation and monitoring plan shall be prepared that outlines the compensatory mitigation in coordination with the RWQCB and CDFW. Mitigation lands shall be comprised of drainages similar to those impacted. Off-site mitigation lands shall be preserved through a conservation easement and the waters mitigation and monitoring plan shall identify an approach for funding assurance for the long-term management of the conserved land. Suitable mitigation lands provided for species or Joshua tree woodland may be used for jurisdictional waters of the state mitigation. The proposed 1:1 acreage ratio is considered sufficient to reduce project effects to less than significant because the type of potentially affected jurisdictional features (i.e., ephemeral drainages) are relatively common in the context of desert region drainage. Furthermore, most effects would likely be temporary because jurisdictional features are anticipated to be relocated on site to maintain hydrology in the project area. It is noted that the final mitigation ratio required by the RWQCB and CDFW for acquisition of regulatory permits may differ.

4.5 Threshold Bio-3

Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

As discussed in Section 3.4.1, the study area does not contain waters, including wetlands, subject to federal jurisdiction under Section 404 of the Clean Water Act and, therefore, the proposed project would not impact or have a substantial adverse effect on federally protected wetland waters, as defined by Section 404 of the Clean Water Act.

4.6 Threshold Bio-4

Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

4.6.1 Construction (Short-Term) Impacts

Construction within the study area could have both a direct and indirect impact on wildlife movement within the study area. Wildlife may be deterred from the construction area due to increased human presence, loud noises, and physical disruptions of habitat. However, construction will be temporary at any location, and wildlife would be able to use temporary construction areas freely after work crews are gone. Also, many of the options contain areas along existing roads and adjacent to other existing development: much of North–South Gen-Tie Option 1 follows an existing rail line; 3.0 miles of the 4.5 miles of North–South Gen-Tie Option 2 follows the paved United Street. Also, typical construction methods, including working in teams from one end of the gen-tie to the other, would not impede wildlife movement over a large area at any one time. Therefore, short-term impacts to movement of native wildlife species and from impediments to use of native wildlife nursery sites would be less than significant.

4.6.2 Operations (Long-Term) Impacts

As described in Section 3.7, the study area is not located within a regional wildlife movement corridor or linkage planning area as identified in *A Linkage Network for the California Deserts* (Penrod et al. 2012). The study area is located within an open landscape where wildlife can freely move within and throughout the study area with little impediment. The placement of poles within the study area is not anticipated to result in long-term direct or indirect impacts to wildlife movement within the study area. The poles would be placed approximately 700 feet apart and will not act as a barrier to wildlife movement within the study area. Although access roads associated with the gen tie would result in more continuous disturbance of habitat, any new access roads would support only occasional vehicle use, and wildlife would be able to pass across these roads freely. Therefore, the project would not result in long-term impacts to wildlife movement through the area.

4.7 Threshold Bio-5

Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The Kern County General Plan Land Use, Open Space, and Conservation Element establishes policies related to the protection of threatened or endangered plant and wildlife species and cooperation with federal, state, and local agencies. The project is consistent with the Kern County General Plan biological resource policies. Table 4-2 includes the policies and implementation measures related to biological resources, and describes how the project is consistent with the general plan.

Table 4-2
Kern County General Plan Consistency Analysis

General Plan Policies and Implementation Measures	Consistency	Analysis
Policies		
Policy 27. Threatened or endangered plant and wildlife species should be protected in accordance with State and federal laws.	Yes, with mitigation	MM-BIO-1 through MM-BIO-15 would reduce impacts to special-status species to a less-than-significant level. The proposed project would be in compliance with federal and state laws.
Policy 28. County should work closely with State and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources.	Yes, with mitigation.	MM-BIO-1 through MM-BIO-15 would reduce impacts to special-status species to a less-than-significant level. The proposed project would be in compliance with federal and state laws. The applicant has be in consultation with both state and federal resource agencies.
Policy 29. The County will seek cooperative efforts with local, State, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.	Yes, with mitigation	MM-BIO-1 through MM-BIO-15 would reduce impacts to special-status species to a less-than-significant level.

Table 4-2
Kern County General Plan Consistency Analysis

General Plan Policies and Implementation Measures	Consistency	Analysis
Policy 31. Under the provisions of CEQA, the County, as lead agency, will solicit comments from the California Department of Fish and Game and the U.S. Fish and Wildlife Service when an environmental document (Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report) is prepared.	Yes	The EIR will be sent to CDFW and USFWS for review and comment.
Policy 32. Riparian areas will be managed in accordance with United States Army Corps of Engineers, and the California Department of Fish and Game rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns.	Yes	There are no ACOE-jurisdictional waters in the study area and, thus, there would be no impacts to ACOE-jurisdictional waters. There is a potential that CDFW-jurisdictional waters would be impacted by the project. MM-BIO-1, MM-BIO-2, MM-BIO-4, MM-BIO-5, MM-BIO-6, and MM-BIO-19 would reduce potential impacts to CDFW-jurisdictional waters of the state to less-than-significant levels.
Implementation Measures		
Q. Discretionary projects shall consider effects to biological resources as required by the CEQA.		This BTR evaluations the effects of the proposed project on special-status biological resources in accordance with CEQA.
R. Consult and consider the comments from responsible and trustee wildlife agencies when reviewing a discretionary project subject to the CEQA.		Comments from the resource agencies will be evaluated and responded to during the CEQA process.
S. Pursue the development and implementation of conservation programs with State and federal wildlife agencies for property owners desiring streamlined endangered species mitigation programs.		Not Applicable.

The Mojave Specific Plan requires biological surveys and evaluations be conducted in areas located outside of previously identified urbanized, non-sensitive areas. If rare, threatened, or endangered species are found during the surveys, the biologist will consult with CDFW, USFWS, or other agencies and jurisdictions with authority to implement and enforce requirements of the California or federal Endangered Species Acts, prior to ground disturbance. As described in Section 2, surveys and assessments conducted in the project area include vegetation mapping, a jurisdictional delineation, focused surveys for special-status plants, focused protocol-level desert tortoise surveys, and focused protocol-level Swainson's hawk surveys. In addition, recommended mitigation measures require pre-construction surveys for special-status species that could occur on site, including: MM-BIO-3 (special-status plant surveys); MM-BIO-8 (desert tortoise surveys); MM-BIO-9 (special-status wildlife surveys); MM-BIO-10 (burrowing owl surveys); MM-BIO-11 (nesting bird surveys) MM-BIO-12 (American badger surveys); and MM-BIO-13 (Mohave ground squirrel surveys). If listed rare, threatened, or endangered species are found and cannot be avoided, the applicant would be required to consult with the appropriate resource agencies to ensure compliance with the California and federal Endangered Species Acts.

The Mojave Specific Plan establishes objectives and policies related to biological resources, such as to promote the retention of natural setting and use of native or adaptable vegetation, to reduce the impact of development on important ecological and biological resources, and to encourage the preservation of Joshua trees, Joshua tree woodlands, wildflower displays, or other biologically sensitive flora. Implementation of MM-BIO-16, MM-BIO-17, and MM-BIO-18 would mitigate for the potential loss of Joshua trees and Joshua tree woodlands. MM-BIO-3 would mitigate for potential impacts to special-status plants through pre-construction surveys and, if present, avoidance, minimization, and mitigation measures. Implementation of the recommended mitigation measures would ensure compliance with the Mojave Specific Plan.

The Soledad Mountain—Elephant Butte Specific Plan states that the removal of native desert vegetation should be limited; stands of Joshua trees should be preserved; and utilities along roadways should be placed underground to protect scenic values. The plan also states that adherence to the guidelines identified in the plan will produce the least negative effect on wildlife, other than no development at all. The Soledad Mountain–Elephant Buttes Specific Plan has limited language addressing non-residential/commercial developments and their potential impacts to biological resources. However, it does state that all possible safeguards shall be initiated to prevent destruction of Joshua trees. Implementation of MM-BIO-16, MM-BIO-17, and MM-BIO-18 would ensure compliance with the Soledad Mountain–Elephant Butte Specific Plan.

The project would be constructed and operated in compliance with the requirements of the Kern County General Plan and Zoning Ordinance and the Mojave and Soledad Mountain–Elephant Butte Specific Plans. Impacts to biological resources would be less than significant or mitigated to a less-than-significant level. The project would comply with requirements of local policies and ordinances protecting biological resources through the implementation of the recommended mitigation measures. Therefore, the project would not conflict with local policies or ordinances protecting biological resources.

4.8 Threshold Bio-6

Would the project conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP?

The proposed project is located within the boundaries of the West Mojave Plan, which was originally envisioned as an Multiple Species Habitat Conservation Plan, and a land use plan amendment for BLM-administered lands. The HCP component of the plan was not approved as part of this planning effort, but the West Mojave Plan does serve as a land use plan amendment under the California Desert Conservation Area Plan for BLM lands. Additionally, the proposed project lies within the boundaries of the Desert Renewable Energy Conservation Plan (DRECP). The Draft DRECP was originally developed as an HCP/Natural Community Conservation Plan (NCCP) and a BLM Land Use Plan Amendment covering both public and private lands across seven counties, including the Mojave Desert in Kern County. In October 2015, the DRECP BLM Land Use Plan Amendment and Final EIS, which addresses renewable energy, land use, and conservation on BLM lands only, was released (BLM 2015). The DRECP does not provide HCP/NCCP coverage for private lands in Kern County.

Both the West Mojave Plan and the DRECP apply to BLM lands only. Portions of the North–South Gen-tie Route Option 3 are located within BLM lands. To pursue this option, the applicant would be required to apply and obtain a right-of-way for the gen-tie line through BLM lands. The BLM lands within this route option are designated as a Development Focus Area (DFA) and Visual Resource Management (VRM) area. Therefore, if the North–South Gen-tie Route Option 3 is selected, the proposed project would be required to conform with the provisions in the West Mojave Plan and the DRECP Land Use Plan Amendment (LUPA), including the LUPA-wide Conservation and Management Actions (CMAs) and the CMAs for DFAs and VRM. Therefore, use of this route option would not conflict with any provisions of adopted HCPs/NCCPs because the West Mojave Plan and DRECP are not HCPs or NCCPs and because the BLM would require that the project be implemented consistent with the DRECP LUPA. Additionally, determination of significant impacts and recommendations for mitigation measures to preserve or protect habitat and to otherwise ensure protection of identified species have been included in this report.

The study area is not located within any other local, regional, or state conservation planning areas. Impacts of the project on an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan would be less-than-significant.

5 LEVEL OF SIGNIFICANCE AFTER MITIGATION

All direct and indirect impacts to special-status biological resources that would result from implementation of the proposed project would be either less than significant or less than signification after mitigation.

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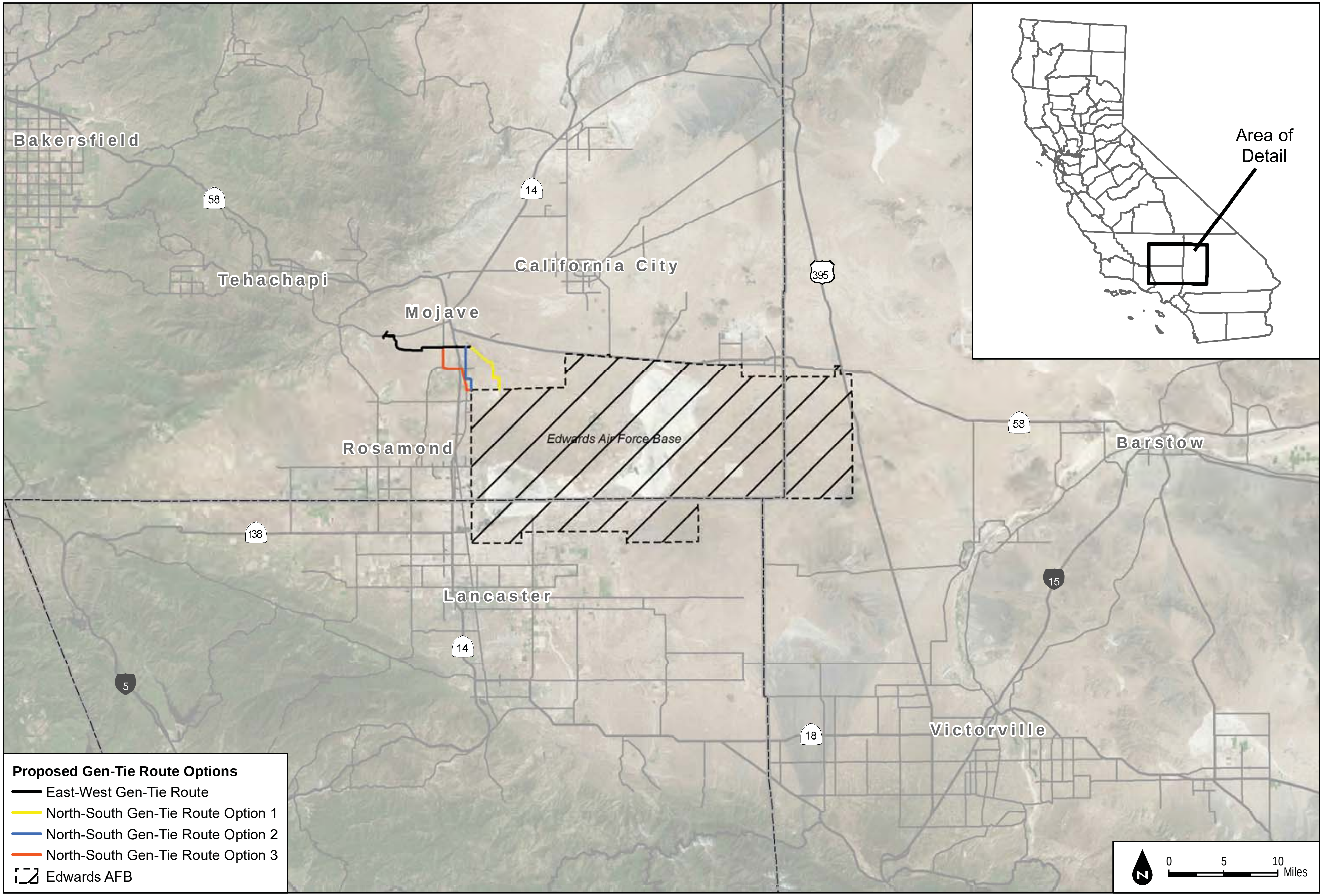

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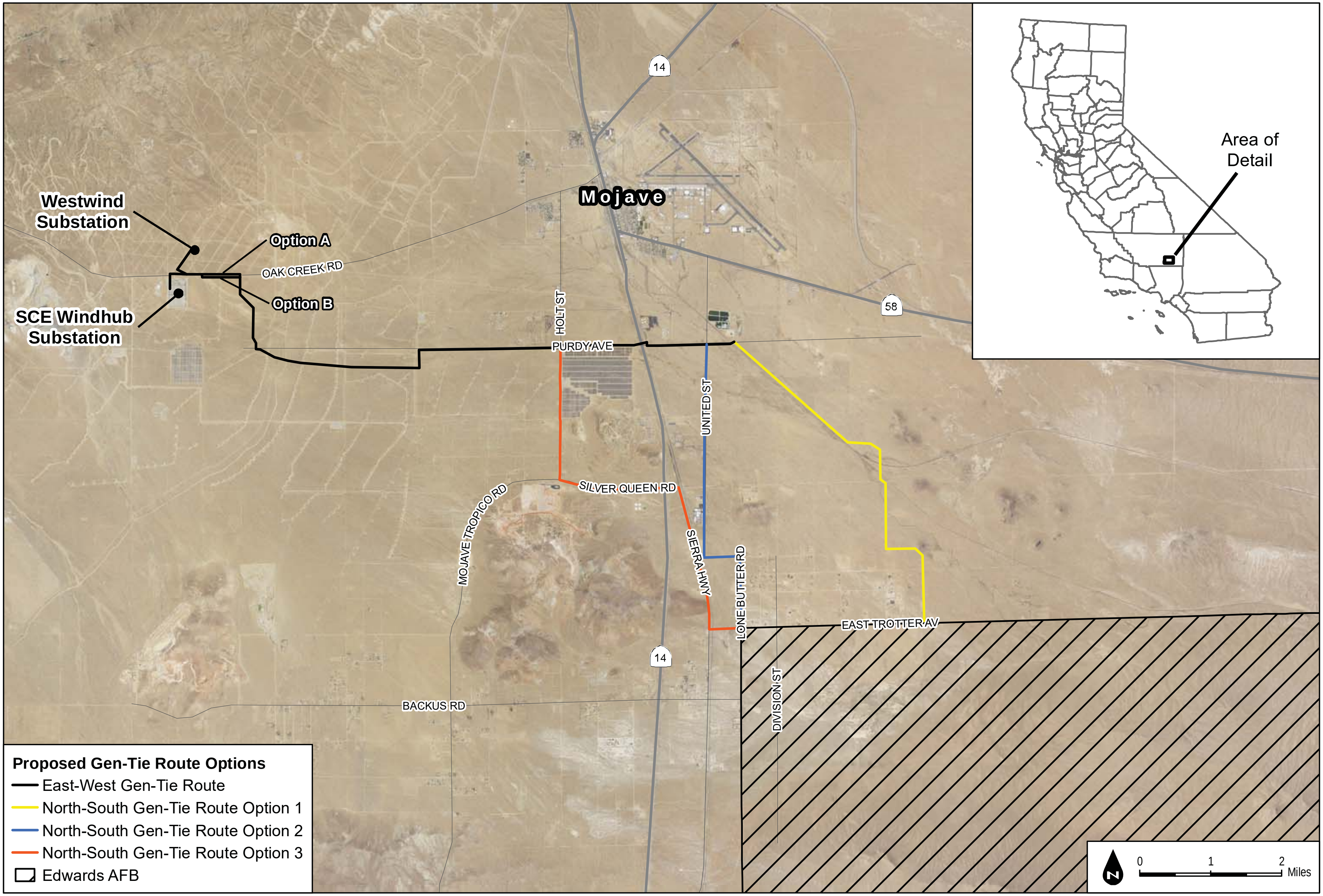

Figure 1-2: GEN-TIE ROUTE OPTIONS

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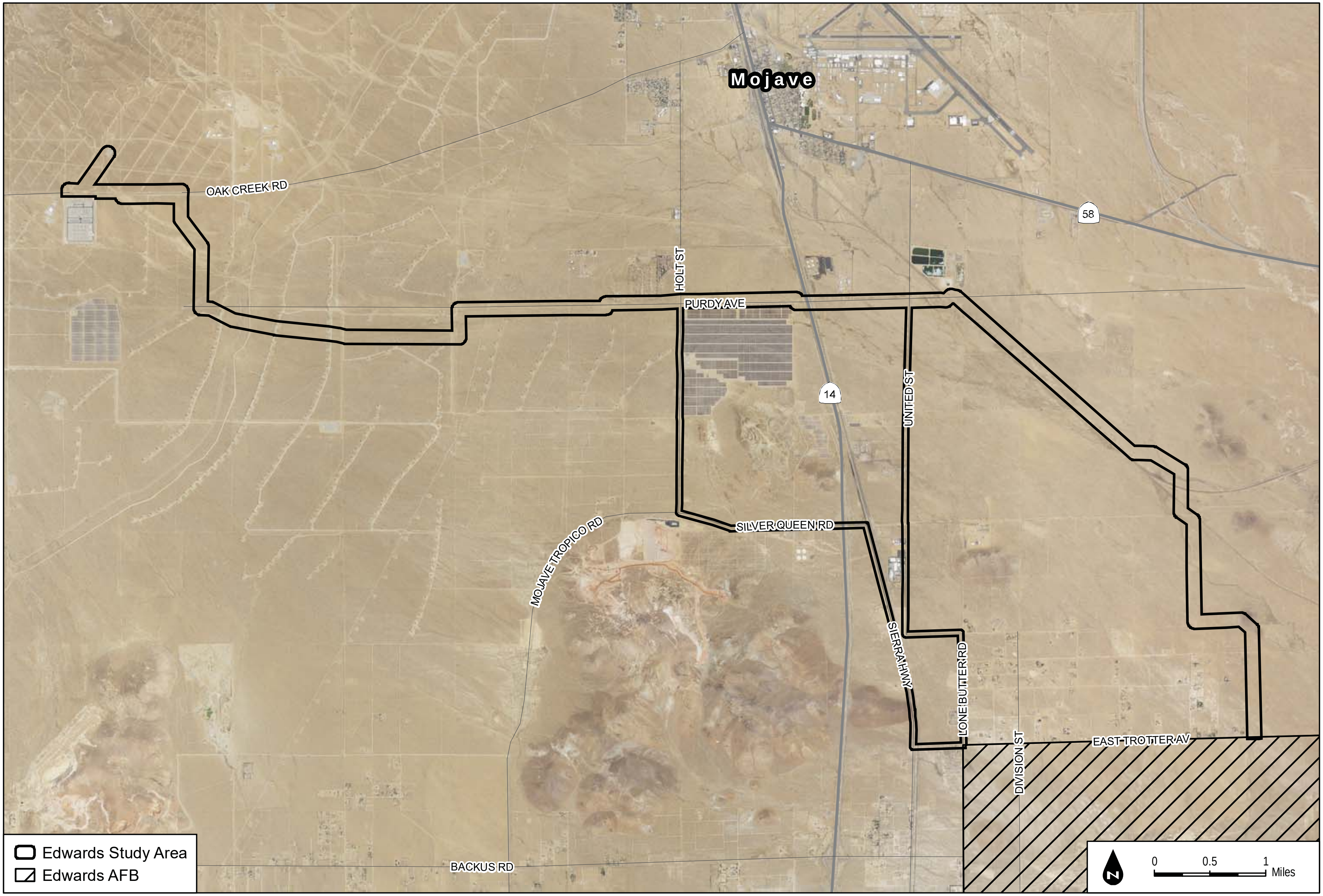

Figure 2-1: BIOLOGICAL RESOURCES STUDY AREA

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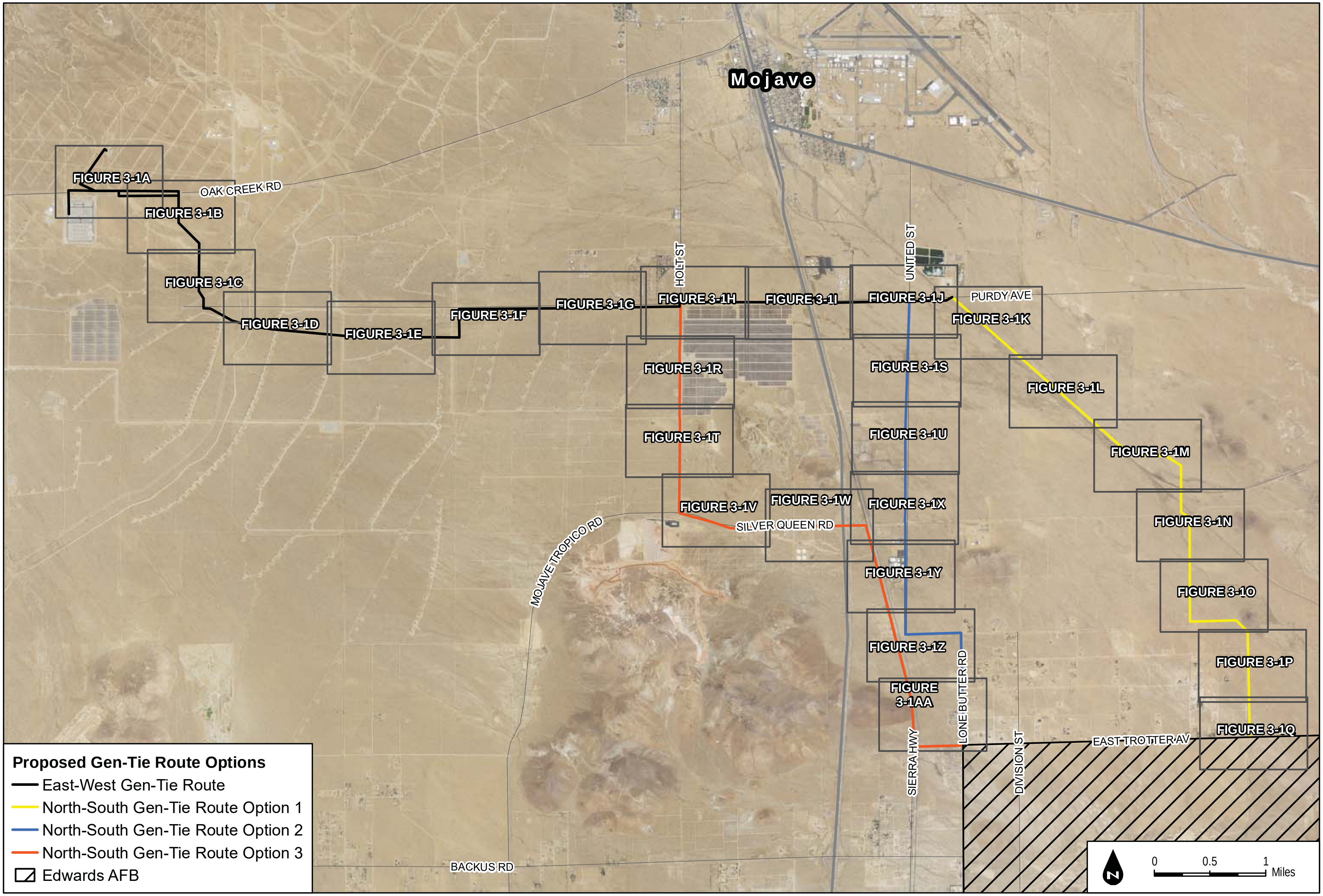

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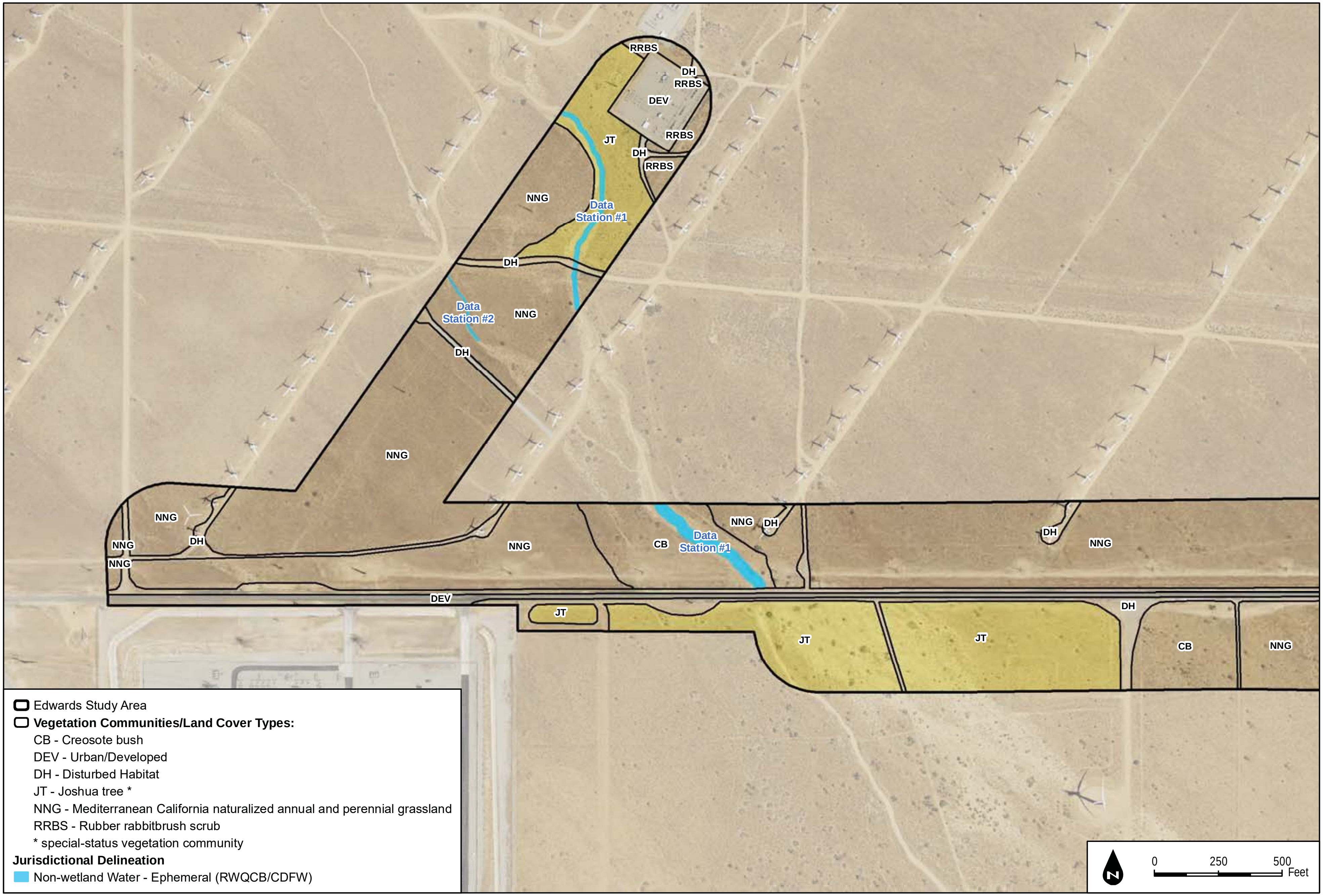

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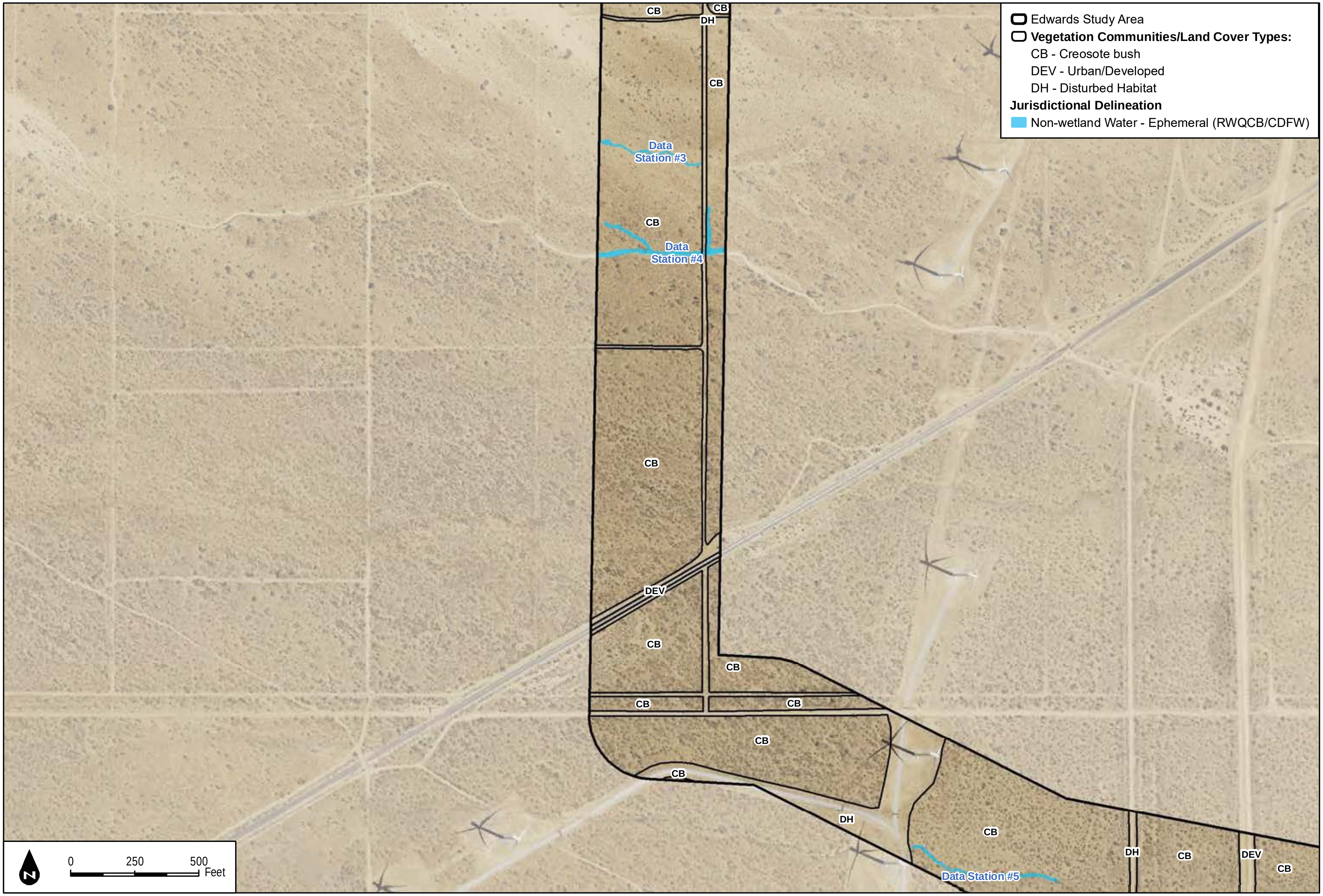

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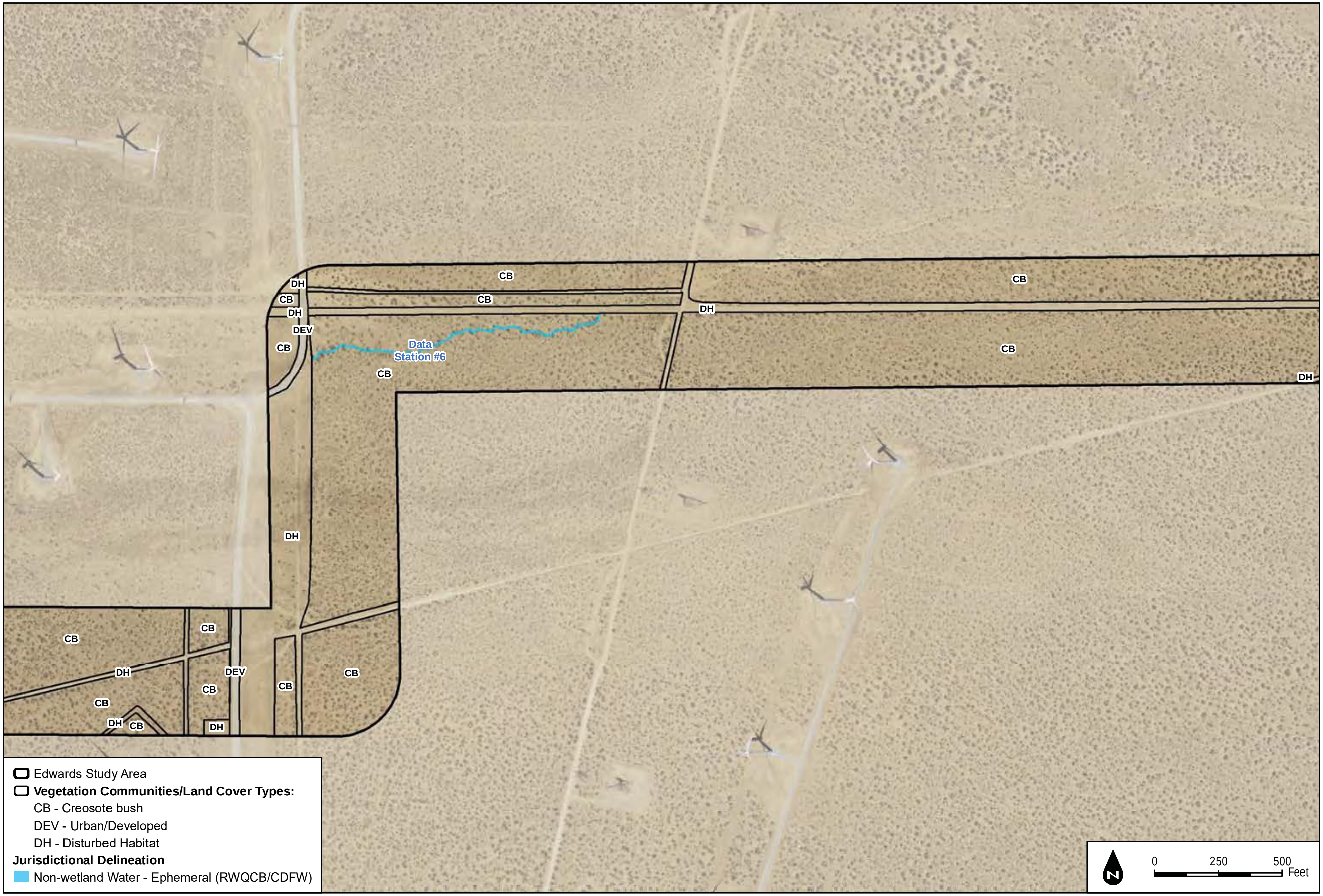

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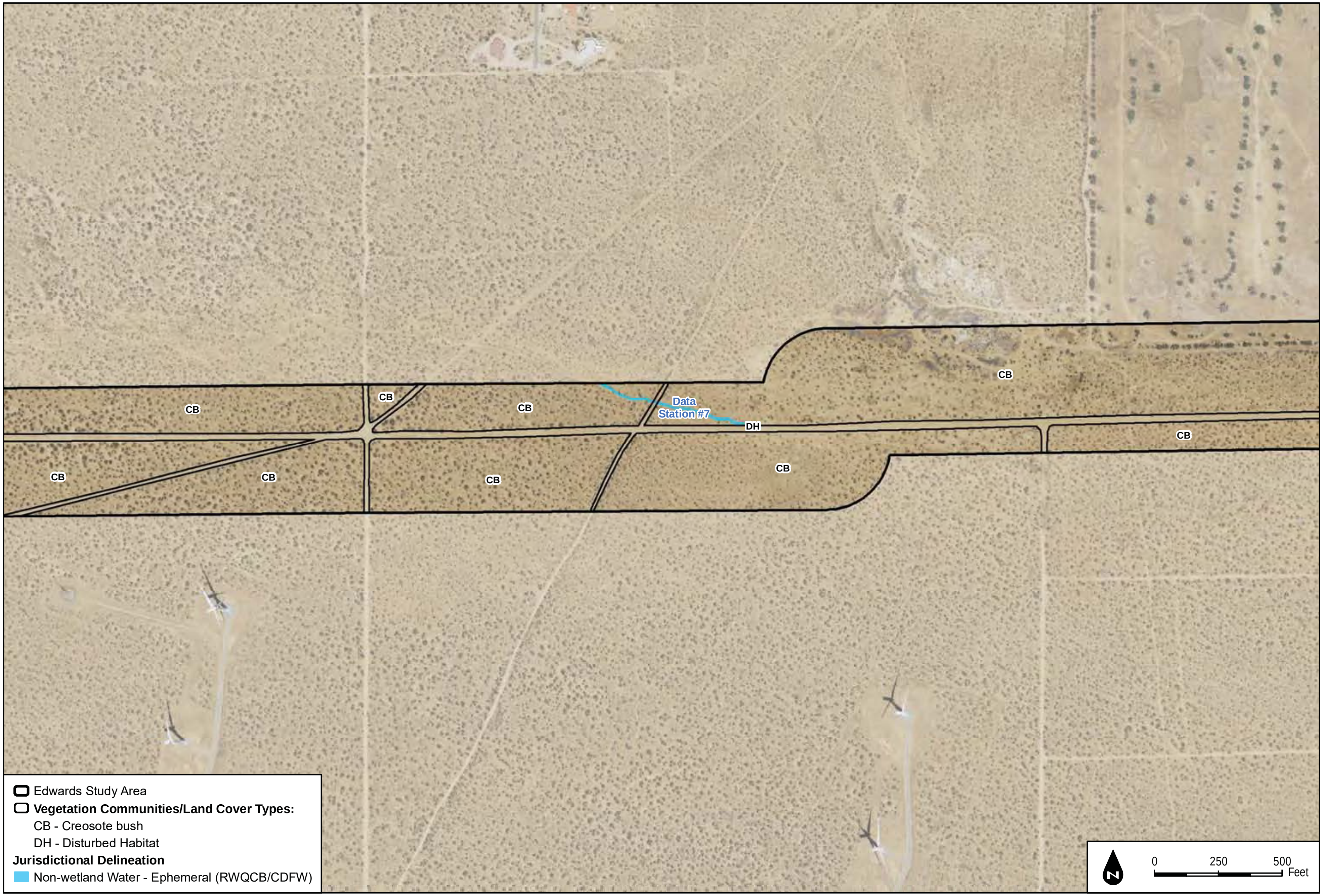

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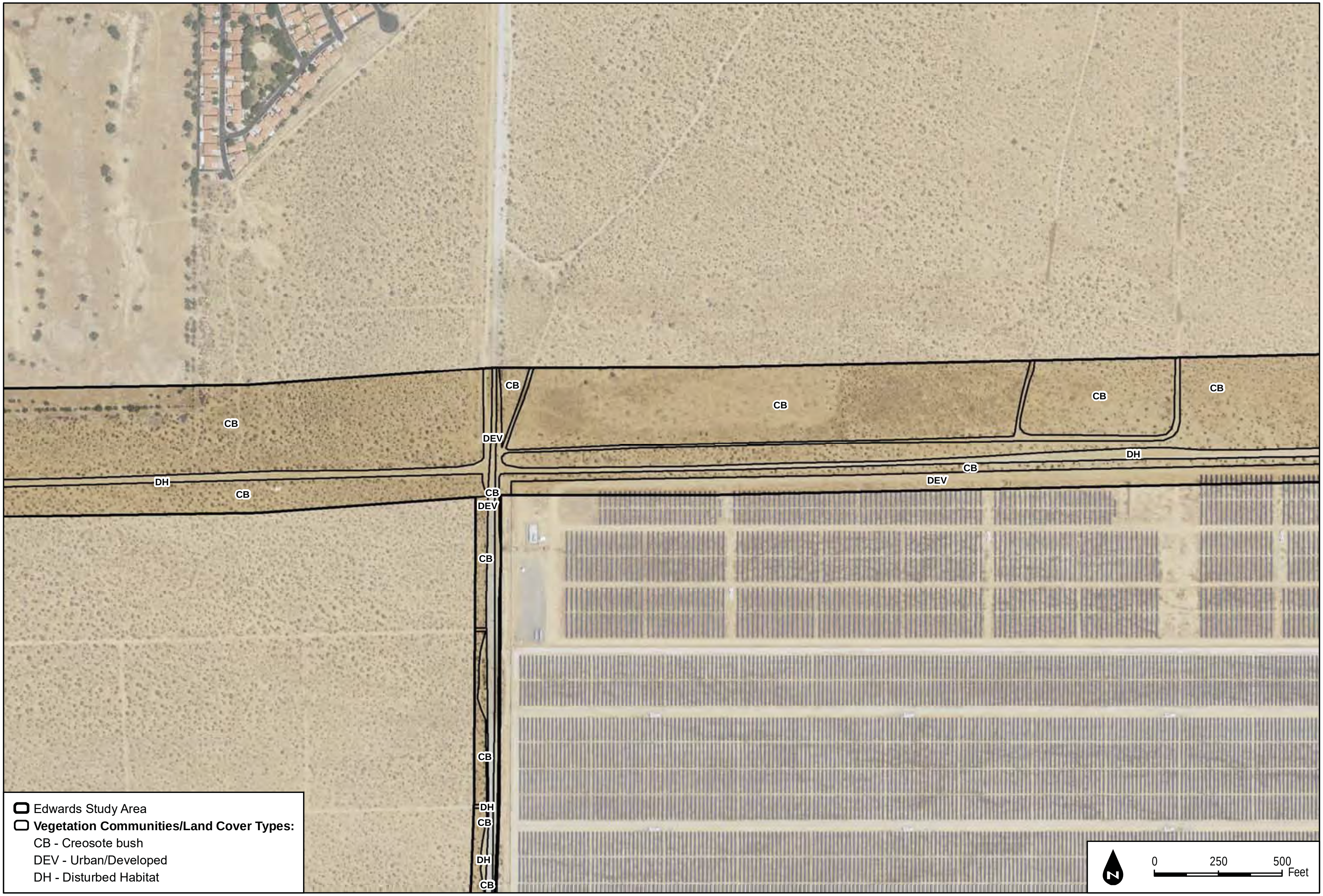

Figure 3-1H: BIOLOGICAL RESOURCES

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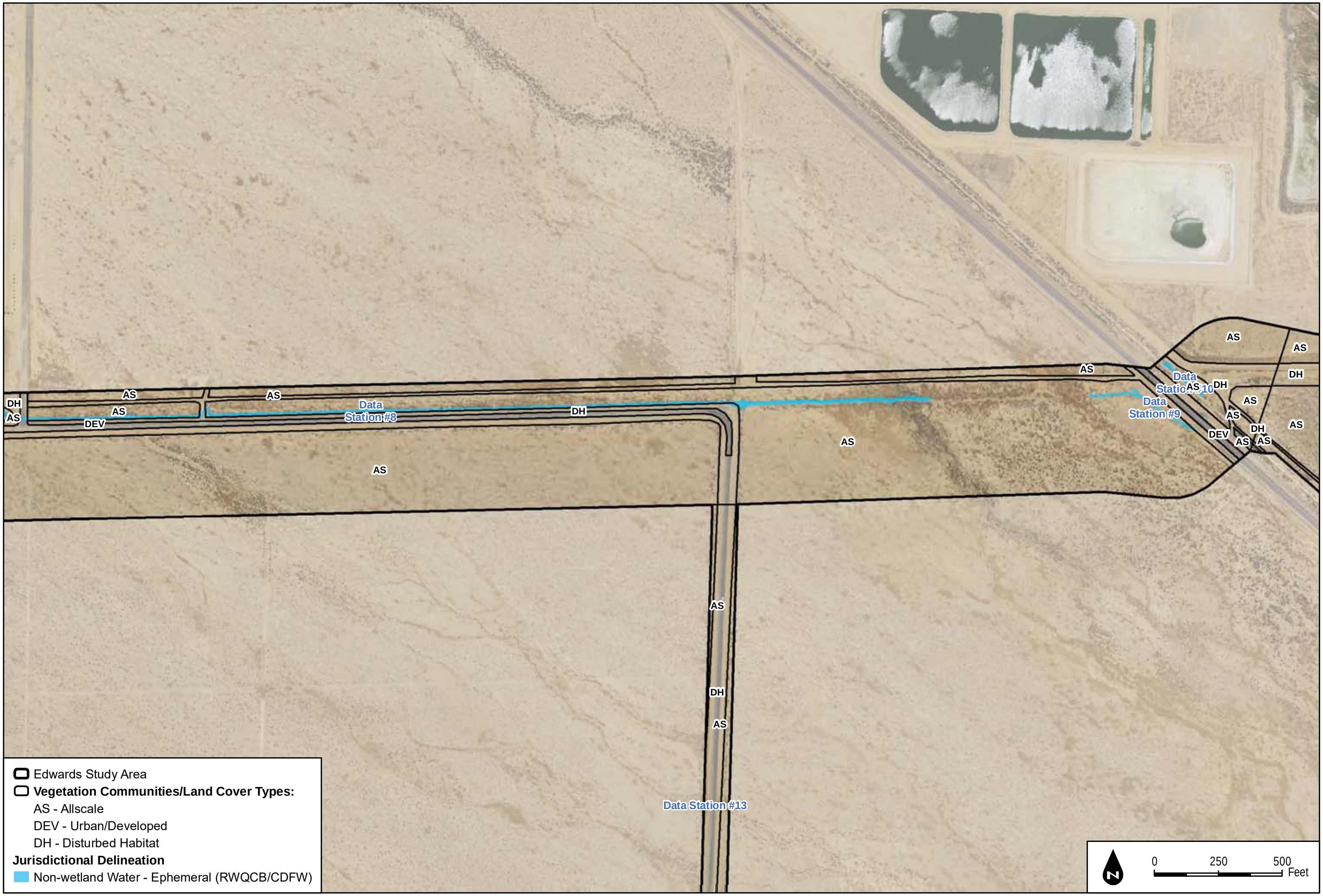

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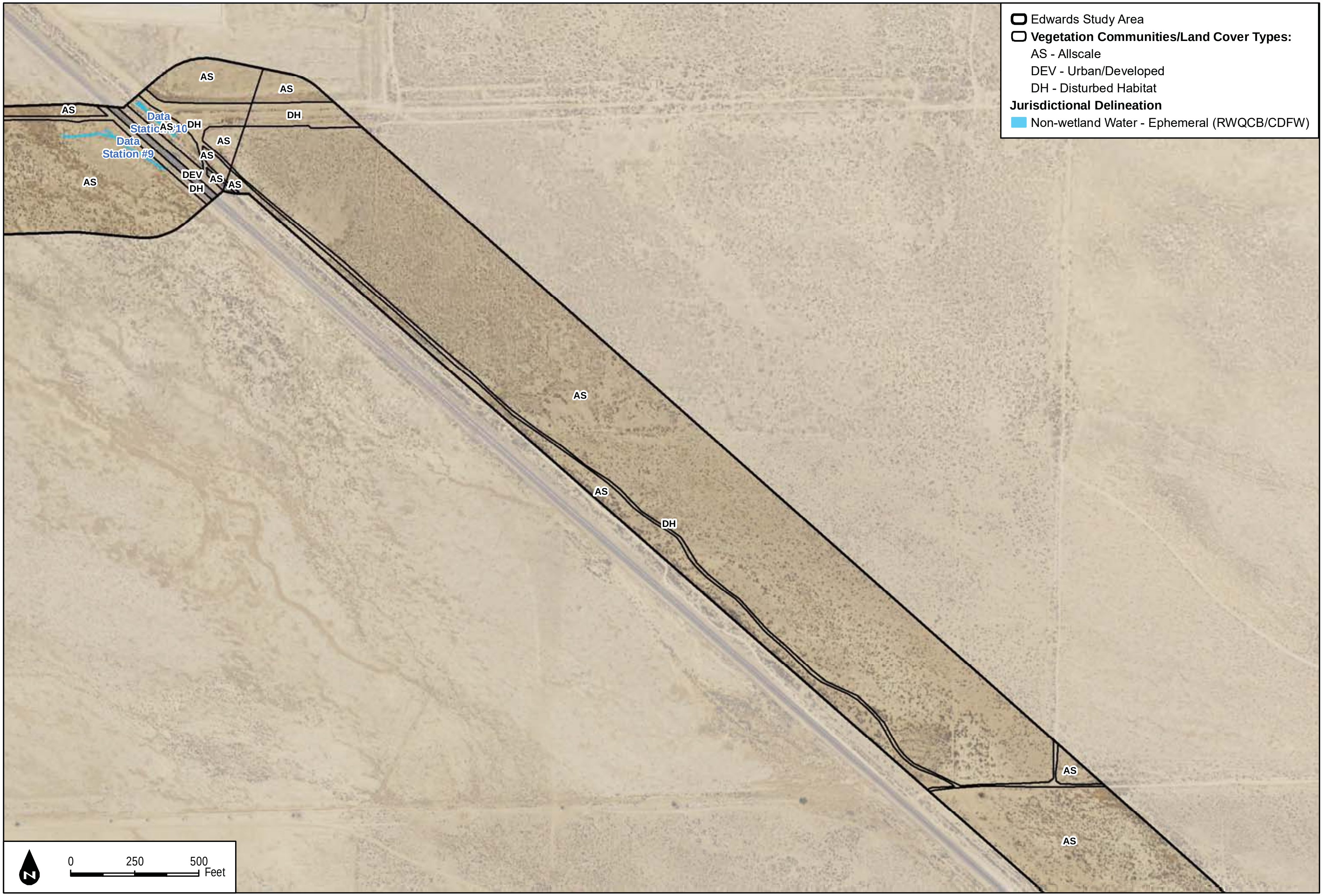

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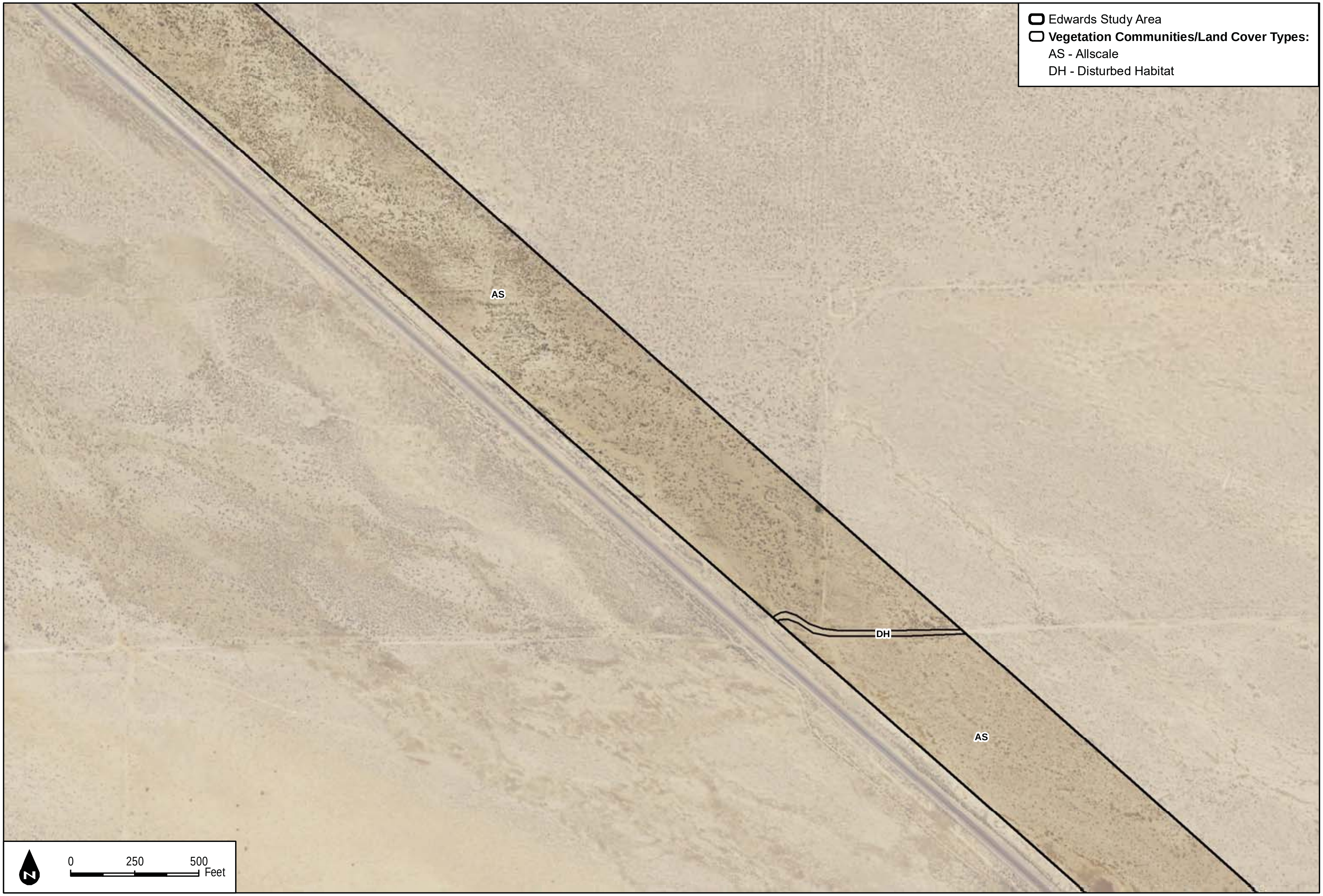

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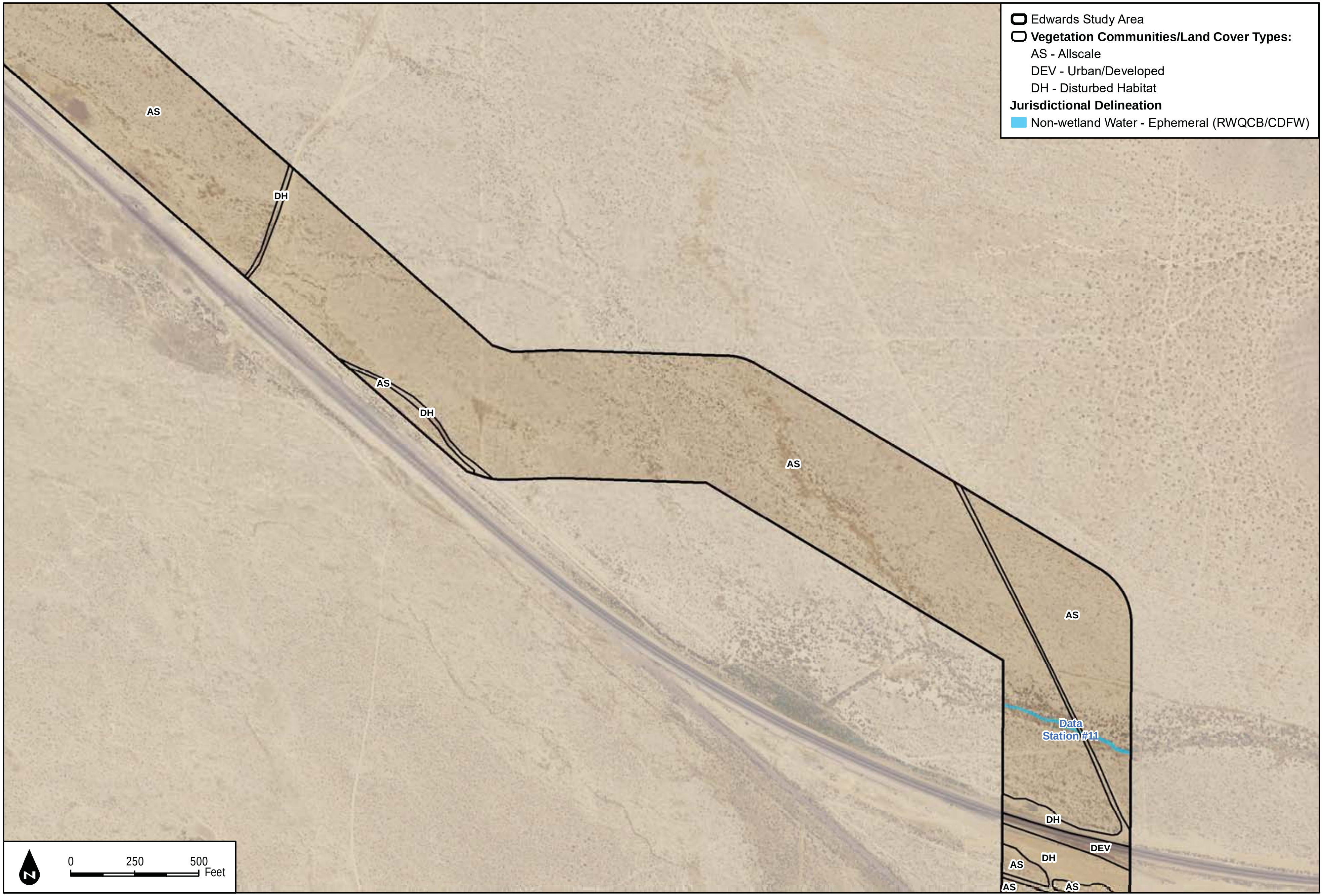

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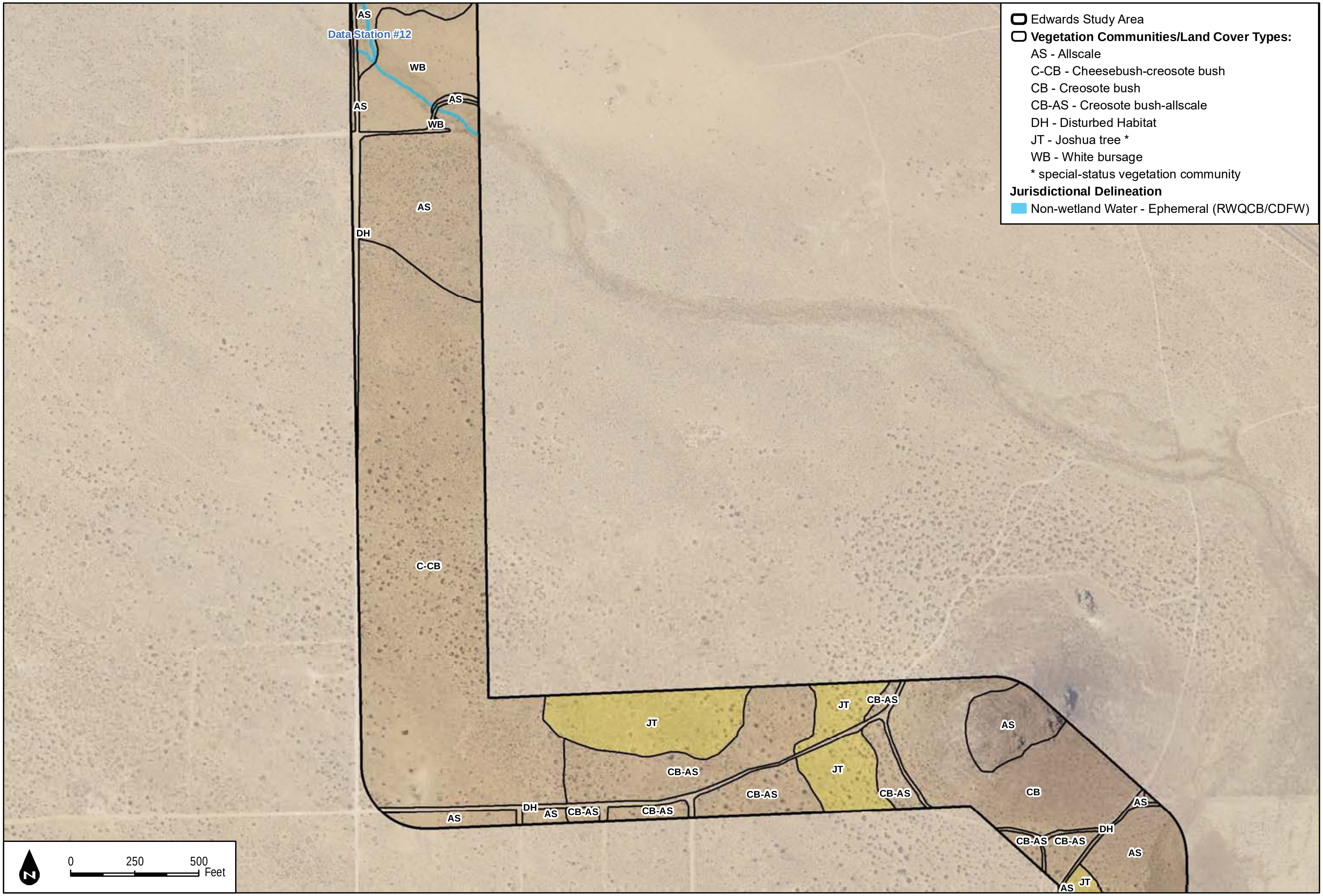

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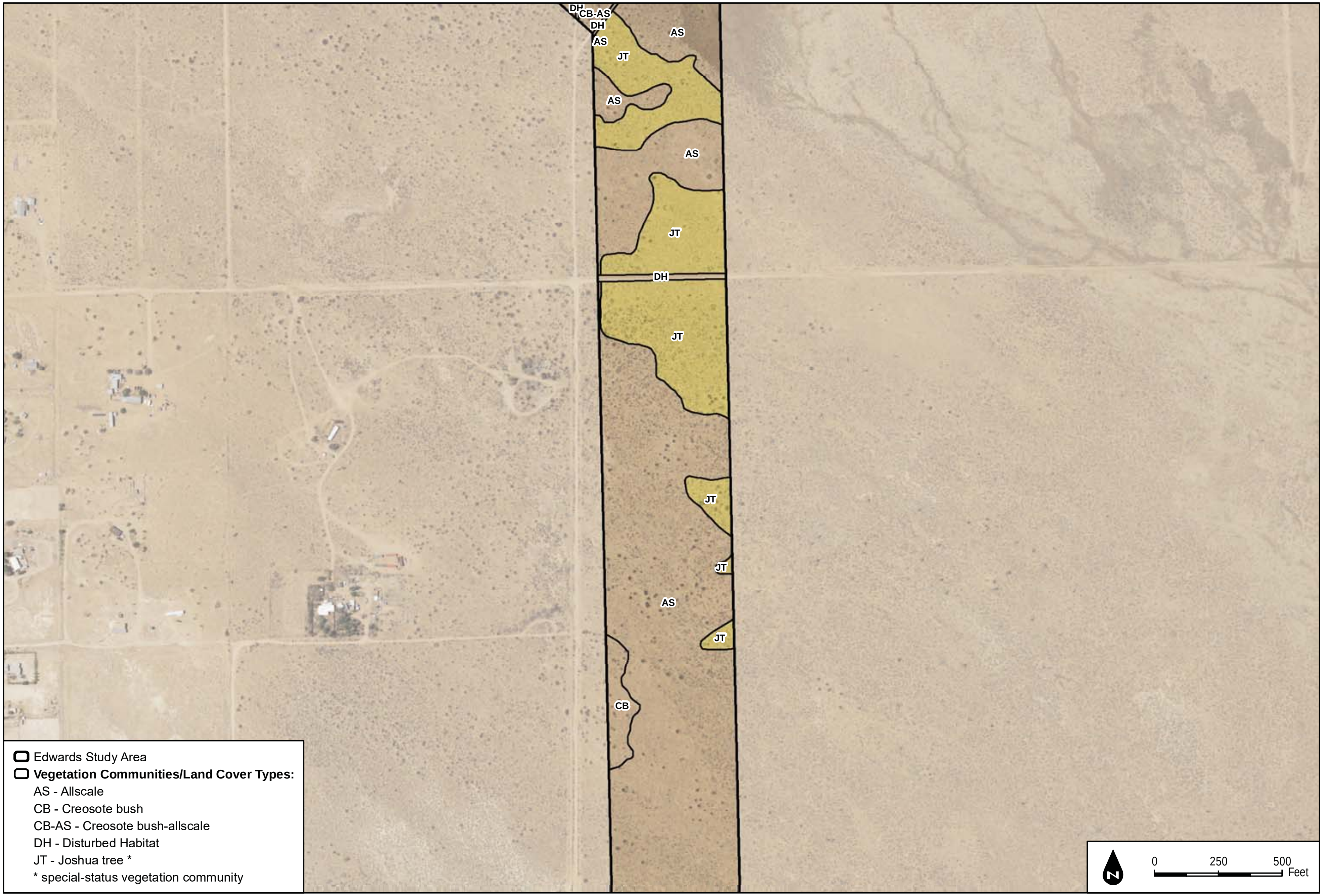

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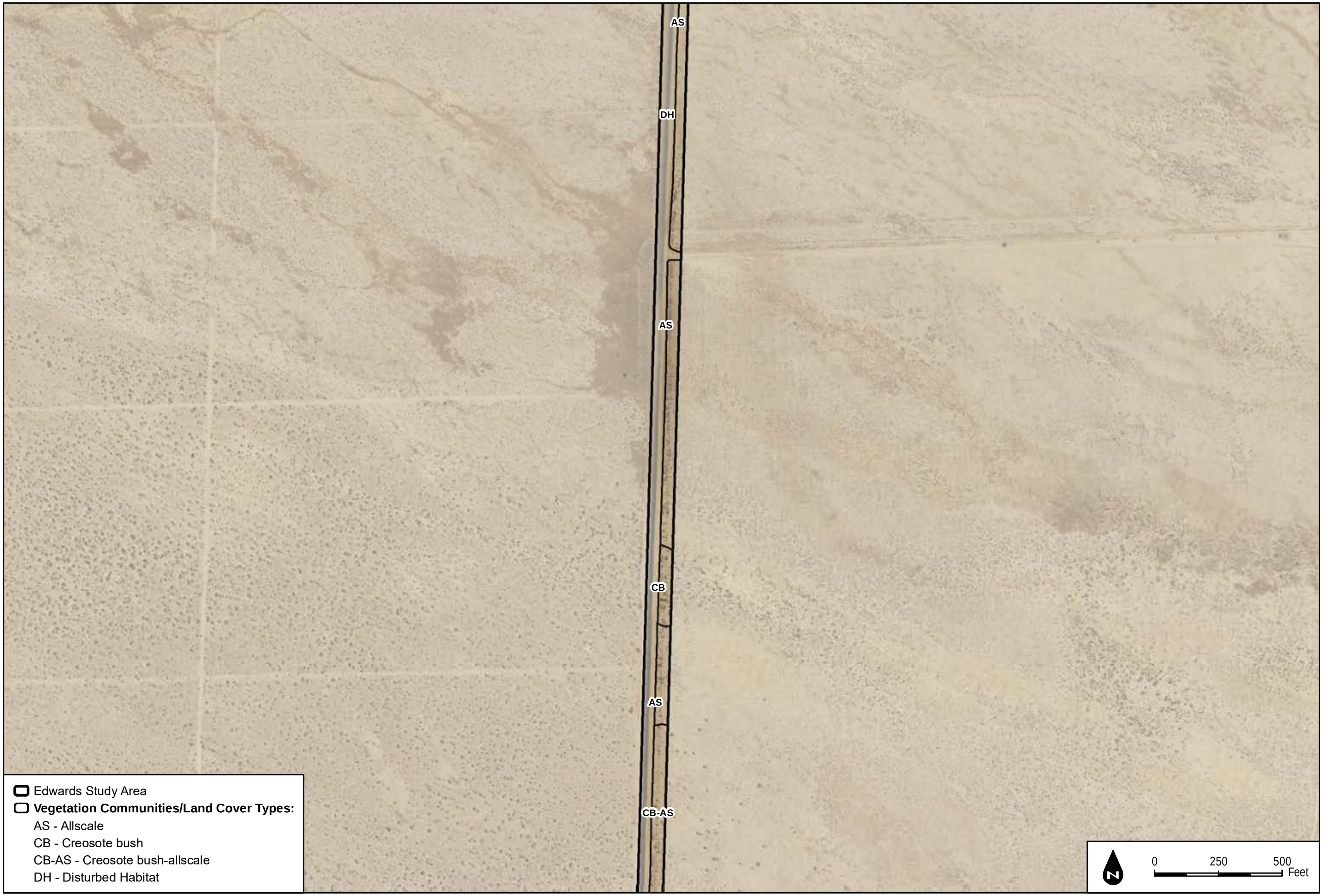

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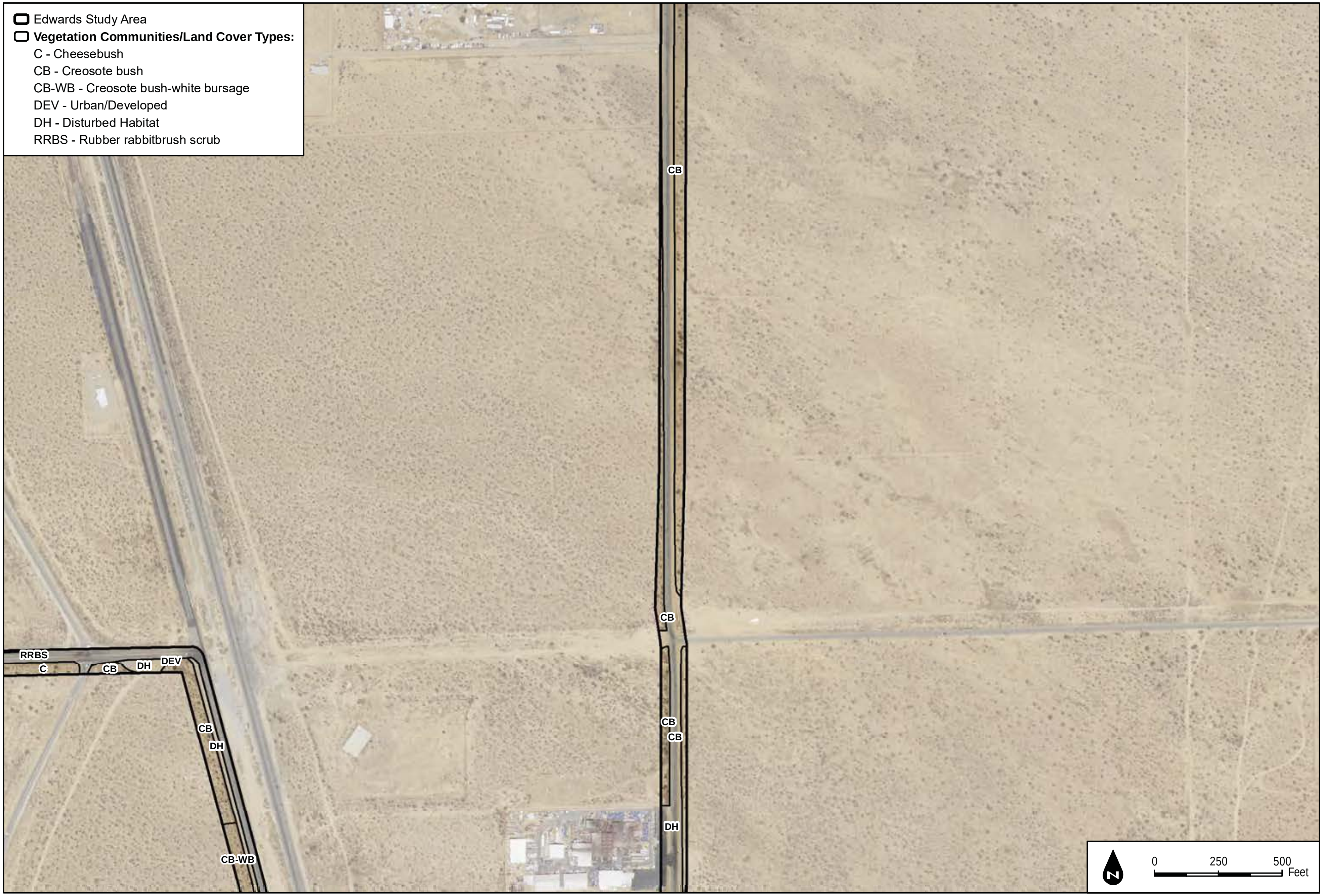

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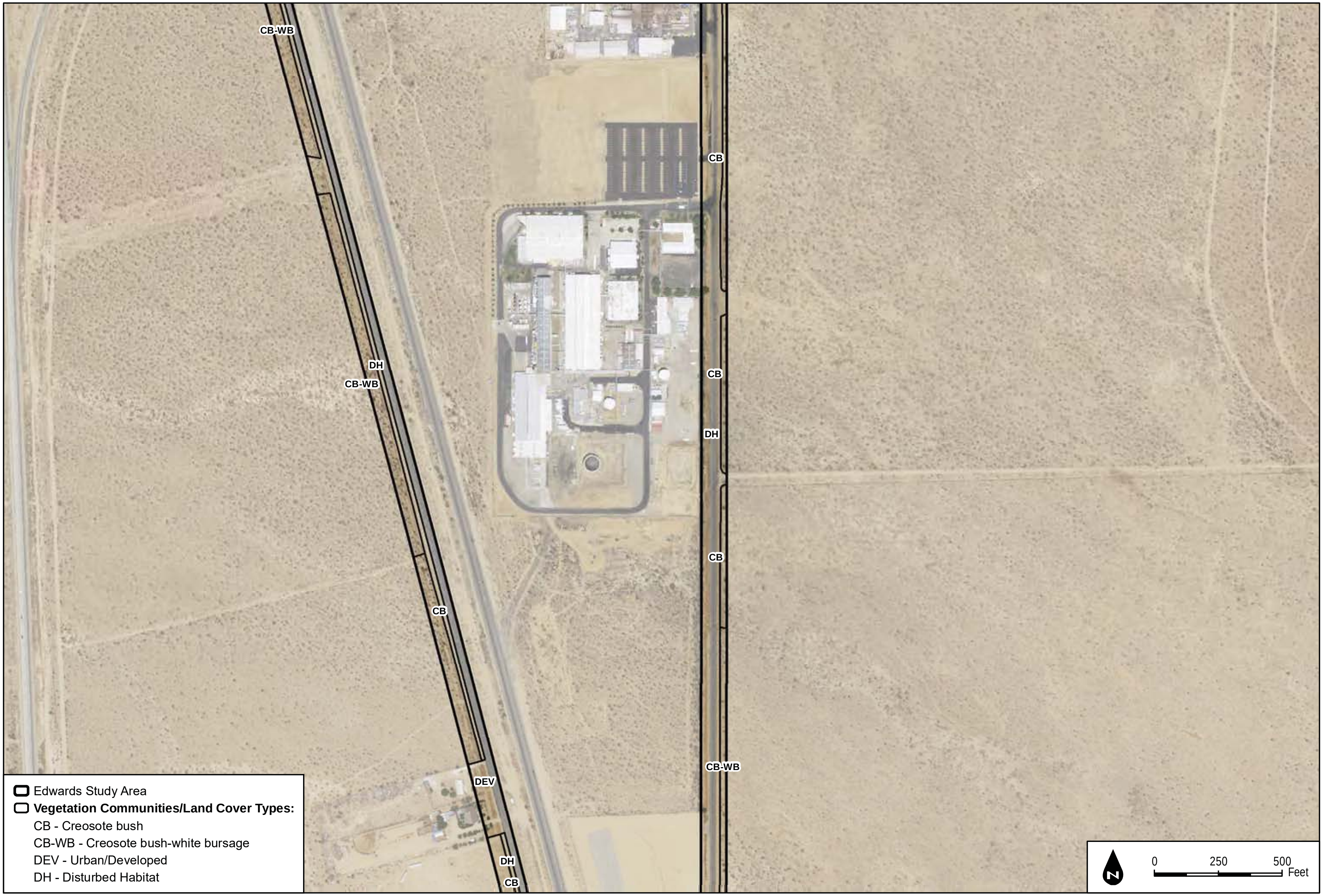

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Figure 3-1Z: BIOLOGICAL RESOURCES

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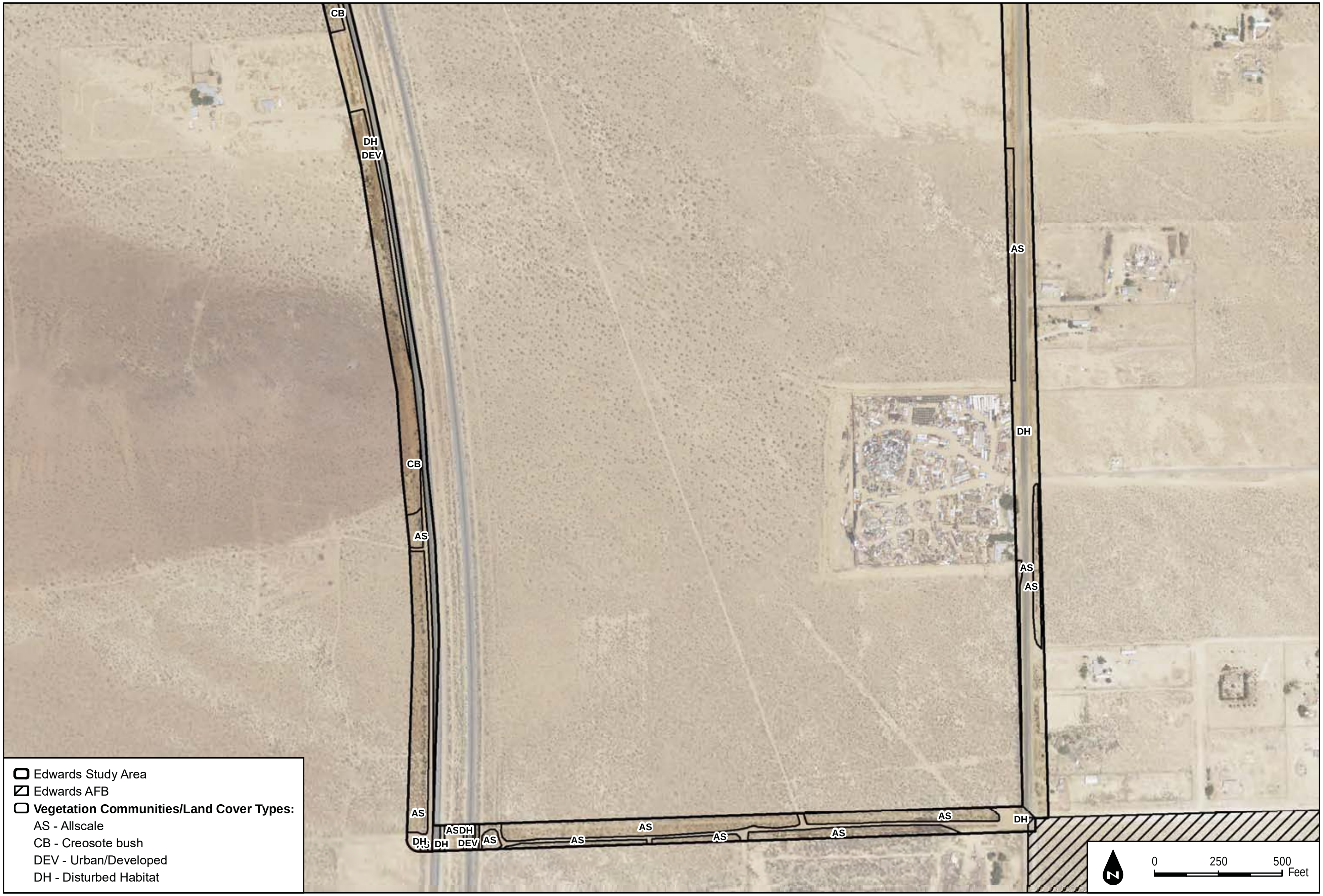

Figure 3-1AA: BIOLOGICAL RESOURCES

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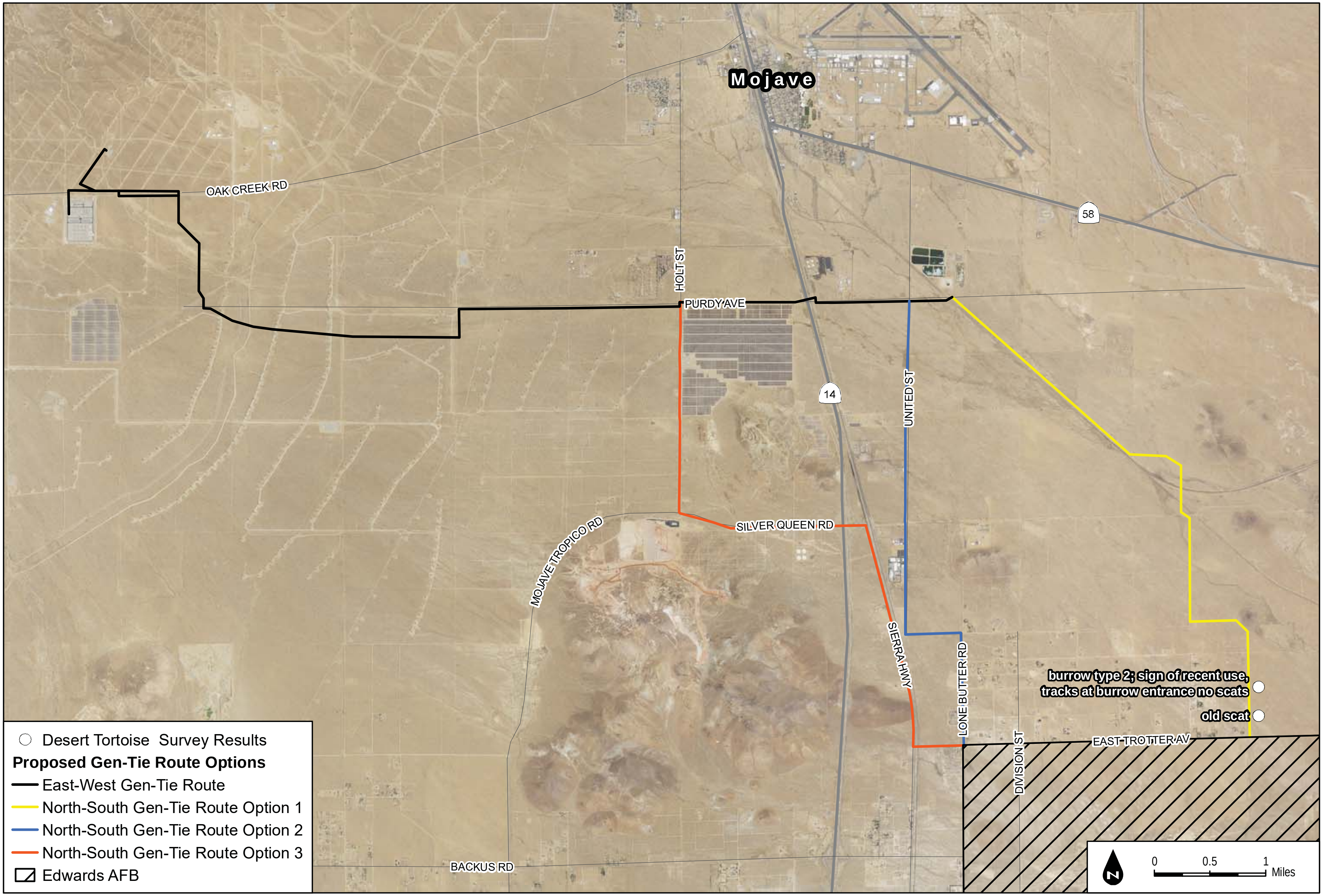

Figure 3-2: DESERT TORTOISE SURVEY RESULTS

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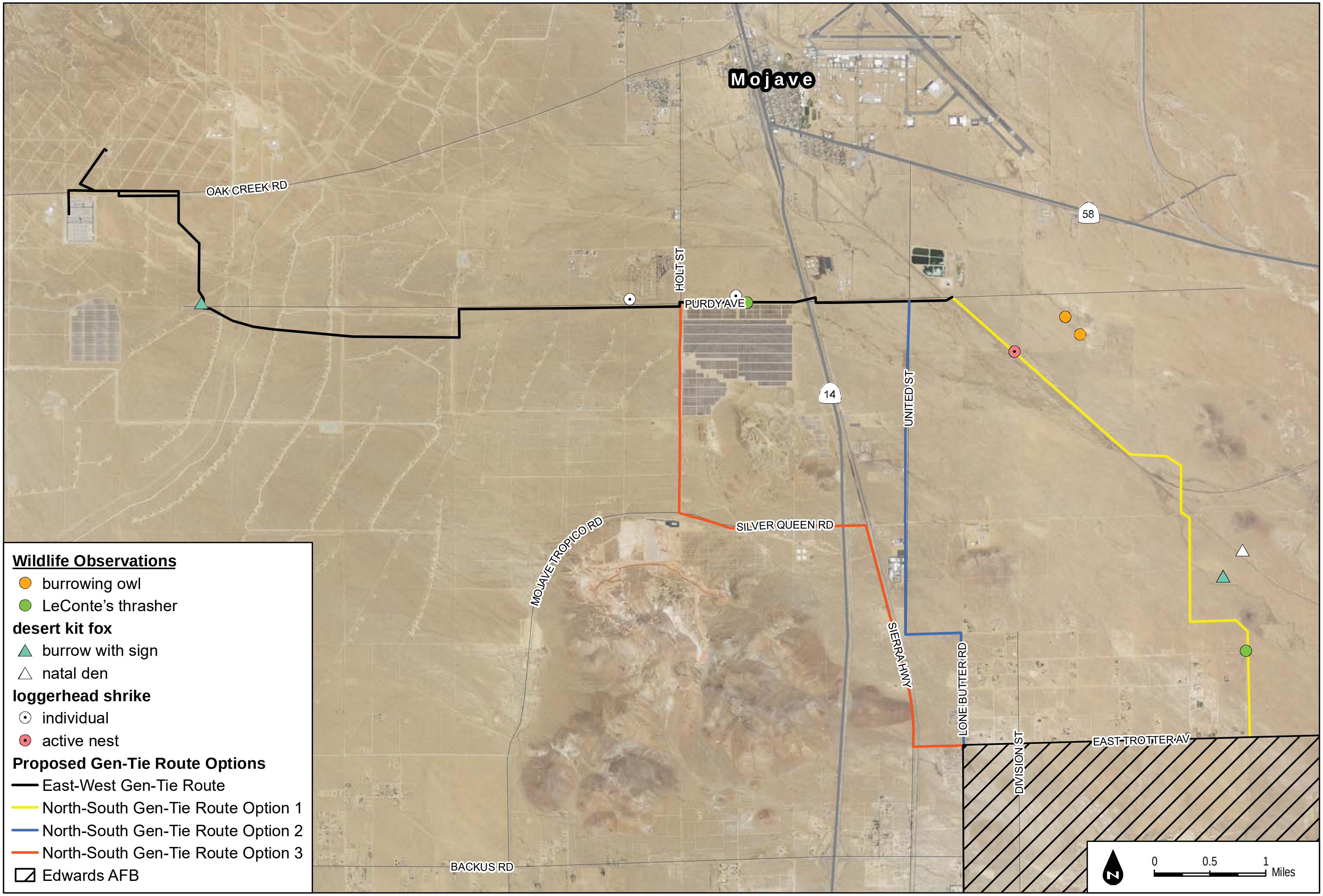

Figure 3-3: OTHER SPECIAL-STATUS WILDLIFE SPECIES OBSERVATIONS

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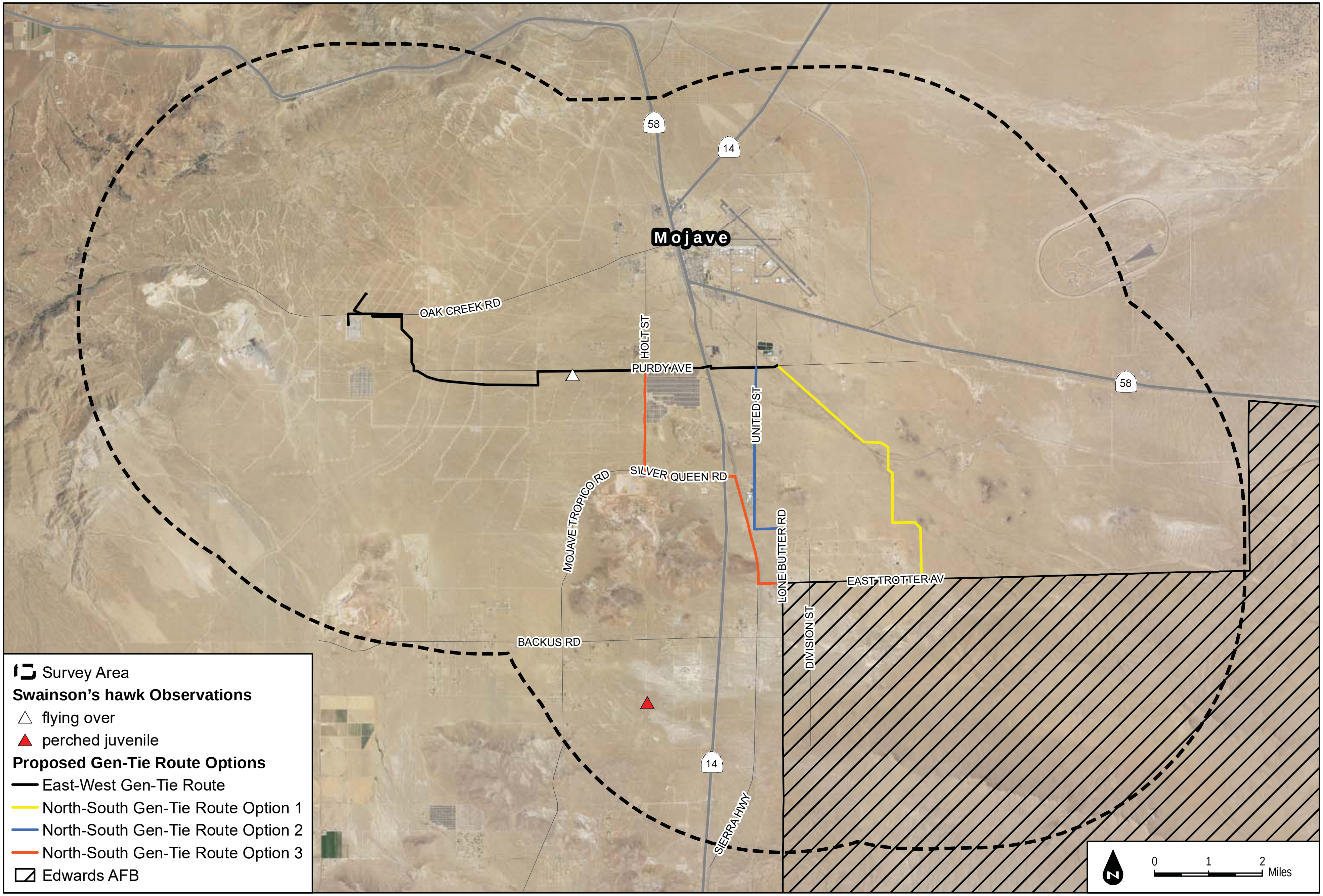

Figure 3-4: SWAINSON'S HAWK SURVEY RESULTS

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APPENDIX A

MESA Forms

Episodic Stream Indicator Data Sheet

Site ID: Edwards Grente	Stream ID: Data Station 1	Date: 5/31/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku, Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓	Mojave		Sonoran/Colorado		Great Basin	Other:

Landform (✓ all that apply)

	Headwater		Upper fan		Middle fan		Lower fan		Alluvial plain		Axial valley		Playa

Channel Form (✓ one)

✓	Single thread		Braided		Compound		Distributary		Discontinuous	Other:

Transect was selected to:

✓	Document fluvial activity & boundaries		Document channel elevations & boundaries
	Document habitat associations		Document a change in watercourse morphology
	Other:		

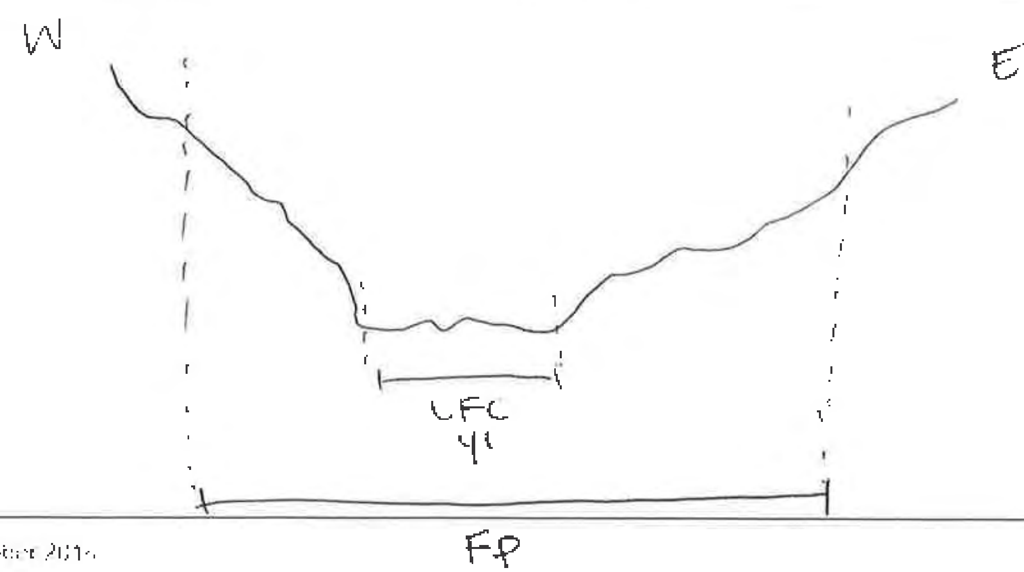
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Ephemeral, single-thread channel

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left —————————————————————————————— Right



Site ID: Edwards Gen-tie	Stream ID: Data Station 1	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators / **Substrate Particle Size**

	Terrestrial Indicators				Substrate Particle Size (Estimated percentages)	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
✓	Cut banks	✓	Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour	✓	Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations	✓	Sediment sorting		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
FP: 5% LFC: <1%	Hir inc <1% Eri nau	LFC = 0.5-2' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

Annual herbs and <1% small shrubs in LFC; ~5% shrub in FP.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Shrubs mostly absent from LFC and low % in FP compared to upland.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

creosote absent from FP & LFC

Site ID: Edwards Gen-Tie	Stream ID: Data Station 1	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				**Substrate Particle Size**	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel	✓	Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
✓	Organic drift	✓	Wrack	✓	% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills	✓	Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

See previous veg section

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

See previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

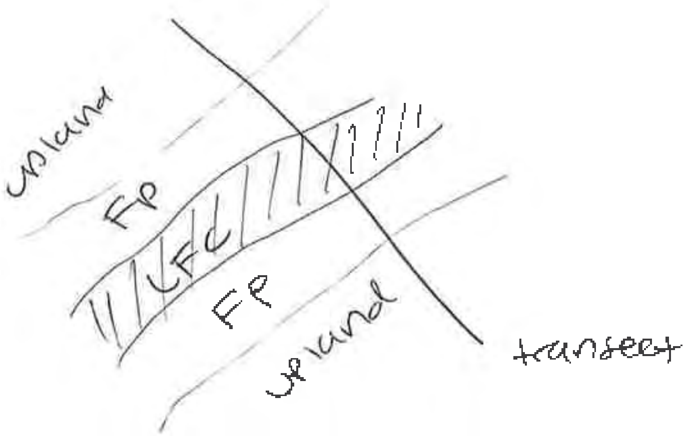
Site ID Edwards Gen-Tie	Stream ID Data Station 1	

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts	✓	Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
1	upstream		
2	downstream, facing East		
3	downstream, facing west		
4	downstream		
5			
6			

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 2	Date: 5/31/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku, Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓ Mojave	Sonoran/Colorado	Great Basin	Other:

Landform (✓ all that apply)

Headwater	Upper fan	Middle fan	Lower fan	Alluvial plain	Axial valley	Playa

Channel Form (✓ one)

✓ Single thread	Braided	Compound	Distributary	Discontinuous	Other:

Transect was selected to:

✓ Document fluvial activity & boundaries	Document channel elevations & boundaries
Document habitat associations	Document a change in watercourse morphology
Other:	

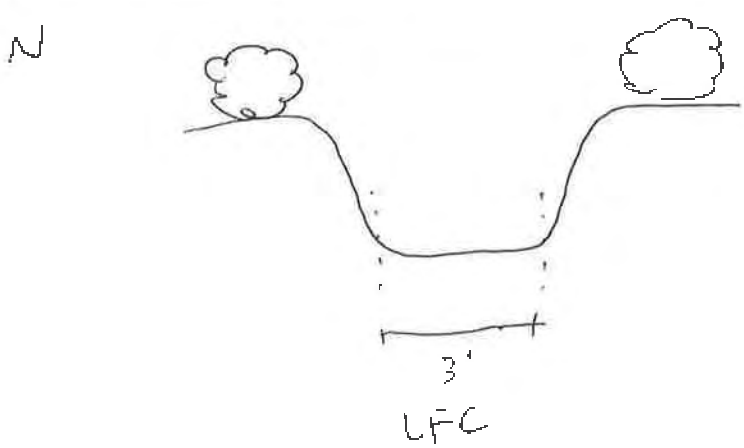
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Drainage feature that continues along side road and eventually sheet-flows before dissipating.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ____ Right



Site ID: Edwards Gen-Tie	Stream ID: Data Station 2	page 2 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators				Substrate Particle Size		
				Estimated percentages		
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
Upland : 7%	Yucca brev 1% upland : Eri nau 6% Bromus sp.	upland : 0.5-2' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

shrubs and annual grasses in uplands. Herb/sandy bottom in watercourse complex.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Eri nau and Bromus sp. in upland. Herb/sandy bottom in watercourse complex.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

Bromus sp. & Eri nau in uplands with primarily unvegetated (<1%) watercourse

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				Substrate Particle Size	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
✓	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel		Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
	Organic drift		Wrack		% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

See previous veg section

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

See previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

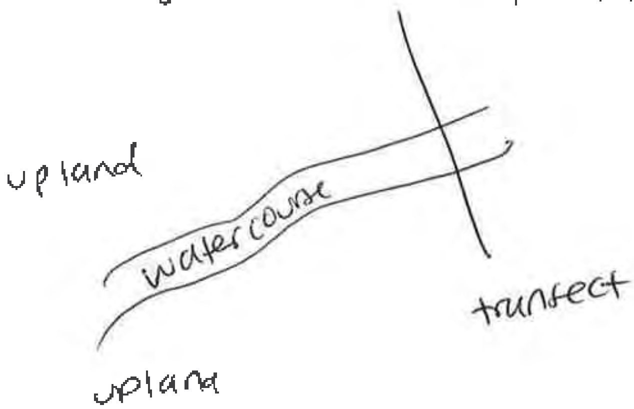
Site ID Edwards Gentle	Stream ID Datum Station 2	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
7	Upstream		
8	Downstream		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 3	Date: 5/31/17
Nearest Town: Mojave		County: Kern
Investigators: Callie Amoaku & Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one) ✓ Mojave ☐ Sonoran/Colorado ☐ Great Basin Other:

Landform (✓ all that apply)

☐ Headwater ☐ Upper fan ☐ Middle fan ☐ Lower fan ☐ Alluvial plain ☐ Axial valley ☐ Playa

Channel Form (✓ one)

✓ Single thread ☐ Braided ☐ Compound ☐ Distributary ☐ Discontinuous Other:

Transect was selected to:

✓ Document fluvial activity & boundaries ☐ Document channel elevations & boundaries

☐ Document habitat associations ☐ Document a change in watercourse morphology

☐ Other:

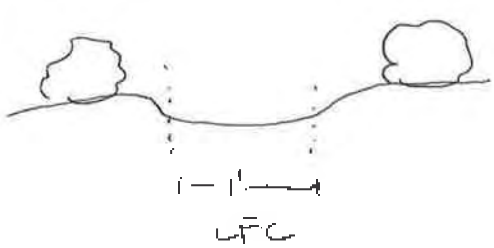
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Narrow ephemeral channel with incised, minimal bank. Feature eventually sheet flow and dissipates.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ____ Right



Site ID: Edwards Gen-Tie	Stream ID: Data Station 3	page 2 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

	Terrestrial Indicators				Substrate Particle Size	
					Estimated percentages	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides		% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
15%	Lartri Erifasfol Yucbre Kralan	0.5 – 3.5'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

shrubs and grasses in upland. watercourse primarily unvegetated (2%)

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

upland has Lartri, Yucbre, Erifasfol, and Kralan. LFC has bromes.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

Upland has more abundant shrubs.

Site ID: Edwards Gen-TIE	Stream ID: Data Station 3	page 3 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA – Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				Substrate Particle Size	
					Estimated percentages	
	Bar forms: sand / gravel		Secondary channels			
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
✓	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel		Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
	Organic drift		Wrack		% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
2%	Bro mad no	0.5-1'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

LFC mostly unvegetated.

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

LFC mostly unvegetated

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

LFC has less bromes than surrounding upland

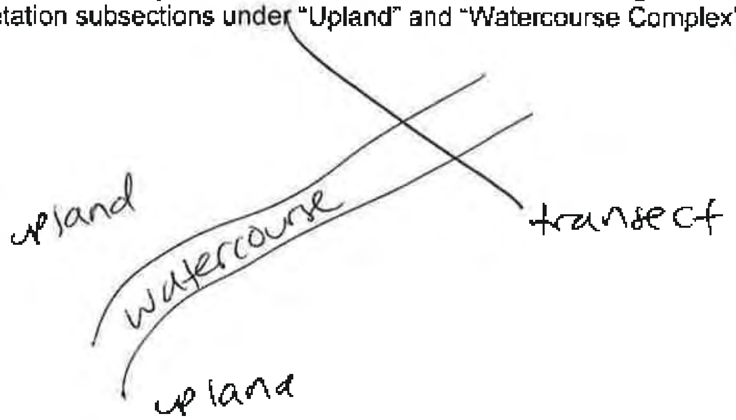
Site ID Edwards Gen-Tie	Stream ID Data Station 3	

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
9	upstream		
10	upstream		
11	Downstream		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 4	Date: 5/31/17
Nearest Town:	County:	
Investigators: Callie Amoaku, Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one): ✓ Mojave ☐ Sonoran/Colorado ☐ Great Basin Other:

Landform (✓ all that apply)

☐ Headwater ☐ Upper fan ☐ Middle fan ☐ Lower fan ☐ Alluvial plain ☐ Axial valley ☐ Playa

Channel Form (✓ one)

✓ Single thread ☐ Braided ☐ Compound ☐ Distributary ☐ Discontinuous Other:

Transect was selected to:

✓ Document fluvial activity & boundaries	☐ Document channel elevations & boundaries
☐ Document habitat associations	☐ Document a change in watercourse morphology
☐ Other:	

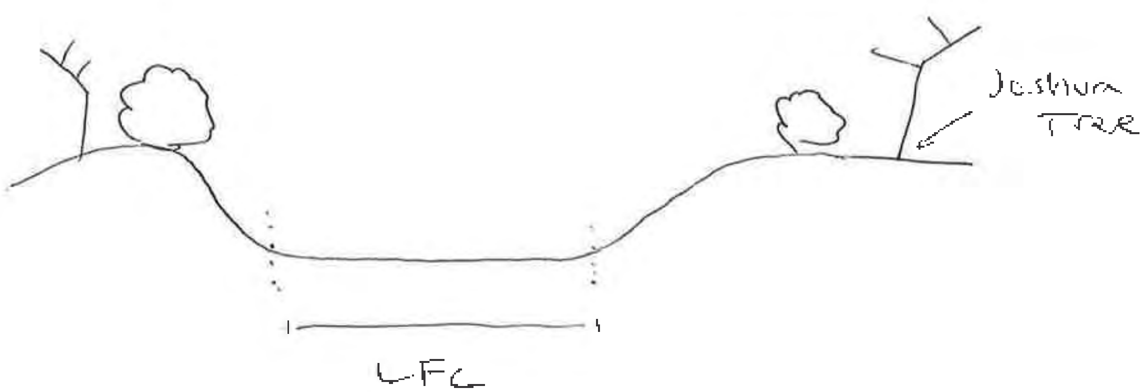
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Wide, deep sandy bottom ephemeral channel. Includes an erosional feature that was previously part of road.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left Right



Note presence or absence of each indicator within a <u>minimum</u> distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators					Substrate Particle Size	
					Estimated percentages	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
✓	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

Two sub-tributaries flow into main channel: one swale and one erosional feature that was previously part of road.

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
Upland: 40%	Upland: Yuc bre, Lar tri, Eri nau, Eri fas fol	3 – 7'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

Shrubs & trees in upland. Watercourse mostly unvegetated (<1%)

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Upland has Yuc bre, Eri nau, Lar tri, and Eri fas fol

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

LFC mostly unvegetated. Upland has trees/shrubs.

Site ID: Edwards Gen-Tie	Stream ID: Data Station 4	page 3 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				**Substrate Particle Size**	
					Estimated percentages	
	Bar forms: sand / gravel		Secondary channels		% Bedrock / Cemented substrate	
	Bifurcated flow		Sediment plastering		% Boulder	≥ 256 mm
✓	Drainage swales		Sediment ramps: sand / gravel		% Cobble	≥ 64 – 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Pebble	≥ 4 – 64 mm
	Imbricated gravel		Sediment sorting		% Granule	≥ 2 – 4 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel	✓	% Sand	≤ 2 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments		% Silt/Clay	Fines
✓	Organic drift	✓	Wrack			
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots	✓	Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

See previous veg section

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

See previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

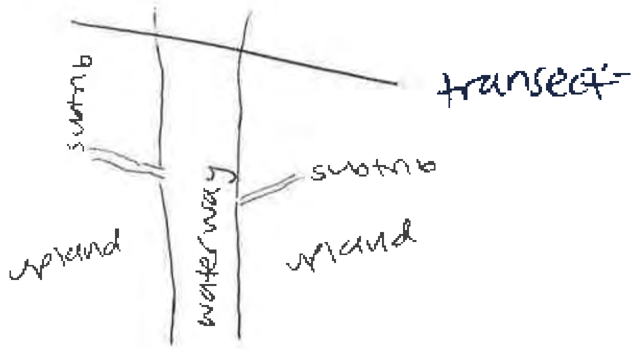
Site ID Edwards Gen-Tie	Stream ID Data Station 4	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
12	upstream		
13	main channel		
14	scour evidence		
15	erosional feature		
16	erosional feature		
17	main channel		
18	main channel		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 5	Date: 5/31/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amodeo, Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓ Mojave	Sonoran/Colorado	Great Basin	Other:

Landform (✓ all that apply)

Headwater	Upper fan	Middle fan	Lower fan	Alluvial plain	Axial valley	Playa

Channel Form (✓ one)

✓ Single thread	Braided	Compound	Distributary	Discontinuous	Other:

Transect was selected to:

✓ Document fluvial activity & boundaries	Document channel elevations & boundaries
Document habitat associations	Document a change in watercourse morphology
Other:	

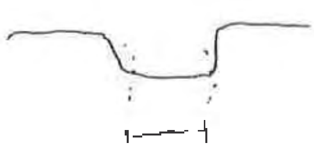
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Narrow, deep ephemeral channel that connects to larger channel downstream, but outside study area

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left Right



LFC
0.5-1'

Site ID: Edwards Gen-Tie	Stream ID: Data Station 5	page 2 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators / **Substrate Particle Size**

	Terrestrial Indicators				Substrate Particle Size (Estimated percentages)	
	Av soil horizon		Relict bars & swales			
	Biotic soil crusts		Rock fractured in place		% Bedrock / Cemented substrate	
✓	Bioturbation		Rock varnish		% Boulder	≥ 256 mm
	Caliche: coatings / layers / rubble		Rock weathering		% Cobble	≥ 64 – 256mm
	Carbonate etching		Rubified rock undersides	✓	% Pebble	≥ 4 – 64 mm
	Coppice dunes: active / relict		Soil development	✓	% Granule	≥ 2 – 4 mm
	Deflated surface		Surface rounding of landform	✓	% Sand	≤ 2 mm
	Pavement		Woody debris in place		% Silt/Clay	Fines
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
upland : 30%	Lar tri Bromes Ambdum	0.5-3.5'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

shrubs and grasses in upland with watercourse primarily unvegetated but with some herbs.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

watercourse primarily unvegetated. Upland has Lar tri, Yuc bre and Bromus sp.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

watercourse primarily unvegetated (<1%) of Bromes.

Site ID: Edwards Gen-Tie	Stream ID: Data Station 5	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				Substrate Particle Size	
					Estimated percentages	
	Bar forms: sand / gravel		Secondary channels		% Bedrock / Cemented substrate	
	Bifurcated flow		Sediment plastering		% Boulder	≥ 256 mm
✓	Drainage swales		Sediment ramps: sand / gravel		% Cobble	≥ 64 – 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Pebble	≥ 4 – 64 mm
	Imbricated gravel		Sediment sorting		% Granule	≥ 2 – 4 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel	✓	% Sand	≤ 2 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments		% Silt/Clay	Fines
	Organic drift		Wrack			
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

	Erosion Indicators				
✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
< 1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

LFC primarily unvegetated. Shrubs in upland

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

see previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

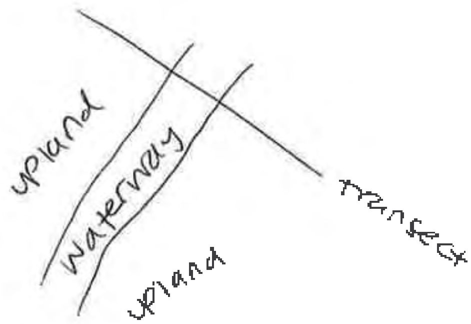
Site ID Edwards Gen-Tie	Stream ID Data Station 5	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
19			
20			

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 6	Date: 5/30/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku, Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓	Mojave		Sonoran/Colorado		Great Basin	Other:

Landform (✓ all that apply)

	Headwater		Upper fan		Middle fan		Lower fan		Alluvial plain		Axial valley		Playa

Channel Form (✓ one)

✓	Single thread		Braided		Compound		Distributary		Discontinuous	Other:

Transect was selected to:

✓	Document fluvial activity & boundaries		Document channel elevations & boundaries
	Document habitat associations		Document a change in watercourse morphology
	Other:		

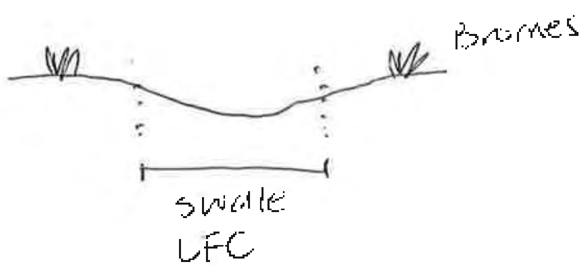
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

swale that appears to convey water from uplands and road runoff from gravel road west/northwest to dirt road.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______________________________ Right



Site ID: Edwards Gen-Tie	Stream ID: Data station 6	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators				Substrate Particle Size		
				Estimated percentages		
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators					
	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
5%	Lar tri Bromus sp.	0.5-4.5'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

Swale made up of grasses while upland made up of grasses and shrubs.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Lar tri comprises the uplands.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

Lar tri more abundant in uplands.

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

Transportation, Deposition & Flow Transition Indicators

	Bar forms: sand / gravel		Secondary channels
	Bifurcated flow		Sediment plastering
✓	Drainage swales		Sediment ramps: sand / gravel
	Flow lineations		Sediment sheets: sand / gravel
	Imbricated gravel		Sediment sorting
	Levee ridges: sand / gravel		Sediment tails: sand / gravel
	Mud: cracks / curls / drapes		Vegetation-channel alignments
✓	Organic drift	✓	Wrack
	Overturned rocks		Wrinkle marks
	Out-of-channel flow: Lateral floodplain / Terminal floodplain		
	Ripples		
	Other:		

Substrate Particle Size

Estimated percentages

	% Bedrock / Cemented substrate	
	% Boulder	≥ 256 mm
	% Cobble	≥ 64 – 256 mm
	% Pebble	≥ 4 – 64 mm
✓	% Granule	≥ 2 – 4 mm
✓	% Sand	≤ 2 mm
	% Silt/Clay	Fines

Erosion Indicators

	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
5%	Bromus sp.	0.5- 1'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

No shrubs in LFC. Shrubs in upland. Grasses throughout.

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

Bromes in both LFC and upland. LFC has no shrubs.

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

upland has shrub species.

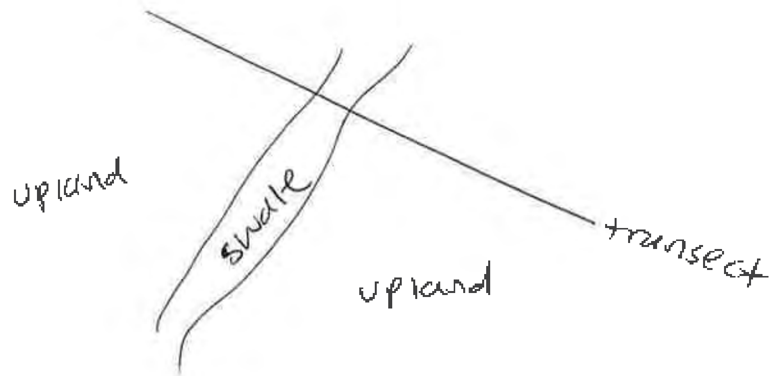
Site ID Edwards Gen-Tie	Stream ID Data Station 6	

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
21	upstream; swale start		
22	downstream		
23	upstream		
24	downstream; swale end		
25	evidence of debris wracking		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie | Stream ID: Data station 7 | Date: 5/30/17

Nearest Town: Mojave | County: Kern

Investigators: Callie Amoaku, Patricia Schuyler

Base Map

Aerial Photo #: | Date: | Topographic Map Name: | Date:

GPS Data

GPS Name: | Datum: | Transect Elevation: | Zone 10 / 11 | GPS Error: ± ft / m

GPS co-ords start of transect: | GPS co-ords end of transect:

Geomorphic Province (✓one) ✓ Mojave ☐ Sonoran/Colorado ☐ Great Basin Other:

Landform (✓ all that apply)

☐ Headwater ☐ Upper fan ☐ Middle fan ☐ Lower fan ☐ Alluvial plain ☐ Axial valley ☐ Playa

Channel Form (✓ one)

✓ Single thread ☐ Braided ☐ Compound ☐ Distributary ☐ Discontinuous Other:

Transect was selected to:

✓ Document fluvial activity & boundaries
☐ Document channel elevations & boundaries
☐ Document habitat associations
☐ Document a change in watercourse morphology
☐ Other:

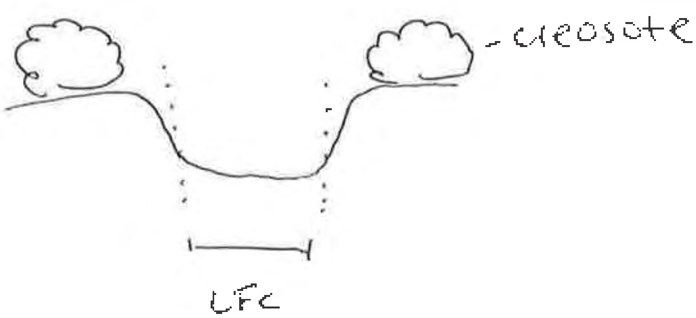
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Sandy bottom channel with cut banks flows to road and continues alongside road.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______________________________ Right



Site ID: Edwards Gen-Tie	Stream ID: Delta Station 7	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

	Terrestrial Indicators				Substrate Particle Size	
					Estimated percentages	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

	Fluvial Indicators				
	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
10%	Lar tri Bromus sp.	0.5–4'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

upland has 10% density of shrub with understory of annual grasses. watercourse largely unvegetated (<1%)

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Watercourse unvegetated (<1%); upland has Lar tri w/ Brome understory.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

waterway does not have Lar tri or Bromus sp. Only in uplands.

Site ID: Edwards Gen-Tie	Stream ID: Delta Station 7	page 3 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

Transportation, Deposition & Flow Transition Indicators

	Bar forms: sand / gravel		Secondary channels
	Bifurcated flow		Sediment plastering
	Drainage swales		Sediment ramps: sand / gravel
	Flow lineations		Sediment sheets: sand / gravel
	Imbricated gravel		Sediment sorting
	Levee ridges: sand / gravel		Sediment tails: sand / gravel
	Mud: cracks / curls / drapes		Vegetation-channel alignments
	Organic drift	✓	Wrack
	Overturned rocks		Wrinkle marks
	Out-of-channel flow: Lateral floodplain / Terminal floodplain		
	Ripples		
	Other:		

Substrate Particle Size

	Estimated percentages	
	% Bedrock / Cemented substrate	
	% Boulder	≥ 256 mm
	% Cobble	≥ 64 – 256 mm
	% Pebble	≥ 4 – 64 mm
	% Granule	≥ 2 – 4 mm
✓	% Sand	≤ 2 mm
✓	% Silt/Clay	Fines

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
>1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

LFC not vegetated (<1%); upland has shrubs/grasses (10%)

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

LFC not vegetated; upland has lartri and bromes.

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

LFC not vegetated.

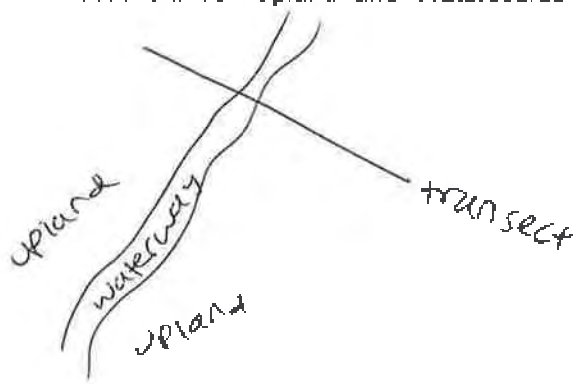
Site ID Edwards Gen-Tie	Stream ID Data Station 7	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
26	Downstream		
27	Upstream		

Episodic Stream Indicator Data Sheet	

Site ID: Edwards Gen Tie	Stream ID: Data Station 8	Date: 5/30/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku; Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one): ✓ Mojave | ☐ Sonoran/Colorado | ☐ Great Basin | Other:

Landform (✓ all that apply)

☐ Headwater | ☐ Upper fan | ☐ Middle fan | ☐ Lower fan | ☐ Alluvial plain | ☐ Axial valley | ☐ Playa

Channel Form (✓ one)

✓ Single thread | ☐ Braided | ☐ Compound | ☐ Distributary | ☐ Discontinuous | Other:

Transect was selected to:

✓	Document fluvial activity & boundaries	☐	Document channel elevations & boundaries
☐	Document habitat associations	☐	Document a change in watercourse morphology
☐	Other:		

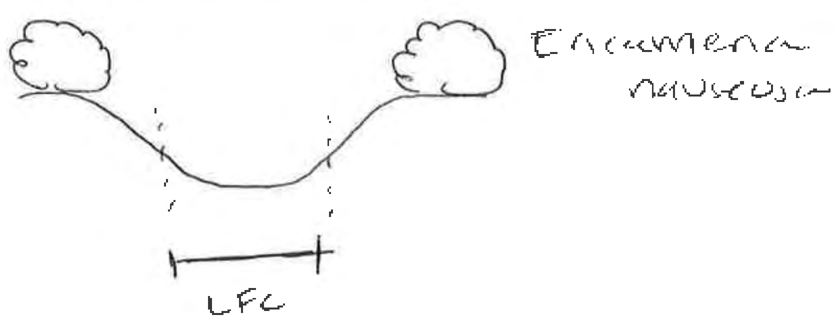
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Ephemeral drainage channel flowing parallel to Purdy Ave. and towards rail road before dissipating into uplands.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ———————————————————— Right



Site ID: Edwards Gen-Tie	Stream ID: Delta Station 8	page 2 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

	Terrestrial Indicators				Substrate Particle Size	
					Estimated percentages	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
20% upland	Eri nau Atr pol	0.5 - 2.5'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

watercourse unvegetated. upland 20% vegetated.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

upland has Eri nau, Atr pol and Brome understory.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

watercourse unvegetated

Site ID: Edwards Gen-Tie	Stream ID: Data station 8	page 3 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

Transportation, Deposition & Flow Transition Indicators

					Substrate Particle Size	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel	✓	Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
	Organic drift		Wrack		% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

see previous veg section

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

see previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

see previous veg section

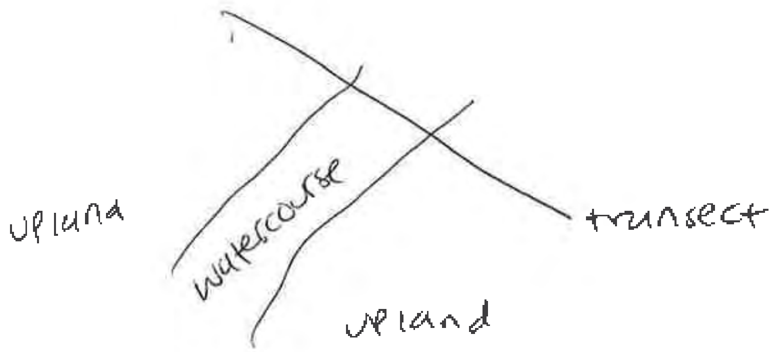
Site ID Edwards Gen-Tie	Stream ID Data station 8	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
28	Downstream		
29	Downstream		
30	upstream		
31	upstream		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 9	Date: 5/30/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku ; Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one): ✓ Mojave | Sonoran/Colorado | Great Basin | Other:

Landform (✓ all that apply)

Headwater | Upper fan | Middle fan | Lower fan | Alluvial plain | Axial valley | Playa

Channel Form (✓ one)

✓ Single thread | Braided | Compound | Distributary | Discontinuous | Other:

Transect was selected to:

✓	Document fluvial activity & boundaries		Document channel elevations & boundaries
	Document habitat associations		Document a change in watercourse morphology
	Other:		

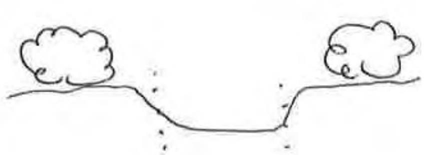
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Erosional feature/swale with sandy bottom that terminates at railroad

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______________________________ Right



LFC

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators				Substrate Particle Size		
				Estimated percentages		
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish	✓	% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering	✓	% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides		% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
upland 25%	Eri nau Hir inc Atr pol Brome	0.5 - 3' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

upland has shrubs (25%) and annuals while watercourse is unvegetated.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Uplands have Eri nau, Atr pol, Hir inc with Bromus understory

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

watercourse is unvegetated

Site ID: Edwards Gen-Tie	Stream ID: Data station 9	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				**Substrate Particle Size**	
					Estimated percentages	
	Bar forms: sand / gravel		Secondary channels			
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel		Sediment sorting	✓	% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel	✓	% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
	Organic drift		Wrack		% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

LFC unvegetated. Uplands have shrubs.

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

See previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

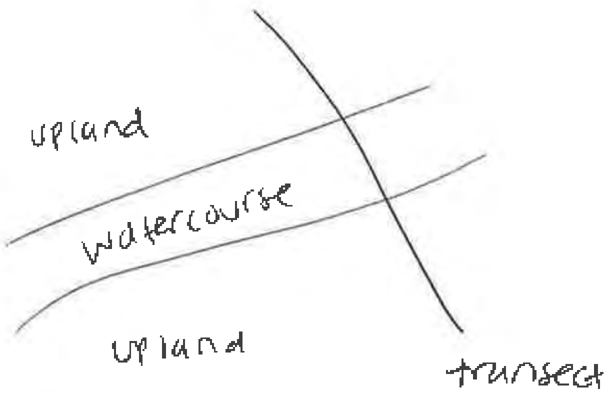
Site ID Edwards Gen-Tie	Stream ID Data Station 9	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
32	Downstream		
33	upstream		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gentle	Stream ID: Data Station 10	Date: 5/30/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoako, Patricia Schuyler		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓ Mojave	Sonoran/Colorado	Great Basin	Other:

Landform (✓ all that apply)

Headwater	Upper fan	Middle fan	Lower fan	Alluvial plain	Axial valley	Playa

Channel Form (✓ one)

✓ Single thread	Braided	Compound	Distributary	Discontinuous	Other:

Transect was selected to:

✓ Document fluvial activity & boundaries	Document channel elevations & boundaries
Document habitat associations	Document a change in watercourse morphology
Other:	

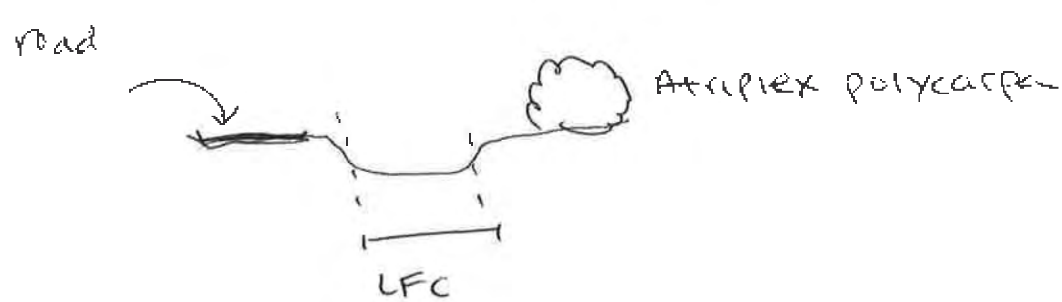
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Ephemeral drainage parallel to road

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ____ Right



Site ID: Edwards Gen-TIE	Stream ID: Data station 10	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators				Substrate Particle Size		
				Estimated percentages		
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering	✓	% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators					
	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
40%	Atr pol 40% Schismus sp.	0.5 -3' Tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

watercourse unvegetated; upland 40% shrubs with schismus understory

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

Watercourse is unvegetated.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

Watercourse is unvegetated. Upland has Atr pol with schismus understory

Site ID: Edwards Gen-Tie	Stream ID: Data Station 10	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				Substrate Particle Size	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel	✓	Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments		% Sand	≤ 2 mm
	Organic drift	✓	Wrack		% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

watercourse unvegetated. Upland has shrubs and grass understory.

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

See previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

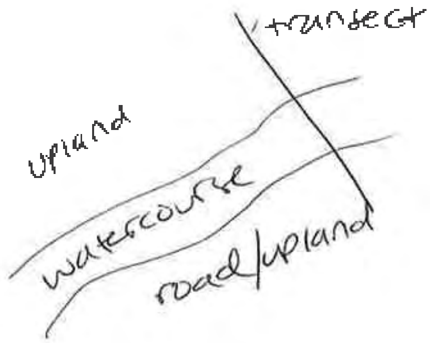
Site ID Edwards Gen-Tie	Stream ID Data Station 10	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
34	Downstream		
35	Upstream		

Episodic Stream Indicator Data Sheet			page 1 of 4
Site ID: Edwards Gen-Tie	Stream ID: Data Station 11		Date: 5/30/17
Nearest Town: Mojave		County: Kern	
Investigators: Callie Amoaku, Patricia Schuyler			

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓	Mojave		Sonoran/Colorado		Great Basin	Other:

Landform (✓ all that apply)

	Headwater		Upper fan		Middle fan		Lower fan		Alluvial plain		Axial valley		Playa

Channel Form (✓ one)

✓	Single thread		Braided		Compound		Distributary		Discontinuous	Other:

Transect was selected to:

✓	Document fluvial activity & boundaries		Document channel elevations & boundaries
	Document habitat associations		Document a change in watercourse morphology
	Other:		

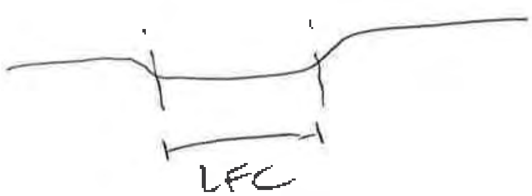
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Swale drainage

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______________________________ Right



Site ID: Edwards Gen-Tie	Stream ID: Data Station 11	page 2 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators				Substrate Particle Size		
				Estimated percentages		
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
20%	Atr pol Bromus sp. Sisymbrium sp.	0.5 - 3.5' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):
upland has shrubs and annuals with grass understory. watercourse has less vegetation with some grass

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):
watercourse does not have Atr pol

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)
upland has more abundant Atr pol, Sisymbrium sp, and Bromus sp.

Site ID: Edwards Gen-Tie	Stream ID: Data Station 11	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				**Substrate Particle Size**	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
✓	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel		Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
✓	Mud: cracks / curls / drapes		Vegetation-channel alignments		% Sand	≤ 2 mm
	Organic drift	✓	Wrack	✓	% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
2%	Bromus sp.	0.5'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

Upland has shrubs; watercourse has Bromes.

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

See previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

See previous veg section

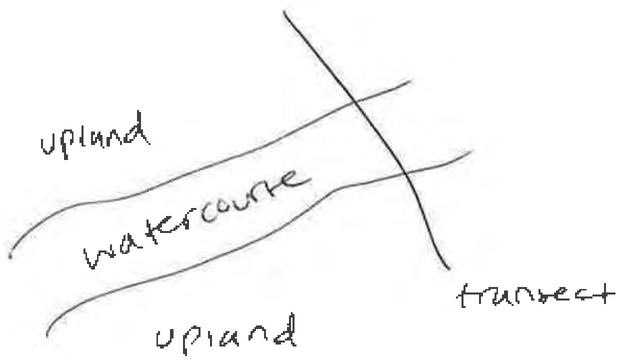
Site ID Edwards Gen-Tie	Stream ID Data Station 11	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
36	Downstream		
37	Upstream		
38	Downstream		
39	upstream		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-TIE	Stream ID: Data Station 12	Date: 4/25/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku; Britney Strittmater		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓ Mojave	☐ Sonoran/Colorado	☐ Great Basin	Other:

Landform (✓ all that apply)

☐ Headwater ☐ Upper fan ☐ Middle fan ☐ Lower fan ☐ Alluvial plain ☐ Axial valley ☐ Playa

Channel Form (✓ one)

✓ Single thread ☐ Braided ☐ Compound ☐ Distributary ☐ Discontinuous Other:

Transect was selected to:

✓ Document fluvial activity & boundaries	☐ Document channel elevations & boundaries
☐ Document habitat associations	☐ Document a change in watercourse morphology
☐ Other:	

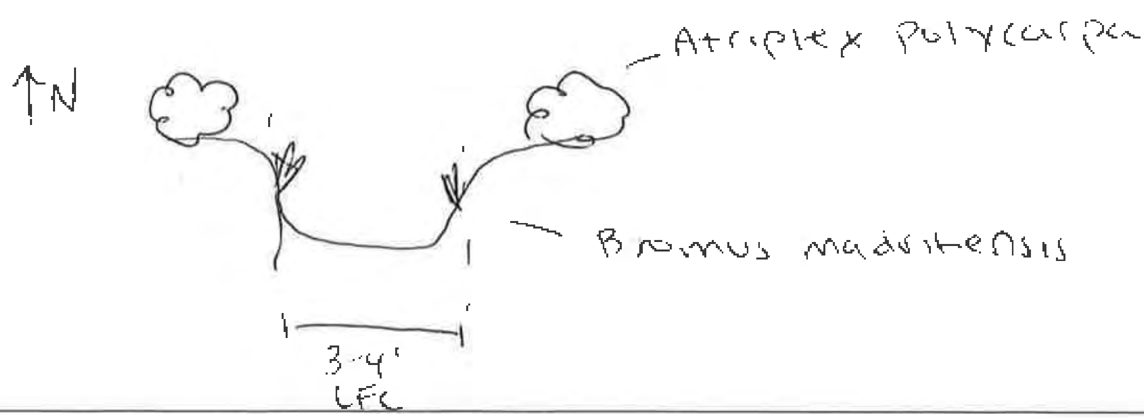
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Swale with surface relief

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______ Right



Site ID: Edwards Gentle	Stream ID: Data Station 12	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators				Substrate Particle Size		
				Estimated percentages		
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
30%	Atr poly (15%) Eup alb (10%) Bro mad (30%)	0.25 - 3.5'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

watercourse unvegetated with grass on sides. upland has shrubs & grasses

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

uplands have more Atr pol and Eup alb while watercourse has more Bro mad.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

Higher density of Bro mad in watercourse compared to uplands.

Site ID: Edwards Gen-Tie	Stream ID: Data Station 12	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				Substrate Particle Size	
					Estimated percentages	
	Bar forms: sand / gravel		Secondary channels		% Bedrock / Cemented substrate	
	Bifurcated flow		Sediment plastering		% Boulder	≥ 256 mm
✓	Drainage swales		Sediment ramps: sand / gravel		% Cobble	≥ 64 – 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Pebble	≥ 4 – 64 mm
	Imbricated gravel		Sediment sorting		% Granule	≥ 2 – 4 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel	✓	% Sand	≤ 2 mm
✓	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Silt/Clay	Fines
✓	Organic drift		Wrack			
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
90% (herb)	Bro mad	0.5-1'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

LFC has 5% grass while upland has shrub/grass

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

upland has Atr pol and Ely alb.

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

LFC has more abandant Bromad than uplands.

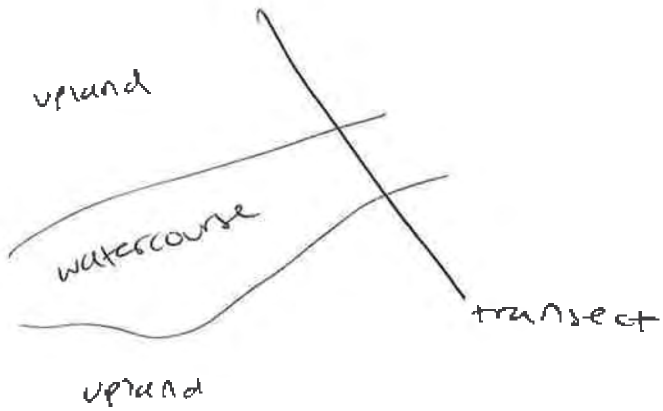
Site ID Edwards Gen-Tie	Stream ID Data station12	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
40	Downstream		
41	Upstream		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Gen-Tie	Stream ID: Data Station 13	Date: 4/20/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku, Britney Strittmater		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:			GPS co-ords end of transect:	

Geomorphic Province (✓one): ✓ Mojave ☐ Sonoran/Colorado ☐ Great Basin Other:

Landform (✓ all that apply)

☐ Headwater ☐ Upper fan ☐ Middle fan ☐ Lower fan ☐ Alluvial plain ☐ Axial valley ☐ Playa

Channel Form (✓ one)

✓ Single thread ☐ Braided ☐ Compound ☐ Distributary ☐ Discontinuous Other:

Transect was selected to:

✓	Document fluvial activity & boundaries	☐	Document channel elevations & boundaries
☐	Document habitat associations	☐	Document a change in watercourse morphology
☐	Other:		

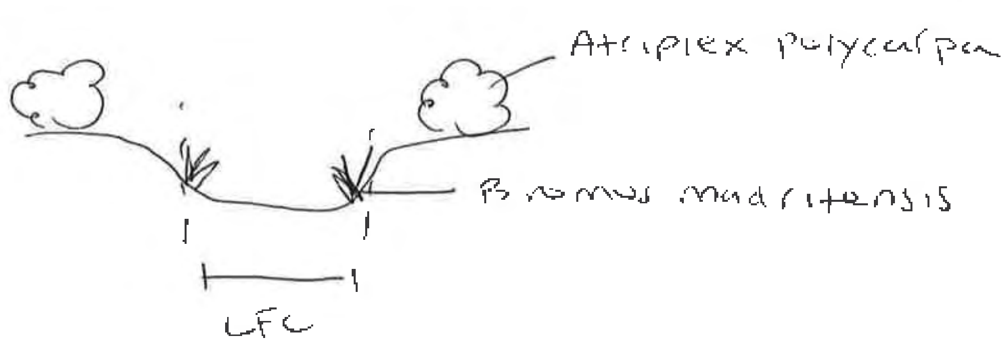
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem. and any anthropogenic influences on the channel form and function:

Depression that narrows into swale nearby road. Connectivity impeded by road. Existing culvert; however, grading cuts off access and culvert almost completely clogged by soil and vegetation.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______________________________ Right



Site ID: Edwards Gen-Tie	Stream ID: Data station (3	page 2 of 4

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA – Mapping Episodic Stream Indicators.

UPLAND

Terrestrial Indicators

					Substrate Particle Size	
	Av soil horizon		Relict bars & swales		Estimated percentages	
	Biotic soil crusts		Rock fractured in place		% Bedrock / Cemented substrate	
✓	Bioturbation		Rock varnish		% Boulder	≥ 256 mm
	Caliche: coatings / layers / rubble		Rock weathering		% Cobble	≥ 64 – 256mm
	Carbonate etching		Rubified rock undersides		% Pebble	≥ 4 – 64 mm
	Coppice dunes: active / relict		Soil development	✓	% Granule	≥ 2 – 4 mm
	Deflated surface		Surface rounding of landform	✓	% Sand	≤ 2 mm
	Pavement		Woody debris in place		% Silt/Clay	Fines
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
5%	Atr pol Hir inc Bro mad	0.5-3.5' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

Upland has shrubs and grasses while watercourse has higher density of grass.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

No Atr pol in watercourse.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

Bro mad more abundant in watercourse. Atr pol and Hir inc more abundant in uplands.

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

Transportation, Deposition & Flow Transition Indicators

	Bar forms: sand / gravel		Secondary channels
	Bifurcated flow		Sediment plastering
✓	Drainage swales		Sediment ramps: sand / gravel
	Flow lineations		Sediment sheets: sand / gravel
	Imbricated gravel		Sediment sorting
	Levee ridges: sand / gravel		Sediment tails: sand / gravel
✓	Mud: cracks / curls / drapes		Vegetation-channel alignments
	Organic drift		Wrack
	Overturned rocks		Wrinkle marks
	Out-of-channel flow: Lateral floodplain / Terminal floodplain		
	Ripples		
	Other:		

Substrate Particle Size

Estimated percentages

	% Bedrock / Cemented substrate	
	% Boulder	≥ 256 mm
	% Cobble	≥ 64 – 256 mm
	% Pebble	≥ 4 – 64 mm
	% Granule	≥ 2 – 4 mm
✓	% Sand	≤ 2 mm
	% Silt/Clay	Fines

Erosion Indicators

	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
40% (herb)	Bro mad rub Hor mur	0.5-1' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

LFC has grasses; upland has grasses/shrubs

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

LFC does not have shrubs.

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

LFC has more abundant Bromad than upland.

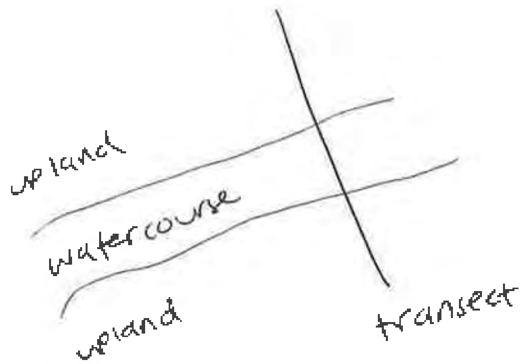
Site ID Edwards Gen-Tie	Stream ID Datastation 13	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
42	culvert; facing E		
43	culvert; facing W		
44	upstream; facing E		

Episodic Stream Indicator Data Sheet	page 1 of 4

Site ID: Edwards Gen-Tie	Stream ID: Data Station 14	Date: 4/26/17
Nearest Town: Mojave	County: Kern	
Investigators: Callie Amoaku; Britney Strittmater		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓	Mojave		Sonoran/Colorado		Great Basin	Other:

Landform (✓ all that apply)

	Headwater		Upper fan		Middle fan		Lower fan		Alluvial plain		Axial valley		Playa

Channel Form (✓ one)

✓	Single thread		Braided		Compound		Distributary		Discontinuous	Other:

Transect was selected to:

✓	Document fluvial activity & boundaries		Document channel elevations & boundaries
	Document habitat associations		Document a change in watercourse morphology
	Other:		

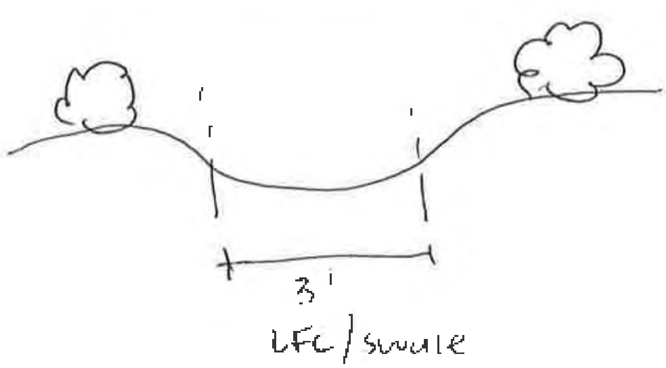
Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

swale that appears to be manmade

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.

Left ______________________________ Right



Site ID: Edwards Gen-Tie	Stream ID: Data station 14	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

	Terrestrial Indicators				Substrate Particle Size	
					Estimated percentages	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering		% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

	Fluvial Indicators				
	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
25%	Lar tri Yuc bre	3-6' tall

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

upland has shrubs/trees. watercourse has grasses with some shrub

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

No Yuc bre in watercourse.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

watercourse has less abundant shrub than upland area.

Site ID: Edwards Gen-TIE	Stream ID: Datastation 14	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				**Substrate Particle Size**	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
✓	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel		Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
✓	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
✓	Organic drift	✓	Wrack	✓	% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
20% (shrub) (40% herb)	Eup alb Eri nau Bro mad rub	0.5-1'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

Higher shrub/tree density in uplands.

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

LFC has Eup alb

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

upland has more abundant shrubs/trees

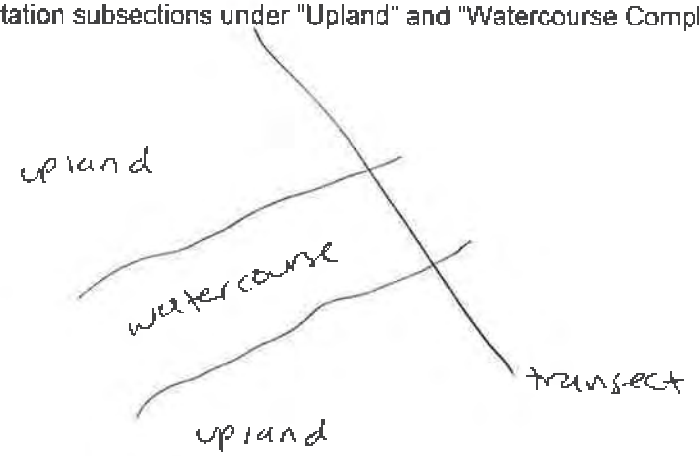
Site ID Edwards Gen-Tie	Stream ID Data Station 14	page 4 of 4

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
45	Inlet; facing North		
46	outlet; facing South		
47	mudcracks; drainage/wracking		
48	swale hydrology		
49	swale; downstream; facing South		

Episodic Stream Indicator Data Sheet

Site ID: Edwards Grate	Stream ID: Datastation 15	Date: 4/26/17
Nearest Town: Mojave		County: Kern
Investigators: Callie Amoaku; Britney Strittmater		

Base Map

Aerial Photo #:	Date:	Topographic Map Name:	Date:

GPS Data

GPS Name:	Datum:	Transect Elevation:	Zone 10 / 11	GPS Error: ± ft / m
GPS co-ords start of transect:		GPS co-ords end of transect:		

Geomorphic Province (✓one)	✓	Mojave		Sonoran/Colorado		Great Basin	Other:

Landform (✓ all that apply)

	Headwater		Upper fan		Middle fan		Lower fan		Alluvial plain		Axial valley		Playa

Channel Form (✓ one)

✓	Single thread		Braided		Compound		Distributary		Discontinuous	Other:

Transect was selected to:

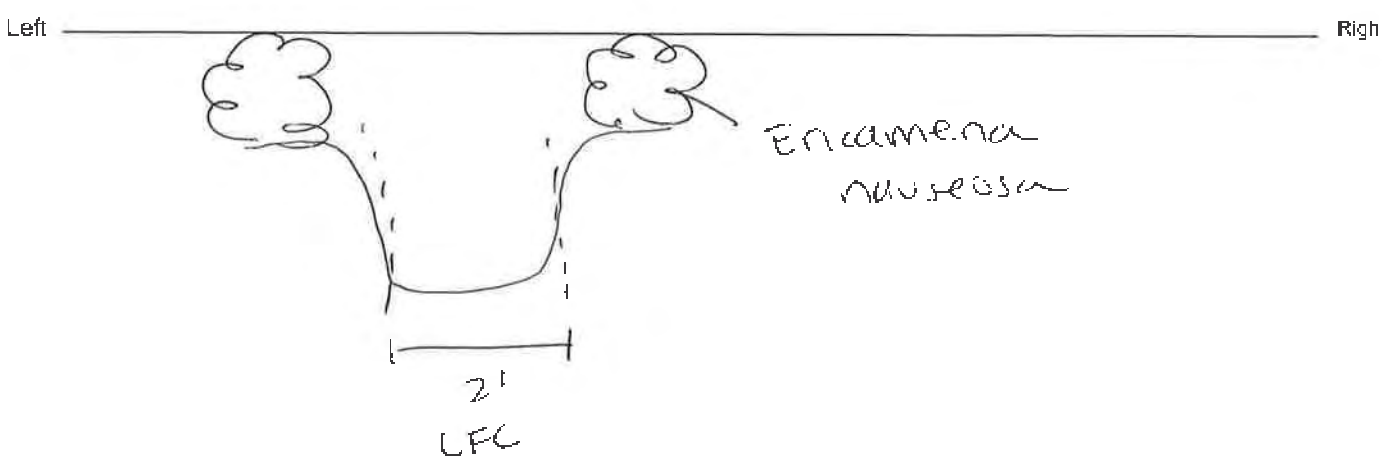
✓	Document fluvial activity & boundaries		Document channel elevations & boundaries
	Document habitat associations		Document a change in watercourse morphology
	Other:		

Date of most recent runoff event (if known):

Physical Setting: Briefly describe geomorphic processes and surficial materials and conditions, including the degree of disturbance relative to an intact dryland stream ecosystem, and any anthropogenic influences on the channel form and function:

Ephemeral channel along road that eventually dissipates.

Summary Site Description and Cross-section Sketch: View across the channel from watercourse-edge to watercourse-edge. Identify channel(s), banks, islands, interfluves, floodplains, terraces, and uplands where present. Note approximate width and elevation differences between features indicated.



Site ID: Edwards Gen-tie	Stream ID: Data Station 15	

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of the representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for indicators not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

UPLAND

	Terrestrial Indicators				Substrate Particle Size	
					Estimated percentages	
	Av soil horizon		Relict bars & swales		% Bedrock / Cemented substrate	
	Biotic soil crusts		Rock fractured in place		% Boulder	≥ 256 mm
✓	Bioturbation		Rock varnish		% Cobble	≥ 64 – 256mm
	Caliche: coatings / layers / rubble		Rock weathering	✓	% Pebble	≥ 4 – 64 mm
	Carbonate etching		Rubified rock undersides	✓	% Granule	≥ 2 – 4 mm
	Coppice dunes: active / relict		Soil development	✓	% Sand	≤ 2 mm
	Deflated surface		Surface rounding of landform		% Silt/Clay	Fines
	Pavement		Woody debris in place			
	Other:					

Fluvial Indicators

	Bars: sand / gravel		Mud: cracks / curls / drapes		Sediment tails: sand / gravel
	Cut banks		Organic drift		Vegetation-channel alignment
	Drainage swales		Overturned rocks		Water-cut benches
	Exposed roots		Scour		Wrack
	First-order streams		Sediment ramps: sand / gravel		Wrinkle marks
	Flow lineations		Sediment sorting		
	Other:				

NA

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
40%	Eri nau Atr pol	3' x 3'

Differences in total shrub/perennial density (total #shrubs/perennial plants) between upland & fluvially active units or watercourse complex? (describe and qualify the differences):

watercourse is unvegetated. upland has shrubs.

Are there plant species that are present in (or absent from) the uplands when compared to fluvially active units or the watercourse complex? (describe differences):

watercourse does not have Eri nau or Atr pol.

Are there plant species that are more abundant (or less abundant) in the uplands when compared to the fluvially active units or the watercourse complex? (describe and qualify differences)

watercourse unvegetated.

Note presence or absence of each indicator within a minimum distance of 50 feet upstream and 50 feet downstream of a representative channel cross section. Mark each box with a plus (+) for those indicators observed, and a minus (–) for those not observed. For examples see the Photo Atlas in MESA ~ Mapping Episodic Stream Indicators.

WATERCOURSE or WATERCOURSE COMPLEX

	Transportation, Deposition & Flow Transition Indicators				Substrate Particle Size	
	Bar forms: sand / gravel		Secondary channels		Estimated percentages	
	Bifurcated flow		Sediment plastering		% Bedrock / Cemented substrate	
✓	Drainage swales		Sediment ramps: sand / gravel		% Boulder	≥ 256 mm
	Flow lineations		Sediment sheets: sand / gravel		% Cobble	≥ 64 – 256 mm
	Imbricated gravel		Sediment sorting		% Pebble	≥ 4 – 64 mm
	Levee ridges: sand / gravel		Sediment tails: sand / gravel		% Granule	≥ 2 – 4 mm
	Mud: cracks / curls / drapes		Vegetation-channel alignments	✓	% Sand	≤ 2 mm
✓	Organic drift		Wrack		% Silt/Clay	Fines
	Overturned rocks		Wrinkle marks			
	Out-of-channel flow: Lateral floodplain / Terminal floodplain					
	Ripples					
	Other:					

Erosion Indicators

✓	Cut banks		Rills		Water-cut benches
	Exposed roots		Scour		Water level mark
	Headcuts		Secondary channels		
	Other:				

Vegetation

Estimated % total vegetative cover (perennial & shrub species combined):	Dominant and co-dominant species (if known) and % of total vegetative cover of each:	Representative height and width of dominant and co-dominant species:
<1%	NA	NA

Differences in total shrub/perennial density (total #shrubs/perennial plants) between the low-flow channel(s) and the adjacent floodplain? (describe and qualify the differences):

see previous veg section

Are there plant species that are present in (or absent from) the low-flow channel(s) when compared to the adjacent floodplain? (describe differences):

see previous veg section

Are there plant species that are more abundant (or less abundant) on the low-flow channel(s) and the adjacent floodplain? (describe and qualify differences)

see previous veg section

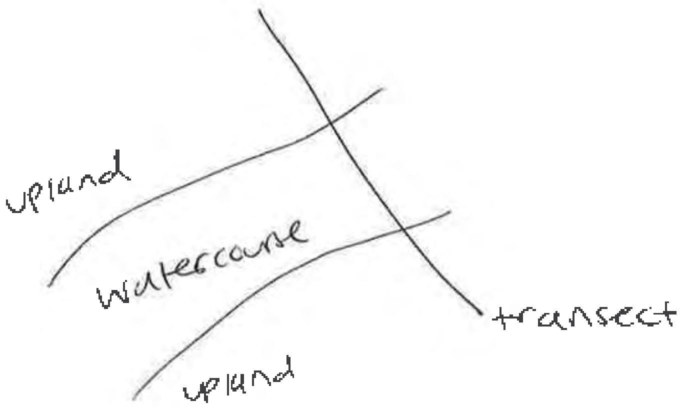
Site ID Edwards Geen-Tie	Stream ID Datu Station 15	

INDICATORS of PONDING & EVAPORATION and EOLIAN TRANSPORT & DEPOSITION

	Algal crusts		Sand-filled channels		
	Beach ridges		Springs		
	Coppice dunes: active / relict		Substrate staining		
	Crusts: carbonate / salt / soda		Vegetation-landscape alignments		
	Mud: cracks / curls / polygons				
	Other:				

Additional Diagrams and Notes

Vegetation cross-section diagram: Draw a cross-section that identifies the approximate locations along the transect or diagram of geomorphic units (see page 1 of data sheet) where there are changes in vegetation characteristics, as summarized in the vegetation subsections under "Upland" and "Watercourse Complex".



Photographs

Photographs should document the representative landscape units, vegetation, and the presence or absence of representative stream indicators.

Photo ID #	Description	GPS location	
50	Downstream, Facing East		
51	Upstream; Facing West		
52	Downstream		

APPENDIX B

Jurisdictional Delineation Photos

APPENDIX B
Jurisdictional Delineation Photos

	
Photo 1: Data Station #1. Upstream view of ephemeral drainage.	Photo 2: Data Station #1. Downstream, facing east.
	
Photo 3: Data Station #1. Downstream, facing west.	Photo 4: Data Station #1. Downstream view of ephemeral drainage.

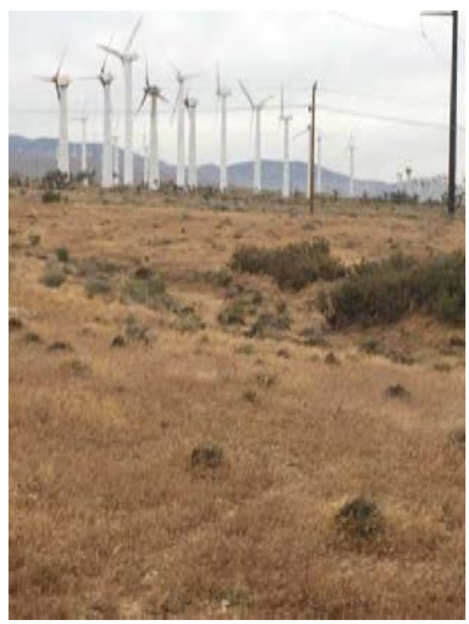
	
Photo 5: Data Station #1.	Photo 6: Data Station #1.
	
Photo 7: Data Station #2. Downstream.	Photo 8: Data Station #2. Upstream.

	
Photo 9: Data Station #3.	Photo 10: Data Station #3.
	
Photo 11: Data Station #3. Downstream view; feature dissipates into uplands.	Photo 12: Data Station #4. Main channel; upstream.

APPENDIX B (Continued)

	
Photo 13: Data Station #4. Main channel.	Photo 14: Data Station #4. Evidence of scouring.
	
Photo 15: Data Station #4. Erosional feature flowing into main channel.	Photo 16: Data Station #4. Feature flowing into main channel.

	
Photo 17: Data Station #4. Main channel.	Photo 18: Data Station #4. Main channel.
	
Photo 19: Data Station #5.	Photo 20: Data Station #5.

	
Photo 21: Data Station #6. Upstream; start of swale.	Photo 22: Data Station #6. Swale; downstream view.
	
Photo 23: Data Station #6. Swale, upstream view.	Photo 24: Data Station #6. Downstream; end of swale.

Photo 25: Data Station #6. Evidence of debris wracking.

Photo 26: Data Station #7. Downstream view.

Photo 27: Data Station #7. Upstream view.

Photo 28: Data Station #8. Downstream view.

	
Photo 29: Data Station #8. Middle of feature, downstream view.	Photo 30: Data Station #8. Middle of feature, upstream view.
	
Photo 31: Data Station #8. Upstream view.	Photo 32: Data Station #9. Downstream view.

	
Photo 33: Data Station #9. Upstream view.	Photo 34: Data Station #10. Downstream view.
	
Photo 35: Data Station #10. Upstream view.	Photo 36: Data Station #11. Lower portion of feature; downstream view.

	
Photo 37: Data Station #11. Lower portion of feature; upstream view.	Photo 38: Data Station #11. Upper portion of feature; downstream view.
	
Photo 39: Data Station #11. Upper portion of feature; upstream view.	Photo 40: Data Station #12. Downstream view.

	
Photo 41: Data Station #12. Upstream view.	Photo 42: Data Station #13. Culvert; facing east.

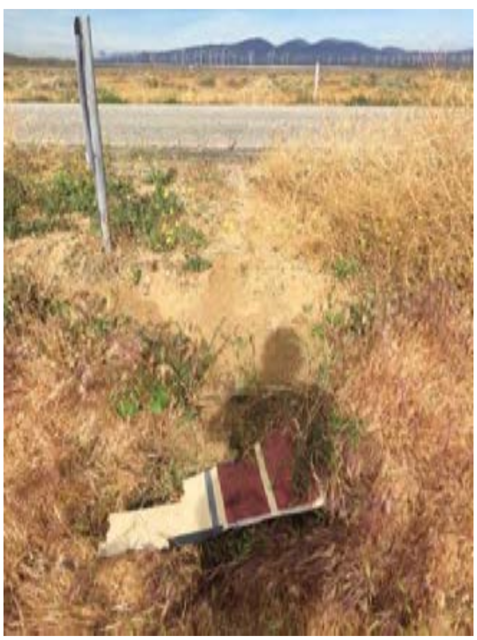
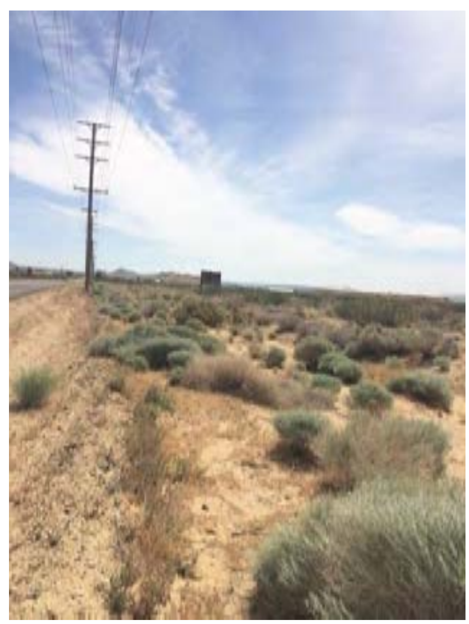



Photo 43: Data Station #13. Culvert; facing west.	Photo 44: Data Station #13. Upstream view; facing east.

	
Photo 45: Data Station #14. Culvert (inlet); facing north.	Photo 46: Data Station #14. Culvert; (outlet); facing south.
	
Photo 47: Data Station #14. Swale hydrology; evidence of mudcracks and debris wracking.	Photo 48: Data Station #14. Swale hydrology.

	
Photo 49: Data Station #14. Swale; downstream view facing south.	Photo 50: Data Station #15. Downstream view; facing east.
	
Photo 51: Data Station #15. Upstream view; facing west.	Photo 52: Data Station #15. Downstream view where feature dissipates.

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APPENDIX C

Compendium of Plant Species Observed in the Study Area

APPENDIX C
Compendium of Plants Observed

VASCULAR SPECIES

GYMNOSPERMS AND GNETOPHYTES

CUPRESSACEAE—CYPRESS FAMILY

Juniperus californica—California juniper

EPHEDRACEAE—EPHEDRA FAMILY

Ephedra nevadensis—Nevada joint fir

MONOCOTS

AGAVACEAE—AGAVE FAMILY

Yucca brevifolia—Joshua tree

ALLIACEAE—ONION FAMILY

Allium fimbriatum var. *mohavense*—Mojave fringed onion

POACEAE—GRASS FAMILY

Elymus elymoides—squirreltail
Stipa speciosa—desert needlegrass
* *Bromus diandrus*—ripgut brome
* *Bromus madritensis* ssp. *rubens*—red brome
* *Bromus tectorum*—cheatgrass
* *Cynodon dactylon*—Bermudagrass
* *Festuca myuros*—rat-tail fescue
* *Hordeum murinum* ssp. *leporinum*—hare barley
* *Schismus arabicus*—Arabian schismus
* *Schismus barbatus*—common Mediterranean grass
* *Triticum aestivum*—common wheat
Stipa hymenoides—Indian rice grass
Distichlis spicata—salt grass
Festuca microstachys—six-weeks fescue

THEMIDACEAE—BRODIAEA FAMILY

Dichelostemma capitatum ssp. *capitatum*—bluedicks

EUDICOTS

AMARANTHACEAE—AMARANTH FAMILY

* *Amaranthus albus*—prostrate pigweed

APIACEAE—CARROT FAMILY

Lomatium mohavense—Mojave desertparsley

APOCYNACEAE—DOGBANE FAMILY

* *Nerium oleander*—oleander

ASTERACEAE—SUNFLOWER FAMILY

Acamptopappus sphaerocephalus—rayless goldenhead
Ambrosia acanthicarpa—flatspine bur ragweed
Chaenactis fremontii—pincushion flower
Chaenactis glabriuscula—yellow pincushion
Ericameria cooperi var. *cooperi*—Cooper's goldenbush
Ericameria nauseosa—rubber rabbitbrush
Eriophyllum wallacei—woolly easterbonnets
Lasthenia californica—California goldfields
Leptosyne californica—California tickseed
Leptosyne calliopsidea—leafstem tickseed
Malacothrix coulteri—snake's head
Malacothrix glabrata—smooth desertdandelion
Stephanomeria exigua ssp. *exigua*—small wirelettuce
Stephanomeria parryi—Parry's wirelettuce
Stephanomeria pauciflora—brownplume wirelettuce
Tetradymia axillaris—longspine horsebrush
Tetradymia stenolepis—Mojave cottonthorn
Xylorhiza tortifolia var. *tortifolia*—Mojave woodyaster
* *Acroptilon repens*—hardheads
* *Lactuca serriola*—prickly lettuce
* *Matricaria discoidea*—disc mayweed
* *Sonchus asper*—spiny sowthistle
* *Taraxacum officinale*—common dandelion
Encelia farinosa—brittle bush
Ambrosia salsola—cheesebush
Ambrosia dumosa—white bursage

BORAGINACEAE—BORAGE FAMILY

Amsinckia menziesii—Menzies' fiddleneck
Cryptantha circumscissa var. *circumscissa*—cushion cryptantha
Cryptantha micrantha—redroot cryptantha
Cryptantha pterocarya var. *cycloptera*—wingnut cryptantha
Pectocarya penicillata—sleeping combseed
Phacelia cicutaria—caterpillar phacelia
Phacelia tanacetifolia—lacy phacelia
Plagiobothrys arizonicus—Arizona popcornflower
Nama demissa var. *demissa*—no common name

BRASSICACEAE—MUSTARD FAMILY

* *Sisymbrium irio*—London rocket
Descurainia pinnata—western tansymustard
Lepidium flavum—yellow pepperweed
Lepidium fremontii—desert pepperweed
Lepidium nitidum—shining pepperweed
Stanleya elata—Panamint princesplume
Tropidocarpum gracile—dobie pod
Stanleya pinnata—desert princesplume
* *Brassica nigra*—black mustard
* *Hirschfeldia incana*—shortpod mustard
* *Sisymbrium altissimum*—tall tumblemustard
* *Sisymbrium orientale*—Indian hedgemustard
* *Lepidium latifolium*—perennial pepper weed

CACTACEAE—CACTUS FAMILY

Cylindropuntia echinocarpa—Wiggins' cholla
Opuntia basilaris var. *basilaris*—beavertail pricklypear

CHENOPODIACEAE—GOOSEFOOT FAMILY

Chenopodium fremontii—Fremont's goosefoot
* *Atriplex semibaccata*—Australian saltbush
* *Bassia hyssopifolia*—fivehorn smotherweed
* *Salsola tragus*—prickly Russian thistle
Atriplex polycarpa—allscale
* *Atriplex prostrata*—fat hen
Atriplex confertifolia—shadscale
Atriplex spinifera—spinescale

Grayia spinosa—spiny hop sage
Krascheninnikovia lanata—winterfat

CUCURBITACEAE—GOURD FAMILY
Cucurbita palmata—coyote gourd
Marah fabacea—California man-root

EUPHORBIACEAE—SPURGE FAMILY
Stillingia linearifolia—queen's-root
Stillingia paucidentata—Mojave toothleaf
Euphorbia albomarginata—whitemargin sandmat
Croton setiger—dove weed

FABACEAE—LEGUME FAMILY
Acmispon strigosus—strigose bird's-foot trefoil
Astragalus didymocarpus—dwarf white milkvetch
Astragalus layneae—widow's milkvetch
Astragalus lentiginosus var. *variabilis*—freckled milkvetch
Lupinus arizonicus—Arizona lupine
* *Melilotus indicus*—annual yellow sweetclover

GERANIACEAE—GERANIUM FAMILY
* *Erodium cicutarium*—redstem stork's bill

LAMIACEAE—MINT FAMILY
Salvia carduacea—thistle sage
* *Marrubium vulgare*—horehound

LOASACEAE—LOASA FAMILY
Mentzelia albicaulis—whitestem blazingstar

MALVACEAE—MALLOW FAMILY
Eremalche exilis—white mallow
Sphaeralcea ambigua—desert globemallow
* *Malva parviflora*—cheeseweed mallow

NYCTAGINACEAE—FOUR O'CLOCK FAMILY
Abronia pogonantha—Mojave sand verbena
Mirabilis laevis var. *retrorsa*—wishbone-bush
Mirabilis multiflora var. *glandulosa*—Colorado four o'clock

ONAGRACEAE—EVENING PRIMROSE FAMILY

Camissonia campestris—Mojave suncup
Camissoniopsis bistorta—southern suncup
Chylismia claviformis ssp. *claviformis*—no common name
Eremothera boothii—Booth's evening primrose
Tetrapteron palmeri—Palmer evening primrose

PAPAVERACEAE—POPPY FAMILY

Eschscholzia californica—California poppy
Eschscholzia minutiflora—pygmy poppy
Platystemon californicus—creamcups

PHRYMACEAE—LOPSEED FAMILY

Mimulus bigelovii—Bigelow's monkeyflower

POLEMONIACEAE—PHLOX FAMILY

Eriastrum diffusum—miniature woollystar
Eriastrum sapphirinum ssp. *dasyanthum*—sapphire woollystar
Gilia latiflora—hollyleaf gilia
Gilia stellata—star gilia
Linanthus parryae—sandblossoms
Loeseliastrum matthewsii—desert calico

POLYGONACEAE—BUCKWHEAT FAMILY

Chorizanthe brevicornu—brittle spineflower
Eriogonum angulosum—anglestem buckwheat
Eriogonum fasciculatum var. *polifolium*—Eastern Mojave buckwheat
Eriogonum reniforme—kidneyleaf buckwheat
Eriogonum wrightii var. *wrightii*—bastardsage
Oxytheca perfoliata—roundleaf oxytheca
Rumex hymenosepalus—canaigre dock
* *Polygonum aviculare* ssp. *depressum*—prostrate knotweed

SOLANACEAE—NIGHTSHADE FAMILY

Datura wrightii—sacred thorn-apple
Lycium cooperi—peach thorn
Lycium andersonii—Anderson's boxthorn

TAMARICACEAE—TAMARISK FAMILY

* *Tamarix ramosissima*—saltcedar

ZYGOPHYLLACEAE—CALTROP FAMILY

Larrea tridentata—creosote bush

* *Tribulus terrestris*—puncturevine

* signifies introduced (non-native) species

APPENDIX D

Special-Status Plant Species Not Expected to Occur in the Study Area

APPENDIX D
Special-Status Plant Species Not Expected to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/Life Form/Blooming Period/Elevation Range (feet)	Potential to Occur
Allium howellii var. *clokeyi*	Mt. Pinos onion	None/None/1B.3	Great Basin scrub, Meadows and seeps (edges), Pinyon and juniper woodland/perennial bulbiferous herb/Apr–June/4,265–6,070	Not expected to occur. The site is outside of the species' known elevation range.
Allium shevockii	Spanish needle onion	None/None/1B.3	Pinyon and juniper woodland, Upper montane coniferous forest; rocky/perennial bulbiferous herb/May–June/2,785–8,200	Not expected to occur. No suitable vegetation present.
Astragalus hornii var. *hornii*	Horn's milk-vetch	None/None/1B.1	Meadows and seeps, Playas; lake margins, alkaline/annual herb/May–Oct/195–2,790	Not expected to occur. No suitable vegetation present.
Calochortus palmeri var. *palmeri*	Palmer's mariposa lily	None/None/1B.2	Chaparral, Lower montane coniferous forest, Meadows and seeps; mesic/perennial bulbiferous herb/Apr–July/2,325–7,840	Not expected to occur. No suitable vegetation present.
Diplacus pictus	calico monkeyflower	None/None/1B.2	Broadleafed upland forest, Cismontane woodland; granitic, disturbed areas/annual herb/Mar–May/325–4,690	Not expected to occur. No suitable vegetation present.
Eriogonum kennedyi var. *pinicola*	Kern buckwheat	None/None/1B.1	Chaparral, Pinyon and juniper woodland; clay/perennial herb/May–June(July)/4,395–6,400	Not expected to occur. The site is outside of the species' known elevation range, and there is no suitable vegetation present.
Fritillaria brandegeei	Greenhorn fritillary	None/None/1B.3	Lower montane coniferous forest (granitic)/perennial bulbiferous herb/Apr–June/4,360–6,890	Not expected to occur. The site is outside of the species' known elevation range, and there is no suitable vegetation present.
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	None/None/1B.1	Marshes and swamps (coastal salt), Playas, Vernal pools/annual herb/Feb–June/0–4,005	Not expected to occur. No suitable vegetation present.
Monardella linoides ssp. *oblonga*	Tehachapi monardella	None/None/1B.3	Lower montane coniferous forest, Pinyon and juniper woodland, Upper montane coniferous forest/perennial rhizomatous herb/(May)June–Aug/2,950–8,105	Not expected to occur. No suitable vegetation present.
Navarretia peninsularis	Baja navarretia	None/None/1B.2	Chaparral (openings), Lower montane coniferous forest, Meadows and seeps, Pinyon and juniper woodland; mesic/annual herb/(May)June–Aug/4,920–7,545	Not expected to occur. The site is outside of the species' known elevation range, and there is no suitable vegetation present.

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/Life Form/Blooming Period/Elevation Range (feet)	Potential to Occur
Orthotrichum spjutii	Spjut's bristle moss	None/None/1B.3	Lower montane coniferous forest, Pinyon and juniper woodland, Subalpine coniferous forest, Upper montane coniferous forest; granitic, rock/moss/N.A./6,885–7,875	Not expected to occur. The site is outside of the species' known elevation range, and there is no suitable vegetation present.
Opuntia basilaris var. *treleasei*	Bakersfield cactus	FE/CE/1B.1	Chenopod scrub, cismontane woodland, valley and foothill grassland; sandy or gravelly/perennial stem succulent/Apr–May/394–4757	Not expected to occur. Species would have been observed during surveys if present. For North-South Gen-Tie Route Option 3, species would have been observed if present during vegetation mapping. Also, closest known occurrence over 27 miles away (CDFW 2017)[1]
Streptanthus cordatus var. *piutensis*	Piute Mountains jewelflower	None/None/1B.2	Broadleafed upland forest, Closed-cone coniferous forest, Pinyon and juniper woodland; clay or metamorphic/perennial herb/May–July/3,590–5,990	Not expected to occur. No suitable vegetation present.
Triteleia piutensis	Piute Mountains triteleia	None/None/1B.1	Pinyon and juniper woodland; Openings, fine volcanic soil throughout scattered boulders or heavy clay soil with volcanic hardpan/perennial bulbiferous herb/May–June/5,200–5,430	Not expected to occur. The site is outside of the species' known elevation range, and there is no suitable vegetation present.

Status Legend:
CRPR: California Rare Plant Rank
1B: Plants Rare, Threatened, or Endangered in California and Elsewhere

Threat Rank
0.1 – Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
0.2 – Moderately threatened in California (20%–80% occurrences threatened/moderate degree and immediacy of threat)
0.3 – Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known)

[1] CDFW. 2017. Element Occurrence Query. California Natural Diversity Database (CNDDB). RareFind, Version 5.0 (Commercial Subscription). Sacramento, California: CDFG, Biogeographic Data Branch. Accessed October 2017. http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp.

APPENDIX E

Compendium of Wildlife Species Observed in the Study Area

APPENDIX E
Compendium of Wildlife Species Observed in the Study Area

BIRD

BLACKBIRDS, ORIOLES AND ALLIES

ICTERIDAE—BLACKBIRDS

Sturnella neglecta—western meadowlark

FALCONS

FALCONIDAE—CARACARAS AND FALCONS

Falco sparverius—American kestrel

FINCHES

FRINGILLIDAE—FRINGILLINE AND CARDUELINE FINCHES AND ALLIES

Haemorhous mexicanus—house finch

FLYCATCHERS

TYRANNIDAE—TYRANT FLYCATCHERS

Myiarchus cinerascens—ash-throated flycatcher
Tyrannus verticalis—western kingbird

HAWKS

ACCIPITRIDAE—HAWKS, KITES, EAGLES, AND ALLIES

Buteo jamaicensis—red-tailed hawk

JAYS, MAGPIES AND CROWS

CORVIDAE—CROWS AND JAYS

Corvus corax—common raven

LARKS

ALAUDIDAE—LARKS

Eremophila alpestris—horned lark

MOCKINGBIRDS AND THRASHERS

MIMIDAE—MOCKINGBIRDS AND THRASHERS

Mimus polyglottos—northern mockingbird
Toxostoma lecontei—LeConte's thrasher

NEW WORLD QUAIL

ODONTOPHORIDAE—NEW WORLD QUAIL

Callipepla californica—California quail

OLD WORLD SPARROWS

PASSERIDAE—OLD WORLD SPARROWS

* *Passer domesticus*—house sparrow

PIGEONS AND DOVES

COLUMBIDAE—PIGEONS AND DOVES

* *Columba livia*—rock pigeon (rock dove)
* *Streptopelia decaocto*—Eurasian collared-dove
Zenaida macroura—mourning dove

ROADRUNNERS AND CUCKOOS

CUCULIDAE—CUCKOOS, ROADRUNNERS, AND ANIS

Geococcyx californianus—greater roadrunner

SHRIKES

LANIIDAE—SHRIKES

Lanius ludovicianus—loggerhead shrike

STARLINGS AND ALLIES

STURNIDAE—STARLINGS

* *Sturnus vulgaris*—European starling

WRENS

TROGLODYTIDAE—WRENS

Campylorhynchus brunneicapillus—cactus wren

NEW WORLD SPARROWS

PASSERELLIDAE—NEW WORLD SPARROWS

Artemisiospiza belli—Bell's sparrow
Junco hyemalis—dark-eyed junco
Zonotrichia leucophrys—white-crowned sparrow

MAMMAL

CANIDS

CANIDAE—WOLVES AND FOXES

Canis latrans—coyote
Vulpes macrotis arsipus—desert kit fox

CATS

FELIDAE—CATS

Lynx rufus—bobcat

HARES AND RABBITS

LEPORIDAE—HARES AND RABBITS

Lepus californicus—black-tailed jackrabbit
Sylvilagus audubonii—desert cottontail

SQUIRRELS

SCIURIDAE—SQUIRRELS

Ammospermophilus leucurus—white-tailed antelope squirrel
Spermophilus (Otospermophilus) beecheyi—California ground squirrel

REPTILE

LIZARDS

PHRYNOSOMATIDAE—IGUANID LIZARDS

Uta stanburiana—common side-blotched lizard

TEIIDAE—WHIPTAIL LIZARDS

Aspidoscelis tigris—tiger whiptail

CROTAPHYTIDAE—COLLARED LIZARDS

Gambelia wislizenii—long-nosed leopard lizard

SNAKES

VIPERIDAE—VIPERS

Crotalus scutulatus—Mohave rattlesnake

* signifies introduced (non-native) species

APPENDIX F

Special-Status Wildlife Species Not Expected to Occur in the Study Area

APPENDIX F
Special-Status Wildlife Species Not Expected to Occur in the Study Area

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur
Amphibians				
Batrachoseps stebbinsi	Tehachapi slender salamander	None/ST	North-facing talus slopes in moist canyons supporting oak and mixed woodlands and/or yuccas in arid and semi-arid locations.	Not expected to occur. Suitable habitat is absent in the study area. Although the CNDDB query identified occurrences of this species, the nearest is not within 10 miles of the study area (CDFW 2017c), which is outside the species' range.
Reptiles				
Phrynosoma blainvillii	Blainville's horned lizard	None/SSC	Open areas of sandy soil in valleys, foothills, and semi-arid mountains including coastal scrub, chaparral, valley–foothill hardwood, conifer, riparian, pine–cypress, juniper, and annual grassland habitats.	Not expected to occur. Although the CNDDB query identified occurrences of this species as close 3.9 miles west of the study area (CDFW 2017c), in the Tehachapi Mountains, the study area is outside the known range and within the range of the desert horned lizard (*Phrynosoma platyrhinos*).
Birds				
Agelaius tricolor (nesting colony)	tricolored blackbird	BCC/SSC	Nests near freshwater, emergent wetland with cattails or tules, but also in Himalayan blackberry, other dense forbs, and in some agricultural crops, such as triticale; forages in grasslands, woodland, and agriculture.	Not expected to nest, unlikely to forage. The nearest occurrences in CNDDB are more than 10.0 miles from the study area (CDFW 2017c). Breeding habitat is absent in the study area, which is also poor foraging habitat.
Asio flammeus (nesting)	short-eared owl	None/SSC	Grassland, prairies, dunes, meadows, irrigated lands, and saline and freshwater emergent wetlands.	Not expected to occur. Although CNDDB includes an occurrence approximately 12.0 miles to the south (CDFW 2017c), suitable habitat is absent in the study area.
Asio otus (nesting)	long-eared owl	None/SSC	Nests in riparian habitat, live oak thickets, other dense stands of trees, edges of coniferous forest; forages in nearby open habitats.	Not expected to occur. No occurrences in CNDDB (CDFW 2017c). Although the study area is within the range of the species, suitable nesting habitat is absent in the study area.
Charadrius (alexandrinus) nivosus (nesting)	(western) snowy plover	FT/SSC	On coasts nests on sandy marine and estuarine shores; in the interior nests on sandy, barren or sparsely vegetated flats near saline or alkaline lakes, reservoirs, and ponds.	Not expected to occur. Although CNDDB includes an occurrence approximately 9.3 miles to the south southeast (CDFW 2017c), suitable unvegetated flats and water sources are absent from the study area.

Scientific Name	Common Name	Status (Federal/ State)	Primary Habitat Associations	Potential to Occur
Circus hudsonius (nesting)	northern harrier	None/SSC	Nests in open wetlands (marshy meadows, wet lightly-grazed pastures, old fields, freshwater and brackish marshes); also in drier habitats (grassland and grain fields); forages in grassland, scrubs, rangelands, emergent wetlands, and other open habitats.	Not expected to occur. No occurrences in CNDDB (CDFW 2017c). Although the study area is within the range of the species, suitable nesting habitat is absent in the study area.
Vireo vicinior (nesting)	gray vireo	BCC/SSC	Nests and forages in pinyon–juniper woodland, oak, and chamise and redshank chaparral.	Not expected to occur. Although CNDDB includes an occurrence approximately 16 miles to the northwest (CDFW 2017c), suitable habitat is absent from the study area.
Xanthocephalus xanthocephalus (nesting)	yellow-headed blackbird	None/SSC	Nests in marshes with tall emergent vegetation, often along borders of lakes and ponds; forages in emergent wetlands, open areas, croplands, and muddy shores of lacustrine habitat.	Not expected to occur. No occurrences in CNDDB (CDFW 2017c). Although the study area is within the range of the species, suitable emergent wetland nesting habitat is absent in the study area.
Mammals				
Onychomys torridus tularensis	Tulare grasshopper mouse	None/SSC	Low, open scrub, and semi-scrub habitats in arid Lower Sonoran associations.	Not expected to occur. Although the nearest CNDDB occurrence is from approximately 3.8 miles to the north northwest (CDFW 2017c), the study area is outside the known range of the species.

Status Key:
Federal: BCC = USFWS bird of conservation concern
FT = federal threatened
State: SSC = California species of special concern
ST = state threatened

Source: CDFW (California Department of Fish and Wildlife). 2017c. Element Occurrence Query. California Natural Diversity Database (CNDDB). RareFind, Version 5 (Commercial Subscription). Sacramento, California: CDFW, Biogeographic Data Branch. https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data.

B5. Phase I Cultural Report

UNITED STATES AIR FORCE
EDWARDS AIR FORCE BASE, CALIFORNIA

ENVIRONMENTAL MANAGEMENT

PHASE 1 CULTURAL RESOURCES INVENTORY FOR THE ORO VERDE SOLAR PROJECT NEAR THE TOWN OF MOJAVE KERN COUNTY, CALIFORNIA AND WITHIN MANAGEMENT REGION 1 EDWARDS AIR FORCE BASE, CALIFORNIA

DRAFT REPORT

APRIL 2013

United States Air Force
Edwards Air Force Base, California

Environmental Management

PHASE I CULTURAL RESOURCES INVENTORY FOR THE ORO VERDE SOLAR PROJECT, NEAR THE TOWN OF MOJAVE KERN COUNTY, CALIFORIA AND WITHIN MANAGEMENT REGION 1, EDWARDS AIR FORCE BASE, CALIFORNIA

DRAFT REPORT

Prepared By ECORP Consulting, Inc.

APRIL 2013

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ECORP Consulting, Inc.
215 N. 5th Street
Redlands, California 92373

8. PERFORMING ORGANIZATION REPORT NUMBER
2012-003.001

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Reymundo "Tony" Chapa, Base Historic Preservation Officer
412 TW/CEVN - Environmental Management
5 East Popson Avenue, Bldg. 2650A
Edwards AFB, CA 93524-1130

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14. ABSTRACT
This draft report provides the methods and results of the Phase I cultural resources inventory for the proposed Oro Verde Solar Project near the town of Mojave, Kern County, California. The Project Study Area (PSA) includes 5,692 acres for siting of an Enhanced Use Lease (EUL) Solar Facility, which will measure between approximately 1,000 and 4,000 acres within the larger Study Area, all within Edwards AFB property. Additionally, approximately 3,085 acres are under investigation for the generation interconnection (Gen-Tie) line. Several preliminary routes are currently under consideration for the Gen-Tie line, all extending to the northwest of the EUL Solar Facility across privately-owned and BLM managed lands. This project included a cultural resource records search, intensive pedestrian survey of 3,140 acres of the EUL Solar Facility Study Area, and a reconnaissance-level survey of potential Gen-Tie routes. A total of 80 sites and 123 isolated finds were newly recorded and 121 previously recorded sites were updated.

15. SUBJECT TERMS
Antelope Valley, City of Mojave, Edwards Air Force Base, Kawaiisu, Kitanemuk, Literature Review, Records Search, Rosamond Lake, Solar Facility, Transmission Line

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C	C	C			19b. TELEPONE NUMBER (*Include area code*) (415) 483-5509

MANAGEMENT SUMMARY

ECORP Consulting, Inc. (ECORP) has conducted a Phase I cultural resources investigation in support of the First Solar, Inc. (First Solar) proposed Oro Verde Solar Project (Oro Verde) near the town of Mojave, Kern County, California (Figure 1). The Project Study Area (PSA) includes 5,692 acres under consideration for the siting of an Enhanced Use Lease (EUL) Solar Facility on Edwards Air Force Base (AFB) and 3,085 acres under consideration for siting an approximate 14-linear-mile generation interconnection (Gen-Tie) transmission line.

The EUL Solar Facility will be built and operated by Sun Edison; however, it will be owned by Edwards AFB. The Gen-Tie transmission line will extend from the northwestern portion of the EUL Solar Facility to the existing Southern California Edison (SCE) Windhub Substation One to the northwest. The Gen-Tie transmission line will extend across both privately-owned land under Kern County Rights of Way (ROW) jurisdiction, and lands managed by the Bureau of Land Management (BLM).

The EUL Solar Facility will be situated on Edwards AFB and is, therefore, subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) and Edwards AFB procedures for cultural resources. The Gen-Tie route options are subject to the cultural resources requirements of the California Environmental Quality Act (CEQA) under the jurisdiction of Kern County, as well as compliance with Section 106 of the NHPA under BLM's jurisdiction.

This study has included numerous phases of work. An in-house records search was conducted by Edwards AFB Cultural Resources Staff to examine site records and reports they have on file for the EUL Solar Facility Study Area; a cultural resources records search was conducted by ECORP archaeologists at the Southern San Joaquin Valley Information Center (SSJVIC) to determine the extent of previous cultural resources investigations and resources within a 0.5-mile radius of the proposed Gen-Tie routes; intensive pedestrian survey was conducted for a 3,140-acre portion of the EUL Solar Facility Study Area that has not been surveyed within the last ten years; a reconnaissance-level survey was conducted for all proposed Gen-Tie routes; and preliminary evaluations of eligibility to the National Register of Historic Places (NRHP) were conducted for sites recorded and updated in the EUL Study Area.

As a result of the field survey, 80 newly identified archaeological sites and 123 isolated finds were recorded with new site records prepared. Of the 123 recorded isolates, 44 are historic in age and 79 are prehistoric. Of the 80 newly recorded sites, 22 are historic period sites and 58 are prehistoric sites. Of the historic period sites, 17 are refuse deposits and 5 are possible agricultural features. Of the prehistoric sites, 49 are lithic deposits, 1 is a possible hearth/roasting pit, and 8 are temporary camps.

In addition to the newly recorded sites, 121 previously recorded sites were field checked with updated site records prepared. Of these, 37 are historic period sites and 84 are prehistoric sites. The 37 historic period sites consist of 3 isolated wells, 8 homesites, 18 refuse deposits, and 8 roads or trails. The 84 prehistoric sites consist of 39 lithic deposits, 1 milling station, 4 roasting pits or hearths, and 40 temporary camps.

During the reconnaissance survey of the Gen-Tie Study Area, the crew identified 11 features that may be historic in age. In addition, 67 previously recorded sites overlap or are adjacent to the Gen-Tie Study Area. The crew also visited the location where a potential Gen-Tie Route option is crossed by a historic road grade along Purdy Avenue, as well as the location where the Los Angeles Aqueduct, a contributor to an NRHP eligible district, crosses into the Gen-Tie Study Area. No new sites were recorded and no previously recorded sites were updated within the Gen-Tie Study Area.

Preliminary recommendations of eligibility for the National Register of Historic Places (NRHP) were generated, based on surface data collected during this inventory, for all 80 newly identified sites in the EUL Study Area. Of the 80 newly recorded sites, 43 are likely ineligible for the NRHP and 37 are potentially eligible for the NRHP pending formal evaluation through subsurface testing and/or archival research. These 37 recourses include 9 prehistoric temporary camps 1 single feature hearth site, and 1 historic period refuse deposit. These sites may have sufficient data potential to qualify for eligibility to the NRHP; however, further study of the sites through test excavation and/or archival research is needed to make formal eligibility determinations. The remaining 43 newly recorded sites are likely ineligible for the NRHP. These 43 sites contain few artifacts, are unlikely to contain subsurface deposits, and/or are unlikely to provide significant additional data beyond what has already been recorded.

Of the 121 previously recorded sites visited during the current project, eight have previously been determined eligible for the NRHP. These consist of six prehistoric temporary camps and two historic period homesites. Twenty-two previously recorded sites have been determined not eligible for the NRHP and 91 previously recorded sites have not been formally evaluated for NRHP eligibility.

During the current project, preliminary recommendations of eligibility for the NRHP were generated for the 91 previously recorded sites in the EUL Study Area that were not previously evaluated. Of these, 50 are potentially eligible for the NRHP. These include 46 prehistoric sites and 4 historic period sites. These sites may have sufficient data potential to qualify for eligibility to the NRHP; however, further study of the sites through test excavation and/or archival research is needed to make formal eligibility determinations. The remaining 41 sites are likely ineligible for the NRHP. These 41 sites contain few artifacts, are unlikely to contain subsurface deposits, and/or are unlikely to provide significant additional data beyond what has already been recorded. In addition, one prehistoric temporary campsite previously recommended as NRHP-eligible (CA-KER-4929/P-15-005804 [EAFB-2402]) is now recommended as not eligible for the NRHP based on the sparse nature of subsurface deposits found during previous testing of the site and the lack of any surface manifestations of the site found during the field check of the site conducted as part of this study.

It is recommended that, once a preferred Solar Facility footprint is identified within the EUL Study Area, all archaeological resources located within the footprint that have been identified as potentially eligible for the NRHP be formally evaluated for the NRHP through detailed recordation, subsurface testing, and/or archival research. If any resources are formally determined eligible by Edward AFB as a result of the investigations, effects to those resources from the proposed solar facility should be assessed. Appropriate treatment measures for adverse effects that cannot be avoided should be developed and implemented in consultation with State Historic Preservation Officer (SHPO). In addition, once alternative Gen-Tie routes are identified for further analysis, an intensive pedestrian survey of the selected Gen-Tie route alternatives should be conducted in order to identify and record new resources and to field check and update previously recorded resources. Any resources identified during this survey should be evaluated for inclusion in the NRHP and California Register of Historical Resources (CRHR) with effects from the proposed project assessed and appropriate treatment measures developed and implemented for adverse effects that cannot be avoided, in compliance with Section 106 of the NHPA and the cultural resources requirements of CEQA.

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1.0 INTRODUCTION

1.0 INTRODUCTION

ECORP Consulting, Inc. (ECORP) has conducted a Phase I cultural resources investigation in support of Sun Edison's proposed Oro Verde Solar Project (Oro Verde) near the town of Mojave, Kern County, California (Figure 1-1). The Project Study Area (PSA) includes 5,692 acres under consideration for the siting of an Enhanced Use Lease (EUL) Solar Facility and 3,085 acres under consideration for an approximate 14-linear-mile generation interconnection (Gen-Tie) transmission line.

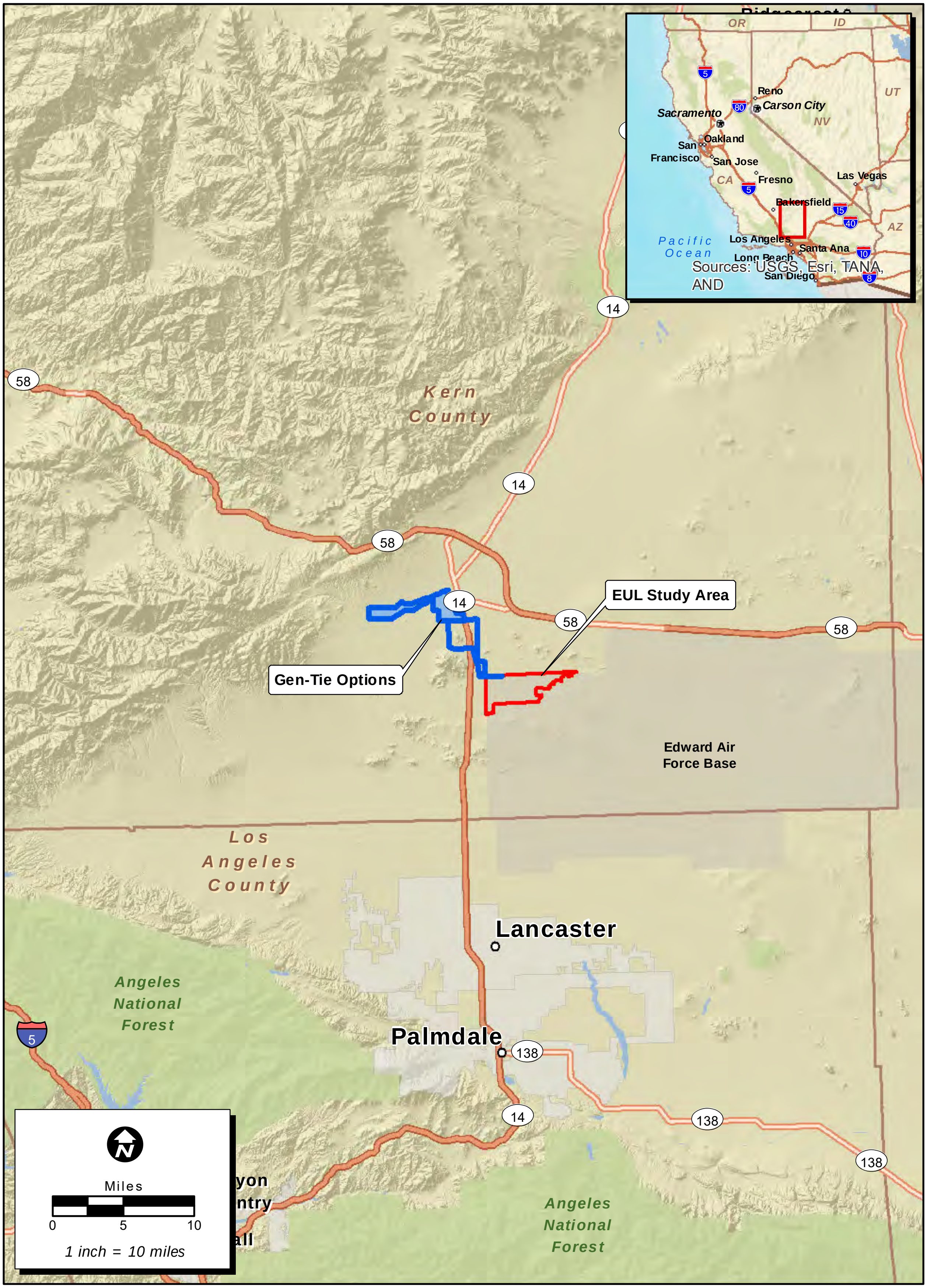
The EUL Solar Facility will be built and operated by Sun Edison, however, will be located on, and owned by, Edwards AFB. The Gen-Tie transmission line will extend from the northwestern portion of the EUL Solar Facility to the existing Southern California Edison (SCE) Windhub Substation One to the northwest. The Gen-Tie transmission line will extend across both privately-owned land under Kern County Rights of Way (ROW) jurisdiction, and lands managed by the Bureau of Land Management (BLM). The areas under consideration for both the EUL Study Area and Gen-Tie route options study area are illustrated in Figures 1-2 through 1-7.

The EUL Solar Facility will be situated on Edwards AFB and is, therefore, subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) and Edwards AFB procedures for cultural resources. The Gen-Tie route options are subject to the cultural resources requirements of the California Environmental Quality Act (CEQA) under the jurisdiction of Kern County, as well as compliance with Section 106 of the NHPA under BLM's jurisdiction.

1.1 Project Description and Location

A 5,692-acre EUL Study Area is under consideration for siting of the EUL Solar Facility on Edwards AFB. Situated within the northwestern corner of Edwards AFB to the east of Highway 14 (Aerospace Highway) and approximately 6 miles southwest of the town of Mojave, the Study Area is bound by Lone Butte Road to the west, Trotter Avenue to the north, and Sopp Road to the south. The exact footprint for the solar facility is still under development, but it is expected to encompass an area between approximately 1,000 and 4,000 acres within the larger Study Area. Because the exact footprint is unknown at this time, the area of potential effects (APE) is defined as the entire 5,692-acre EUL Study Area, as seen in Figures 1-2, 1-6, and 1-7. The APE will be further refined prior to the Phase II cultural resources investigations, once the footprint of the solar facility is established.

A 3,085-acre study area is under consideration for the placement of a Gen-Tie transmission line, which will measure approximately 14-miles in length (see Figures 1-2 through 1-5). Several preliminary routing options are currently under consideration within this study area, all of which originate in the northwestern portion of the EUL Study Area and extend generally northwest to interconnect with the existing SCE Windhub Substation One, located approximately 0.50 mile east of the intersection of 90th Street West and Oak Creek Road, approximately 11 miles southeast of the city of Tehachapi. The Gen-Tie transmission line corridor is still under feasibility analysis and additional routing options may be added at a later date.



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Map Date: 4/5/2013
Source: ESRI

Figure 1-1. Project Vicinity

2012-003.001 Oro Verde Solar Project

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
mapping_guest

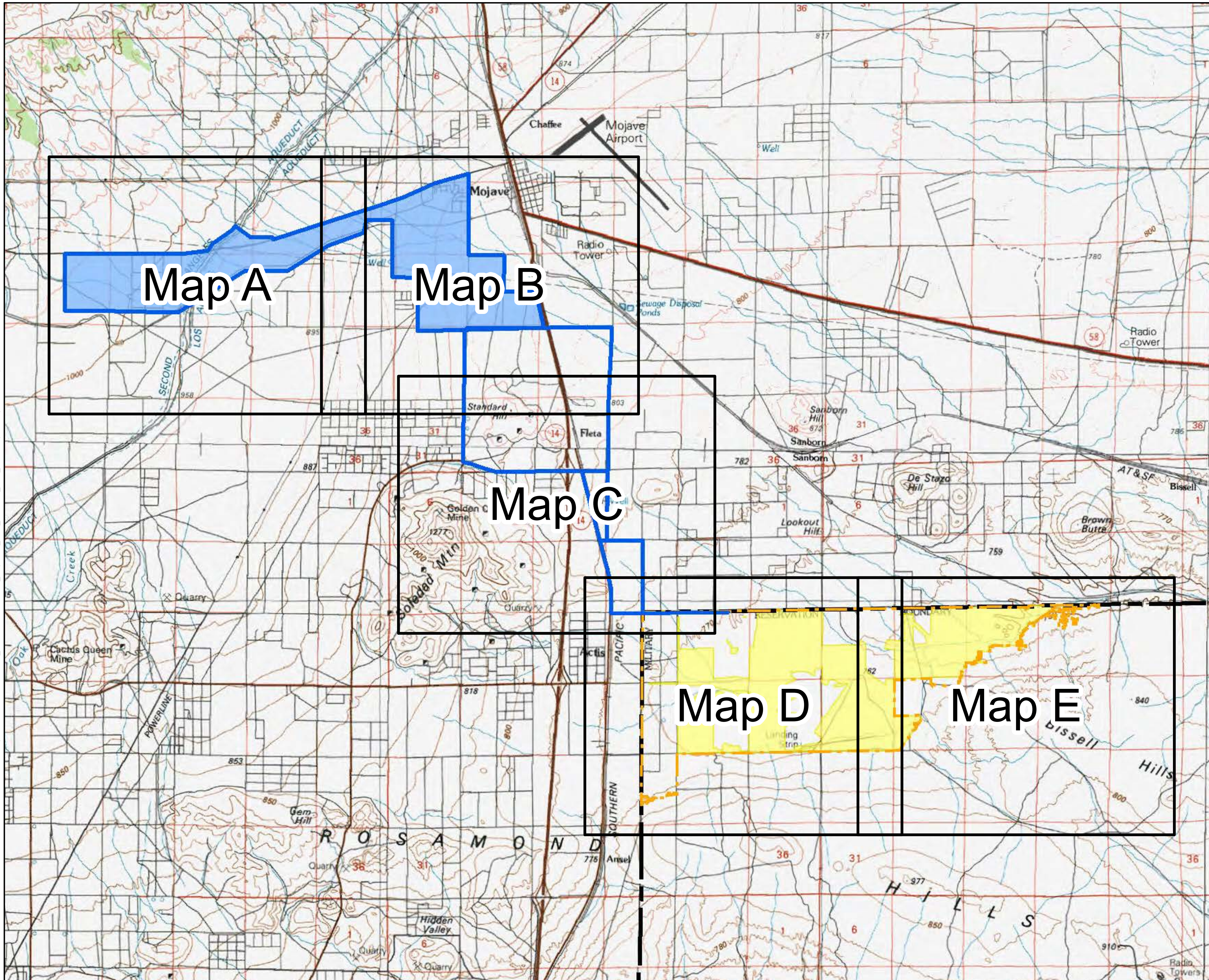

Figure 1-.
Oro Verde Project Components
(Map: Overview)

- Edwards Air Force Base Boundary
- EUL Study
- EUL Survey
- Gen-Tie Route Options Study Area
- Gen-Tie Route Options

USGS Topographic Quadrangles: Soledad Mt (1973), Bissell (1973), Mojave (1992), Monolith(1992), Willow Springs (1974), Sanborn (1989)

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Location: N:\2012\2012-003 Sun Edison MSA\001 Oro Verde Solar Project-EAFB\MAPS\Cultural_Resources\Overview_Maps\OV_CRM_Location_DDP_V2.mxd (MGuidry, 4/9/2013)

Map Date: 4/9/2013

2012-003 Sun Edison MSA - EAFB

Scale in Feet
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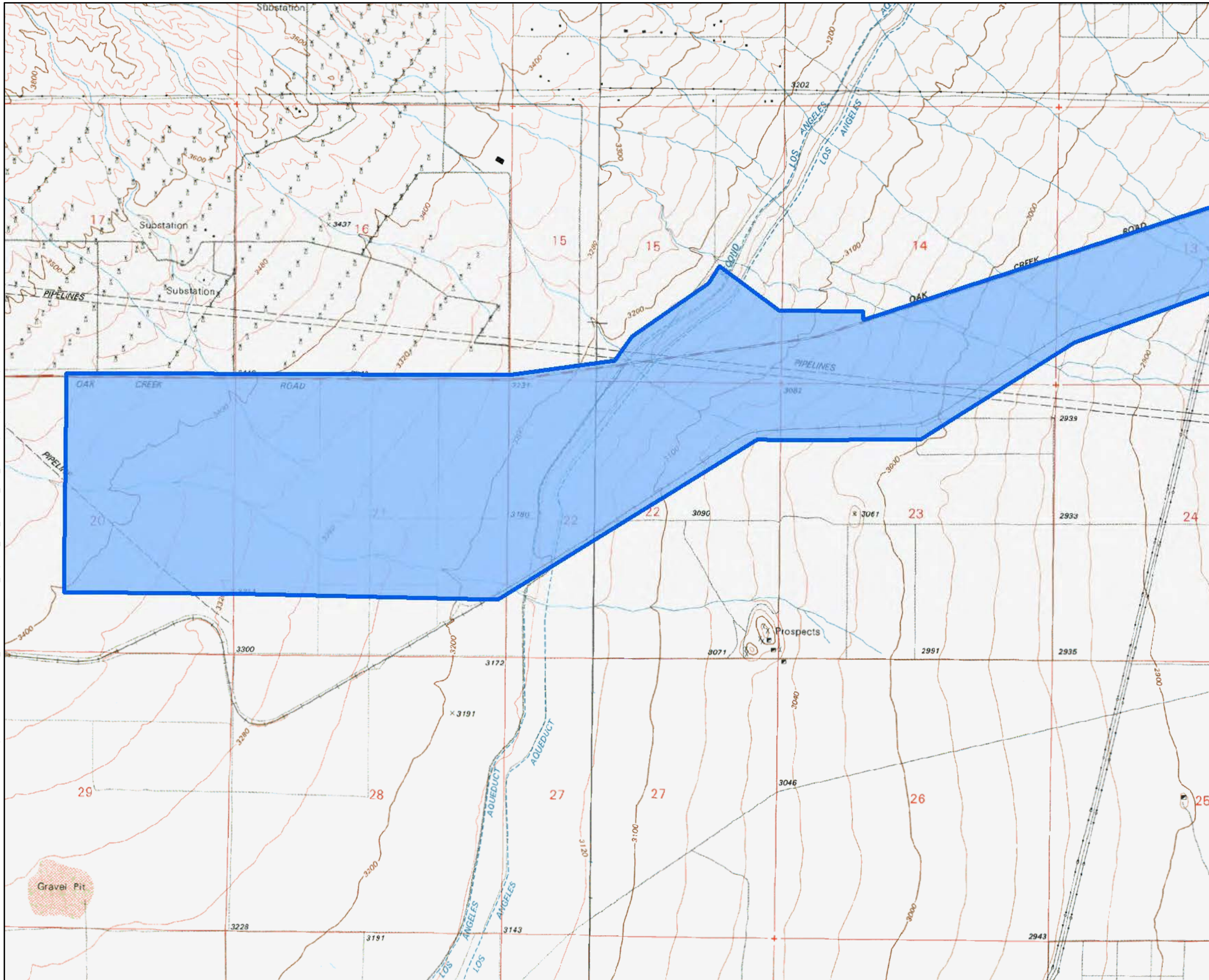


Figure 1-. Oro Verde Project Components (Map: A)

Edwards Air Force Base Boundary

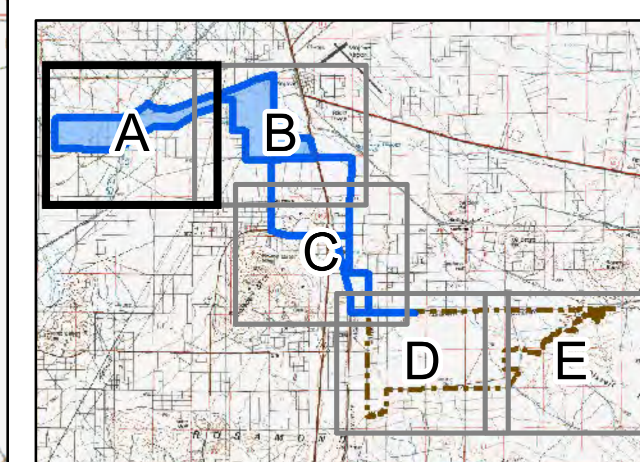
EUL Study

EUL Survey

Gen-Tie Route Options Study Area

Gen-Tie Route Options

USGS Topographic Quadrangles: Soledad Mt (1973), Bissell (1973), Mojave (1992), Monolith(1992), Willow Springs (1974), Sanborn (1989)



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2012\2012-003 Sun Edison MSA\001 Oro Verde Solar Project-EAFB\MAPS\Cultural_Resources\Overview_Maps\OV_CRM_Location_DDP_V2.mxd (MGuidry, 4/9/2013)

2012-003 Sun Edison MSA - EAFB

Scale in Feet
0 1,000 2,000

Map Date: 4/9/2013

Figure 1-.
Oro Verde Project Components
(Map: B)

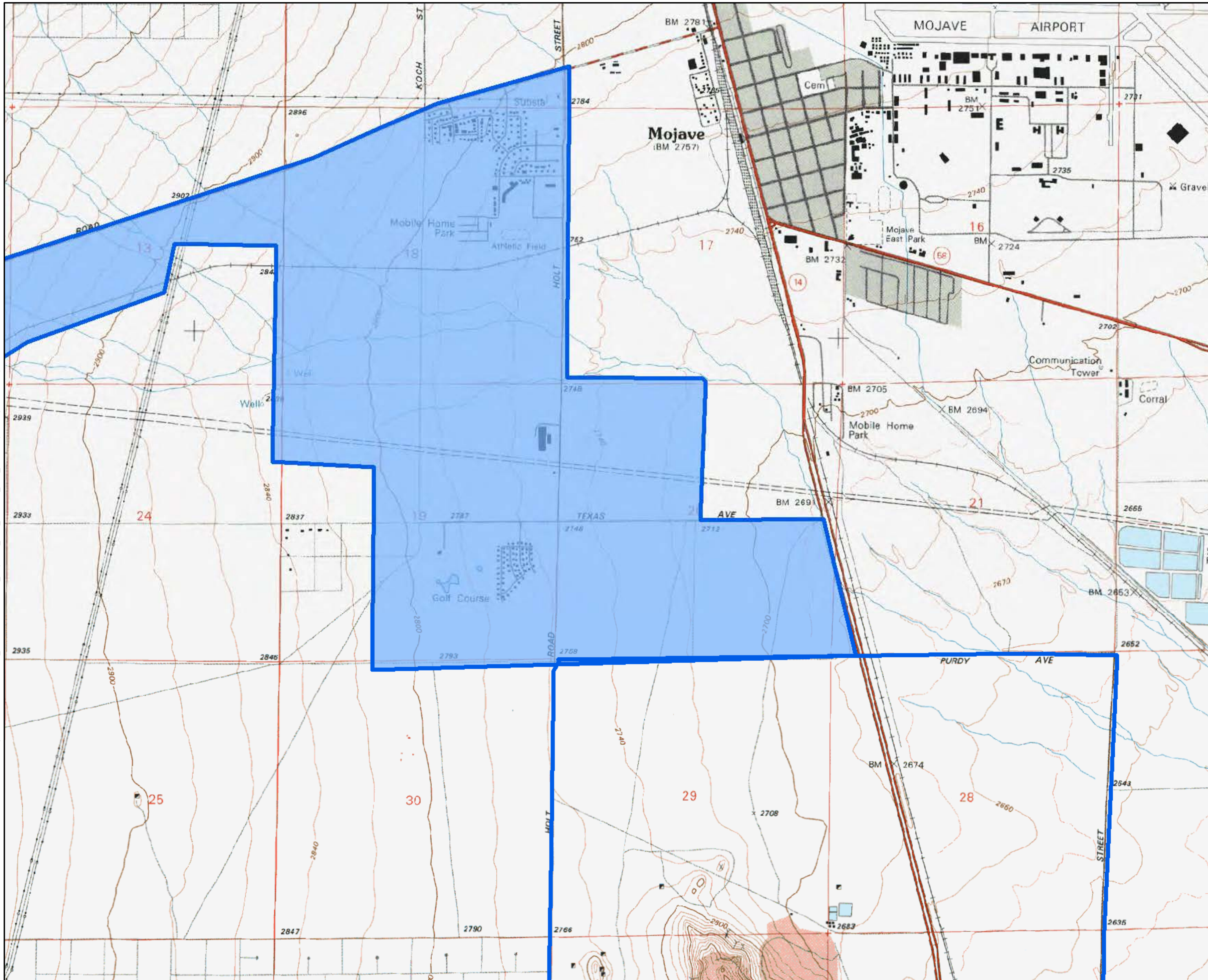
Edwards Air Force Base Boundary

EUL Study

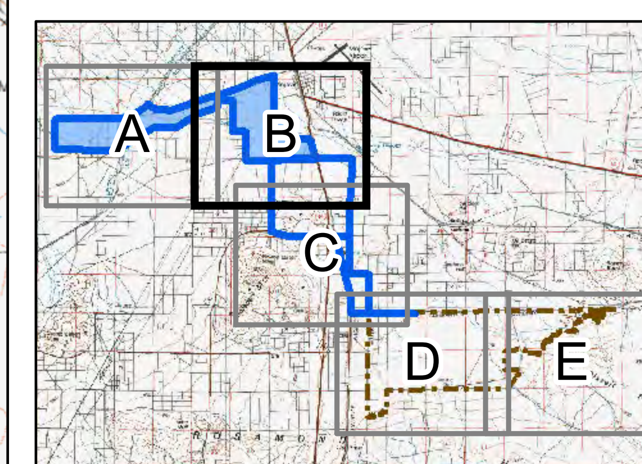
EUL Survey

Gen-Tie Route Options Study Area

Gen-Tie Route Options



USGS Topographic Quadrangles: Soledad Mt (1973), Bissell (1973), Mojave (1992), Monolith(1992), Willow Springs (1974), Sanborn (1989)



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Map Date: 4/9/2013

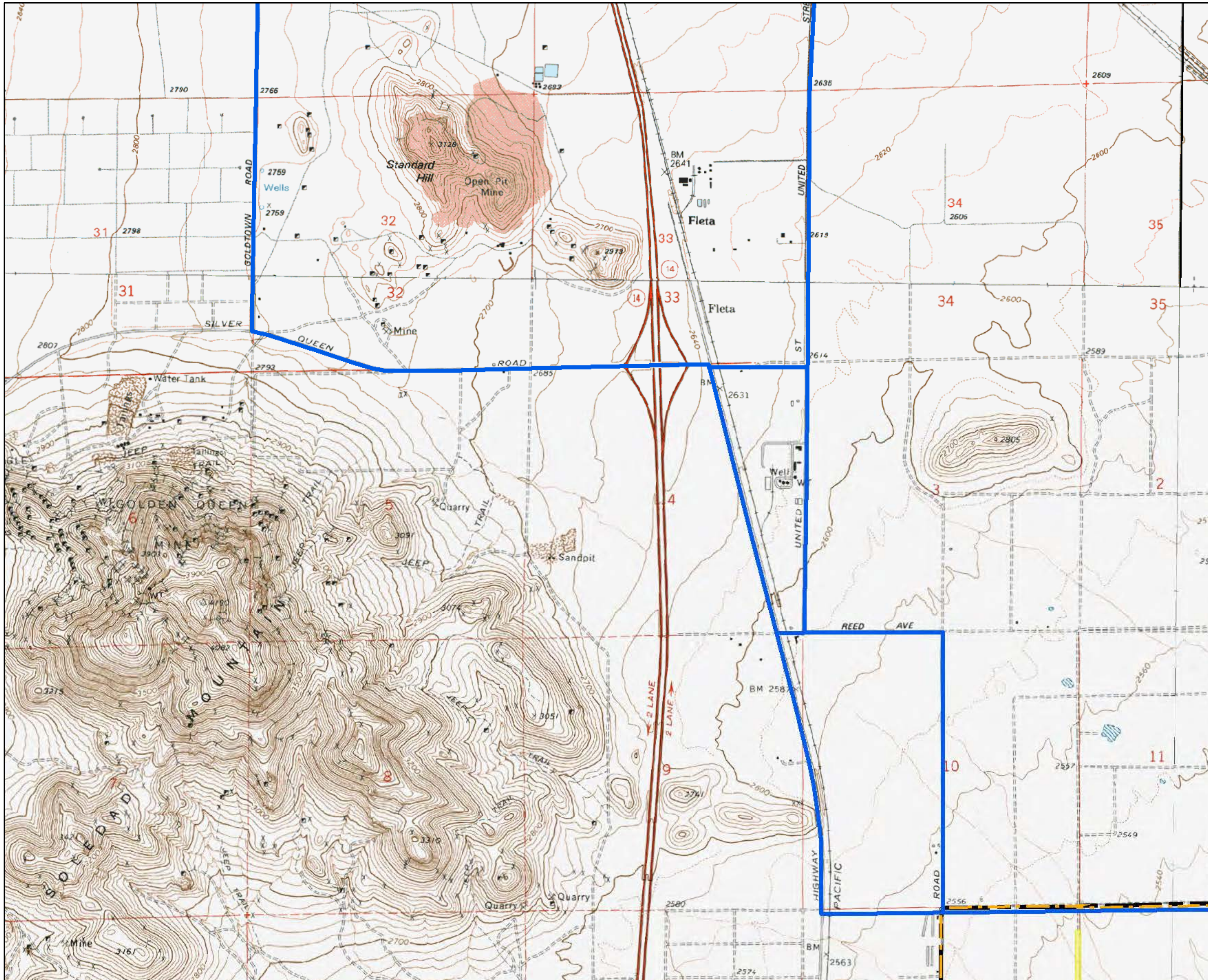
Location: N:\2012\2012-003 Sun Edison MSA\001 Oro Verde Solar Project-EAFB\MAPS\Cultural_Resources\Overview_Maps\OV_CRM_Location_DDP_V2.mxd (MGuidry, 4/9/2013)

2012-003 Sun Edison MSA - EAFB

Scale in Feet
0 1,000 2,000

Figure 1-.
Oro Verde Project Components
(Map: C)

Edwards Air Force Base Boundary
EUL Study
EUL Survey
Gen-Tie Route Options Study Area
Gen-Tie Route Options



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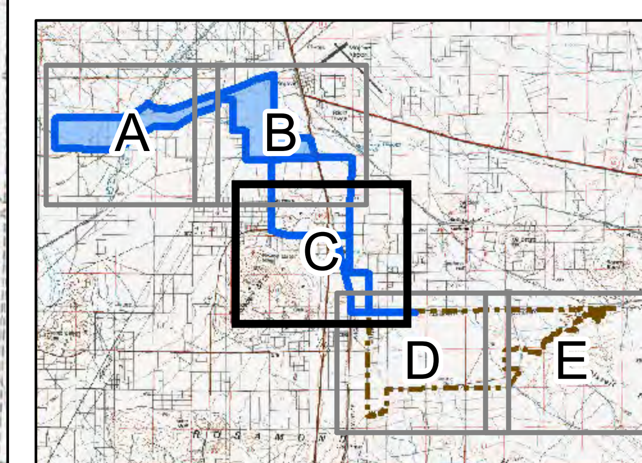

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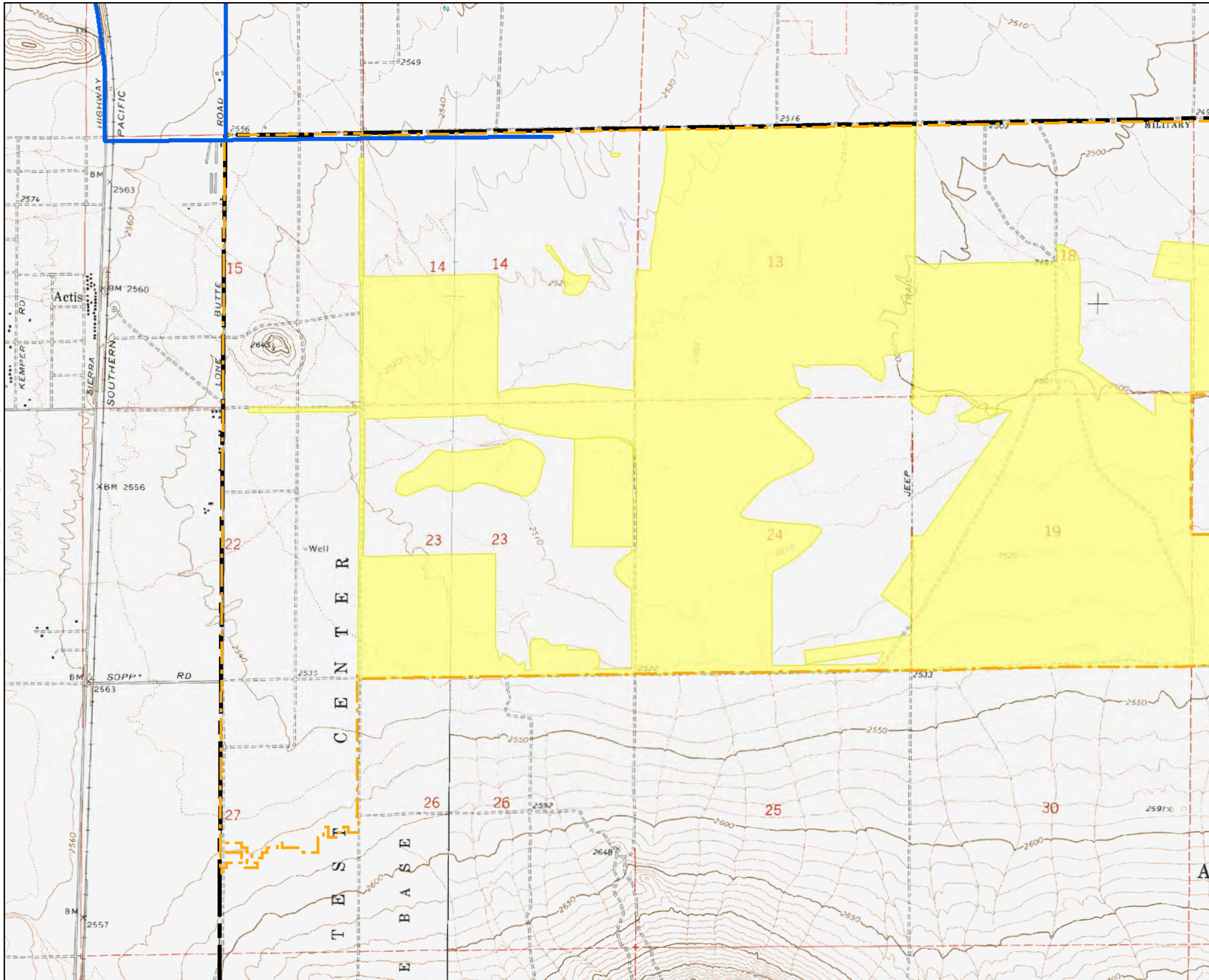
Figure 1-.
Oro Verde Project Components
(Map: D)



Edwards Air Force Base Boundary

EUL Study

EUL Survey

Gen-Tie Route Options Study Area

Gen-Tie Route Options

USGS Topographic Quadrangles: Soledad Mt (1973), Bissell (1973), Mojave (1992), Monolith(1992), Willow Springs (1974), Sanborn (1989)

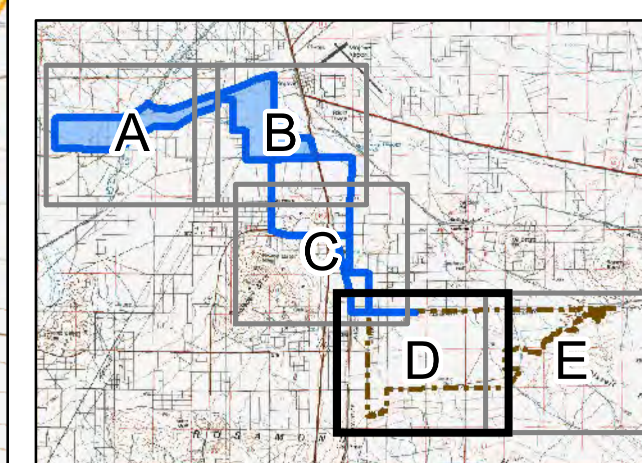


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Figure 1-.
Oro Verde Project Components
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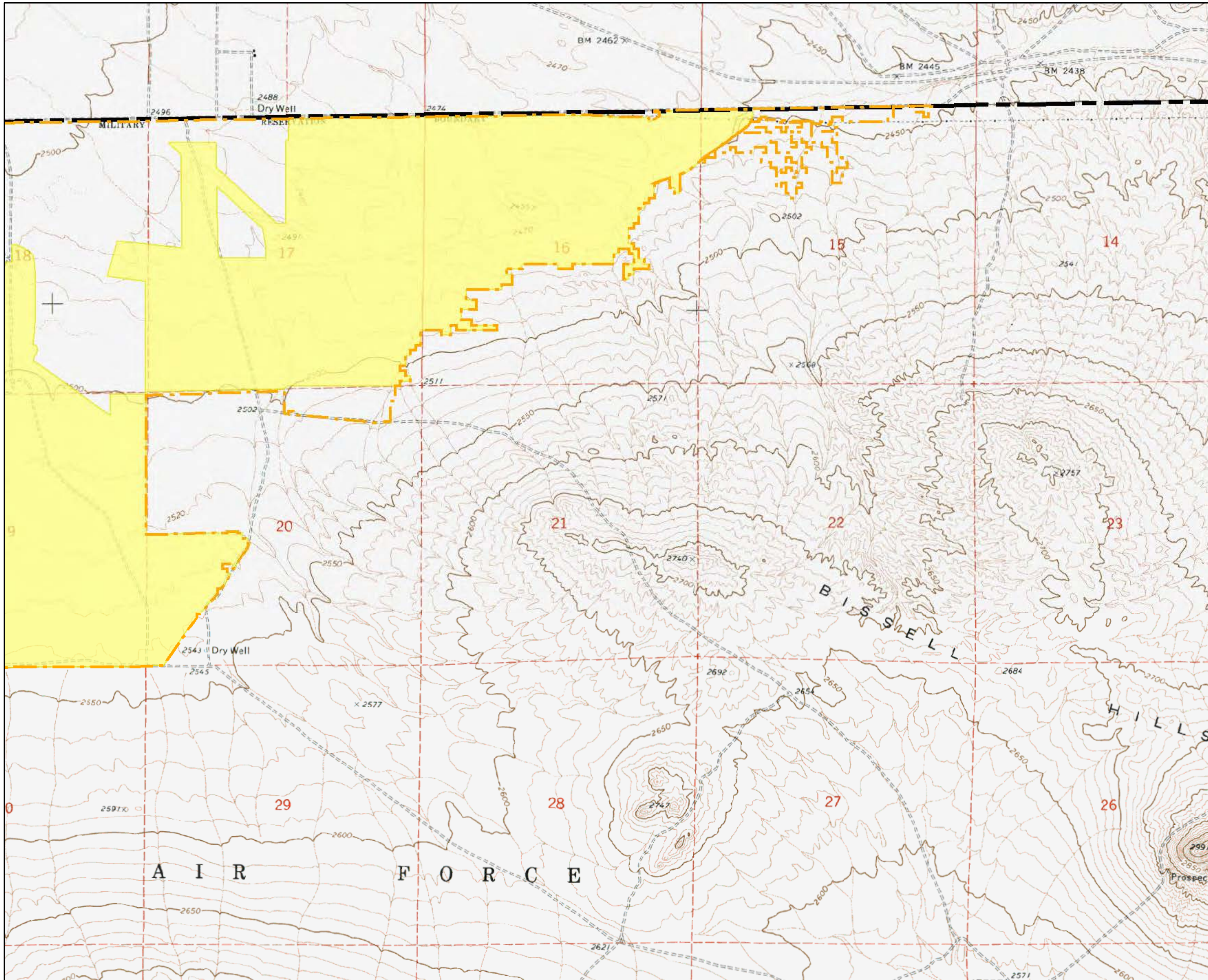


Edwards Air Force Base Boundary

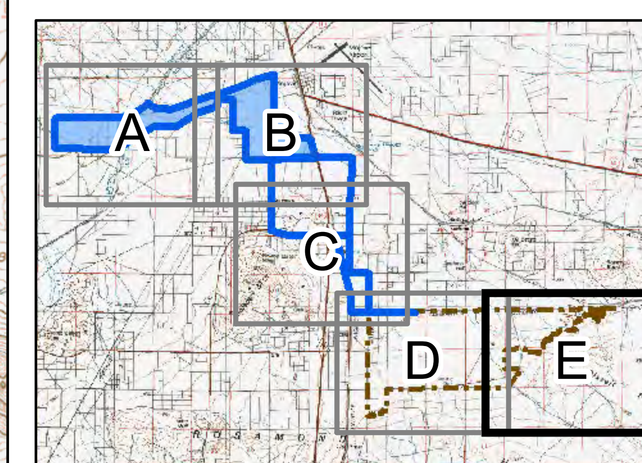
EUL Study

EUL Survey

Gen-Tie Route Options Study Area

Gen-Tie Route Options

USGS Topographic Quadrangles: Soledad Mt (1973), Bissell (1973), Mojave (1992), Monolith(1992), Willow Springs (1974), Sanborn (1989)



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Map Date: 4/9/2013

1.2 Project Background

In order to identify historic properties, as defined under the NHPA, and historical resources, as defined under CEQA, that may be affected by the proposed project, two cultural resources records searches were conducted. In 2011, an in-house records search was conducted by Edwards AFB staff for the EUL Study Area. In December 2011, an electronic version of the record search results, including GIS locational data and electronic versions of all site records and survey reports, was provided to ECORP. This records search provided data on previous surveys and known archaeological sites within the EUL Study Area, as well as the area located on Edwards AFB property within a 0.5-mile radius.

In January 2012, an in-house records search was conducted at the Southern San Joaquin Valley Information Center (SSJVIC) for the preliminary Gen-Tie route options currently under consideration. This records search identified previous cultural resources surveys that have been conducted within a 0.5-mile radius of the preliminary route options, as well as cultural resources that have been previously recorded within this 0.5-mile radius. The data obtained from the SSJVIC were compared and combined with the records acquired from Edwards AFB to create a complete records search results package.

The records search indicated that a total of 44.8 percent (2,552 acres) of the EUL Study Area had been previously surveyed for cultural resources within the past 10 years. A total of 44 percent (2,505 acres) had either not been previously surveyed, or had not been surveyed within the past 10 years. Additionally, four large sites previously determined eligible for the National Register of Historic Places (NRHP) are located within the EUL Study Area. These sites encompassed a total of 11.2 percent (635 acres) of the Study Area, and were included in the current field survey to provide an opportunity to assess the current conditions of the sites. As a result, a total of 56.2 percent (3,140 acres) of the EUL Study Area was surveyed as part of the Phase I cultural resources inventory.

As a result of the field survey 80 sites and 123 isolated finds were newly-recorded, and 121 previously-recorded sites were field checked and updated. A reconnaissance survey was conducted within the Gen-Tie route options study area to identify potential historic-age buildings and features along the route options. Additionally, areas of past disturbances where sites are unlikely to exist and areas that would require field survey if selected as an alternative, were identified as a result of the reconnaissance survey.

This report presents the methods and results of the records searches, field survey of the 3,140 acres of the EUL Solar Facility, and reconnaissance survey of the Gen-Tie route options study area that were conducted for the project. In addition, management recommendations and preliminary evaluations for the NRHP are provided for all newly-identified cultural resources, as well as all previously recorded sites that have not been previously evaluated within the surveyed portion of the EUL Study Area.

2.0 LOCATION AND SETTING

2.0 LOCATION AND SETTING

The Project Study Area, consisting of the EUL Solar Facility Study Area and the Gen-Tie route options study area, is located in the Antelope Valley, within the westernmost portion of the Mojave Desert, to the south and southwest of the town of Mojave in Kern County, California. The EUL Solar Facility Study Area (EUL Study Area) is situated near the northern outskirts of the unincorporated community of Rosamond in Kern County, within Management Region 1 (Bissell Basin) of Edwards Air Force Base. The EUL Study Area is bounded on the western extent by an unpaved section of Division Street, Trotter Avenue along the northern extent (parallel to the Edwards Air Force Base boundary), and Sopp Road along the southern extent. As shown on the U.S. Geological Survey (USGS) 7.5-minute Soledad Mountain (1973), and Bissell (1973), California topographic quadrangle maps, the EUL Study Area is located within Sections 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 29 and 30 of Township 10 North, Range 11 West and Sections 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, and 27 of Township 10 North, Range 12 West of the San Bernardino Base and Meridian (see Figure 1-1).
The Gen-Tie route options study area originates in the northwestern portion of the EUL Study Area and extends generally northwest to interconnect with the existing SCE Windhub Substation One, located approximately 0.50 mile east of the intersection of 90th Street West and Oak Creek Road approximately 11 miles southeast of the city of Tehachapi. As shown on the USGS 7.5 minute Soledad Mountain (1973), Bissell (1973), Monolith (1973), and Mojave (1973), California topographic quadrangle maps, the Gen-Tie route options study area is located within Sections 3, 4, 5, 9, 10, 11, 14, and 15 of Township 10 North, Range 12 West; Sections 7, 8, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 33, and 34 of Township 11 North, Range 12 West; and Sections 13, 14, 15, 16, 17, 20, 21, 22, 23, and 24 of Township 11 North, Range 13 West of the San Bernardino Base and Meridian (see Figures 1-2 through 1-7).

The Project Study Area is situated at an elevation of 2,475 to 3,400 feet above mean sea level, and primarily slopes gently to the southeast. Soils within the EUL Study Area consist of Tertiary intrusive rocks, Quaternary sand deposits, and Mesozoic granitic rocks (Earle et al. 1997, Giambastiani et al. 2007, US Geological Survey 2010). There are numerous claypan playas and sand dunes located generally in the central portion of the EUL Study Area. Soils in the Gen-Tie route options study area are consistent with those in the EUL Study Area and generally consist of alluvial deposits. Soledad Mountain is located northwest of the EUL Study Area and south of the Gen-Tie route options study area, Rosamond Hills lies to the southwest of both Study Areas, and Bissell Hills lies to the southeast of both Study Areas.

Rosamond Lake, a large Pleistocene-age dry lake bed, is located 4.5 miles (8.04 kilometers) south of the EUL Study Area. This lakebed is a remnant of ancient Lake Thompson, which receded approximately 8,000 years before present (B.P.) after the waning of glacial climate in western North America (Earle et al. 1997, Thompson 1929).

The dominant vegetation in the EUL Study Area is saltbush scrub, with areas of creosote bush scrub and Joshua tree woodland (Giambastiani et al. 2007) (Figure 2-1). Much of the native vegetation, however, was removed in the mid-20th century and replaced by agricultural crops. Today, the agricultural fields have been abandoned, and are filled with Mojave Desert scrub along with non-native weeds. The Mojave Desert scrub includes saltbush scrub (*Atriplex confertifolia*), burrobush *(Ambrosia dumosa)* creosote bush scrub (*Larrea tridentata*), Joshua tree *(Yucca brevifolia)* woodland, and "wash wetland" or mesquite *bosque* (Earle et al. 1997, Sawyer 1994, Vasek and Barbour 1977). The extent of Joshua tree woodland and creosote bush scrub varies in the project area, becoming denser in the eastern portion of the EUL Study Area, and more sparse in the western portion of the EUL Study Area. Other shrubs in the general area that appear in the sandy soil include winterfat (*Krasheninnikovia lanata*), spiny hopsage (*Grayia spinosa*), goldenheads (*Acamptopappus sphaerocephalus*), Mormon tea (*Ephedra nevadensis*), felt-thorn (*Tetradymia stenolepis*), and Cooper's golden bush (*Ericameria cooperi*) (ICRMP 2010).

In addition to past agricultural activity, the EUL Study Area has been disturbed by the grading and paving of Sopp Road to the south, Division Road to the west, Backus Road in the center, Trotter Road to the north and a number of unnamed, yet well-utilized, dirt roads, as well as off-road vehicle activity and recently deposited refuse. In the north-central portion of the EUL Study Area, there are burned areas from the Bissell Basin Brush Fire of the late 1990s.

The Gen-Tie route options study area contains disturbances from the grading and paving of roads along the route, including Sierra Highway, Trotter Road, Lone Butte Road, Reed Avenue, United Street, Silver Queen Road, Purdy Avenue, Holt Street, 25th Street West, Camelot Boulevard, 40th Street West, Oak Creek Road and 80th Street West. In the western portion of the Gen-Tie route options study area, there are disturbances from an existing wind farm, historic period aqueduct, historic period railroad, and modern transmission lines. There are also surrounding areas of modern and historic period residences, as well as agricultural/industrial structures. Modern dumping disturbances are prevalent in undeveloped areas in close proximity to residential developments, and OHV disturbances are common.

Figure 2-8. Project Overview. View northeast. Photo No. 2012O-133-1.

3.0 CULTURAL SETTING

3.0 CULTURAL SETTING

3.1 Prehistory

Two significant volumes on the prehistory of California, *The Archaeology of California* by Joseph and Kerry Chartkoff, and *California Archaeology* by Michael Moratto, were published in 1984. At that time, Warren (1984, in Moratto 1984) provided a modified version of his earlier (1980b) Mojave Desert chronology. The 1984 version included six cultural periods marked primarily by projectile point types (Table 3-1).

Table 3-1
Cultural Sequences for the Mojave Desert Region, California

Cultural Complex	Approximate Time Period in Years B.C. and Calendar Years A.D.	Characteristic Artifacts
Fluted Point, or Pleistocene Period	10,000 – 8,000 B.C.	Fluted points (Clovis)
Lake Mojave Period	8,000 – 5,000 B.C.	Stemmed points (Lake Mojave, Silver Lake)
Pinto Period	5,000 – 2,000 B.C.	Pinto and leaf-shaped points
Gypsum Period	2,000 B.C. – A.D. 500	Gypsum and Elko series points
Saratoga Spring Period	A.D. 500 – 1200	Rose Spring, Eastgate, Saratoga Spring points
Late Prehistoric, or Shoshonean Period	A.D. 1200 – Contact with European explorers ca. 1770	Desert Series points, ceramics

Adapted from Warren 1984; Warren 1980a

New research has led to refinements of the prehistoric chronology of the Mojave Desert region since the early 1980s, including new applications of radiocarbon dating on marine shell and organic materials in sediments, improved understanding of obsidian hydration rates, and more detailed flaked stone technology profiles. This ongoing research has contributed new information that has enhanced understanding of the prehistoric chronology of the Mojave Desert region, a chronology that will most likely continue to be refined in the future. Sutton et al. (2007) discuss these refinements in depth, and present a slightly modified chronological sequence, which is, nonetheless, very similar to that of Warren (1984). Sutton et al. (2007) place their chronology in the context of climatic periods (Pleistocene, early Holocene, middle Holocene, and late Holocene) separated further by cultural complexes based upon technological advances. In addition to the cultural complexes, Sutton et al. (2007) include a hypothetical Pre-Clovis complex pre-dating 10,000 years B.C., for which there is little or no solid archaeological evidence in the Mojave Desert. They also propose a Deadman Lake complex roughly contemporaneous with the Pinto Period, based on artifact assemblages they contend are unique to the Twentynine Palms area. A brief discussion of the different cultural complexes is presented below in Table 3-2.

Table 3-2
Temporal Periods and Cultural Sequences for the Mojave Desert Region, California

Temporal Period	Cultural Complex	Approximate Dating	Characteristic Artifacts
Pleistocene	Pre-Clovis (hypothetical)	Pre-10,000 B.C.	Unclear
	Fluted Point, or Pleistocene Period	10,000 – 8,000 B.C.	Fluted points (Clovis)
Early Holocene	Lake Mojave Period	8,000 – 6,000 B.C.	Stemmed points (Lake Mojave, Silver Lake)
Early Holocene / Middle Holocene	Pinto Period	7,000 – 3,000 B.C.	Pinto and leaf-shaped points
Middle Holocene	Deadman Lake (Provisional)		Contracting-stem and leaf-shaped points
	Possible population hiatus	*3,000 – 2,000 B.C.*	*Few sites or artifacts*
Late Holocene	Gypsum Period	2,000 B.C. – A.D. 200	Gypsum and Elko series points
	Saratoga Spring, or Rose Spring Period	A.D. 200 – 1100	Rose Spring, Eastgate, Saratoga Spring points
	Late Prehistoric, or Shoshonean Period	A.D. 1100 – Contact	Desert Series points, ceramics

Adapted from Sutton et al. 2007

The Fluted Point or Late Pleistocene Period – 10,000 to 8,000 B.C.

The presence of humans in the Mojave Desert prior to 10,000 B.C. cannot be discounted, in the face of growing evidence of earlier occupation of other regions of North America. The oldest well-identified cultural complex in the Mojave Desert, however, is Clovis (ca. 10,000-8,000 B.C.), characterized by the long, fluted Clovis projectile point and Clovis-like points known as Great Basin Concave Base points (Basgall and Overly 2004:63-64). Reliable radiocarbon dates for organic material associated with fluted points in the Mojave Desert are lacking, but obsidian hydration has established that they have older relative ages than stemmed points from the same region. Only one possible Clovis occupation site has been found, at China Lake, while other fluted points have been recorded as isolated finds. Very little can be inferred about the people who created these fluted points, except that they most likely lived in highly mobile small groups and camped near reliable sources of water. Fluted point finds are concentrated in the China Lake and Lake Thompson (predecessor of Rosamond, Rogers, and Buckhorn lakes) areas, which are known to have had significant stream runoff and to have been good water sources during the Pleistocene/Holocene Transition, continuing during the early Holocene (Sutton et al. 2007).

Lake Mojave Period (Early Holocene) – 8,000 to 5,000 BC

The best-documented cultural complex in the region during the early Holocene is the Lake Mojave period, characterized by Great Basin Stemmed (Lake Mojave and Silver Lake) points, numerous bifaces including crescents, unifaces, and sometimes ground stone artifacts. Non-local lithic materials and shell beads in Lake Mojave assemblages indicate long foraging trips and/or trade with other regions. The small number of ground stone implements, and the lack of extensive wear on them, suggests that vegetal resources were not used heavily. As with the Fluted Point Period, social groups of the Lake Mojave Period appear to have been small, highly mobile, and attracted to a variety of environments where water was available. Interestingly, archaeofaunal data indicate a reliance on small game like rabbits, hares, rodents, and reptiles, rather than bigger game implied by the large projectile points. Lake Mojave Period artifacts have been mostly surface finds, making absolute dating by radiocarbon methods difficult (Sutton et al. 2007). Numerous Lake Mojave Period artifacts have been documented at Rosamond Lake (Edwards AFB), ancient Lake Mojave (Silver and Soda dry lakes), and on neighboring military installations such as Fort Irwin, China Lake Naval Air Weapons Station (NAWS), and the Marine Corps Air Ground Combat Center at Twentynine Palms.

Pinto Period (Early to Middle Holocene) – 5,000 to 2,000 BC

Previous investigators (e.g., Warren 1984) defined the Pinto Period as a response to Mid-Holocene climatic warming and desiccation in the Great Basin, including the Mojave Desert. In this scenario, the Pinto Period began after the Lake Mojave Period at about 5,000 B.C., corresponding roughly with the Holocene Maximum warming trend. At first, groups of hunter-gatherers adapted to the drying, warming conditions, possibly by abandoning the desert floor and occupying the higher, wetter margins for a thousand years or more. As the climate cooled again, the desert was repopulated as springs, streams, and shallow lakes reappeared (Warren 1984). Information gathered during the past two decades suggests that the Pinto Period began during the early Holocene and overlapped the Lake Mojave Period. Recently obtained radiocarbon dates from Pinto Basin, Little Lake, Fort Irwin, and Twentynine Palms indicate ages of at least 9,000 years for some Pinto sites (Sutton et al. 2007). Although there is still some debate about the inception of the Pinto complex, it is clear that it is probably older than had been previously thought.

Pinto artifact assemblages have less diversity of lithic materials than their Lake Mojave predecessors, suggesting a reduced range. At the same time, the presence of *Olivella* shell beads suggests that there was trade with coastal groups. Ground stone milling tools are much more prevalent than in Lake Mojave assemblages, indicating that extensive plant food processing began at the end of the early Holocene, before the beginning of the dry, warm conditions that affected the desert floor during the middle Holocene (Sutton et al. 2007).

Gypsum Period (2,000 BC to A.D. 500)

Near the end of the middle Holocene, harsh climatic conditions associated with the Holocene Maximum warming trend (also known as the Altithermal) may have resulted in very low population densities, and even temporary abandonment, of large expanses of the Mojave Desert. Very few sites have been dated to a time span between about 3,000 and 2,000 B.C. that separates the Pinto and Gypsum complexes. The appearance of corner-notched (Elko), concave-base (Humboldt), and contracting-stemmed (Gypsum) projectile points in late Holocene sites of the western and northern Mojave signals the beginning of the Gypsum Period, as temperatures began to ameliorate during the First Neoglacial episode at the beginning of the late Holocene (Warren 1984; Sutton et al. 2007).

In addition to the characteristic projectile point types, Gypsum assemblages include leaf-shaped points, stone knives, flake scrapers, T-shaped drills, choppers, hammer stones, shaft smoothers, ornamental items, split-twig animal figures, and paint. Some of these items, along with the presence of rock art, suggest ritual activities. Manos, metates, mortars, and pestles are found also (Warren 1984; Sutton et al. 2007). Gypsum sites are generally smaller and more numerous than earlier components, and are spread over a wider variety of environments. Socio-economic contact with the California coast is indicated by the presence of shell beads. Gypsum Period sites show evidence of exploitation of split-hoofed animals, rabbits, hares, and rodents, as well as hard seeds and mesquite. Better technology and somewhat more complex social organization (compared to the previous Pinto population) probably helped peoples of the Gypsum complex adapt to the warming and drying conditions that began again after about 2,000 years ago A more successful adaptation to the warm dry conditions is indicated because another population hiatus did not occur in the Mojave Desert during this period (Warren 1984; Sutton et al. 2007). By around 1,000 B.C., the Northern Uto-Aztecan peoples who had probably come from northern Mexico around the end of the Pinto Period had separated into Tubatulabalic, Hopic, Numic, and Takic language groups (Sutton et al. 2007).

Saratoga Spring or Rose Spring Period (Late Holocene) – A.D. 500 to 1200

Although the climate was warmer at the beginning of the Saratoga Spring Period than it had been during the First Neoglacial episode, conditions were sufficiently mesic to support springs and streams in the Mojave Desert, and possibly even shallow perennial lake stands at some of the desert playas (Sutton et al. 2007). Archaeological data suggest a significant increase in population, especially in the western Mojave. Projectile points indicate that the bow and arrow were introduced to the Mojave Desert during the Saratoga Spring Period. While they probably do not indicate a major cultural change in the region (Warren 1984), they were a technological advance that may have improved hunting efficiency and increased the carrying capacity of the land, resulting in a rise in population (Sutton et al. 2007).

Saratoga Spring sites in the southern Mojave Desert reflect the influence of Hakataya culture from the lower Colorado River by the inclusion of buffware and brownware pottery sherds and Desert Side-Notched and Cottonwood points. Hakataya intrusion or influence probably extended as far north and west as the east side of Antelope Valley (Warren 1984). Anasazi pottery and turquoise mining sites indicate the presence and influence of Pueblo peoples in the eastern Mojave during the Saratoga Spring Period (Warren 1984). In the western Mojave, particularly Antelope Valley, the effects of Hakataya and Anasazi contact or intrusion appear to have been minimal. Large village sites with cemeteries and well-developed middens, indicating long-term occupations, have been documented there. Among the artifacts found in Saratoga Spring sites of the Antelope Valley are steatite items and large numbers of shell beads, probably indicating trade with coastal groups (Warren 1984; Sutton et al. 2007).

The rise in temperature and return to xeric conditions and occasional severe droughts associated with the Medieval Climatic Anomaly affected roughly the second half of the Saratoga Spring Period, beginning around A.D. 700. Deteriorating climatic conditions in the Mojave Desert led to a population decline, and may have been partially responsible for bringing the Saratoga Spring complex to an end around A.D. 1100 (Sutton et al. 2007).

Late Prehistoric Period (Late Holocene) – A.D. 1200 to Contact (ca. 1770)

The several tribes occupying the Mojave Desert at the time of contact with Europeans are believed to have had their genesis in the separate cultural complexes that developed during the Late Prehistoric Period (Warren 1984; Sutton et al. 2007). Toward the end of the Medieval Climatic Anomaly, the population of the Mojave continued a decline that had begun during the Saratoga Spring Period. Hakataya and Anasazi cultural influences remained in the southern and eastern parts of the region, respectively. By around A.D. 1000, the Numic speakers of the western Mojave Desert had differentiated into distinct language groups, one of which was the Southern Paiute, which spread eastward and occupied an area north of the Mojave River. The Chemehuevi branch of the Southern Paiute later moved south along the west side of the Colorado River as far as the Chuckwalla Valley. The Shoshone, moved into territory even farther north. South of the Mojave River, and in much of southern California, Takic-speaking groups were predominant (Sutton et al. 2007).

Late Prehistoric sites are abundant in the Mojave Desert, and range include lithic scatters, temporary campsites, and large villages with middens and cemeteries. Artifacts include Desert series projectile points, ground stone milling tools, shell beads, incised stones and pendants, and brownware and buffware ceramics. Obsidian was not used as frequently as during earlier periods. Faunal remains at archaeological sites indicate that deer, rabbits, hares, rodents, and reptiles were eaten, along with a wide variety of vegetal foods, indicated by ground stone grinding implements (Sutton et al. 2007). Trade, especially along the Mojave River and in the Antelope Valley, appears to have enabled the transport of resources over long distances, possibly mitigating against shortages and making a more sedentary, village-oriented existence possible during the Late Prehistoric Period (Warren 1984).

3.2 Ethnohistory

Ethnographic accounts indicate that the project area was used by two groups, the Kitanemuk and the Kawaiisu.

Kitanemuk

The Kitanemuk occupied the Tehachapi mountains and the northwestern areas of the Antelope Valley and maintained a cultural and linguistic continuity with the Serrano to the south and the Vanyume to the east in the area of the upper Mojave River (Earle 1990, 1997; Earle et al. 1997).

The Kitanemuk were mostly mountain dwellers who moved into the arid valley floors in the cooler seasons. They seem to have had good trade and ritual relations with their neighbors, the Chumash and Tubatulabal, and possibly the Kawaiisu (Blackburn and Bean 1978). The common mortuary practice for the Kitanemuk was to bury their dead in cemeteries. The body was doubled up, tied, and then wrapped in a mat with valuables. If the deceased was a chief, a pole was brought from the mountains and painted before being placed at the head of the grave (Blackburn and Bean 1978). Decayed red-colored wood has been found in association with some Kitanemuk burials.

The Kitanemuk were moved to the missions of San Fernando, San Gabriel, and San Buenaventura during the Mission Period (1769 to 1834). In the 1850s, some Kitanemuk settled at Fort Tejon and were later moved onto the Tule Reservation. Harrington's (1917) Kitanemuk informants resided at Tejon Ranch in 1917 and some Kitanemuk descendants are said to still reside on the Tule River Reservation (Blackburn and Bean 1978).

Kawaiisu

The Kawaiisu occupied the Piute Mountains at the southern end of the Sierra Nevada Range and the northern part of the Tehachapi Mountains (Zigmond 1986). The Kawaiisu spoke a language belonging to the Numic branch of the Uto-Aztecan language family while their neighbors to the south, the Kitanemuk and, closer to the coast, the Tatavium and the Gabrielino, spoke languages belonging to the Takic branch of the Uto-Aztecan language family. Takic speaking groups moved into coastal southern California from the Great Basin probably around 3,000 years ago (Moratto 1984:560), while Numic groups that later became the Kawaiisu appear to have arrived in the northeastern Kern County area from the Great Basin more recently, possibly around A.D. 1,000 to 1,200 (Macko et al. 1993:12).

The Kawaiisu had winter villages in Cache Creek Canyon northeast of the modern town of Tehachapi. In summer and fall, some of these people moved to higher elevations (above 4,000 feet) and occupied temporary camps while collecting acorns and pinyon nuts (Macko et al. 1993:36). Acorns were processed in bedrock mortars using a pestle, although portable mortars were also used. The Kawaiisu also made trips into the Mojave Desert to the east and northeast, including the southern Panamint Valleyand southern Death Valley, as well as southeast to Rogers Lake and the Mojave River near present-day Barstow. During trips to higher-elevation desert areas in the spring, antelope and bighorn sheep were taken by driving them into "surrounds" (Zigmond 1986:398). In addition to acorns and pinyon nuts, the Kawaiisu exploited a wide array of plant foods, including grass and chia seeds, berries, and roots. Baskets were used to transport and store plant foods. Deer was the preferred animal food and was hunted with bow and arrow. Smaller animals, such as rabbits and rodents, were often caught using traps and snares (Zigmond 1986:400).

In the winter, people occupied circular houses made of a willow pole framework and covered with brush and mats made of bark and tule reeds. In the summer, open flat roofed shade houses were used. Other structures included sweathouses, circular brush enclosures (windbreaks), and small granaries (Zigmond 1986:401).

Archaeologically, the Numic speakers, such as the Kawaiisu, have been associated with the appearance of Desert Side Notched arrow points and Owens Valley Brown Ware ceramics

(Macko et al. 1993:16). These first appear in the northern Tehachapis about 1,000 BP and indicate the beginning of the Late Prehistoric Period. The preceding Rose Spring or Saratoga Springs period (circa 1,500 to 1,000 BP) is indicated by the presence of Rose Spring points (small corner-notched expanding-stem points) and Cottonwood Triangular arrow points.

3.3 History

The Project area is located within the Antelope Valley of the western Mojave Desert. It lies in an area that has remained rural to the present day. The closest important population center is the City of Lancaster, the northeastern outskirts of which lie 11 miles (17.71 kilometers) to the south of the Project area. Contributing factors to the development of this region included the construction of railroads, Homestead and Desert Land Acts claims, development of agriculture and ranching and associated irrigation, mining, and governmental pursuit of national defense and aerospace interests (Earle et al. 1997). The histories of the Antelope Valley and Lancaster are discussed in detail below.

During the 1770s, the Spanish explored the desert and foothills that make up the Antelope Valley (Earle et al. 1997). By 1828, Mexican traders and American trappers led by Jedediah Smith had established two routes that led from the desert to the coast: the Old Spanish Trail near the Cajon Pass, and the Owens Valley Road through the Tehachapi Pass. Kit Carson, one of the trappers on Smith's 1828 expedition, was the guide for John C. Frémont's exploration party in 1844 that crossed over the Old Spanish Trail to reach the Antelope Valley floor (Goetzmann 1979). Later, Frémont provided the first published description of the flora, geography, and geology of the area (Thompson 1929).

Several years later, the federal government funded surveys to explore proposed alternative routes for the transcontinental railroad (Goetzmann 1979). Two of these railroad survey parties passed through the central Antelope Valley in the 1850s. Between 1861 and 1876, the Antelope Valley was used as an access corridor between Los Angeles and several mining districts in the Coso, Panamint, and Argus Mountains, and in Death Valley (Earle et al. 1997; Miller and Miller 1976; Clark and Clark 1978).

In 1876, the Southern Pacific Railroad constructed a north-south railroad line through the Antelope Valley as part of its main line connecting San Francisco and Los Angeles. The line south from Fresno had been completed through Bakersfield to Tehachapi by 1875. In 1876 the line was completed from Tehachapi through Mojave and south across the Antelope Valley. The line was then built through Soledad Canyon to connect at the community of Lang with existing track that had been built north from Los Angeles. The connection at Lang was made in September 1876 and the first Southern Pacific train arrived in Los Angeles from San Francisco soon thereafter. Lancaster began as a stop on the Southern Pacific line in the Antelope Valley and the railroad built the first houses there for its workers (Robertson 1998; Settle 1967a, 1983).

The Southern Pacific Railroad built a line from Mojave through Waterman Junction (Barstow), Amboy, and Cadiz to Needles in 1883 in order to forestall the entry of the Atchison, Topeka, & Santa Fe (AT&SF) Railroad into California. The AT&SF (dba Atlantic & Pacific Railroad) had just completed its transcontinental route across New Mexico and Arizona to Needles and had also reached the port of Guaymas, Mexico, from where it would ship freight to San Francisco via steamer, bypassing the Southern Pacific lines in California (Bryant 1974). Because of the threat from the AT&SF in Guaymas, the Southern Pacific sold the Mojave to Needles line to the AT&SF in 1884, assuming that the AT&SF would transfer its freight for San Francisco and Los Angeles to the Southern Pacific in Mojave. However, the AT&SF completed their own route to Los Angeles via Barstow and San Bernardino in 1887 (Bryant 1974). The AT&SF leased access on the Southern Pacific track from Mojave to Bakersfield in 1899 and purchased the San Francisco and San Joaquin Valley Railway's route from Bakersfield to Point Richmond on San Francisco Bay in 1901 (Robertson 1998). In summary, the AT&SF had the railroad route from Needles (where it connected with the AT&SF transcontinental route to Kansas City) to Mojave by 1884. The AT&SF completed their route from Mojave to San Francisco Bay in 1901.

The town of Mojave developed as a stop on the Southern Pacific Railroad beginning in 1876. The Southern Pacific named the place Mojave because it was at the western end of the Mojave Desert (Gudde 1969:206). Further development occurred when Mojave became a junction point for several railroad lines. The AT&SF arrived in 1884 and in 1910 the Southern Pacific built a line north from Mojave to Olancha and Owenyo where it connected with the Nevada & California Railroad which came south from Fernley, Nevada (Robertson 1998). Later in the twentieth century Mojave became a highway junction point at the intersection of SR 14 and SR 58.

In the 1880s, colonization companies and local boosters spurred a variety of groups to establish colonies in the Antelope Valley. These groups included Quakers, German Lutherans, Scots, English, proponents of prohibition and scientific farming, and utopian socialists. The main focus of the economy in the area was agriculture and ranching. During this time, rain was unusually plentiful and farms in the Antelope Valley produced large crops of wheat, barley, and other grains (Stickel and Weinman-Roberts 1980). Later, the establishment of six different irrigation districts allowed the cultivation of alfalfa and a variety of fruits and nuts (*Antelope Valley Ledger-Gazette* 1929a, 1930)*.* Cattle and sheep raising also became an important industry in the region (*Antelope Valley Ledger-Gazette* 1914, 1929a, 1929b; Wentworth 1948).

Following the establishment of the first artesian well in Lancaster by the Southern Pacific Railroad in 1883, Moses L. Wicks bought 60 sections there from the railroad and had a townsite laid out by surveyor J. A. Bernal in February 1884. Wicks, a native of Mississippi, had been instrumental in the founding of Pomona, California. After building a lumber yard near the intersection of Tenth Street and Antelope Avenue (today's Lancaster Boulevard and Sierra Highway), Wicks began promoting Lancaster by advertising in English newspapers (Settle 1967b). The first substantial building in town, the Lancaster House Hotel, was constructed on the corner of Tenth Street and Antelope Avenue at about this time. By 1886, settlers were pouring into the region, and Lancaster had its own newspaper, the *Antelope Valley Ledger-Gazette*, established by S. A. Drummer and a Mr. Cramer. In the summer of 1888, Wicks, who had established the mile-square townsite just five years earlier, sold the majority of Lancaster to James P. Ward for about $20.00 per acre (Settle 1967b, 1983).

Between 1880 and 1920, several extreme fluctuations occurred between wet and drought years, which had a profound impact on homesteads in the Antelope Valley, as well as settlements in the area. The colonies that had ample water supplies survived, and those that did not, failed. Many Lancaster residents left the area. Despite the droughts, however, development in the central Antelope Valley, including Lancaster, continued (Hensher 1991;

Settle 1967b; Thompson 1929). By 1890, Lancaster had its first church, built by Roman Catholics on land donated by Ward. A grammar school was built of locally manufactured bricks in 1889 and 1890. No Protestant church existed at that time, but services were held on Sundays in the schoolhouse. Lancaster's first post office was established in the early 1890s, with Miss Abbie Dunning serving as postmistress. By 1902, Lancaster had its first telephone and had organized a Chamber of Commerce (Settle 1967b, 1983).

Although recurring drought conditions made life difficult for homesteaders in the surrounding countryside, Lancaster continued to grow during the early years of the 20th century. In 1908, a junior high school was started in connection with the grammar school and, in 1912, the Antelope Valley Union High School was established. The County of Los Angeles built a library branch in Lancaster in 1913. In 1915, the high school moved to its present site on Division Street and Lancaster Boulevard. The Bank of Lancaster was founded by J. W. Jeal in 1912, and in 1913 it was joined by the Farmers' Merchant Bank, organized by George Fuller. By the fall of 1914, some of Lancaster's streets and houses were lighted by electric power. A section of Tenth Street (Lancaster Boulevard) and the portion of Antelope Avenue (Sierra Highway) passing through town were paved in 1916. The purchase of large quantities of produce by the federal government during World War I brought some prosperity to Lancaster. In spite of growth, modernization, and the establishment of institutions such as banks, schools, and churches, Lancaster retained some of the characteristics of a frontier town. In 1920, Lancaster police officer H. E. Glidden was shot to death by a bandit on Antelope Avenue. A posse quickly found the murderer and killed him (Settle 1967b, 1983).

The 1920s saw a second building boom in Lancaster. In 1921, the Mint Canyon Highway, a paved road, was completed to Los Angeles. This reduced the distance and travel time between the city and the desert town, bringing about more automobile traffic. More importantly, the highway made it possible to truck shipments of alfalfa and grain to the markets in Los Angeles. The Antelope Valley Hospital was opened in 1922, and a county-owned building was constructed in 1923 to contain the courthouse and library. In 1929, Antelope Valley Junior College was established, with classes held at the high school. From a couple of miles of pavement on Tenth Street and Antelope Avenue in 1916, Lancaster increased its modernized roads to over 95 miles of pavement by 1930. That year, the population of the town was 1,550 (Settle 1967b, 1983).

In the 1930s, fluctuations in the amount of rainfall were compounded by an unprecedented worldwide economic depression (Ellis 1971; Hensher 1991; Hine 1953; Malone and Etulain 1989). As a result, the number of new land entries on the public domain dramatically decreased and many people were forced to leave existing homesteads when they could not afford to pay the property taxes or were unable to make the required improvements. Other, better-established settlers, however, were able to use this time to expand their personal holdings (Kern County 1948, 1958). In 1935 the federal government stopped making federal public land available for transfer to private ownership through sale or homesteading (except for mining claims and certain small tracts) (Robinson 1948:175). In spite of periodic drought and the Great Depression, farming, predominantly alfalfa production, remained the main economic enterprise of the Lancaster area and Antelope Valley as a whole. In 1932, the Fernando Milling and Supply Company established a large alfalfa mill in town, providing employment for many residents. Telephone, electric, and gas utilities, as well as the railroad, continued to employ many people in Lancaster. Construction began on the Antelope Valley Fairgrounds in 1938, and the first fair took place in 1941 (Settle 1983).

During World War II, the growth of Army Air Base, Muroc Lake (present-day Edwards Air Force Base [AFB]) contributed to the economic growth of Lancaster. Many young men from the Lancaster area served in the armed forces. A USO recreation building for military personnel was constructed in Jane Reynolds Park in Lancaster by the federal government. Following the war, growth continued steadily. Television came to the town in 1948, and radio station KAVL began broadcasting in 1950. A plan for the Antelope Valley Freeway was approved in 1958. In 1961, the new Antelope Valley College held its first classes (Settle 1983).

Between 1950 and 1960, the population of Lancaster increased from 3,600 to more than 29,000 largely in response to the growth and expansion of Edwards AFB. By 1970, the town had grown to nearly 41,000. Growth of the town was given a boost in 1972 when the Antelope Valley Freeway (State Route 14) was completed through Lancaster, forming a high-speed connection with the Los Angeles area. On November 22, 1977, an overwhelming majority of voters decided on incorporation, and Lancaster officially became a city, with Stan Kleiner its first mayor. The same year, NASA's first space shuttle orbiter was transported through Lancaster on its way from its assembly site in Palmdale to Edwards AFB (Settle 1983). Throughout the 1980s, 1990s, and early 21st century, the aerospace industry in Palmdale, along with the NASA and U.S. Air Force research and training facilities at Edwards AFB, have continued to be a focus of economic activity in the Lancaster area, with agriculture playing a smaller role as suburbs expand into the countryside and water is needed for a growing population. While many Lancaster residents continue to earn a living from wage work in the Antelope Valley, in recent years more and more families derive their incomes from jobs in the San Fernando Valley and Los Angeles, commuting from Lancaster every day on the Antelope Valley Freeway (State Highway 14). The population of Lancaster is currently approximately 157,000 (City of Lancaster 2012).

The rural areas outside Lancaster, including the project vicinity, were settled by individual families who purchased land from the federal government or the railroad, or obtained land through the Homestead Act or the Desert Land Act. Land in even-numbered sections within 20 miles of the Southern Pacific Railroad and all land more than 20 miles from the railroad could be purchased from the federal General Land Office using the cash entry method. The odd-numbered sections within 20 miles of the Southern Pacific Railroad route south of Tehachapi were granted by Congress in 1871 to the Southern Pacific Railroad Company to help finance railroad construction (Robinson 1948:154, 156). The railroad sold parcels within the odd-numbered sections to settlers. Land sales to settlers by the railroad probably did not occur until after 1903 in the project vicinity when the railroad received patents (federal deeds) to the land from the federal government (BLM 2012).

Most land in the project vicinity in the even-numbered sections was transferred from the federal public domain to individual settlers through the Homestead Act of 1862 and the Desert Land Act of 1877 (amended in 1891). The Homestead Act of 1862 allowed persons wanting to obtain title to public land to file a homestead claim at the local branch of the General Land Office. If the claimant built a house, lived on the land, and cultivated it for five years (reduced to three years after 1912), the federal government issued a patent or federal deed for the land to the homesteader. If the homestead claimant failed to build a house within six months or abandoned the land for more than six months, the land reverted to the government (Robinson 1948:168-

169). If the homesteader fulfilled the conditions, the federal government issued a patent (federal deed) for the land. Under the Desert Land Act, persons could claim an entire section (640 acres) by paying 25 cents per acre and irrigating it within three years. In 1891 the amount of land was reduced to 320 acres and the time to reclaim it with irrigation was extended to four years (Robinson 1948:170-171). The irrigation water was usually obtained by digging wells. After rural electrification in the early twentieth century, pumping of irrigation water from wells was facilitated by electrically-powered pumps. Upon submitting proof that the land had been irrigated, the claimant received a patent from the federal government). Note that under the Desert Land Act, it was not necessary to build a house and live on the property; it was only necessary to irrigate it.

Between 1910 and 1934, hundreds of claims were filed for land within the modern Edwards AFB boundaries. Approximately one in four of these entries resulted in a transfer of land from federal to private ownership through the issuance of a patent. Failure to make final proof was primarily due to the settlers' inability to adapt to the extreme wind, drought, flooding, and high temperatures of the western Mojave Desert. The climatic fluctuations between 1880 and 1920 were compounded in the 1930s by such events as the Dust Bowl in the Midwest and the unprecedented worldwide economic depression (Malone and Etulain 1989). As a result of these factors, the number of new land entries on the public domain decreased dramatically. Many people were forced to leave their homesteads when they could not afford to pay property taxes or were unable to make required homestead improvements. However, some well- established settlers, mostly those who had made their money before their land entries, were able to use this period to make their required improvements.

Although no new homestead or desert land entries were permitted after 1935, those homesteaders with valid entries were allowed to maintain their entries through proper improvements. Parcels of five acres or less could still be purchased from the US government until the 1950s through the Small Tracts Act. At what is now Edwards AFB, many homesteads continued to be occupied until the acquisition of land by the military in the 1940s and 1950s.

The Muroc Lake Bombing and Gunnery Range was established in 1933 around Muroc Dry Lake (now known as Rogers Dry Lake), and over the next 8 years expanded to about half of Edwards AFB's current size. The facility played a strategic role in World War II, serving as the primary installation providing long-range air patrols from the Pacific Coast and training air crews for combat. This led to further expansion of the facility and construction of permanent buildings to replace the existing tent city. When the Air Force was created as an independent service in 1948, the facility was redesignated as Muroc Air Force Base. It was renamed once more in 1949 to Edwards Air Force Base in honor of Captain Glen W. Edwards, who died in 1948 during a test of the YB-49 “Flying Wing” (Mueller 1989). During the 1940s and 1950s as Edwards AFB was established as a flight test center to test new aircraft and weaponry needed for World War II and the Cold War, the Base was expanded to its current size to allow adequate airspace for military aircraft testing and land for developing and testing propulsion systems and vehicles for space exploration. Although portions of Edwards AFB are still used as a bombing and gunnery range, the majority of activities on the Base are directed towards rocket motor testing and the development and testing of experimental jet aircraft.

4.0 METHODS

4.0 METHODS

4.1 Records Search Methods

4.1.1 EUL Solar Facility Record Search Methods

An in-house records search was conducted by Edwards AFB Cultural Resources Staff to examine site records and reports they have on file for the EUL Solar Facility Study Area. In December 2011, an electronic version of the record search results, including GIS locational data and electronic versions of all site records and survey reports, was provided to ECORP by Edwards AFB staff. This records search provided the data on previous surveys and known archaeological sites within the EUL Study Area.

4.1.2 Gen-Tie Route Record Search Methods

A cultural resources records search was conducted for the proposed Gen-Tie routes in January 2012 at the Southern San Joaquin Valley Information Center (SSJVIC), located at California State University, Bakersfield. The purpose of the records search was to determine the extent of previous cultural resources investigations within a 0.5-mile (800-meter) radius of the Gen-Tie route, and whether any archaeological sites or other historic resources exist within or near any of the proposed route options. Materials reviewed included reports of previous cultural resources investigations, archaeological site records, historical maps, and listings of resources on the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), California Points of Historical Interest (CPHI), California Landmarks, and National Historic Landmarks.

The Historic Property Data File at SSJVIC was also reviewed by ECORP Archaeologists for both the Gen-Tie Line and the EUL Solar Facility. This file was reviewed in order to identify any properties that have been listed on or determined eligible for listing on the NRHP, CRHR, CPHI, California Landmarks, and National Historic Landmarks within the EUL Solar Facility Study Area and the Gen-Tie routes.

4.2 Field Survey Methods

ECORP archaeologists conducted fieldwork in two phases. The first phase consisted of intensive pedestrian survey of a portion of the EUL Solar Facility Study Area in May and June of 2012. The second phase consisted of a reconnaissance-level survey of potential Gen-Tie routes in July of 2012. Each phase is described in detail below.

4.2.1 EUL Solar Facility Field Survey Methods

The records search indicated that 44.8 percent (2,552 acres) of the entire 5,692-acres EUL Study Area had been previously surveyed for cultural resources within the past 10 years. Surveys are considered current for a period of 10 years. Because 2,552 acres had been surveyed within 10 years, these 2,552 acres were not visited during the current project. A total of 44 percent (2,505 acres) had either not been previously surveyed, or had not been surveyed within the past 10 years. Additionally, four large NRHP-eligible sites were identified within the EUL Study Area. These sites encompassed a total of 11.2 percent (635 acres) of the Study

Area, and were included in the total area surveyed in order to assess the current condition of the four eligible sites. Thus, 3,140 acres of the 5,692-acre EUL Solar Facility Study Area were surveyed during this project.

Intensive pedestrian survey was conducted between May 8 and June 29, 2012 for the 3,140 acre portion of the EUL Solar Facility Study Area. This area was surveyed by a crew of six archaeologists using transects spaced no more than 15 meters apart. At times, the crew of six split into two crews of three people for the purpose of site recordation. When an artifact or feature was identified, it was marked with a pin flag or flagging tape. In order to determine if the artifact was an isolate or part of a site, the area immediately surrounding the artifact or feature was surveyed in linear transects separated by 5 to 10 meter intervals, depending on visibility of the surrounding environment. This reduced interval survey continued for 50 to 75 meters past the last marked artifact in all directions in order to determine the site or isolate boundary.

An archaeological site was defined as consisting of at least three associated artifacts or a single feature. Cultural resources not meeting the site criteria were recorded as isolates.

Archaeological sites and isolates were assigned a unique temporary number based on the project code and the order in which they were found (i.e. OV-001, OV-002, etc.). Sites and isolates were distinguished from one another by assigning an '-I' to the end of temporary numbers for isolates (i.e. OV-003-I, OV-007-I). Because site recordation was, at times, conducted by two crews working concurrently, blocks of temporary numbers (e.g., OV-000s, OV-100s) were used by each crew. Therefore, not all temporary numbers in one block of numbers were assigned if less than 100 resources were recorded by a given crew. In addition, some temporary numbers were eliminated at the end of the survey as some sites and/or isolated finds were combined into one site based on their proximity to each other.

As appropriate, the site boundary, loci, concentrations, and items of interest were mapped using a hand-held GPS Trimble GeoXT unit with sub-meter accuracy. Digital photographs were taken of select artifacts and features, as well as site overviews showing the general environment and the presence, if any, of human or naturally-occurring disturbances. Following fieldwork, Department of Parks and Recreation (DPR) 523 isolate and site records were prepared for each of the resources determined to be prehistoric or historic in age, and location and sketch maps were created using data collected from the handheld GPS units used in the field.

An attempt was made to locate all previously recorded sites within the 3,140 acres surveyed. ECORP archaeologists resurveyed the previously reported locations of each known resource. In order to identify the boundary for previously recorded sites, the area surrounding that site or isolate was walked in linear transects separated by 5- to 15-meter intervals, depending on site location and landscape, for 30 to 50 meters beyond the previously recorded boundary. Site constituents were then compared to the original site records. Any new changes, including man-made or naturally occurring disturbances and/or damage, were recorded. Site records were updated to note any changes since the site had been originally recorded using a DPR 523 Continuation Sheet for sites that had no changes, little change, or were not relocated. Sites that had changes to the originally recorded site boundaries were updated using DPR Primary and Archaeological Site Records.

Locations of all newly-identified and previously recorded resources within the surveyed area are provided in Appendix B, with Department of Parks and Recreations (DPR) records presented in Appendices E through G. Notes were taken on the environmental setting and disturbances within the project area. Ground visibility was good (approximately 80 percent) at the time of the field survey.

4.2.2 Gen-Tie Route Field Survey Methods

On July 3, 2012, ECORP archaeologists conducted a reconnaissance-level survey of all proposed Gen-Tie routes. All Gen-Tie routes were driven at a slow speed (approximately 25 miles per hour) and all historic period structures along the routes were identified, photographed and notes were taken on their condition. In addition, an attempt was made to relocate all previously recorded resources within the Gen-Tie route study area. Notes were taken on the condition of each previously recorded site and each site was photographed. Areas of previous disturbances from agriculture, development, or grading along the Gen-Tie Line routes were also noted. Following the reconnaissance survey, a map was generated showing areas along the proposed Gen-Tie routes that contain known resources, identified by the record search, and potentially historic age resources, identified by the reconnaissance survey.

4.3 Preliminary National Register of Historic Places (NRHP) Eligibility Evaluation Methods

Preliminary evaluations for the NRHP were conducted for all newly-identified cultural resources and all previously recorded sites that have not been previously evaluated within the surveyed portion of the EUL Study Area. Preliminary evaluations were based solely on survey-level data from the surface manifestations of the sites. Formal evaluations for the NRHP were not conducted during the current project and no subsurface testing was performed on any sites. As a result, preliminary evaluations of many of the sites determined that additional studies (e.g., test excavations, archival research) were needed to make formal NRHP evaluations. The NRHP eligibility criteria, as listed below in Table 4-1, were used in the preliminary evaluations. In addition, the overall condition and integrity of each site was assessed in regards to the site's ability to convey its historical significance.

Because the majority of the sites recorded within the surveyed portion of the EUL Study Area consist of artifact scatters of either prehistoric or historic-age materials, preliminary evaluations of the sites primarily focused on their eligibility for the NRHP under Criterion D for their data potential. Consideration was given to the sites' abilities to address established prehistoric and historic research themes in the region.

Table 4-1
Criteria for Inclusion of a Property in the NRHP

Criterion	Association	Characteristic
A	Event	Properties associated with events that have made a significant contribution to the broad patterns of U.S. history.
B	Person	Properties associated with the lives of persons significant in U.S. history.
C	Design/ Construction	Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
D	Information Potential	Properties that have yielded, or may be likely to yield, information important in prehistory or history.

Source: National Park Service 1991

4.3.1 Prehistoric Resources

In order to assess the potential NRHP eligibility of the prehistoric period sites under Criterion D based on surface manifestations only, consideration was given to the sites' potential ability to address varied research questions under the prehistoric research themes, including:

- Chronology
- Subsistence
- Settlement Organization
- Technology
- Lithic Procurement and Selection

Factors considered included density and diversity of the assemblage, presence of features, variations in lithic materials represented, the presence of tools or other temporally or functionally diagnostic materials, potential for subsurface deposits based on the geologic context of the site, the diversity of activities represented in the assemblage, and whether the site appears to represent a single occupation of limited activity or multiple episodes of occupation or a longer duration of site occupation.

4.3.2 Historic Period Resources

The preliminary evaluations of the historic period resources focused on the sites' ability to address questions related to the historic research themes, including:

- Site Chronology and Formation
- Site Patterns
- Economic Activities
- Consumption Patterns
- Technology
- Demographics

Sites reflecting occupation of the land, such as homesites and agricultural-related sites, will likely require further investigation, particularly through archival research, to assess NRHP eligibility. As a result, preliminary evaluations primarily focused on refuse deposits as those sites typically do not reflect occupation of the land where the material was deposited, and evaluations could be made based on survey-level data. Consideration was also given to whether the site appeared to represent a single episode of dumping or multiple dumping episodes over time. Several factors were considered in evaluating the refuse scatters, including the density and diversity of the assemblage and the ability of the site constituents to address the historic research themes. Specifically, consideration was given to whether the site could provide information on chronology/site formation, economic activities, consumption patterns, and the demographics of the depositors (i.e., age, gender, ethnicity).

5.0 RECORD SEARCH RESULTS

5.0 RECORD SEARCH RESULTS

It is general practice that cultural resource surveys are considered valid for a period of no more than 10 years. A conservative date of 2004 was used for the purposes of the records searches, as 2004 is ten years before the approximate construction start date, which is anticipated to be 2014. The records searches indicated that approximately 49 percent (2,778 acres) of the 5,692-acres EUL Study Area has been surveyed for cultural resources since 2004. Approximately 7 percent (2.5 miles) of the 36 miles currently under consideration for the Gen-Tie route options has been surveyed since 2004.

5.1 EUL Solar Facility Study Area

A total of 19 cultural resources investigations have been conducted within the current EUL Study Area between 1976 and 2012. Of these, 7 have been conducted since 2004, encompassing a total of 2,778 acres of the EUL Study Area. Details of all 19 investigations are presented in Table C-1 in Appendix C.

The records search results show that 245 cultural resources have been previously recorded within the 5,692-acre EUL Study Area. These consist of 165 prehistoric, 68 historic-period (i.e., sites over 50 years in age), and 12 “sub modern” sites (i.e., sites dating between 45 and 50 years old). Details of all 245 cultural resources are presented in Table C-2 in Appendix C.

The 165 prehistoric sites include 1 base camp or village, 71 lithic deposits of varying density, 10 roasting pits/hearths, and 83 temporary camps. Nine prehistoric sites have been evaluated as eligible for the NRHP including one small, light temporary camp (EAFB-374/CA-KER-1769); six large, light temporary camps (EAFB-303/CA-KER-1168, EAFB-568/CA-KER-2016, EAFB-632/CA-KER-2125/H, EAFB-1340/CA-KER-4773/H, EAFB-2402/CA-KER-4929, and EAFB-3608/CA-KER-6812); and two large, dense temporary camps (EAFB-385/CA-KER-177, EAFB 562/CA-KER-2009/H). Twenty-three of the prehistoric sites have been evaluated and determined not eligible for the NHRP, while the remaining 133 prehistoric sites have not been evaluated (see Table C-2 in Appendix C).

A total of 68 of the previously recorded resources are historic in age. These include 13 agricultural features, 12 homesites, 35 refuse deposits, and 8 roads or trail segments. Of these 68 historic-period resources, 5 are considered eligible for the NRHP. The NRHP-eligible sites include four homesites (EAFB-5/CA-KER-2481H, EAFB-17/CA-KER-2523H, EAFB-845/CA-KER-2290H and EAFB-3598/CA-KER-3803H) and one civilian refuse deposit (EAFB-3600/CA-KER-6805H). Twelve of the historic-period sites have been evaluated and determined not eligible for the NRHP, while the remaining 51 have not been evaluated. The 12 “sub-modern” resources are all refuse deposits, none of which have been evaluated for NRHP eligibility (see Table C-2 in Appendix C).

Four of the NRHP-eligible sites are substantial in size and have been completely recorded. These four sites encompass approximately 635 acres of the EUL Study Area.

5.2 Gen-Tie Line Route Records Search

A total of 63 cultural resources investigations were conducted within the current Gen-Tie route options study area between 1974 and 2010. Of these, 23 have been conducted since 2004, encompassing a total of approximately 2.5 miles of the area currently under consideration. Details of all 63 investigations are presented in Table C-3 in Appendix C.

The records search for the preliminary Gen-Tie route options show that 171 cultural resources have been previously recorded within 0.5 mile of the Gen-Tie route options study area. These included 79 isolates (40 prehistoric and 39 historic period) and 92 sites (33 prehistoric, 57 historic period, and 2 multi-component site with both prehistoric and historic-period artifacts). Details of all 171 cultural resources are presented in Table C-4 in Appendix C.

Of the 171 resources, 67 overlap, or are immediately adjacent to, the Gen-Tie route options survey area. These 67 resources consist of 16 prehistoric isolates, 20 prehistoric sites, 9 historic period isolates, 21 historic period sites, and 1 multi-component site with both prehistoric and historic-period artifacts.

The 20 prehistoric sites overlapping the Gen-Tie route options survey area consist of 19 lithic deposits and 1 temporary camp. None of these prehistoric sites have been evaluated for NRHP eligibility. The 21 historic sites consist of 13 refuse deposits, 2 railroad grades, 4 road grades, a labor camp, and the Los Angeles Aqueduct.

Of these 21 historic-period resources, the Los Angeles Aqueduct (P15-003549/CA-KER-3549H) is a contributor to a district that has been determined eligible for listing on the NRHP. The remaining 20 resources have not been evaluated. The multicomponent site consists of a historic-period homesite within the boundaries of a prehistoric temporary camp. The multi-component site has not been evaluated for the NRHP.

The NRHP-eligible ATSF Railroad grade (P15-000560/CA-KER-560H) extends adjacent to the eastern edge of several of the preliminary Gen-Tie route options. The Los Angeles Aqueduct (P15-003549/CA-KER-3549H), which is a contributor to a district that has been determined NRHP-eligible, crosses the Gen-Tie route options survey area at the western end.

6.0 RESULTS

6.0 RESULTS

6.1 Field Survey Results

As a result of the field survey, 80 newly identified archaeological sites and 123 isolated finds were recorded. In addition, 121 previously recorded sites were updated as part of the current project.

6.1.1 Newly Recorded Sites

A total of 80 new sites were discovered during the field survey. Of these, 22 are historic-period sites and 58 are prehistoric sites. Of the historic period sites, 17 are refuse deposits and 5 are possible agricultural features. Of the prehistoric sites, 49 are lithic deposits, 1 is a possible hearths/roasting pits, and 8 are temporary camps. All 80 sites are listed in Table D in Appendix D, and DPR site records are provided in Appendix E. Detailed descriptions of all 80 new sites are provided below.

OV-002. This site is sparse historic refuse deposit measuring 254 feet (north-south) by 109 feet (east-west). This site consists of three matchstick filler cans, two rotary-opened sanitary cans and one internal friction paint can. One of the matchstick filler cans measures 2 13/16 inches in diameter by 4 12/16 inches in length and the other two matchstick filler cans measure 2 14/16 inches in diameter by 4 6/16 inches in length. Based on these measurements, the three matchstick filler cans possibly date from 1917 to 1929 (Rock 1989).

OV-005. Measuring 17 meters (northeast-southwest) by 5.6 meters (northwest-southeast), the site is a prehistoric period small, light lithic deposit consisting of four chert flakes. The four flakes consist of two grey chert interior flakes, one white chert interior flake and one rose chert interior flake with inclusions.

OV-006. Measuring 59 meters (north-south) by 28.6 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of 16 artifacts. The artifacts consists of one chalcedony utilized flake tool, four tan chert interior flakes, one quartzite interior flake, one red jasper interior flake, two white chert interior flakes, one brown chert interior flake, one banded rhyolite interior flake, one andesite cortical flake, three pieces of red jasper shatter, and one piece of chert shatter.

OV-010. Measuring 36 meters (north-south) by 13 meters (east-west), the site is a prehistoric large, light lithic deposit. The lithic deposit contains one piece of brown jasper cortical shatter, one grayish white interior flake, one gray rhyolite cortical flake, and one gray chert interior flake.

OV-012. Measuring 303 feet (northwest-southeast) by 192 feet (northeast-southwest), the site is a historic period small, light refuse deposit. This site contains one ice pick-opened match stick filler can measuring 3 13/16 inches in length by 2 15/16 inches diameter, one ice pick-opened matchstick filler can measuring 3 15/16 inches in length by 2 15/16 inches in diameter, one ice pick-opened matchstick filler can measuring 4 5/16 inches in length by 2 15/16 inches in diameter, one matchstick filler can measuring 3 inches in diameter by 4 inches in length, one ice pick-opened matchstick filler can measuring 3 14/16 inches in length by 2 15/16 inches in diameter that may date to between 1917 and 1929 (Rock 1989), and one small hole-in-cap can with crimped side seam and stamped ends that measures 2 8/16 inches in length by 2 7/16 inches in diameter with a 8/16 inch cap diameter. Hole in cap cans were manufactured between 1810 and the late 1930s (Rock 1989). Additional artifacts noted include two key wind external friction coffee tins; two rotary opened sanitary cans; one ceramic bowl fragment with a white glaze, red and blue design, cross hatching on rim, and floral transfer print; and an amber glass bottle finish and shoulder. The bottle finish has gas seed inclusions, rough side seams, and a screw cap finish with segmented threading.

OV-016. Measuring 33 meters (northwest-southeast) by 20 meters (northeast-southwest), the site is a prehistoric-period large, light lithic deposit consisting of one jasper cortical flake, one mottled white chert interior flake and one rhyolite cortical flake.

OV-029. Measuring 14 meters (north-south) by 14 meters (east-west), the site is a prehistoric large, light temporary camp that contains a deflated hearth or roasting pit (Feature 1).

Feature 1 is a cluster of fire-affected rock that may represent the remains of a hearth or roasting pit. This cluster contains approximately 35 fire-affected cobbles. Material types noted include granite, basalt, and rhyolite.

In addition to the feature, this site contains one gray chert biface fragment and a small, tan/light gray chalcedony projectile point (collected).

OV-030. Measuring 69 meters (east-west) by 38 meters (north-south), the site is a prehistoric period, large, light lithic deposit of 12 artifacts. Artifacts consist of one white chert scraper tool with bifacial retouching on one edge (collected); one dark chert biface tip; one brown chert cortical flake; one rhyolite interior flake; one obsidian interior flake; one obsidian interior microflake; one brown chalcedony interior flake with a possibly utilized edge; one large green rhyolite cortical flake; one large white quartzite interior flake; two white chert interior flakes; and one tan chert interior flake.

OV-038. Measuring 15 meters (northwest-southeast) by 34 meters (northeast-southwest), this prehistoric large, light temporary camp consists of a concentration of fire-affected rock (Concentration 1), possibly from a washed out hearth or roasting pit, and a sparse lithic scatter containing two flakes and two pieces of shatter. Concentration 1 contains approximately 35 fragments of fire-affected rock of various materials and measures 7 meters in diameter. Material types noted consist of caliche, schist, and rhyolite. Outlying artifacts include one piece of white chert shatter, one rhyolite interior flake, one dark chert cortical flake and one piece of chalcedony shatter.

OV-042. Measuring 29 feet (north-south) by 23 feet (east-west), is a historic period refuse deposit consisting of glass, ceramics, a can, construction debris, and metal debris. This site contains approximately 20 colorless window glass fragments, 2 green glass fragments, 1 aqua glass fragment, 1 sun-altered amethyst glass fragment, 4 metal jar lids, 5 internal friction lids, several white stoneware ceramic fragments, 20 milled lumber fragments, approximately 20 round wire nails, 15 nuts and bolts, 4 green and red leather straps, 1 concrete block, metal straps, 1 metal spool, 1 metal bucket, 2 rubber tire scraps, metal scraps, 1 metal tool box embossed with

Milton Products Co., and 1 1-gallon can embossed with Aunt Sue's French Dry Cleaner. Modern trash was noted throughout the site.

OV-047. Measuring 79 feet (north-south) by 30 feet (east-west), this site is a historic period sparse refuse deposit containing two hole-in-cap cans and one blown-in-mold whiskey bottle with an applied finish (collected). The whiskey bottle has pronounced gas seeds and blisters and is embossed on the base with 562. Hole-in-cap cans were manufactured from 1810 to the late 1930s (Rock 1989).

OV-048. Measuring 153 feet (north-south) by 14 feet (east-west), this is a historic period fence line containing two reinforced wooden posts connected by barbed wire (Feature 1) and a colorless glass bottle base with an Anchor Hocking Glass Corporation maker's mark and embossing that reads DES. 5, 211.1 1-208.

Feature 1 is a section of fencing consisting of two reinforced milled lumber posts connected by a piece of two strand, triple wrapped, double tine barbed wire. The height of the northern post is 49 inches. The height of the southern post is 57 inches. The northern post is reinforced by two diagonal pieces of milled lumber with large steel spikes. The southern post stands without reinforcements. The distance between the posts is approximately 6 feet trending north to south.

OV-049. Measuring 103 feet (east-west) by 12 feet (north-south), the site is a historic period fence line consisting of two pressure-treated milled lumber posts (Feature 1). The posts are located approximately 90 feet apart. The western post measures 7 feet 5 inches high. The eastern post has fallen and is severely weathered. It measures 8 feet in length. No artifacts were noted at this site.

OV-050. Measuring 13 feet (north-south) by 12 feet (east-west), the site is a historic period site consisting of one standing pressure treated milled lumber post (Feature 1), two fallen and severely weathered milled lumber posts, and a strand of double tine barbed wire.

Feature 1 is a vertical, pressure treated milled lumber post. It measures 67 inches at visible height, and 8 inches in thickness and 6 ½ inches in width. Various nails protrude from the post. The east face has a cut indentation.

OV-054. Measuring 141 meters (east-west) by 33 meters (north-south), the site is a prehistoric period large, light temporary camp consisting of a sparse lithic deposit of flakes and one concentration of fire affected rock (Concentration 1).

Concentration 1 measures roughly 7 meters in diameter and contains more than 40 pieces of granite, caliche, and basalt. Many of these cobbles appear fire affected.

Outside of the concentration, but within the site boundary, archaeologists noted more than 25 rhyolite and granitic cobbles and pieces of fire-affected rock as well as a sparse lithic deposit. Additional artifacts noted include seven brown chert interior flakes, one grey/red quartzite cortical flake, one tan chert cortical flake, one brown chert cortical flake, three rhyolite interior flakes, three tan chert interior flakes, one limestone interior flake, one piece of rhyolite shatter, one dark brown chert interior flake, one brown quartzite interior flake, one piece of chalcedony shatter, one grey chert flake, one brown chert utilized interior flake, and one undifferentiated burnt bone fragment with a straight cut edge along the long axis. It is unknown if the faunal bone fragment is prehistoric in age.

OV-058. Measuring 15 meters (northwest-southeast) by 4 meters (northwest-southeast) the site is a prehistoric period small, light lithic deposit containing one limestone cortical flake, one white chert interior flake, and one rhyolite interior flake.

OV-060. Measuring 43 meters (northeast-southwest) by 14 meters (northwest-southeast), the site is a prehistoric period large, light lithic deposit containing five flakes; one brown chert interior flake, one brown chert cortical flake, one white chert interior flake, and two tan chert interior flakes.

OV-061. Measuring 34 meters (north-south) by 31 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of eight flakes: one white chert interior flake, one chalcedony interior flake, one grey chert interior flake, two brown chert interior flakes, one purple chalcedony interior flake, one tan chalcedony interior flake and one tan chert interior flake.

OV-062. Measuring 602 feet (northwest-southeast) by 314 feet (northeast-southwest), the site is a historic period refuse deposit containing eleven concentrations of various materials from historic period to modern age. There are artifacts scattered throughout the site consisting of various metal debris, glass fragments, cans, bottles, and miscellaneous artifacts.

Concentration 1 is a refuse deposit composed primarily of glass fragments. The artifacts of this concentration include more than 300 colorless glass fragments, more than 150 green glass fragments, more than 200 amber glass fragments, more than 40 fragments of colorless pane glass, more than 15 fragments of glazed ceramic white ware, more than 30 pieces of metal debris, 4 fragments of milled lumber, 15 modern colorless bottle bases, 1 complete condiment jar, and 1 rectangular sardine tin.

Concentration 2 is a concentration of glass fragments, metal debris, ties, and milled lumber. The artifacts of this concentration include more than 800 colorless glass fragments, more than 100 green glass fragments, more than 500 amber glass fragments, more than 30 aqua glass fragments, 4 milk glass fragments, 2 red glass fragments, 1 fragment of sun-altered amethyst glass dating to between 1880 and World War 1 (Lockhart 2006), and 15 cobalt blue glass fragments. Other artifacts noted include more than 100 wire nails, 4 fragments of milled lumber, more than 100 glazed ceramic white ware fragments, 1 fragment of ceramic crock ware, 4 ceramic terra cotta fragments, 12 sanitary cans, more than 10 fragments of plastic and 1 metal door knob. Diagnostic artifacts include one complete hot sauce bottle; two complete medicine bottles; two complete condiment jars; one complete perfume bottle embossed with Woodbury; one complete bottle with an Anchor Hocking maker's mark and a Hires applied-color lithograph that dates to after 1938 (Toulouse 1971); one complete lotion bottle with the bronze lithograph Charm Rose Tussy still intact, and one colorless bottle base with KARO embossed on it and an Owens-Illinois maker's mark (Toulouse 1971).

Concentration 3 contains more than 300 colorless glass fragments, 2 fragments of green glass, more than 300 amber glass fragments, 5 fragments of cobalt blue glass, 2 aqua glass fragments, 7 colorless bottle bases, 6 amber bottle bases, more than 15 ceramic fragments from bathroom appliances, 10 fragments of milled lumber, and 1 church key-opened sanitary can. Diagnostic artifacts include two bottle fragments embossed with Owens Illinois maker's marks, one of which dates to 1948 and is embossed with Duraglas; one 1950s quarter; and one amber glass bottle base with a Glass Container's Inc. maker's mark that dates to between 1935 to 1940 (Toulouse 1971).

Concentration 4 is composed of more than 200 fragments of colorless glass, more than 50 amber glass fragments, 3 fragments of sun-altered amethyst glass dating to between 1880 and World War 1 (Lockhart 2006), 15 green glass fragments, 10 fragments of milled lumber, 10 ceramic insulator fragments, 1 complete colorless condiment jar, 1 complete sprinkle top colorless condiment bottle, 1 complete green glass bottle with an Owens Illinois maker's mark and a 1940 date code, 1 complete green glass apothecary bottle with an Owens Illinois maker's mark, and 1 complete amber glass bottle with an Owens Illinois maker's mark (Toulouse 1971).

Concentration 5 is composed of more than 100 colorless glass fragments, more than 50 amber glass fragments, 2 colorless bottle bases, and 5 fragments of ceramic earthenware with a pink glaze. Diagnostic artifacts include one complete colorless bottle with grapes embossed on the shoulders and a Thatcher Manufacturing Company maker's mark that likely dates to 1950 (Toulouse 1971), one complete colorless glass bottle, one complete colorless glass condiment jar with a Glass Containers Company maker's mark, one amber glass bottle base with a Latchford Marble Glass Company maker's mark, and one colorless bottle base with an Owens Illinois maker's mark.

Concentration 6 contains more than 300 colorless glass fragments, more than 200 amber glass fragments, more than 40 green glass fragments, 3 milk glass fragments, 1 colorless glass container, 1 hinged lid tobacco tin, 1 sanitary can, 1 square can, 2 fragments of milled lumber, 4 fragments of ceramic crockery, 5 fragments of blue glazed ceramics, more than 25 fragments of green glazed ceramics, 10 fragments of orange glazed ceramics, and 6 fragments of yellow glazed ceramics. Diagnostic artifacts include two colorless jars embossed with Best Foods and an Owens Illinois maker's mark, one amber glass bottle embossed 1-WAY that may date to 1948, one glass cup base embossed with Oven Fire King Glass, one complete green glass apothecary bottle, and one colorless bottle base with Hazel Atlas Glass Company maker's mark (Toulouse 1971).

Concentration 7 is composed of more than 1,000 colorless glass fragments, more than 800 amber glass fragments, more than 100 green glass fragments, more than 30 purple glass fragments, more than 30 milk glass fragments, more than 10 cobalt blue glass fragments, more than 20 terra cotta ceramic fragments, more than 25 orange glazed ceramic fragments, more than 15 ceramic white ware fragments, and more than 15 yellow glazed ceramic fragments. Additional artifacts include three milled lumber fragments, two red brick fragments, one cone top beverage can, two matchstick filler cans, one sanitary can, one bi-metal pull tab can, one fragment of undifferentiated butchered bone, one spark plug, and one metal squeeze tube. Diagnostic artifacts include one colorless bottle base with an Owens Illinois maker's mark, two amber bottle bases embossed with 1-WAY, one complete toiletry bottle with a Glass Containers Company maker's mark, one colorless glass fragment with a Pepsi applied-color lithograph that dates from 1940 to 1950, one colorless bottle with an Owens Illinois maker's mark and a 1945 date code (Toulouse 1971), and one complete amber bottle with the embossing MLN.

Concentration 8 contains more than 200 colorless glass fragments, more than 100 amber glass fragments, 4 olive glass fragments, 2 purple glass fragments, more than 15 yellow glazed ceramic fragments, 2 green glazed ceramic fragments, 10 orange glazed ceramic fragments, 1 round nail, 5 undifferentiated butchered faunal bone fragments, 1 metal toy gun handle, 1 colorless bottle base with an Owens Illinois maker's mark and a 1948 date code, 1 complete amber glass apothecary bottle with an Owens Illinois maker's mark and a 1946 date code, 1 colorless bottle base with a Hazel Atlas maker's mark, and 1 colorless bottle base with a Latchford Marble maker's mark (Toulouse 1971).

Concentration 9 contains more than 200 colorless glass fragments, more than 30 amber glass fragments, and 1 amber bottle base with a Thatcher Manufacturing Company maker's mark.

Concentration 10 is composed of more than 100 colorless glass fragments, more than 50 amber glass bottle base fragments, more than 18 green glass fragments, 1 fragment of sun-altered amethyst glass dating to between 1880 and World War 1 (Lockhart 2006), 2 aqua glass fragments, 3 milk glass fragments, 2 green glazed ceramic fragments, 2 blue glazed ceramic fragments, and 4 fragments of milled lumber. Diagnostic artifacts include one orange glazed ceramic fragment with a Homer Laughlin 1944 maker's mark, one amber glass bottle base with a Glass Containers maker's mark, one amber bottle base with an Owens Illinois maker's mark and a 1944 date code, one light green kick up bottle base with an Owens Illinois maker's mark and a 1940 date code (Toulouse 1971), one complete colorless bottle with Anchor Hocking maker's mark, one colorless bottle base with a Hazel Atlas maker's mark, one colorless bottle base with a maker's mark of HHK, and one metal belt buckle with an embossed scene of a cowboy wrangling a steer.

Concentration 11 is composed of more than 100 colorless glass fragments, more than 50 amber glass fragments, 8 green glass fragments, 1 sun-altered amethyst glass fragment dating to between 1880 and World War 1 (Lockhart 2006), 1 milk glass fragment, 1 fragment of teal glazed earthenware, 4 fragments of milled lumber, 3 red brick fragments, 12 sanitary cans, 2 matchstick filler cans, and 1 clam shell. Diagnostic artifacts include one amber bottle base with an Owens Illinois maker's mark, a 1936 date code that is embossed with White Magic; one amber glass bottle base that has glass seed and blister inclusions; one colorless glass bottle base with a Hazel Atlas maker's mark; one colorless bottle base with a Rockway Glass maker's mark; one complete amber glass bottle with an Owens Illinois maker's mark and a 1950 date code, one light green kick up bottle base embossed with WP/William Peter, one amber bottle base with an Anchor Hocking maker's mark, and one green glass bottle base with an Owens Illinois maker's mark and a 1950 date code (Toulouse 1971).

OV-063. Measuring 66 meters (east-west) by 23 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of three white chert interior flakes, one tan chert cortical flake, four tan chert interior flakes, one brown chert cortical flake, one charred grey basalt cortical flake, and one chalcedony interior flake.

OV-070. Measuring 26 meters (north-south) by 19 meters (east-west), the site is a prehistoric period large, light lithic deposit containing one brown chert biface fragment with white inclusions, two white chert cortical flakes, five white chert interior flakes, one piece of white chert shatter, one mottled white chert interior flake, four tan chert cortical flakes, four tan chert interior flakes, one mottled tan chert interior flake, one mottled tan chert cortical flake, one piece of tan chert shatter, five tan chalcedony interior flakes, two limestone cortical flakes, one pale yellow limestone interior flake, one brown chert interior flake, two pieces of brown chert cortical shatter, one mottled grey chert cortical flake, and one rhyolite interior flake.

OV-072. Measuring 69 meters (northwest-southeast) by 32 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of four grey chert interior flakes, one brown chert cortical flake, one tan chert cortical flake, three white chert interior flakes, two tan chalcedony interior flakes, one white chert interior flake, one tan chert interior flake, and one rhyolite biface broken into two pieces.

OV-075. Measuring 599 feet (east-west) by 18 feet (north-south), the site is a historic period single feature site consisting of a historic period fence line that runs east-west for approximately 599 feet. This fence line is composed of three strands of barbed wire that are partially embedded in the ground. There are no posts associated with this fence line.

OV-083. Measuring 355 feet (east-west) by 170 feet (north-south), the site is a historic period refuse deposit consisting of eight ice pick opened matchstick filler cans, one sanitary can, and one can lid embossed with ...LEND ALWAYS PLEASE \ PRY UP TO OPEN.

OV-086. Measuring 33 meters (east-west) by 16 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of nineteen white chert interior flakes, five white chert fragments, one tan chert cortical flake, one rhyolite interior flake, one grey chert cortical flake, three tan chert interior flakes, and one brown chert interior flake.

OV-093. Measuring 67 meters (northeast-southwest) by 4 meters (northwest-southeast), the site is a prehistoric period large, light lithic deposit containing two brown chalcedony cortical flakes and two brown chalcedony interior flakes.

OV-096. Measuring 81 meters (north-south) by 34 meters (east-west), the site is a prehistoric period large, light lithic deposit containing one large red rhyolite cortical flake, one red/clear chalcedony interior flake, one white chalcedony interior flake, one white chert cortical flake, and one piece of vesicular basalt fire-affected rock.

OV-106. Measuring 37 meters (east-west) by 12.5 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of five chalcedony interior flakes, three brown chert interior flakes and two white chert interior flakes.

OV-107. Measuring 14.6 meters (north-south) by 13.5 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of one brown chalcedony shatter, one red jasper interior flake, one chalcedony cortical flake, one white chalcedony interior flake, one white chert interior flake, and one brown chalcedony cortical flake.

OV-109. Measuring 20 meters (northwest-southeast) by 9 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of three rhyolite interior flakes and one piece of chalcedony shatter.

OV-115. Measuring 210 feet (east-west) by 115 feet (north-south), the site is a sparse historic period refuse deposit containing 1 small enamelware basin, 1 .22-caliber bullet casing embossed with F, 1 .22-caliber bullet casing embossed with 5, approximately 80 amber glass bottle fragments, 15 colorless glass fragments, 1 colorless glass bottle base fragment embossed with ..INT, 1 metal machine part, 1 external friction can that has 7 holes on top of the lid, and 1 knife-opened matchstick filler can that measures 4 14/16 inches high by 3 inches in diameter. Matchstick filler cans with these measurements may date to between 1917 and 1929 (Rock 1989).

OV-121. Measuring 434 feet (north-south) by 425 feet (east-west), the site is a sparse historic period can deposit containing seven matchstick filler cans and one pocket tobacco tin. Matchstick filler cans consist of one knife-opened matchstick filler can measuring 4 7/16 inches in length by 2 15/16 inches in diameter; two matchstick filler cans measuring 4 5/16 inches long by 3 inches in diameter; one rotary-opened, crushed matchstick filler can measuring 4 6/16 inches in length; two knife-opened matchstick filler cans measuring 4 6/16 inches in length by 3 inches in diameter; and one matchstick filler can measuring 4 5/16 inches in length by 2 5/16 inches in diameter. Based on their measurements, the matchstick filler cans found in this assemblage may date to between 1915 and 1930 (Rock 1989).

OV-124. Measuring 262 meters (north-south) by 111 meters (east-west), the site is a prehistoric period, large, light temporary campsite located on the top of a large sand dune. The site contains one artifact concentration (Concentration 1), six possible hearth features located in small depressions, and an outlying artifact scatter.

Feature 1 is a small hearth feature located in the southern part of Concentration 1. This feature contains 27 granitic cobbles, several which are fire affected. This feature is located in a small sandy depression and measures 170 centimeters north-south by 240 centimeters east-west. Most of the cobbles are partially embedded in the depression and none of the cobbles appear to be ground.

Feature 2 is a small concentration of fire-affected cobbles in the southwest portion of Concentration 1. This feature is eroding from a small dune. It contains 11 granitic cobbles, 6 of which are embedded into the dune. None of the cobbles appear to have any signs of use such as a ground or pecked surface. This feature measures 210 centimeters east-west by 150 centimeters north-south. Most of the cobbles measure between 10 to 20 centimeters in size.

Feature 3 is a small deposit of cobbles, differentiated from the general surface by the presence of what appears to be a groundstone artifact. Within 3 meters of the possible groundstone artifact are approximately 50 10-centimeter sized cobbles, consisting mainly of materials types such as granite, schist and quartz. Four of these cobbles appear to be fire affected and are partially embedded in the sand. The feature also contains one interior rhyolite flake, one cortical rhyolite flake, and one piece of chalcedony shatter. The measurements of this feature are 5 meters east-west by 2 meters north-south.

Feature 4 is a deposit of approximately 20 granitic cobbles located in a sparsely vegetated, sandy depression. The feature measures 2.67 meters north-south by 3 meters east-west. Three artifacts were noted within the feature boundaries. These are one burgundy interior rhyolite flake, one peach colored interior chalcedony flake with many inclusions, and one brown chalcedony interior flake.

Feature 5 is another possible hearth feature located in a broad sandy depression. This feature consists of 35 cobbles, one of which appears to have a ground surface. The cobbles are smaller in size than the other five features and range in size from 5 to 10 centimeters. They are mainly granitic with at least one sedimentary cobble present. The cobbles are not embedded in the sandy depression, but do appear fire affected. Within the feature are one jasper interior flake and one red chalcedony interior flake. Approximately 50 historic period round metal brackets were noted on the western side of the depression. This feature measures 240 centimeters east-west by 180 centimeters north-south.

Feature 6 is a possible blown out hearth located in the eastern portion of the site. Feature six appears to be eroding out of a sand dune onto a small claypan basin. This feature consists of 23 cobbles, some of which are partially embedded. The material types of these cobbles include caliche, granite, quartz, and feldspar. Several fragments appear to be fire affected. None of the cobbles appear to have a ground surface. This hearth is greatly dispersed and measures 5.8 meters east-west by 1.5 meters north-south. One chalcedony interior flake was noted approximately three meters south of the feature.

Concentration 1 contains 1 brown chert cortical flake, 12 pieces of rhyolite shatter, 7 interior rhyolite flakes, 1 utilized rhyolite interior flake, 4 pieces of quartzite shatter, 8 interior chalcedony flakes, 1 quartzite interior flake, 1 piece of milk quartz shatter, 2 pieces of chalcedony shatter, 3 white chert interior flakes, 1 piece of jasper shatter, 3 pieces of chert shatter, 3 chalcedony cortical flakes, and 1 obsidian interior flake. Three worked artifacts were observed within Concentration. 1 These include one exhausted rhyolite core, one small granitic fire-affected mano fragment, and one small chalcedony projectile point. More than 100 fragments of fire-affected rock were noted in this concentration.

Outside of the concentration, but within the site boundary, archaeologists observed five flakes and two pieces of chert shatter. Two worked artifacts were also observed outside of the concentration. These consisted of one obsidian biface fragment, and one small-grained granite mano/hammerstone.

OV-125. Measuring 689 feet (north-south) by 29 feet (east-west), the site is a historic period fence line that contains 11 standing railroad tie posts. The fence line is oriented north-south and appears to follow the half section boundary. The northern end of this fence terminates at the top of a large sand dune.

OV-129. Measuring 93 meters (north-south) by 54 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting 16 tan chert interior flakes, 1 white and orange colored chalcedony interior flake, 2 chalcedony interior flakes with many inclusions of a different material, 4 interior quartzite flakes, 2 obsidian interior flakes, 2 pieces of white chert shatter, 5 brown chalcedony interior flakes, 1 mottled brown interior chert flake, 2 interior red rhyolite flakes, 1 red and peach banded interior rhyolite flake, 1 cortical rhyolite flake, 1 mottled gray and black interior chert flake, 1 cortical tan quartzite flake, and one piece of quartzite shatter.

OV-130. Measuring 25 meters (northwest-southeast) by 17 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of one rhyolite interior flake, one brown interior chalcedony flake, seven interior chert flakes, and one piece of rhyolite shatter.

OV-131. Measuring 70 meters (east-west) by 45 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of; one rhyolite cortical flake, four rhyolite interior flakes, one brown chalcedony interior flake, one chert interior flake, one jasper interior flake, one piece of orange chalcedony shatter, three pieces of chert shatter, and two fragments of burned caliche.

OV-134. Measuring 63 meters (east-west) by 40 meters (north-south), the site is a prehistoric period large, light lithic deposit containing one artifact concentration (Concentration 1) and 11 outlying flakes.

Concentration 1 consists of approximately 40 rhyolite interior flakes, 1 piece of brown chert shatter, 2 brown chert interior flakes, 2 rhyolite cortical flakes, 2 pieces of rhyolite shatter, 1 grey chert interior flake, and 1 tan chert interior flake. Archaeologists noted the distal end of one rhyolite biface fragment, and one pink rhyolite edge-modified flake.

Outside of the concentration, but within the site boundary are one chalcedony interior flake, one obsidian interior flake, one rhyolite cortical flake, and eight rhyolite interior flakes.

OV-135. Measuring 648 feet (northwest-southeast) by 246 feet (northeast-southwest), the site is a large, sparse historic-period refuse deposit of cans and various metal debris. Artifacts consist of one corrugated sanitary can, one peerless-opened sanitary can, two 1-gallon internal friction paint cans, two internal friction cans, two knife-opened matchstick filler cans, nine ice pick-opened matchstick filler cans, one hole-in-cap can lid, three knife-opened hole-in-cap cans that may date to between 1875 to 1903 (Rock 1989), one key wind-opened can, and several fragments of milled lumber. Archaeologists also noted two church key-opened 1-quart motor oil cans with the lithograph Outboard Motor Oil. The church key can opener was introduced in 1935 (Rock 1989).

OV-139. Measuring 109 meters (north-south) by 92 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of one chalcedony cortical flake, three pieces of chalcedony shatter, eight chalcedony interior flakes, three pieces of chert shatter, six chert interior flakes, two pieces of red vesicular basalt shatter, one chalcedony cortical flake, two obsidian interior flakes, four rhyolite interior flakes, one charred fragment of the distal end of the tibia of a small mammal, and two charred bird bone long bone fragments.

OV-140. Measuring 299 feet (north-south) by 224 feet (east-west), the site is a large sparse historic period refuse deposit consisting of 2 church key-opened flat top beverage cans, 5 rotary-opened sanitary cans, 1 sanitary can lid, 15 amber glass fragments, 1 amber glass bottle base embossed with 53 \ 15, 1 aqua glass fragment, 1 milled lumber post, and 1 porcelain vessel rim fragment with a white glaze.

OV-142. Measuring 31 meters (north-south) by 26 meters (east-west), the site is a prehistoric period large temporary camp consisting of one white chert interior flake, one obsidian interior flake, one jasper interior flake, one chalcedony interior flake, one piece of chalcedony shatter, one piece of fire-affected rock, and one piece of fire-affected groundstone.

OV-146. Measuring 250 feet (northeast-southwest) by 124 feet (northwest-southeast), the site is a sparse historic period refuse deposit consisting of one colorless glass bottle base that is embossed with an Owens Illinois maker's mark, Duraglas, and a 1952 date code (Toulouse 1971); one fragment of sun-altered glass, which dates from 1880 to World War I (Lockhart 2006); one fragment of weathered aqua glass; one aqua glass bottle fragment with a red and yellow applied color lithograph (ACL) ...YAL CRO...REG US PAT OFF. This site contains one church key-opened flat top beverage can and one porcelain fragment with a white glaze. One stainless steel metal camp spoon was collected. The handle of this spoon is engraved with LEE and a Boy Scouts emblem.

OV-150. Measuring 32 meters (north-south) by 20 meters (east-west), the site is a prehistoric period large, light lithic deposit containing four rhyolite interior flakes, one piece of rhyolite shatter, one piece of light tan rhyolite shatter, two mottled tan chert interior flakes, one grey chert interior flake, one piece of brown chert shatter, one yellow chalcedony cortical flake, one purple-grey chalcedony interior flake, one andesite cortical flake, one obsidian interior flake, and two fire-affected fragments of coarse basalt.

OV-162. Measuring 1,010 feet (northeast-southwest) by 274 feet (northwest-southeast), the site consists of two historic period, long, low earthen berms (Feature 1 and Feature 2). One .30-06 unfired round was located on the site. It measures 2 4/16 inches long by 7/16 inches in diameter. The round is headstamped with 792\MM\44 and may date to 1944.

Feature 1 is the western berm that measures 8 feet wide, 1 ½ feet tall, and runs for approximately 800 feet northeast to southwest. A row of posts with non-rusted, modern looking, chevron shaped metal tops runs parallel to the berm approximately 30 meters to the east.

Feature 2 is a parallel berm of the same description located approximately 225 feet southeast of Feature 1. Feature 2 runs northeast to southwest on the eastern side of the posts.

OV-166. Measuring 137 meters (east-west) by 79 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of one rhyolite interior flake, one tan chert cortical flake, two brown chalcedony interior flakes, one white chert interior flake, one dark brown chert cortical flake, one obsidian interior flake, three white chalcedony interior flakes, one pink chert interior flake, one piece of brown chalcedony shatter, one piece of burned caliche, and a small round circular rock that is not ground, but appears to be shaped by pecking.

OV-167. Measuring 238 feet (northwest-southeast) by 75 feet (northeast-southwest), the site is a historic period small refuse deposit consisting of a small artifact concentration (Concentration 1) and sparse outlying artifact scatter.

Concentration 1 contains an earthenware saucer with a white glaze, a semi-scalloped edge, and a maker's mark reading TST\AVONA CHINA\IIII within a triangle. Ceramic dishes with this maker's mark were manufactured by Taylor, Smith, and Taylor of Chester, West Virginia prior to 1920 (Lehner 1988). This concentration also contains one colorless glass measuring cup broken into at least three pieces embossed with 2108-S...\#1133...\PATMAR30, one colorless glass bottle base with an Illinois Glass Company maker's mark that dates to between 1915 and 1929 (Toulouse 1971), one colorless glass bottle base with a Capstan Glass Company maker's mark that dates to between 1918 and 1938 (Toulouse 1971), and one colorless glass fragment embossed with ...en's. Other items noted in this concentration include approximately 20 colorless glass fragments, 1 aqua glass fragment, 1 metal bracket, 1 metal jar lid, and 3 pieces of rubber.

Outside of the concentration, but within the site boundary, archaeologists observed three matchstick filler cans; one tall external friction spice tin; two colorless glass fragments; two aqua glass fragments; one colorless glass bottle base embossed with AirlinE\Honey\REG.; and one colorless glass bottle base with no stippling, a prominent suction scar, and the embossing ...ST\...DS, which is likely a Best Foods Jar.

OV-180. Measuring 166 feet (northwest-southeast) by 61 feet (northeast-southwest), the site is a historic period small refuse deposit and a survey marker (Feature 1). The refuse deposit consists of two church key-opened flat top beverage cans, one rotary opened sanitary can, and a crushed five gallon paint bucket that still contains some paint.

Feature 1 is a small square marker encased in concrete that measures 8 ½ inches by 8 ½ inches and is flush with the ground surface. The marker is engraved with IMPROVED 0/200. It also has a symbol that is a dot with four lines radiating out from it in the four cardinal directions. There are two wooden posts next to it measuring 3 ½ inches by 30 inches high and 1 ½ inches by 38 inches high. One of the two wooden posts is partially falling over.

OV-181. Measuring 151 feet (north-south) by 138 feet (east-west), the site is a historic period refuse deposit containing one concentration of refuse (Concentration 1).

Concentration 1 contains five matchstick filler cans that measure 2 ½ inches in length by 2 7/16 inches in diameter, one cone top beverage can, two sanitary cans, four rectangular meat tins, one pocket tobacco tin with a hinged lid, two rotary opened sanitary can lids. Glass items noted include 14 olive green glass fragments, 13 amber glass fragments, 11 colorless glass fragments, 1 olive green bottle base, 2 colorless glass bottle finishes with metal screw top caps, 2 colorless glass jar finish with screw top threads, 1 colorless glass bottle base embossed with H.J. HEINZ CO, 1 colorless fluted drinking glass base with no maker's mark, and 1 amber glass bottle base fragment with embossing. This concentration also contains melted rubber; one aluminum mason jar lid; two crown cap bottle lids; six earthenware plate fragments with white glaze, blue bond and floral transfer print; and one metal frame with spring coils.

Outside of the concentration, but within the site boundary, archaeologists observed two cone top beverage cans, two small knife punched-opened sanitary cans, two medium rotary-opened sanitary cans, one small ice pick-opened matchstick filler can, one key wind lid, one possible battery fragment, one small matchstick filler can, one spice tin, one top to a 5-gallon fuel can, and several other matchstick filler and sanitary cans.

OV-184. Measuring 136 meters (east-west) by 110 meters (north-south), the site is a prehistoric period large, light lithic deposit containing 16 white chalcedony interior flakes, 2 tan chalcedony interior flakes, 1 red chalcedony interior flake, 2 mottled orange/clear chalcedony interior flakes, 1 piece of red chalcedony shatter, 1 piece of white chalcedony shatter, 1 piece of brown chalcedony shatter, 8 tan chert interior flakes, 3 white chert interior flakes, 1 yellow chert interior flake, 1 mottled yellow chert interior flake, 3 tan chert cortical flakes, 2 butterscotch jasper interior flakes, 1 fragment of jasper shatter, 2 obsidian interior flakes, 1 rhyolite interior flake, 1 grey chert interior flake, and 1 rhyolite edge-modified flake. Two charred bird long bone fragments were noted. In addition, two artifacts were collected from the site. These include one rhyolite projectile point with a broken base, and one large butterscotch colored jasper core.

OV-186. Measuring 34 meters (north-south) by 27 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of one mottled orange/clear edge modified flake, two white chalcedony interior flakes, one mottled grey/white chalcedony interior flake, two white/orange chert interior flakes, one piece of brown chalcedony shatter, and one yellow chert interior flake.

OV-188. Measuring 27 meters (north-south) by 19 meters (east-west), the site is a prehistoric period large, light lithic deposit containing 21 rhyolite interior flakes, 2 chalcedony interior flakes, and 1 obsidian interior flake.

OV-189. Measuring 27 meters (east-west) by 10 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of one white chert cortical flake, two tan chalcedony cortical flakes, six tan chert interior flakes, one tan chert cortical flake, one tan/brown chalcedony interior flake, three white chert interior flakes, and two fragments of granitic fire-affected rock.

OV-191. Measuring 33 meters (northwest-southeast) by 11 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of one small chalcedony cortical flake, one large chert cortical flake with at least one utilized edge, and one chert core/hammerstone.

OV-192. Measuring 29 meters (north-south) by 23 meters (east-west), the site is a possible prehistoric period single feature site consisting of a dispersed hearth feature (Feature 1) and sparse lithic scatter consisting of one tan chert cortical flake; and one white interior flake.

Feature 1 is a possible dispersed hearth feature consisting of roughly a 5 meter by 5 meter area containing thirteen pink granitic cobbles ranging in size from 5 centimeters long to 20 centimeters long. Several of the cobbles appear to be fire affected and are partially to almost completely embedded in the ground surface. Nine fragments of charred bird bone, three chert flakes, and one piece of chert shatter were also noted within the Feature 1 boundary.

OV-193. Measuring 103 meters (north-south) by 85 meters (east-west), the site is a prehistoric period large, light lithic deposit. The lithic deposit consists of three tan chert interior flakes, four grey chert interior flakes, three white chert interior flakes, one brown chert interior flake, one white chert cortical flake, two tan chert cortical flakes, one grey chert cortical flake, one brown chert cortical flake, one chalcedony interior flake, one brown chalcedony interior flake, one clear chalcedony with black dendritic inclusion interior flake, one piece of chalcedony shatter, one rhyolite cortical flake, and two rhyolite interior flakes. In addition, one edge modified white chert interior flake and one fire-affected granitic cobble were noted within the site.

OV-197. Measuring 38 meters (north-south) by 33 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of are two brown chert interior flakes, two grey chert interior flakes, two white chert interior flakes, and one piece of white chert shatter.

OV-198. Measuring 76 meters (northwest-southeast) by 38 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of one pink/orange rhyolite cortical flake, one piece of chalcedony shatter, one grey chert cortical flake, one yellow chert interior flake, two pink/tan rhyolite interior flakes, one white quartzite interior flake, one white chert interior flake, and one red chalcedony interior flake. Researchers also noted one grey/white chert exhausted core.

OV-200. Measuring 114 meters (east-west) by 106 meter (north-south), the site is a prehistoric period large, light lithic deposit consisting of seven tan chert interior flakes, five jasper interior flakes, four tan chert shatter pieces, two brown chalcedony cortical secondary flakes, two purple rhyolite cortical flakes, two white chert interior flakes, one purple rhyolite interior flake, one basalt cortical primary flake, one tan chalcedony cortical flake, one brown chalcedony interior flake, one brown chert cortical flake, one piece of white chalcedony shatter, one piece of grey chert shatter, one piece of white chert shatter, one white chert cortical flake, one tan chert cortical flake, one grey chert cortical flake, and one burned caliche fragment.

OV-202. Measuring 54 meters (north-south) by 31 meters (east-west), the site is a prehistoric period large, light lithic deposit containing one rhyolite interior flake, one jasper cortical flake, one tan chert interior flake, one piece of brown chalcedony shatter, one piece of white chert shatter, and one piece of dark brown chert shatter with cortex present.

OV-204. Measuring 166 meters (north-south) by 58 meters (east-west), the site is a prehistoric period large, light lithic deposit containing one grey chert interior flake, one red/clear chalcedony interior flake, one brown chalcedony interior flake, one white chalcedony interior flake, one obsidian interior flake, five rhyolite interior flakes, one grey chert shatter piece, and one large, sandstone dome scraper (collected).

OV-207. Measuring 36 meters (east-west) by 3.5 meters (north-south), the is a prehistoric period small, light lithic deposit containing one white chert interior flake, one chalcedony interior flake, and one purple rhyolite interior flake.

OV-209. Measuring 92 meters (north-south) by 27 meters (east-west), the site is a prehistoric period large, light lithic deposit containing one jasper interior flake, one red/clear chalcedony interior flake, one rhyolite interior flake, one grey chert interior flake and six tan chert interior flakes.

OV-210. Measuring 332 meters (northwest-southeast) by 133 meters (northeast-southwest), the site is a prehistoric period, large, temporary campsite containing one lithic concentration (Concentration 1) and a deposit of artifacts over the entirety of the site.

Concentration 1 contains a total of 82 artifacts consisting of 27 tan chert interior flakes, 12 dark brown chert interior flakes, 7 tan chalcedony interior flakes, 6 white chert interior flakes, 4 grey chert interior flakes, 2 white chalcedony interior flakes, 1 rhyolite interior flake, 9 tan chert cortical flakes, 6 brown chert cortical flakes, 2 tan chalcedony cortical flakes, 2 white chert cortical flakes, 2 brown chert cortical flakes, 1 piece of brown chert shatter; and 1 piece of white chert shatter.

Outside of any concentration, and within site boundaries, archaeologists observed 92 lithic artifacts and 1 piece of ground stone. Lithic artifacts consist of 34 tan/brown chert interior flakes; 9 grey chert interior flakes; 6 rhyolite interior flakes; 4 dark brown chert interior flakes; 4 white chert interior flakes; 2 white chalcedony interior flakes; 1 olive green chert interior flake; 1 pink chalcedony interior flake; 1 grey basalt interior flake; 1 tan chalcedony interior flake; 5 tan/brown chert cortical, secondary flakes; 2 dark brown chert cortical, secondary flakes; 2 white chert, cortical secondary flakes; 1 pink chalcedony cortical, secondary flake; 1 rhyolite cortical, secondary flake; 2 dark brown chert cortical, primary flakes; 1 tan chert cortical, primary flake; 1 chalcedony cortical, primary flake; 3 pieces of tan/brown chert shatter; 3 pieces of purple rhyolite shatter; 2 pieces of brown chalcedony shatter; 1 piece of red/clear chalcedony shatter; 1 piece of grey chert shatter; 1 piece of tan quartzite shatter; 2 dark brown chert interior microflakes; 1 red jasper interior microflake, and 1 granitic mano fragment.

OV-213. Measuring 34 meters (northwest-southeast) by 6 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit containing one white chalcedony interior flake, one dark brown chalcedony interior flake and one obsidian interior flake.

OV-219. Measuring 168 meters (northwest-southeast) by 45.5 meters (northeast-southwest), the site is a prehistoric period large, light temporary camp consisting of 27 flakes, 2 of which are edge-modified. Flakes noted include 12 rhyolite interior flakes; 4 tan chert interior flakes; 2 white chert interior flakes; 1 jasper interior flake; 1 tan chalcedony interior flake; 1 white chalcedony interior flake; 1 brown chert interior flake; 1 butterscotch chert interior flake; 1 tan chert cortical, secondary flake; 1 rhyolite cortical, primary flake; 1 rhyolite edge-modified flake; and 1 jasper edge-modified flake. In addition to these lithic artifacts, archaeologists noted fire-affected rock within the site, including a small deposit of five fragments of fire-affected rock clustered within a 2 meter-square area.

OV-220. Measuring 15 meters (north-south) by 8 meters (east-west), the site is a prehistoric period small, light lithic deposit containing three tan chert interior flakes and one large piece of tan chert shatter.

OV-221. Measuring 153 meters (east-west) by 77 meters (north-south), the site is a prehistoric period, large, light lithic deposit consisting of 16 tan chert interior flakes, 9 tan chalcedony interior flakes, 7 grey chert interior flakes, 7 white chert interior flakes, 4 brown chert interior flakes, 3 white chalcedony interior flakes, 2 orange chalcedony interior flakes, 2 rhyolite interior flakes, 1 orange and white chert interior flake, 1 red chalcedony interior flake, 1 red jasper interior flake, 1 pale-yellow chert interior flake, 1 brown chert cortical flake, 1 tan chert cortical flake, 2 pale-yellow chert shatter fragments, and 2 brown chert shatter fragments. One fragment of fire-affected rock was also noted within the site boundaries.

OV-225. Measuring 61 meters (north-south) by 48 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of 41 tan chert interior flakes; 33 grey chert interior flakes; 21 brown chalcedony interior flakes; 14 brown chert interior flakes; 10 white chert interior flakes; 2 tan chalcedony interior flakes; 2 butterscotch chert interior flakes; 1 rhyolite interior flake; 1 orange chalcedony interior flake; 1 black chert interior flake; 1 red chert interior flake; 5 brown chert cortical, secondary flakes; 3 tan chert cortical, secondary flakes; 3 grey chert cortical, secondary flake; 2 chalcedony cortical, secondary flakes; 1 white chert cortical, secondary flake; 3 tan chert cortical, primary flakes; 2 brown chert cortical, primary flakes; 1 white chert cortical, primary flake; 1 brown chalcedony primary flake; 2 tan chert shatter fragments; and 1 tan chalcedony shatter fragment. In addition, archaeologists collected a tan chert projectile point.

OV-232. Measuring 51.5 meters (east-west) by 29 meters (north-south), the site is a prehistoric period sparse large, light lithic deposit consisting of one brown chalcedony interior flake; two grey chert cortical, secondary flakes; two white chalcedony interior flakes; one grey chert interior flake; three white chert interior flakes; one grey chert cortical, primary flake; one tan chalcedony interior flake; one tan chert interior microflake; and one rose chalcedony shatter fragment.

OV-233. Measuring 102 meters (east-west) by 62 meters (north-south), the site is a prehistoric period large, light temporary camp consisting of a possible hearth feature (Feature 1) and a sparse lithic deposit. The lithic deposit consists of four tan chert interior flakes, three grey chert interior flakes, one white chalcedony interior flake, one pale-yellow chert interior flake, one brown chert interior flake, one rhyolite interior flake, one white chert interior flake, one red chalcedony interior flake, one tan chert cortical flake, two tan chalcedony interior flakes, two obsidian interior flakes, and one rose chalcedony interior flake.

Feature 1 is a possible hearth feature consisting of 12 fragments of broken granitic and basaltic cobbles. This feature measures roughly 10 meters in diameter and is located in the southwestern portion of the site.

OV-235. Measuring 56 meters (north-south) by 37 meters (east-west), the site is a prehistoric period large, light temporary camp consisting of one possible hearth feature (Feature 1), and a lithic deposit consisting of two white chert interior flakes, two grey chert interior flakes, four brown chert interior flakes, one brown chert interior flake with possible edge modification, and one obsidian biface fragment.

Feature 1 is one small cobble concentration measuring 80 centimeters in diameter. This feature contains five granitic fire-affected cobbles. Two of these cobbles are partially embedded into the ground.

OV-238. Measuring 58 meters (northwest-southeast) by 21 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of one brown chert interior flake, one tan chert interior flake, three white chert interior flakes, one mottled grey/red interior flake and one pale-yellow chert interior flake fragment.

OV-240. Measuring 94 meters (north-south) by 27 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of 14 tan chert interior flakes; 8 brown chert interior flakes; 4 pale-yellow chert interior flakes; 3 grey chert interior flakes; 2 tan chalcedony interior flakes; 2 white chert interior flakes; 1 grey chalcedony interior flake; 1 white chalcedony interior flake; 1 rhyolite interior flake; 1 brown chert interior flake; 1 pale-yellow chert cortical, secondary flake; 1 white chert cortical, secondary flake; 1 brown chert cortical, primary flake; 1 piece of brown chert shatter; 1 piece of tan chert shatter; and 1 tan chert biface fragment (distal end).

OV-241. Measuring 85 meters (east-west) by 39 meters (north-south), the site is a sparse prehistoric period large, light lithic deposit consisting of 13 tan chert interior flakes; 2 tan chert cortical, primary flakes; 2 tan chert shatter fragments; 7 grey chert interior flakes; 1 grey chert cortical, secondary flake; 1 grey chert shatter fragment; 5 brown chert interior flakes; 3 white chert interior flakes; 2 pale-yellow chert interior flakes; 1 tan chalcedony interior flake; 1 tan chalcedony cortical, secondary flake; 1 brown chalcedony interior flake; 2 brown chalcedony cortical, secondary flakes; 1 pale-yellow chert cortical, secondary flake; 1 orange chalcedony interior flake; 1 white chalcedony interior flake; 1 clear chalcedony interior flake; and 1 butterscotch chert interior flake.

OV-245. Measuring 45 meters (east-west) by 14 meters (north-south), the site is a prehistoric period large, light lithic deposit consisting of one tan chert interior flake; two brown chert cortical, secondary flakes; and one chert secondary shatter fragment.

OV-246. Measuring 37 meters(northwest-southeast) by 17 meters (northeast-southwest), the site is a prehistoric period large, light lithic deposit consisting of one tan chert interior flake, one obsidian interior flake, one white chert interior flake, and one brown chalcedony interior flake.

OV-247. Measuring 272 feet (northeast-southwest) by 78 feet (northwest-southeast), the site is a historic period refuse deposit consisting of one jab lift-opened matchstick filler can that is partially crushed with a diameter of 3 14/16 inches; one ice pick-opened, crushed matchstick filler can measuring 4 4/16 inches in length and 3 14/16 inches in diameter; and one knife punch-opened matchstick filler can measuring 4 6/16 inches in length and 3 14/16 inches in diameter.

OV-248. Measuring 59 meters (north-south) by 35 meters (east-west), the site is a prehistoric period large, light lithic deposit consisting of two tan chert cortical flakes and one purple rhyolite interior flake.

OV-249. Measuring 456 feet (north-south) by 189 feet (east-west), the site is a historic period refuse deposit consisting of two artifact concentrations.

Concentration 1 consists of four fragments of amber glass, two fragments of sun-altered amethyst glass dating to between 1880 and World War 1 (Lockhart 2006), three fragments of aqua glass, one sun-altered amethyst glass cork stop bottle finish with no mold seams dating to between 1880 and World War 1 (Lockhart 2006), one amber glass bottle base with no stippling that is embossed with 28H, one internal friction can, one small hole-in-cap can measuring 2 6/16 inches in diameter by 2 8/16 inches in height, one crushed hole-in-cap can, two jab lift-opened round meat tins, and one jab lift-opened sanitary can.

Concentration 2 contains eight sanitary cans, four small hole-in-cap cans, two large hole-in-cap cans, two miscellaneous can fragments, one key wind can, one round meat tin, one colorless glass fragment, one triangular piece of metal, and one lid from a rectangular fuel can.

6.1.2 Previously Recorded Archaeological Sites

A total of 245 previously recorded archaeological sites fall within the EUL Study Area (see Table C-2 in Appendix C). Of these, 68 are historic period sites, 165 are prehistoric sites, and 12 are sub-modern sites. Of these resources, 121 were visited during the current field investigation, and their condition was assessed and updated. Of these 121 visited resources, 37 were historic period sites and 84 were prehistoric sites. The 37 historic period sites consist of 3 isolated wells, 8 homesites, 18 refuse deposits, and 8 roads or trails. The 84 prehistoric sites consist of 39 lithic deposits, 1 milling station, 4 roasting pits or hearths, and 40 temporary camps. All 121 updated resources are listed in Table D-2 within appendix D and DPR site records are provided in Appendix F. Detailed descriptions of each site, including recent updates, are provided below.

EAFB-9 (CA-KER-2125H). This site was originally by R.H. Norwood in 1988 and was described as a homesite consisting of a small adobe structure, adobe berm, collapsed well, metal water tank, and a small amount of corrugated tin and refuse (Norwood and Wessell 1988a). The site was revisited on July 3, 2005 by JT3/CH2M HILL archaeologists Erica Maier and Matthew Basham. Maier and Basham were able to relocate site features and noted no new disturbances in the area (Maier and Basham 2005). The site has not been previously evaluated for eligibility for National Register of Historic Places (NRHP).

ECORP archaeologists visited the site in May of 2012. ECORP archaeologists were able to relocate the refuse deposit (Concentration 1) and three out of the four features noted in the 1988 record. ECORP archaeologists were unable to relocate the small adobe structure (Feature 1) but did relocate the possible collapsed well (Feature 2), which was more of a large basin with an attached spoils pile, and the metal water tank (Feature 3). In addition, ECORP added Feature 4, a concrete wall, which was drawn on the 1988 sketch map, but was not described. Concentration 1 is an associated refuse deposit described in the original record as a light trash scatter, sheet tin, cans, glass, wire and miscellaneous metal fragments (Norwood and Wessell 1988). When ECORP archaeologists visited the site, Concentration 1 contained numerous pieces of milled lumber; broken stoneware vessels; glass fragments, including an aqua glass insulator fragment; nails; bullet shell casings; broken crockery-ware; earthenware; and wire. The sketch map was updated to include Feature 4 and to map the location of the refuse concentration.

EAFB-10/ P-15-002735 (CA-KER-2735/H). This site was originally recorded by R. H. Norwood in 1990 as a complex homesite containing multiple foundations, wells, animal pens, structural debris, tamarisk trees, and refuse deposits (Norwood 1990). The site was subsequently visited in both 1994 and 1996 by archaeologists from Computer Sciences Corporation. They provided more detailed descriptions of site features and added an additional locus consisting of one concentration of historic period refuse and a deposit of historic period artifacts (Boyer and Ronning 1994a; Greene and Lillard 1996). According to GIS data provided by Edwards Air Force Base (AFB), this site has been recommended as not eligible for the NRHP.

In 2010, CA-KER-2735 was visited by archaeologists from ECORP Consulting, Inc. ECORP archaeologists recorded a total of 15 features including 1 residential foundation (Feature 1), 4 ancillary foundations (Features 2, 3, 4, and 5), 6 water troughs (Features 6, 7, 8, 13, 14, and 15), 1 cistern (Feature 10), 2 large concrete columns (Feature 9), the remains of a well and pump mount (Feature 11), and 2 concrete supports (Feature 12). In addition, they noted three artifact concentrations of historic period domestic expendables (Concentrations 1, 2, and 3), and nine possible privy pit depressions (Pits 1-9). A total of three 1-meter by 1-meter test units (TUs 1-3) and three 5-meter by 5-meter surface scrape units (SSUs 1-3) were employed to investigate and gather data from Site EAFB-10. TU-1 and TU-2 were excavated within and adjacent to a residential foundation (Feature 1); TU-3 was excavated within one of nine possible privy depressions. SSU-1 was employed at Concentration 2, SSU-2 was placed at Concentration 3, and SSU-3 was scraped at Concentration 1. All features, concentrations, and testing results were recorded in detail in the site record (Smallwood et al. 2010).

As part of the Edwards AFB, Oro Verde Solar Project, the site was revisited on May 24, 2012 by ECORP archaeologists. During this investigation, ECORP archaeologists found that all site constituents, locational, and environmental data remains consistent with the previous 2010 site record. They also noted extensive evidence of modern dumping and target shooting throughout the area.

EAFB-16/ P-15-002530 (CA-KER-2530H). The site was originally recorded in 1980 by Greenwood and Associates during a helicopter survey. The site was revisited in 1989 by R. H. Norwood and was described as homesite ruins with foundations, remains of outbuildings, agricultural features, a stone BBQ, wells, Tamarisk windbreaks, and associated trash and debris. The site was revisited in 1996 by Computer Sciences Corporation during a project to conduct a sample survey of Bissell Basin and they found the site to be consistent with the previous site record. During this visit, the Computer Sciences Corporation crew identified two loci of historic period household, agricultural, and construction refuse (Locus 1 and Locus 2) (Onzol 1996a). Earth Tech visited the site in 2001 as part of a homestead well closure program and completed a site sketch map at that time (Bark 2001a and 2001b). EAFB 16 was tested in May 2003 by Jones & Stokes. Testing included examination of feature depth with a metal probe and excavation of two test units in Feature 1. The site was mapped to scale during this Phase II effort, and 11 features were assigned feature numbers and recorded in detail. Feature 1 is a foundation and cellar. Feature 2 is a concrete well. Feature 3 is a garage foundation pad. Feature 4 is a fragmented concrete wall foundation. Feature 5 is a pair of pits north of Feature 1. Feature 6 is a board form concrete wall foundation with a pad foundation poured over ½ of it. Features 7 and 9 are wells that could not be located and have possibly been removed. Feature 8 is a scatter of lumber, charcoal, bedsprings, barbed wire, and sanitary cans. Feature 10 is a growth of cane. Feature 11 is a stone and mortar barbecue (Ashkar 2003). According to GIS data provided by Edwards AFB, this site has been recommended as not eligible for the NRHP.

ECORP Archaeologists visited the site on May 22, 2012 as part of the Edwards Edwards AFB, Oro Verde Solar Project. During this intensive survey, two additional features (Feature 12 and Feature 13) and one additional locus (Locus 3) were recorded. Feature 12 consists of eight fence posts located on the north-northeast boundary of the homesite portion of the site. Feature 13 is a fence line that consists of three posts joined by wood posts, barbed wire, and rabbit wire. Locus 3 is a concentration of historic period refuse consisting of cans, glass, ceramics, construction debris, and miscellaneous household items. Features 1-11, and Loci 1 and 2 were found to be consistent with the previous site record.

EAFB-17/ P-15-002523 (CA-KER-2523H). EAFB-17 was initially recorded by R.H. Norwood in 1989 and later revisited as part of a survey program by Computer Sciences Corporation (Onzol 1996b). The site was previously reported to be historic period homesite ruins with a rock-walled main house ruin, foundation slabs for outbuildings, trees and stumps, a well, fence lines, field delineations, and refuse (Norwood 1989b). A resurvey of the site area in 1996 resulted in the identification of two loci situated a short distance to the north of the homesite ruins. These two loci were designated as Locus A and Locus B. Both loci were composed of household refuse, consisting primarily of cans and glass fragments (Onzol 1996b). On January 12-14, 2010, archaeologists from ECORP Consulting, Inc. revisited the site as part of a testing project. During this project, the site boundaries remained as previously recorded and one additional foundation was identified and recorded within the established site boundaries. ECORP archaeologists identified a total of 11 features and 4 refuse concentrations. Seven test units were excavated as well as five surface scrape units. Features consisted of a filled well marked with a metal post (Feature 1), a concrete slab-type foundation (Feature 2), a newly identified perimeter-type foundation (Feature 3), a melted adobe wall (Feature 4), concrete slabs for ancillary structures (Features 5 and 6), floating slab and perimeter foundations (Features 7, 8, and 11), a slab foundation (Feature 9), and a newly identified rectilinear shape of melted clay (Feature 10). A total of seven test units (TUs 1-7) and two 5 by 5-meter surface scrapes (SSUs 1 and 2) were employed to investigate and gather data from Site EAFB-17. All features, concentrations, and testing results were recorded in detail in the site record. No artifacts were collected from Site EAFB-17 during the 2010 study (Sharp 2010a). According to GIS data provided by Edwards AFB, this site has been recommended as not eligible for the NRHP.

ECORP archaeologists revisited the site on May 23, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP personnel noted that the site contents and conditions are generally consistent with the previous records. A small, sparse historic period refuse deposit was noted just east of the previous boundary. Artifacts in this deposit include one piece of barbed wire, one piece of sheet metal, one rotary-opened sanitary can, four matchstick filler cans, one external friction key-wind coffee can, and one large 1-gallon can with holes for a handle and stamped ends. Given the paucity and sporadic nature of the additional artifacts, the site boundary was not altered during the current investigation.

EAFB-23 (CA-KER-1709H). This historic period site was originally recorded in 1980 by Greenwood and Associates as part of the Edwards Air Force Base 1980 Overview and Management Plan. The site was described as a homesite ruin, most likely a domestic home and sheep ranch, and was found to contain seven loci (McIntyre et al. 1980b). The site was revisited by McIntyre et al. in 1993. The team updated the description of the site and took a detailed inventory of historic artifacts found within the site boundaries. Seven loci designations were assigned at this time. Locus A is a cement slab with finished cement floor, a deposit of asbestos tile, and a concentration of volcanic rock. Locus B is a cement barn foundation and possible sheep dip area. Locus C is a well. Locus D is a sheep chute. Locus E is a corral. Locus F is reservoir. Locus G is a trash dump. (McIntyre et al. 1993). In June of 1998, the site was visited by Chris Shaver of Earth Tech, Inc. as part of a well closure program. The site was found to be consistent with the previous site record (Shaver 1998). The site was visited by Richard G. Bark and Apasara Nicol-Bark in March 2007 as part of the EAFB Site Protection Program. At this time, only the features nearest to the roads were examined. No new disturbances were noted (Bark and Nicol-Bark 2007). According to GIS data provided by Edwards AFB, this site has been recommended as not eligible for the NRHP.

ECORP archaeologists tested the site on June 17, 2009 as part of the Edwards Air Force Base Damages V Phase II testing project. All seven loci were relocated and reexamined. All loci were in good condition and little change was noted. One 1-meter by 1-meter test unit (TU I) was placed in Locus A near the northeast comer of the foundation. One additional 1-meter by 1-meter unit (TU2) was placed in Locus B on the northeast side of the walkway. All features, concentrations, and testing results were recorded in detail in the site record (Ballester et al. 2009).

ECORP archaeologists visited the site on May 29, 2012 as part of the current examination. During this visit, several artifacts were not relocated, many of the loci had indications of heavy disturbance, several modern shotgun casings and evidence of gunfire vandalism were present, and modern refuse was scattered throughout the site. All glass artifacts were broken excluding one amber glass medicine bottle, which was collected. Locus A was relocated, but found to be heavily degraded. The concentration of volcanic rocks within Locus A was not relocated. Locus B was relocated but was heavily degraded. There is indication that a feature within Locus B described as a “sheep dip” (McIntyre et al. 1980b) is actually a privy pit. Locus C, the well, was found to be consistent with the previous Shaver (1998) site record; Locus D, the sheep chute, was relocated and heavily degraded; Locus E, the corral, was not relocated; Locus F, the reservoir, was not relocated; and Locus G was relocated and remapped to reflect its larger boundaries. The site is overgrown with brush and there is a modern campfire rock ring present. ECORP archaeologists returned to the site on May 31, 2012 and relocated a prehistoric mano fragment described in the previous site record, and collected a cuff-type copper bracelet with a raised relief decoration.

EAFB-24/ P-15-011371 (CA-KER-6609H). Site CA-KER-6609H, a historic period, civilian refuse deposit/dump, was first recorded by R.H. Norwood in 1984. He describes the site as containing cans, glass, appliances and a wood burning stove that appear to date to after 1950 (Norwood 1984a). In 2001, the site was field checked by A. Gueyger and C. Havelaar. During this field check, Gueyger and Havelaar were unable to relocate the refuse dump (Gueygar and Havelaar 2001). In 2004 archaeologists from Tetra Tech, Inc. visited the site and were able to locate five cans within the site boundary (Puckett and Nicol-Bark 2004). The site was evaluated for eligibility in 2004 and it was determined that the Phase II investigation has exhausted the research potential of the site. Therefore, the site has been recommended as not eligible for the NRHP (Puckett and Spinney 2004).

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on June 7, 2012 by ECORP archaeologists. Despite an intensive search of the area, no evidence of this site was observed.

EAFB-303 (CA-KER-1168). The site was originally recorded by Toren et al. in 1980 as a small, light lithic scatter comprised of chert, chalcedony, and rhyolite flakes. In 1996, archaeologists from Computer Sciences Corporation revisited the site, expanded the previous site boundary, identified four lithic concentrations, fire-affected rock, and burned bone (Boyer et al. 1996). In 2003, Earth Tech conducted a Phase II testing program at the site. Earth Tech expanded the site boundary, identified 5 loci, excavated 23 shovel test pits, excavated 2 test units, and collected over 2,000 artifacts from the surface. All loci contents and all testing results were recorded in detail in the site record. Due to the presence of well-defined loci consisting of a variety of artifacts and features reflecting varied and long-term activity, and due to the presence of substantial subsurface deposits, the site was recommended as eligible for the NRHP (Hogan-Conrad and Holmes 2004a).

ECORP Archaeologists visited the site on June 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, all five loci of this site were relocated; however, likely due to the surface collection conducted by Earth Tech in 2003, fewer artifacts were noted within Loci 1, 3, 4, and 5. In Locus 1, ECORP archaeologists identified 35 to 45 flakes and 1 fragment aqua glass. In Locus 2, ECORP archaeologists found that the constituents and conditions of the locus are consistent with previous site description and the locus contains approximately 800 chert and chalcedony flakes and shatter fragments. In Locus 3, ECORP archaeologists found approximately 80 to 90 chalcedony, chert, and rhyolite flakes and 2 chert biface fragments. Locus 4 contains seven flakes and one granitic cobble. In Locus 5, only 16 flakes and 1 charred rabbit mandible were identified out of the more than 100 artifacts noted in the Earth Tech record.

EAFB-304 (CA-KER-1169). This site was initially recorded in 1980 as a prehistoric period, large light, lithic deposit containing 15 to 20 chert and chalcedony cortical flakes (Wessel et al. 1980a). The site has not been previously evaluated for eligibility for the NRHP.

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on May 31, 2012 by ECORP archaeologists. Despite an intensive search of the area, no evidence of this site was observed.

EAFB-306 (CA-KER-1170). Site CA-KER-1170, a prehistoric lithic deposit, was initially recorded in 1980 as a probable lithic "chipping" station containing approximately 15 white chert flakes in a sparse concentration (Wessel et al. 1980b). The site has not been previously evaluated for eligibility for the NRHP.

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on June 7, 2012 by ECORP archaeologists. Despite an intensive search of the area, the site could not be located.

EAFB-373/ P-15-001768 (CA-KER-1768). This site was initially recorded by Norwood in 1984 and was described as a prehistoric large, light temporary camp (Norwood 1984b). The site was revisited, tested, and surface collected by Earth Tech personnel in 2002. The site was described as a lithic deposit with 345 lithic artifacts, including 1 biface tip, 2 flake tools, 342 fragments, and 65 faunal remains (Bark et al. 2004a). According to GIS data provided by Edwards AFB, this site has been recommended as not eligible for the NRHP.

ECORP Archaeologists visited the site on June 4, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this visit, 60 to 70 flakes of chert, chalcedony, jasper and rhyolite were noted. All other descriptions and data remain consistent with the previous site record.

EAFB-374/ P-15-001769 (CA-KER-1769). This site was originally recorded in 1984 and was described as a small lithic deposit with approximately 20 flakes (Norwood 1984c). Earth Tech personnel investigated this site in April 2002, via a surface collection, five shovel test units (STUs) and one test unit (TU). The site was described as a large, light temporary camp composed of 194 flake fragments, 1 biface fragment, 33 faunal remains, and a probable human cranial fragment. Most of the site's contents were collected at that time. This record includes the NRHP status code indicating that the site is recommended not eligible for the NRHP; however, the record does not include a discussion on the process by which they arrived at this determination (Bark et al. 2004b).

ECORP Archaeologists visited the site on June 1, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this site visit, approximately 55 to 65 lithic flakes were relocated on the surface. One piece of heavily weathered non-diagnostic bone was found within the site. No evidence of a human cranial fragment was observed. One obsidian flake was noted approximately 40 meters outside the site, its location was recorded, and boundaries were expanded to include this additional flake.

EAFB-375/ P-15-001770 (CA-KER-1770). The site was first recorded by R.H. Norwood in 1984 and was described as a sparse lithic deposit of approximately 20 chert and rhyolite flakes (Norwood 1984d). In 2002, the site was tested by Earth Tech, Inc. During this testing project, Earth tech archaeologists identified 102 pieces of lithic debitage and 278 faunal remains. In addition, they excavated four shovel test pits and collected artifacts from the surface. This record includes the NRHP status code indicating that the site is recommended not eligible for the NRHP; however, the record does not include a discussion on the process by which they arrived at this determination (Harris et al 2002). Following this, the site was remapped by R. Bark in 2007 after noting a discrepancy between the 2002 site sketch map and location map.

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on June 1, 2012 by ECORP archaeologists. Despite an intensive search of the area, the site could not be located. The 2002 site record does not indicate the percentage of surface artifacts that were collected as part of the testing project (Harris et al 2002). Thus, it is possible that the majority of the surface artifacts were removed during the 2002 testing project.

EAFB-385/ P-15-001771 (CA-KER-1771). The site was originally recorded in 1984 by R. H. Norwood and was described as a lithic deposit with two main concentrations (Norwood 1984e). In 1996, Computer Sciences Corporation archaeologists revisited the site and described it as a large, light temporary camp with two lithic concentrations, a lithic scatter, and fire-affected rock. At this time, they noted impacts from nearby historic land use (Onzol 1996c). Earth Tech relocated the site in 2003 and classified it as a large, dense temporary camp with four distinct loci. The site was tested with surface artifact collection, as well as excavation of 24 STUs and 1 TU. Testing showed substantial subsurface deposits extending to 90 centimeters below datum. The site contains four distinct loci and an extensive artifact assemblage. The site also contained pendant fragments suggesting the site may provide insight into ceremonial, exchange, and trade questions. Due to these factors, the site was recommended as eligible for the NRHP (Hogan-Conrad and Holmes 2003a).

ECORP Archaeologists visited the site on May 30 and 31, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this visit, four loci were relocated; however, site contents were not consistent with the initial record. It is possible that Earth Tech collected many of the surface artifacts in 2003. In Locus 1 (originally recorded by Norwood as Concentration 1) ECORP archaeologists relocated 70 to 80 flakes. One chert cortical flake and one chert biface fragment with multiple inclusions were collected. In Locus 2 (originally recorded by Norwood as Concentration 2) ECORP archaeologists relocated 30 to 40 flakes, as well as multiple pin flags from the Earth Tech surface collections and excavations. In Locus 3, ECORP archaeologists located two flakes and one piece of burned caliche. Most of the artifacts from this locus were probably removed during the surface collection conducted by Earth Tech in 2003. Locus 4 is comprised of three sections (Locus 4-A, 4-B, and 4-C). Locus 4-A contains 60 to 70 flakes of chert, rhyolite, and chalcedony, with burned pieces of caliche throughout. Locus 4-B consists of only two flakes, most likely resulting from a complete surface collection by Earth Tech in 2003. Locus 4-C contains approximately 50 to 60 flakes of chert, rhyolite, and obsidian. Site boundaries were remapped and expanded to include lithic material located outside the four loci.

EAFB-395/ P-15-001772 (CA-KER-1772H). The site was originally recorded in 1984 and was described as a historic period can dump containing two major loci (Loci 1 and 2) and a third locus to the east (Locus 3). Locus 1 contains household refuse consisting of 27 cans, and 22 ceramic fragments. Locus 2 contains domestic refuse consisting of 31 cans and 1 ceramic fragment. Locus 3 contains domestic refuse consisting of three cans (Norwood and Phillips 1984a). ECORP Consulting, Inc. archaeologists visited the site in 2009 as a part of the Damage V Phase II Evaluation, and at that time were only able to relocate 5 matchstick-filler cans, (very likely Locus 3 of the Norwood and Phillips record), and remapped the site boundary. It was noted by the ECORP archaeologists in 2009 that thick ground cover may have hindered efforts to locate elements of the site (Howard and Denniston 2009). According to GIS data provided by Edwards AFB, this site has been recommended as not eligible for the NRHP.

ECORP archaeologists visited the site on June 8 and 11, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, all three of the loci described in the original Norwood and Phillips 1984 site record were relocated, containing most of the original contents.

Locus 1 contained two tobacco tins with a hinged lid, five crushed matchstick-filler cans, two sanitary cans, three crushed hole-in-cap cans, eight matchstick filler cans measuring 4 5/16 inches in tall by 3 inches in diameter, one round meat tin, one rectangular spice tin, two sanitary can lids, one rectangular external friction lid, one porcelain plate fragment with a white glaze and green floral transfer print, one earthenware teacup fragment with a white glaze and floral transfer print, four earthenware fragments with a white glaze, one wire nail and one aluminum washer. The plate fragments depicting the 1914 calendar were not relocated.

Locus 2 contained 13 matchstick filler cans, 1 round meat tin, 5 peerless opened sanitary cans, 2 rectangular hole-in-cap meat tins, 1 cigarette case, 1 small oval powder tin with external friction lid (possibly the talcum powder can described by Norwood and Phillips in the 1984 record), 1 round hole-in-cap can and 3 earthenware fragments with a white glaze.

Locus 3 contained one crushed matchstick filler can, three matchstick filler cans measuring 4 5/16 inches tall by 2 15/16 inches in diameter, a size that was manufactured between 1917 and 1929 (Simonis n.d.), one matchstick filler can cut in two possibly indicating reuse as a cup or bowl, one large matchstick filler can, measuring 4 2/16 inches in diameter, and one sanitary can.

An unpaved two track, east to west trending road runs adjacent to the southern portion of the site. The sketch map was updated to reflect current boundaries.

EAFB-422 (CA-KER-1776). The site was originally recorded by R. H. Norwood in 1984 and was described as a sparse lithic scatter containing more than 43, mainly chert, flakes (Norwood 1984f). The site has not been previously evaluated for eligibility for the NRHP.

As part of the Edwards AFB, Oro Verde Solar Project, ECORP archaeologists visited the site on June 11, 2012. The site contains a deposit of 78 lithic flakes consisting of pale yellow, gray, brown, tan, and white chert; tan chalcedony; rhyolite; black basalt; and tan quartzite and 3 pieces of brown chert shatter. An additional artifact concentration was identified in the eastern portion of the site consisting of 52 flakes and 2 pieces of shatter.

EAFB-426/ P-15-00 1777 (CA-KER-1777). The site was originally recorded in 1984 as a lithic deposit consisting of approximately 130 flakes, mostly of red rhyolite; 2 cores; and one possible Silver Lake projectile point. It was noted that approximately 100 of these flakes are located within a concentration in the southern portion of the site (Norwood 1984g). The site boundaries were expanded by Sergejev and Porter-Rodriguez in 2008 and three concentrations of fire-affected rock were found. Concentration 1 consists of approximately 5 chert flakes and approximately 25 caliche and rhyolite fire-affected rocks. Concentration 2 contains approximately 50 caliche and rhyolite fire-affected rocks. Concentration 3 contains 1 chert flake, 1 piece of chert shatter, and approximately 20 rhyolite rhyolite fire-affected rocks. Artifacts listed in the original site record were relocated (Sergejev and Porter-Rodriguez 2008a).

On May 28, 2009, ECORP archaeologists visited EAFB-426 as part of the Damages V Phase II investigation. All fire-affected rock concentrations were found, but archaeologists were only able to identify two pieces of flaked stone in the concentration originally recorded in the southern portion of the site. An additional concentration of fire-affected rock (Concentration 4) was identified. One 50 by 50-centimeter shovel test unit was placed in each of the four rhyolite fire-affected rock concentrations. All yielded negative results. The remaining site area was surface collected and point-provenienced. Thirty-two interior chert flakes, four cortical chert flakes, three pieces of chert shatter, one interior obsidian flakes, seven interior rhyolite flakes, one cortical rhyolite flake, eight chalcedony interior flake, and one chalcedony cortical flake were collected (King et al. 2009). Based upon GIS data provided by Edwards AFB, this site has been recommended as not eligible for the NRHP.

In May of 2012, ECORP archaeologists visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this visit, five additional flakes were found to the west of the 2008/2009 site boundaries. The site boundary was expanded to include these additional flakes.

EAFB-427 (CA-KER-1778). The site was originally recorded in 1984 and was described as a scatter of grey-tan mottled chert flakes (Norwood 1984h). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on June 1, 2012 as part of the current project. During this survey, a total of 45 flakes were found consisting of 15 white chert interior flakes, 20 mottled white chert interior flakes, 2 grey chert cortical, secondary flakes, 1 pale yellow chert interior flake, 7 mottled white chert secondary flakes, 1 chalcedony interior flake, 5 tan chert interior flakes, 11 brown chert interior flakes, 1 mottled white chert primary flake, 4 gray chert interior flakes, 1 tan chert secondary flake and 2 brown chert shatter pieces. The boundary was remapped to include these additional flakes.

EAFB-428/ (CA-KER-1779). This site was originally recorded by R. H. Norwood in 1984 and was described as a scatter of approximately 28 flakes of mostly chert (Norwood 1984i). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc., archaeologists revisited the site on June 4, 2012 as a part of the Edwards AFB, Oro Verde Solar Project, and observed a total of 31 flakes and 1 chert core. Flakes consist of three tan chert interior flakes, one mottled tan chert interior flake, nine white chert interior flakes, six pale yellow chert flakes, one grey chert interior flake, one tan chert cortical flake, one rhyolite cortical flake, two rhyolite interior flakes, three chalcedony interior flakes, one chalcedony cortical flake, and three quartzite interior flakes. The site was remapped and boundaries were expanded to encompass newly identified artifacts.

EAFB-429/ (CA-KER-1780). This site was originally recorded by R. H. Norwood and M. Phillips in 1984 and was described as a scatter of approximately 25 chert flakes and 1 uniface (Norwood and Phillips 1984b). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on June 1, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, the site was relocated a few meters south of the previous map, on an alluvial platform on soft, gravelly sand. Site contents were 32 lithic flakes consisting of 8 tan chert interior flakes, 3 brown chert cortical primary flakes, 3 brown chert interior flakes, 3 brown chert cortical secondary flakes, 2 tan chert cortical secondary flakes, 7 white chert cortical secondary flakes, 1 chalcedony interior flake, 1 white chert interior flake, 3 grey chert interior flakes, and the brown chert unifacial retouching mentioned in the original site record. Site boundaries were expanded to the south to include the few additional artifacts and to reflect the adjusted location of the site.

EAFB-430/ (CA-KER-1781H). The site was originally recorded by R. H. Norwood and M. Phillips in 1984 and was described as a historic period, moderately dense refuse deposit containing one artifact concentration near the western boundary, and a scattered refuse deposit consisting mostly of cans and glass (Norwood and Phillips 1983). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on June 7 and 8, 2012 as a part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists relocated the site contents and discovered two new features, a well (Feature 1) and embedded milled lumber boards (Feature 2). The field crew relocated and assigned a concentration number to the refuse concentration mentioned in the original site record (Concentration 1), and identified a previously unrecorded refuse concentration (Concentration 2).

Feature 1 is a well consisting of an open shaft and concrete lining. On the surface are two tubular, thick metal sheets with multiple rivets along the seams, measuring 33 inches long and 13 inches in diameter. The shaft diameter is 14 inches and the depth is unknown. There is water at the bottom of the well.

Feature 2 consists of two milled lumber boards embedded in the ground and lined with asphalt. Braided wire is buried along with the feature.

Concentration 1 measures 5 feet by 5 feet, and consists of 5 open sanitary cans, 10 matchstick filler cans, 9 hole-in-cap cans, 1 small hole-in-cap can, 1 hinged tobacco tin, miscellaneous metal fragments, 1 sun-altered amethyst glass handle, 12 aqua flat glass fragments, and 4 sun-altered amethyst glass fragments. It was originally noted by Norwood and Phillips to be located in the western portion of the site, and this remains consistent with the original record.

Additional refuse located near the concentration but scattered diffusely includes 11 sanitary cans including 1 with SANITARY embossed, 20 matchstick filler cans, 12 hole-in-cap cans, 1 rectangular hinged-lid can, 13 aqua glass fragments, 1 green bottle base fragment, 2 green glass fragments, and 1 enamelware wash basin.

Concentration 2 is a large roadside refuse deposit located on either side of a northwest/southeast trending dirt road east of the original recorded location of EAFB-430. It appears to contain approximately 70 cans distributed over a large area, including approximately 30 hole-in-cap cans, 30 matchstick filler cans, 5 peerless-opened sanitary cans, and 3 sanitary can lids.

The southeast portion of the site near the two newly recorded features contains additional refuse. This portion of the site includes 2 sanitary cans, 1 rectangular fuel can with an embossed marking, 1 crushed paint can, 1 round-headed bolt with a square nut, 4 miscellaneous metal pieces, 3 round nails, 4 aqua glass fragments, 10 colorless glass fragments, approximately 30 amber glass bottle fragments, 1 mason jar fragment with a Ball Bros. Manufacturing maker's mark, 18 milled lumber pieces, and 1 metal paint brush band with embossing.

The site boundaries were expanded to include these new features and additional refuse.

EAFB-562/ P-15-002009 (CA-KER-2009/H). This site was originally recorded by Norwood in 1985 and was described as a large temporary camp with three loci, hearth features, several hundred flakes, lithic tools, unifaces, cores, bifaces, and several fire-affected cobbles (Norwood et al. 1985).

Earth Tech revisited the site in 2003, recorded a total of six loci, and tested it via a surface collection and subsurface excavation. Locus 1 was described as a concentration of lithic debitage and tools. No subsurface testing was conducted at Locus 1. Locus 2 was a concentration of surface artifacts and six hearth features. The surface artifacts include lithic debitage and formed tools as well as two granitic metates. Two STUs, one SRU, and two TUs were excavated at this location. Locus 3 was described as a light concentration of surface artifacts and a hearth. No subsurface testing was conducted at Locus 3. Locus 4 was described as a high-density lithic deposit consisting of chert and obsidian debitage and formed tools. Seven STUs and two TUs were excavated at this location. Locus 5 was defined by a surface concentration of artifacts. Four STUs, one SRU, and one TU were excavated at this location. Locus 6 consists of a small lithic deposit. Testing was not conducted in this area. Due to the presence of several loci consisting of a variety of artifacts and features, substantial subsurface artifacts, and the presence of pendant artifacts that may have the potential to yield insights into ceremonial, exchange, and trade questions, the site was recommended eligible for the NRHP (Jones et al. 2003.). The site was subsequently monitored in 2006 and 2007 by JT3/CH2M Hill archaeologists who noted motorcycle track disturbances, collected two projectile points and a chert crescent, and noted additional flakes, extending the site boundary to the northeast (Sergejev and Kramme 2006a and 2007a). It was last visited in 2009 during a routine monitoring program and no new disturbances were noted (D'Arcy and Kulevich, 2010).

ECORP Archaeologists revisited the site from June 15, 2012 to June 28, 2012, as part of the Edwards Edwards AFB, Oro Verde Solar Project. During this intensive survey, the six loci recorded by Earth Tech in 2003 were relocated and their site contents examined. ECORP archaeologists identified 9 concentrations within Locus 2 and mapped them. The western boundary was also expanded to include additional lithic material.

Locus 1 is a large lithic deposit located at the northeastern end of the site. The northern boundary fence of the base bisects the locus, trending east to west. Only the portion south of the boundary, within the base, was re-recorded by ECORP archaeologists in 2012. Approximately -300 flakes of obsidian, chalcedony, chert, basalt, and rhyolite were identified within the base boundary. Two cores were also noted. A historic homesite (EAFB-3049) overlaps Locus 1.

Locus 2 contains nine artifact concentrations and two hearth features.

Feature 1 is a possible blown-out hearth. It is located on the southern slope of the large dune within Locus 2, Concentration 1. This feature is approximately 7 meters from the claypan playa and may be eroding out of the dune above. Feature 1 contains ten granitic cobbles scattered over a roughly 3 by 3-meter area. The cobbles range in size from 5 to 20 centimeters long. Three of the fragments are partially embedded and at least two appear to be fire-affected. No additional artifacts were noted within the feature and none of the cobbles appear to be ground.

Feature 2 is a cluster of cobbles and broken cobbles along a south-to-southwest waterline for large, distinct playa. Approximately 15 rocks, about half of them embedded in soil and mostly fire-affected, were identified. The probable blown-out hearth area measures 2.5 meters southeast to northwest and 2 meters southwest to northeast. Eight to 10 small rocks on the playa floor may have moved down-slope from the feature, about 2.5 to 3 meters away; however, it is unclear if they are part of the feature.

Concentration 2-1 contains approximately 400 to 600 flakes of chert (tan and grey) and obsidian. Several obsidian flakes were noted outside the concentration as well.

Concentration 2-2 is a large concentration located in the southern area of Locus 2. It consists of 70 or more flakes of various chert and chalcedony materials. Fire-affected rock was also found at the western edge of the concentration.

Concentration 2-3 contains a small scattered deposit of fire-affected rock of granitic and rhyolite materials. The concentration also contains one grey chert multi-directional core.

Concentration 2-4 is a large, sparse lithic scatter located on the top and southern slope of a large sand dune that borders the northern edge of a claypan playa. The concentration contains approximately 150 flakes of tan and grey chert. At least one edge-modified flake was also noted.

Concentration 2-5 is a concentration of granite cobbles located on the playa surface. This concentration contains approximately 70 to 80 cobbles ranging in size from 3 to 10 centimeters. Many of the cobbles appear to be fire-affected. One chalcedony interior flake and one grey chert interior flake were also noted.

Concentration 2-6 is a cobble cluster of approximately 15 rocks located on a sloping edge of a dune next to the playa. Only one cobble, which is embedded, appears to be fire-affected. One chert interior flake was identified within the concentration. Five to six more flakes were found nearby.

Concentration 2-7 is a sparse lithic deposit located on the northern slope of the southern sand dune and on the playa. This concentration contains approximately 50 flakes of chalcedony, rhyolite, basalt and chert. One chalcedony core, one chert core, one edge modified chert flake, one bifacial basalt mano fragment, one tan chert biface and one tan chert biface fragment were also identified.

Concentration 2-8 is a large artifact deposit located on the eastern dune and on the southeast playa of Locus 2. This concentration contains approximately 300 flakes, 3 edge-modified flakes, 5 cores, 6 biface fragments, and 1 metate fragment. Materials include chert, chalcedony and rhyolite. Some of the flakes are quite large.

Concentration 2-9 contains approximately 80 flakes, and 1 fine-grained basalt biface fragment with a small patch of cortex remaining. An obsidian possible Humboldt-type projectile point that may have been reworked was collected. Flake materials include chert, chalcedony, obsidian, and rhyolite.

Locus 3 was originally recorded as a light lithic deposit and hearth feature. Approximately 65 to 75 flakes of chert, chalcedony, rhyolite, and obsidian were identified as well as the datum. Two cobbles in the southern part of the locus were identified, however no hearth was located.

Locus 4 boundaries are consistent with previous site records; however, no diagnostic artifacts were located. It is noted, however there were hundreds of pin flags scattered throughout the site, possibly left by Earth Tech during testing in 2003.

Locus 5 is a small, dense concentration of at least 300 flakes of chert, chalcedony, rhyolite, and obsidian.

Locus 6 is a large lithic deposit located on a wide alluvial plain, south of Locus 1. This locus contains approximately 100 flakes of chert, chalcedony and rhyolite. No tools were noted within this locus.

Twenty-seven flakes were found due west of the previous western boundary of EAFB-562. This area was added to the site record and site map. This deposit is composed primarily of chert, and chalcedony. One obsidian flake and one basalt flake were identified.

Two artifacts were collected. Located outside Locus 5 to the south, one obsidian leaf-shaped projectile point was identified and collected. The second artifact collected appears to be associated with Locus 2. Located in Concentration 9 of Locus 2, it is an obsidian possible

Humboldt-type projectile point that may have been reworked. Although there have been disturbances to the overall site, it is still roughly consistent with previous site records, and most of the loci still contain artifacts.

EAFB-568/ P-15-002016 (CA-KER-2016). This site was originally recorded in 1985 as a large temporary camp/food preparation area consisting of deflated hearths with hundreds of fire-affected rocks, approximately 100 flakes, cores, schist fragments and flaked tools (Norwood 1985). Archaeologists for Computer Sciences Corporation visited the site in 1997 and greatly expanded the site boundaries, indicating that the site contained a large locus (Locus 1), three major artifact concentrations, and many smaller loci containing possible hearth features and artifact deposits (Onzol 1997a). Subsequent JT3/CH2M Hill monitoring visits for the Range Rider program in 2006 noted modern disturbances. JT3/CH2M Hill archaeologists collected an obsidian Elko-eared projectile point and a black and gray chert Gypsum series projectile point (Sergejev and Kramme 2006b and Sergejev and Maier 2006). According to GIS information provided by Edwards AFB, the site has been recommended eligible for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site in May of 2012. None of the previous site records described individual features, loci or concentrations within the site. Thus, ECORP archaeologists attempted to relocate previously recorded loci and features using shape files in the Edwards GIS Database. In total 39 loci were field checked and updated. Of these 39 loci, 19 loci could not be relocated, 8 contained possible hearth features, and 12 contained lithic deposits. An obsidian biface fragment and an obsidian projectile point fragment were collected. A historic period pocket knife was also collected within this site. Site boundaries were updated to include newly-identified artifacts and existing concentrations within the EAFB-provided shape files.

In total 39 loci were field checked and updated. No evidence could be found of prehistoric resources in Loci 101, 154, 156, 157, 158, 160, 164, 166, 168, 172, 176-179, 194, 196, 197, 207, and 208. Descriptions of relocated loci designations containing features are provided below.

Eight Loci contain concentrations of fire-affected rock. These Loci include Loci 170, 173, 174, 175, 180, 191, 203, and 204.

Locus 201 contains a sparse lithic scatter of approximately 30 chert and rhyolite flakes, along with a concentration of fire-affected rocks.

Locus 202 contains more than 100 chert, rhyolite and other flakes. The locus also contains a scatter of fire-affected rocks. Artifact density is greatest in the vicinity of the site datum.

Descriptions of loci that contained lithic deposits are provided below.

Locus 1 contains two dense concentrations of lithic flakes. Outside of the two artifact concentrations, artifact density in Locus 1 is sparse, with an average of more than 100 meters separating artifacts.

Locus 102 is a small, dense concentration of artifacts containing approximately 70 flakes, including an edge-modified flake. A chalcedony biface fragment and one piece of groundstone were also observed.

Locus 161 contains approximately 20 chalcedony and rhyolite flakes.

Locus 162 contains 10 flakes and 1 piece of shatter. Pieces of wire and lumber were also observed.

Locus 163 contains approximately 30 chert, rhyolite and obsidian flakes and 16 broken, gravel to golf-ball-sized cobbles.

Locus 165 contains only one lithic flake.

Locus 198 contains four flakes and one piece of shatter.

Locus 200 was not relocated in the previously mapped location. However, a biface fragment and 12 flakes were found just southeast of the locus boundary. The biface has a serrated edge and a square base.

Locus 209 contains a deposit of lithic flakes.

Locus 210 contains an obsidian biface fragment measuring 4.6 centimeters long, 1.5 centimeters wide, and 0.8 centimeter thick. This artifact was collected.

In addition to these loci, the site contains a sparse deposit of outlying artifacts. These were not tallied during the current investigation. However, several areas of increased artifact density were noted.

Two elongated, oval-shaped halves of a historic period pocket knife handle approximately 8 inches long were found at the location of Locus 160, where no prehistoric materials were found. Each of the halves, which are made of copper-plated steel, bears the slightly raised image of a slender woman, in two different poses. Approximately one-third of a steel knife blade is still attached to one of the halves. The knife was collected. Overall, the site remains consistent with previous records and the boundaries remained unchanged.

EAFB-569/ (CA-KER-2010). This site was first recorded as a large prehistoric period lithic deposit containing 4 artifact concentrations, more than 550 flakes, midden, 1 biface, and 1 core (Davis and Norwood 1985). The site has not been previously evaluated for eligibility for the NRHP.

The site was visited by archaeologists from ECORP Consulting, Inc. on June 13, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists identified two possible hearth features (Features 1 and 2) within the existing site boundary. ECORP archaeologists relocated three dead Joshua trees noted on the previous record, along with the biface and possibly the core. Concentration contents were consistent with the previous record.

Feature 1 consists of 10 fire-affected granitic cobbles that are partially embedded in the ground. Artifacts noted within Feature 1 include 11 burned faunal bones, 1 fire-affected cobble, 2 grey chert cortical flakes, 1 white chert interior flake and 1 brown chert interior flake, and one chert core.

Feature 2 consists of 11 fist sized pieces of granitic fire-affected rocks and 1 quartz cobble. The cobbles are partially embedded under a saltbush.

Map boundaries were updated to included concentration boundaries, expanded site boundaries, and the two new hearth features.

EAFB-570/ (CA-KER-2011). The site was originally recorded by G. Davis, R. Norwood, and K. Braun-Adams in 1985 as a small, light lithic deposit containing approximately 75 flakes of mostly chert and rhyolite within a main flake area approximately 15 meters by 20 meters (Davis et al. 1985). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on June 13, 2012 as part of the Edwards AFB, Oro Verde Solar Project. It was noted that the main flake area was located approximately 60 meters to the southeast of the shape file provided. During this intensive survey, the site was found to contain 2 concentrations of artifacts (Concentrations 1 and 2) contained within a larger lithic deposit area. It was also noted that the site contained more material than what was recorded in the original site record.

Concentration 1 contains four tan chert interior flakes, two white chert secondary cortical flakes, four white chert interior flakes, three tan chert secondary cortical flakes, one gray chert cortical flake, one mottled brown and white chert interior flake, five rhyolite interior flakes, and one rhyolite cortical flake.

Concentration 2 contains 27 white chert interior flakes, 3 brown chert interior flakes, 18 gray chert interior flakes, 23 tan chert interior flakes, 3 tan chert cortical flakes, 1 chalcedony secondary cortical flake, 5 chalcedony interior flakes, and 1 chalcedony cortical flake.

Artifacts within the main flake area but outside of the concentrations consist of approximately 95 to 110 flakes of chert and rhyolite material. One serrated edge-modified flake lies west of the main flake area.

The site was remapped to include the new location, and the concentration boundaries within the main lithic area.

EAFB-837/ (CA-KER-2284H). This site was initially recorded as a historic period homesite with foundation rubble (rock/cement), fencing, heavy trash deposits and a large corral The occupation area was noted as highly disturbed by vandalism and grading (Norwood and Wessell 1988b). Earth Tech Archaeologists field checked the site on July 24, 2001, at which time the site record was updated. No foundation was identified; however, a well, a concrete box, and a decorative concrete pump stand were noted. The record states that Earth Tech personnel were unable to relocate the well feature (Bark 2001c). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on May 22, 2012. The ECORP crew relocated the foundation feature, the fence line, and a feature that may be the well. The crew was unable to relocate the corral feature mentioned in the original site record. ECORP archaeologists assigned feature numbers to a total of seven features. Features relocated consisted of a blown out foundation (Feature 1), a probable well (Feature 2), and a fence line (Feature 7). Newly identified features consist of a rock ring (Feature 3), two wooden fence posts (Feature 4), a metal pipe (Feature 5), and a possible privy pit (Feature 6). In addition, the ECORP crew identified three concentrations of historic period refuse.

Feature 1 is a concentration of large cobbles and fragments of concrete blocks that likely represents the remains of a structure foundation. The feature is heavily fragmented and disturbed. The feature measures 39 feet north-south by 42 feet east-west. A 10-foot wide by 3-foot deep depression is located at the center of the feature. The feature has an apparent chimney flue, and an associated household refuse deposit and metal debris.

Artifacts associated with Feature 1 consist of approximately 1 clear glass bottle base with a CO maker's mark, 1 clear glass bottle base with an Owens Illinois maker's mark, 100 amber glass fragments, approximately 30 aqua glass fragments, approximately 30 green glass fragments, approximately 50 colorless glass fragments, approximately 30 sun-altered amethyst glass fragments, approximately 20 white stoneware fragments, approximately 20 yellow crockery ware fragments, 1 white ware ceramic base fragment with a Homer Laughlin Empress maker's mark, 1 white ware ceramic base fragment with a Majestic maker's mark, 1 white ware ceramic base fragment with K.T. & K. Co. maker's mark, approximately 24 porcelain fragments, 1 ceramic door handle, 5 ceramic pipe fragments, approximately 100 round nails, 6 metal bed springs, approximately 100 metal fragments, and 1 metal button with an embossed letter K.

Feature 2 is a possible well. It consists of a steel standpipe with a diameter of 3 inches and a visible height of 7 feet 2 inches. The pipe is embedded in the ground and surrounded for a radius of approximately 5 feet by pieces of pink granite and coarse concrete rubble. Feature 2 is also marked with a steel T-post just outside the stone rubble with "probable well" written on it. No artifacts are associated with Feature 2.

Feature 3 is a rock ring composed of 12 large pink granitic and rhyolite rocks containing small fragments of charcoal. The feature also contains an L-shaped steel stake with wire attached. Artifacts associated with Feature 3 consist of one amber glass fragment, one porcelain fragment, three round nails, and one miscellaneous metal fragment.

Feature 4 consists of two wooden fence posts measuring 3 inches by 4 inches, with a visible height of 16 to 20 inches and standing 8 feet 6 inches apart with a southwest-northeast alignment. A metal spike is perpendicular to the center of the two posts. Feature 4 is also marked by a metal T-post. Five round nails were found in association with the feature.

Feature 5 is a metal pipe with round wire attached and a visible height of 11 inches. No associated artifacts were found.

Feature 6 is a possible privy pit with an associated mound on its west end. The pit and mound measure 55 feet northwest-southeast by with a width ranging from 12 to 18 feet northeast-southwest. Measured separately, the pit measures 25 feet northwest-southeast by 12 feet northeast to southwest, and the mound measures 18 feet in diameter. The mound is approximately 20 inches in height. Refuse deposits in and within the immediately surrounding area appear to have been looted by unauthorized artifact collectors.

Artifacts associated with Feature 6 consist of 8 rotary-opened sanitary cans, 1 oblong rotary-opened sanitary can, 1 rotary-opened sanitary can reused as a strainer with two handmade metal wire attachments on top and perforations on the bottom, 1 brown glass bottle base embossed with G7, approximately 50 aqua pane glass fragments, approximately 24 sun-altered amethyst glass fragments, approximately 30 amber glass fragments, approximately 20 white stoneware fragments, and 1 white ware fragment with maker's mark, 1 white ceramic door handle fragment, approximately 20 metal barrel straps, approximately 80 pieces of wood debris with round nails, 1 metal buckle, and approximately 300 miscellaneous metal fragments.

Feature 7 is a fence line, in two sections, with wooden posts and a combination of barbed wire and rabbit wire. Section 7A contains three embedded wooden posts with double-tine barbed wire, and rabbit wire embedded in the ground. From the far western extent of Section 7A, this segment extends east 237 feet, the feature then turns sharply and extends north for 438 feet. Section 7B runs for approximately 387 feet along the southern boundary of the site, and consists of three wooden posts. No artifacts were seen in association with Feature 7.

Concentration 1 is a historic refuse concentration measuring 38 feet east-west by 29 feet north-south. This concentration contains approximately 40 cans, including sanitary cans, MSF cans, tobacco tins, internal friction-lid cans, and hole-in-cap cans. The deposit also contains 1 amber glass bottle base embossed with RED RAVEN\SPIRITS, approximately 40 SAM glass fragments, 60 aqua glass fragments, 40 clear glass fragments, approximately 40 terra cotta fragments, 4 yellow crockery fragments, 60 white stoneware fragments, and 1 Royal Baking Powder can lid dating from 1899 to 1934 (Rock 1989).

Concentration 2 is a concentration of 10 milled lumber pieces and 2 pieces of metal hardware in an area measuring 23 feet east-west by 12 feet north-south.

Concentration 3 is a historic period refuse concentration measuring 21 feet north-south by 12 feet east-west. This concentration consists of six sanitary cans, one rotary-opened hole-in-cap can, three paint cans, and two internal friction cans surrounding a wooden fence post.

Site boundaries were remapped to reflect new data gathered during this examination.

EAFB-839 This site was originally recorded by R. Norwood and T. Wessell as a historic-period well and an earthen loading dock/ramp (Norwood and Wessel 1988c). The site was visited by Earth Tech archaeologists in 1994, who relocated the feature and noted a sparse scatter of cans, amber glass, and steel cable (Howard and Clement 1994a). The site has not been previously evaluated for the NRHP.

On June 6, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. The crew assigned feature numbers to the previous recorded loading dock (Feature 1) and identified a large dirt mound feature (Feature 2).

Feature 1 is a well and an earthen loading dock/ramp shored with logs. This feature is consistent with the description in the 1994 Earth Tech record. When ECORP visited the site, they noted that the feature is located in a recent burn area, and the logs shoring the ramp have been charred. Two posts were noted on the southern end of the loading ramp.

Feature 2 is a large dirt pile located approximately 41 feet southwest of Feature 1. Feature 2 is of unknown use and measures 9 feet north-south by 11 feet east-west.

In addition to the features noted above, ECORP archaeologists observed historic period refuse scattered throughout the site. This deposit consists of heavy gage cable, pieces of lumber, 2 flat top beverage cans, 3 stoneware vessel fragments with an orange glaze, 1 metal slug, nails, 10 colorless glass fragments, and 13 amber glass fragments. During this intensive survey, ECORP personnel noted that the site was plotted too far west. A new boundary was drawn in the proper location.

EAFB-845/ (CA-KER-2290H). This is a historic period homesite originally recorded by R. Norwood and T. Wessell in 1988. They describe the site as containing a rock foundation, possible outbuilding, pits, fencing, and a trash scatter. Norwood and Wessell note that they were unable to find a well on the site (Norwood and Wessell 1988d). In 1999, the site was updated Earth Tech as part of a well closure program. They located the well associated with the homestead and noted that it was surrounded by approximately 10 fragments of aqua glass. The record notes that the well was closed (Storey and Shaver 1998). The site was subsequently field checked by ASM Affiliates in 2005, who noted that the site contents were consistent with the 1988 record but the site was mapped in the wrong location (Giambastiani et al. 2005). According to GIS data provided by Edwards AFB, the site has been recommended eligible for the NRHP.

ECORP Consulting, Inc. visited the site on May 16, 2012 as part of the current project. ECORP archaeologists identified five features, consisting of a residence foundation (Feature 1), a group of associated fence lines (Feature 2), the remains of two corrugated metal outbuildings (Features 3 and 5), and a pair of wooden posts (Feature 4). In addition, ECORP archaeologists identified one artifact concentration (Concentration 1) and a large outlying artifact deposit. ECORP archaeologists were able to relocate the well, which was capped and buried in 1999 (Storey and Shaver 1998) and noted a large depression in the southern portion of the site.

Feature 1 is an unmortared cobblestone foundation/embedded alignment located in the middle of the site. The foundation consists of two sections. One section runs east-west for approximately 30 feet and consists of seven quartzite boulders measuring approximately 1 to 2 feet across, one large granitic boulder on the east end, and 23 smaller cobbles. The second section runs north-south for approximately 14 feet, and connects with the first section at the northwest corner. It is approximately 3 feet wide and consists of 62 deeply embedded purple and red rhyolite rocks ranging in size from approximately 5 to 18 inches across. The north-south, rhyolite section is more intact than the east-west, quartzite section, which appears to be disturbed, possibly by someone collecting the attractive rocks for building or landscaping. The other two walls that would be necessary to form a rectangular foundation do not exist; however, a large scatter of granitic cobbles lies to the south, and a small pile of granitic cobbles is located to the southwest. A large scatter of lumber is located southeast of the feature, and five large fallen Joshua trees are to the north.

Artifacts scattered within and surrounding Feature 1 included more than 150 pieces of milled lumber in various sizes, of which 2 contain nails. Metal containers consist of 8 sanitary cans, 1 matchstick filler can, 2 hole-in-cap cans, 2 flat-top beverage cans, 1 aluminum and steel beverage can, 4 pocket tobacco tins, 1 internal friction-lid can, and 1 external friction-lid can. Glass items consists of 1 sun-altered amethyst-colored glass bottle base with a prominent scar and B embossed, 1 sun-altered amethyst glass bottle heel with RACINE W… and SLOUGH BUCK… embossed, 4 sun-altered amethyst glass fragments, 1 brown glass fragment, 3 sun-altered amethyst milk glass fragments, 3 aqua glass bottle fragments, approximately 100 aqua-colored pane glass fragments, 2 decorative colorless glass fragments with a scalloped rim, and 3 cobalt blue glass fragments. Ceramic artifacts consist of one earthenware rim sherd with a blue geometric pattern, four earthenware fragments with a white glaze, six porcelain sherds with a green glaze and a green leaf transfer print, one porcelain sherd, one porcelain base sherd with a partial maker's mark reading Elyse… and Rose…, and three stoneware vessel sherds with a brown glaze. Miscellaneous metal artifacts consist of two pieces of sheet metal, two wire nails, one unidentifiable piece of metal, one small metal gasket, one metal key from a key-wind mechanism, and one metal skeleton key (collected). Other artifacts consist of one red brick fragment, and one shell clothing button with two holes.

Feature 2 consists of five sections of fence line (Features 2A through 2D). Feature 2A is a section of rabbit wire fence that runs north-south for approximately 27 feet 6 inches. Feature 2B is another section of north-south rabbit wire fence that is 23 feet long and is located 39 feet north of 2A. Feature 2C is a rabbit wire fence that still has two standing wood posts. The fence starts near the northwest corner of Feature 1 and runs south for 130 feet, then turns west for an additional 65 feet. Feature 2D consists of a standing wood post south of Feature 2C. The post is broken and the remaining stump stands approximately 20 inches high. It is surrounded by pieces of lumber and rabbit wire. Feature 2E is a north-south section of rabbit wire fence that is approximately 26 feet long.

Feature 3 is the remains of a possible coop or shed, consisting of two 6-foot-long strips of corrugated metal forming an "L" shape. The strips are embedded in the ground, and stand 14 inches high. Three additional strips of corrugated metal lie east of the feature.

Feature 4 consists of two 4-by-6-inch wood posts approximately 5 inches high. The southernmost post contains two wire nails driven vertically into the top.

Feature 5 is similar in construction and material to Feature 3. It consists of three sheets of corrugated metal embedded in the ground to form a "U" shape, with the open end facing east.
ECORP archaeologists expanded the site boundary to include all features and artifacts identified. Two items, a metal key and the lid from a tooth powder tin were collected.

Concentration 1 consists of 44 sanitary cans with interlocking seams, of which 11 have been church-key opened and 3 have been rotary opened; 1 toothpowder tin embossed with Dr. E.L. Graves' Unequaled tooth powder (collected); and 1 large, square, crushed can.

Artifacts located in the northern portion of the site outside of the concentration and not associated with any features consist of cans, glass, ceramics, miscellaneous metal fragments and parts, lumber, and a marine shell. Metal containers consist of four sanitary cans, two small matchstick filler cans, one crushed matchstick filler can, two hole-in-cap cans, two small crushed hole-in-cap cans, three church key-opened flat top beverage cans, three aluminum and steel beverage cans, one key-wound external friction lid can, one round rotary-opened meat tin, one rectangular key-wound can, one rectangular fuel can, one internal friction lid paint can, and one sanitary can lid. Glass containers are represented by 16 colorless glass fragments, 6 amber glass fragments, 27 aqua glass fragments, and 52 sun-altered amethyst glass fragments. Ceramics consist of 7 glossy white ceramic sherds, 6 brown pottery sherds, and a fragment of a white porcelain female figurine with black hair and blue eyes. GERMANY 8 is impressed on the back of the figure, along its shoulders. Miscellaneous metal objects consist of 7 long strands of possible fencing wire; 4 pieces of small wire; 1 piece of rabbit wire; 1 steel washer; 1 metal wash basin with the bottom cut out and cut along the seam; the top of a metal wash basin, also cut; 2 pieces of corrugated metal; 1 piece of sheet metal; more than 20 wire nails; 4 pieces of metal strapping; 2 unidentifiable machine parts; and 1 barrel hoop. More than 40 pieces of lumber were found in this area of the site. Fragments of two bivalve shells were also observed.

Artifacts scattered throughout the southern portion of the site consist of cans, miscellaneous metal items, and lumber. Metal containers consist of two crushed sanitary cans, two small matchstick filler cans, one larger matchstick filler can, one rectangular hole-in-cap can, one hole-in-cap can top fragment, one crushed 1-gallon rectangular can, one 1-gallon internal friction-lid paint can with a wire handle, two 1-quart internal friction-lid paint cans, one internal friction-lid can with no handle, one rippled metal lid with a central hole and seven embossed, one 8-inch-diameter flat metal lid, and one flat-top beverage can with church key openings. Other metal artifacts consist of one 10-inch diameter pie tin, five pieces of 0.25-inch wire (single-strand and braided), four pieces of 0.125-inch wire, two rectangular metal strips with wire nails, and a metal “L” shaped strap with bolts. Four pieces of lumber were also observed.

The site was remapped to encompass all concentrations, features, and artifacts identified during this investigation.

EAFB-950. The site was initially recorded by R.H. Norwood in 1988 and described as one isolated well feature (Norwood 1988a). In 1994, archaeologists from Earth Tech visited the site. They relocated the well noted above and expanded the site boundary to include two small concentration of historic period refuse (Howard and Clement 1994b). The site has not been previously evaluated for eligibility for the NRHP.

On May 21, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, the well feature and two refuse concentrations were not relocated. ECORP archaeologists did note a very low density, sparse, historic period refuse deposit within the previously recorded boundaries. This deposit consists of one toy wagon, one MSF can, several glass fragments, one white ceramic fragment, one metal bucket, several hole-in-cap cans, and one shell fragment.

EAFB-1343. The Edwards AFB GIS database contains a shape file for EAFB-1343 and notes that this site was recorded as part of project 1993-D. It is described as a well feature. The site has not been previously evaluated for eligibility for the NRHP.

On May 22, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, this resource was not relocated.

EAFB-2240/ P-15-002284 (CA-KER-2284/H). EAFB 2240 is the prehistoric component of the multi-component site CA-KER2284/H. Site EAFB-2240 was originally recorded by archaeologists from Computer Sciences Corporation in 2006 (Onzol 1996d). They describe the site as containing seven flakes and a portable metate fragment. Earth Tech Archaeologists visited the site in 2002 for a Phase II Evaluation in which the site was recorded as containing one chert flake, one rhyolite flake, one sandstone metate and six faunal remains. Earth Tech personnel excavated three shovel-test-units and collected all surface artifacts. Testing results were recorded in detail in the site record. Only one test unit contained subsurface deposits. Five fragments of faunal bone were recovered from this unit at a depth of between 20 to 40 centimeters below surface. The 2004 record includes the NRHP status indicating the site has been recommended not eligible for the NRHP (Bark et al. 2004c).

ECORP Archaeologists visited the site on May 22, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, one grey chert interior flake and one white chert interior flake were located within the site boundary. These are likely newly-identified artifacts given the previous surface collections in 2002.

EAFB-2244/ P-15-005654 (CA-KER-4518). This site was originally recorded in 1996 by archaeologists from Computer Sciences Corporation. They recorded this site as a prehistoric temporary camp containing 18 flakes and 1 piece of fire-affected rock (Lillard 1996a). The site has not been previously evaluated for eligibility for the NRHP.

On May 21, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, only one badly weathered flake was located within the previously recorded site boundary.

EAFB-2245/ P-15-005603 (CA-KER-4790H). This site is a historic period refuse deposit originally recorded in 1996 by Computer Sciences Corporation. They describe the site as containing more than 20 large broken chunks of chert, iron stove fragments, nails, tacks, wire, cable, paint cans, colorless pane glass, milled lumber and amethyst glass (Boyer 1996a). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. Archaeologists visited the site on May 22, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, the site was noted to be generally consistent with the original site record. Several cans, pieces of milled lumber, and sheet metal were noted east of the 1996 site boundary and the eastern site boundary was extended to include these identified artifacts.

EAFB-2247/ P-15-005604 (CA-KER-4791). The site was initially recorded as a prehistoric lithic deposit by Computer Sciences Corporation in 1996. They describe the site as containing 11 flakes and shatter fragments (de la Garza 1996a). In 2004 Earth Tech visited the site as part of a Phase II testing project. As part of this project they excavated three shovel test pits and one test unit. In addition they collected 14 pieces of debitage, 3 biface fragments, and 1 scraper from the surface of the site. Earth Tech archaeologists determined that Phase II testing has exhausted the research potential for the site, and it has been recommended as ineligible for the NRHP (Hogan-Conrad and Holmes 2004b).

On May 21, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, only one cortical flake was noted. This is likely due to Earth Tech's surface collection of the site constituents.

EAFB-2249/ P-15-005605 (CA-KER-4792). Site CA-KER-4792 was first recorded by archaeologists from Computer Sciences Corporation in 1996. This record describes the site as a prehistoric temporary campsite containing 13 flakes, 5 fragments of fire-affected rock, and 1 ground stone fragment (de la Garza 1996b). In 2002 Earth Tech visited the site as part of a Phase II testing Program. They identified 11 pieces of chert debitage, 1 quartzite milling tool fragment and 1 piece of fire-affected rock. Earth Tech excavated 2 surface test units and collected all 13 surface artifacts. The artifact assemblage was sparse and TUs were negative for subsurface deposits. The site record includes an NRHP status code indicating the site has been recommended not eligible for the NRHP (Bark et al. 2004d).

ECORP Consulting, Inc. field checked the site on May 22, 2012 as part of the Edwards AFB, Oro Verde Solar Project. Likely due to Earth Tech's surface collection in 2002, ECORP archaeologists did not identify any artifacts within the previously recorded boundaries.

EAFB-2251/ P-15-005600 (CA-KER-4583). The site was originally by Computer Sciences Corporation in 1996 and was described as a small, light, prehistoric lithic deposit containing 2 purplish-brown rhyolite, secondary interior flakes; 2 reddish-brown chert, primary flakes; 4 reddish-brown chert, secondary interior flakes; and 2 greyish-white chert, secondary interior flakes (de la Garza 1996c). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on May 22, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists were able to relocate all 10 flakes from the 1996 record, and identified 9 additional flakes outside of the previous site boundary. The newly recorded flakes consist of two grayish-white chert interior flakes and seven reddish-brown chert interior flakes.

EAFB-2252/ P-15-005667 (CA-KER-4828). The site was initially recorded in 1996 as a light prehistoric lithic deposit by Computer Sciences Corporation. They describe the site as containing three rhyolite interior flakes, one chert interior flake, and one vesicular basalt interior flake (Onzol 1996e). The site has not been previously evaluated for eligibility for the NRHP.

On May 22, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists were able to relocate the three rhyolite interior flakes mentioned in the previous site record but were not able relocate the two chert and basalt flakes noted above.

EAFB-2253/ P-15-005668 (CA-KER-4829). The site was initially recorded as a light prehistoric lithic deposit by Computer Sciences Corporation in 1996. They describe the site as containing 24 chert flakes, 17 rhyolite flakes, 1 chert biface fragment, 1 groundstone fragment, and 1 fire-affected rock (de la Garza 1996d). The site has not been previously evaluated for eligibility for the NRHP.

On May 22, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site conditions and constituents were consistent with the previous record. One addition, however, was noted. A previously unrecorded rhyolite biface was found within the site boundary.

EAFB-2254/ P-15-005601 (CA-KER-4584). The site was initially recorded as a light prehistoric lithic deposit by Computer Sciences Corporation. They describe the site as measuring 8 meters by 4 meters and containing three flakes and one core (Boyer 1996b). The site has not been previously evaluated for eligibility for the NRHP.

On May 22, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, only one chalcedony interior flake was located.

EAFB-2255/ P-15-005606 (CA-KER-4793). CA-KER-4793, a prehistoric temporary campsite, was first recorded in 1996 by archaeologists from Computer Sciences Corporation. They describe the site as containing 11 rhyolite flakes, 6 brown/black chert flakes, and 1 rhyolite biface (Boyer 1996c). In 2004, Earth Tech visited the site as part of a Phase II testing program. Earth Tech archaeologists identified 16 pieces of debitage, 5 biface fragments, 1 complete biface, and 131 fragments of faunal bone from the site surface. In addition, Earth Tech excavated three shovel test pits, one test unit, and collected all surface artifacts noted above. Through testing, the site was determined to have a sparse, shallow subsurface deposit with no diagnostic artifacts or features, and was recommended not eligible for the NRHP (Hogan-Conrad and Holmes 2004c).

On May 21, 2012, archaeologists from ECORP Consulting, Inc. updated this site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, no cultural resources were identified within the previously recorded site boundaries. This is likely due to Earth Tech's surface collections in 2004.

EAFB-2257/ P-15-005671 (CA-KER-4832). The site was initially recorded by Computer Sciences Corporation in 1996 as a prehistoric large, light temporary camp, containing six secondary rhyolite flakes, two red and white secondary chert flakes, one red-brown primary quartzite flake, one dark brown chert flake, three white secondary chert flakes, one white piece of chert with some heat treatment, one primary rhyolite flake, one secondary chalcedony flake, one dark brown chert flake with a bifacially worked edge, and one yellow secondary chert flake one mano, one metate fragment, and fire-affected rock (de la Garza 1996e). The site has not been previously evaluated for eligibility for the NRHP.

On May 24, 2012, ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. The crew relocated 16 flakes and shatter fragments as well as the granitic metate fragment noted in the 1996 record. Flakes noted include eight rhyolite flakes, two obsidian flakes, one piece of white chert shatter, one white chert flake, one tan chert flake, one chalcedony flake, one pale yellow chert flake, and one piece of white quartzite shatter. ECORP Archaeologists also identified one rhyolite biface fragment. The mano and fire-affected rock were not observed during this project. No changes were made to the original site boundary.

EAFB-2258/ P-15-005664 (CA-KER-4825). This site was first recorded by Computer Sciences Corporation in 1996 and described as a large, light temporary camp consisting of two tertiary rhyolite flakes, one gray and red mottled secondary chert flake, two quartz flakes, one secondary basalt flake, one gray and pink mottled chert flake, one brown and gray secondary chert flake, one large chunk of rhyolite, one granitic flake, two fragments of burned bone, and a fire-affected rock scatter (Johannesmeyer 1996). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on May 24, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists were unable to relocate all of the flakes, the faunal bone fragments and fire-affected rocks noted in the 1996 record. ECORP archaeologists identified six rhyolite interior flakes, one rhyolite cortical secondary flake, one gray chert interior flake, and one quartzite interior flake. Several of these flakes were found outside of the previously recorded site boundary. The site boundary was remapped to encompass the newly identified artifacts.

EAFB-2259/ P-15-005655 (CA-KER-4816). CA-KER-4816 was initially recorded by Computer Sciences Corporation in 1996. They describe the site as a prehistoric temporary camp containing 1 possible hearth feature; 33 rhyolite, chert, chalcedony, and obsidian flakes; 9 unworked chert and rhyolite chunks; 1 rhyolite spall; 2 bifaces; and 4 fire-affected rocks (Hangan 1996). The site has not been previously evaluated for eligibility for the NRHP.

On May 24, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site conditions and constituents were generally consistent with the previous record. A single obsidian flake, noted in the 1996 record, was not relocated.

EAFB-2260/ P-15-005669 (CA-KER-4830H). This site is a historic-period refuse deposit first recorded by Computer Sciences Corporation in 1996. The site is described as containing approximately 50 sanitary cans, several glass fragments, wire, and a metal belt (Boyer 1996d). The site has not been previously evaluated for eligibility for the NRHP.

On May 23, 2012, ECORP Consulting, Inc. visited this site as part of the Edwards AFB, Oro Verde Solar Project. Only 16 of the approximately 50 sanitary cans noted in the original record could be relocated; however, 30 matchstick filler cans, 1 hole-in-cap can, 1 meat tin, 1 powder tin, 1 external friction paint can, 1 5-gallon rectangular fuel can, 1 cone top beverage can, 1 SAM glass bottle and 1 complete colorless glass bottle were identified. The original site boundary was expanded to include artifacts located outside of the original 1996 boundary.

EAFB-2261/ P-15-005602 (CA-KER-4585). CA-KER-4585 was initially recorded by Computer Sciences Corporation in 1996. They describe the site as a light prehistoric lithic deposit containing four chert flakes, one rhyolite flake, and one fire-affected rock (de la Garza 1996f). The site has not been previously evaluated for eligibility for the NRHP.

On May 23, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that both the site constituents and conditions were consistent with the previous record. In addition to the artifacts noted in the 1996 record, one newly identified reddish-brown rhyolite interior flake was identified within the site boundary.

EAFB-2262/ P-15-005656 (CA-KER-4817). CA-KER-4817 was originally recorded as a prehistoric temporary campsite by Computer Sciences Corporation in 1996. They describe the site as containing over 50 secondary interior chert flakes, four chalcedony secondary interior flakes; 17 secondary interior rhyolite flakes, 1 hearth feature, 1 chert scraper, 1 chert biface, and 1 schist fragment (Lillard 1996b). The site has not been previously evaluated for eligibility for the NRHP.

On May 24, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, the hearth feature was relocated. However, it was greatly weathered and almost unidentifiable. The chert scraper was relocated. The artifact count did not match the previous site record. The crew identified 53 chert flakes, 5 rhyolite flakes, 1 black chert cortical primary flake, 1 groundstone fragment, 1 piece of rhyolite shatter, and 1 white chert exhausted core. The chert biface noted in the 1996 record was not relocated. The site boundary remained unchanged.

EAFB-2263/ P-15-005657 (CA-KER-4818). The site was originally recorded by Computer Sciences Corporation in 1996 and described as a light lithic deposit containing one obsidian flake, three rhyolite flakes, and five chert flakes (Onzol 1996f). The site has not been previously evaluated for eligibility for the NRHP.

On May 24, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, no cultural resources were identified and the site was not relocated. EAFB-2263 (CA-KER-4818) is located within the boundary of a large historic period homestead site (EAFB-10). When ECORP visited this homestead site, they noted evidence of modern dumping and target shooting throughout the area. It is possible that the artifacts have been moved by disturbance or looted.

EAFB-2264/ P-15-005658 (CA-KER-4619). CA-KER-4619 was initially recorded in 1996 as a possible roasting pit by Computer Sciences Corporation. They describe the site as containing one rhyolite flake and four pieces of fire-affected rock (Onzol 1996t). In March 2003, Earth Tech visited the site as part of a Phase II testing project. Earth Tech archaeologists excavated 5 shovel test units and collected 10 pieces of debitage, 21 fragments of faunal bone, and an obsidian projectile point. Earth Tech archaeologists did not observe the fire-affected rock fragments noted in the 1996 record. Through testing, Earth Tech established that the artifact assemblage was small and had limited data potential. Therefore, the site was recommended not eligible for the NRHP (Hogan-Conrad and Holmes 2004d).

On May 25, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists observed one rhyolite interior flake, one reddish-black chert interior flake, one white chert cortical, primary flake, and one black chert Gypsum projectile point (collected). Site boundaries remained unchanged.

EAFB-2265/ P-15-005659 (CA-KER-4820). The site was originally recorded in 1996 by archaeologists from Computer Sciences Corporation. They describe the site as a small milling station containing one metate fragment and two flakes (Onzol 1996g). In 2003, Earth Tech visited the site as part of a Phase II testing project. They excavated three shovel test pits and one test unit at the site and collected six flakes, one hammerstone, one metate, and one faunal bone fragment. Through testing, Earth Tech determined that the site contained no diagnostic features or artifacts, and that the subsurface deposit was sparse. Therefore, the site was recommended not eligible for the NRHP (Hogan-Conrad and Holmes 2004e).

On May 25, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists identified two rhyolite interior flakes within the previously recorded site boundary.

EAFB-2316/ P-15-005660 (CA-KER-4821). The site was originally recorded by Computer Sciences Corporation in 1996 and described as a temporary camp containing two chert chunks, one chert preform, and one groundstone fragment (de la Garza 1996g). The site has not been previously evaluated for eligibility for the NRHP.

On May 22, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP archaeologists relocated one rhyolite groundstone fragment, one grey and white chert chunk, and one grey and white chert flake. The chert preform, noted in the 1996 record, was not relocated. The site boundary remained unchanged.

EAFB-2317/ P-15-005672 (CA-KER-4833H). The site was initially recorded in 1996 by Computer Sciences Corporation as a historic refuse deposit containing three cans (de la Garza 1996h). The site has not been previously evaluated for eligibility for the NRHP.

On May 23, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, two matchstick filler cans were relocated within previous site boundary. The site boundary remained unchanged.

EAFB-2367/ P-15-005625 (CA-KER-4799). This site was originally recorded by Computer Sciences Corporation in 1996 and was described as a large, light lithic deposit with more than 20 flakes and 2 fire-affected rocks (Onzol 1996h). The site has not been previously evaluated for eligibility for the NRHP.

ECORP archaeologists relocated the site on June 19, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists observed 13 of the 20 flakes noted in the 1999 record, 1 shatter fragment, 1 edge modified flake (EMF), and 3 pieces of fire-affected rock. ECORP archaeologists found five of these flakes and one piece of fire-affected rock to the southwest of the 1999 site boundary. The site boundary was extended to encompass these artifacts.

EAFB-2368/ P-15-005626 (CA-KER-4800). The site was originally recorded in 1996 by Computer Sciences Corporation as a large, light, prehistoric temporary camp composed of approximately 40 chert flakes, 3 obsidian flakes, 1 rhyolite flake, 1 basalt flake, 1 unifacial chert tool, 1 chert core fragment, 1 schist groundstone fragment (Onzol 1996i). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on June 15, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP personnel were able to relocate one core, a worked schist fragment, and three chert flakes. In addition, the crew located an additional chert core fragment. The crew was unable to relocate the rhyolite flake, the basalt flake, or the unifacial chert tool. An additional artifact deposit was identified 49 meters east of the 1996, EAFB-2368 boundary. This additional deposit includes one rhyolite cortical, secondary flake; two jasper interior flakes; three white chert interior flakes; five rhyolite interior flakes; one brown chert interior flake; one red chalcedony interior flake; one chalcedony shatter piece; one brown chert shatter piece; one rhyolite early stage biface fragment with some cortex present; and one fragment of burned caliche. This additional deposit was combined with EAFB-2368 and the site was remapped to account for the new material.

EAFB-2369/ P-15-005627 (CA-KER-4801). CA-KER-4801 was originally recorded by archaeologists from Computer Sciences Corporation in 1996. They describe the site as a small temporary campsite containing three chert flakes and one fragment of burned faunal bone (Onzol 1996j). The site has not been previously evaluated for eligibility for the NRHP.

As part of the Edwards AFB, Oro Verde Solar Project, this site was visited on June 20, 2012 by archaeologists from ECORP Consulting, Inc. Despite an intensive search of the area, no cultural materials were identified and the site could not be located.

EAFB-2370/ P-15-005369 (CA-KER-4802). This site was originally recorded by Computer Sciences Corporation in 1996 and was described as containing more than 50 chert and rhyolite flakes, 1 chert utilized flake, and 1 basalt uniface (Onzol 1996k). The site has not been previously evaluated for eligibility for the NRHP.

In June 2012, ECORP archaeologists revisited the site as part of the Edwards AFB, Oro Verde Solar Project. The ECORP crew relocated 37 chert and rhyolite flakes, and 1 piece of granitic fire-affected rock within the previous site boundary. The crew was unable to relocate the utilized flake or the uniface noted in the 1996 record. In addition, ECORP archaeologists noted three flakes west of the 1996 boundary. The site boundary was extended to include these newly identified artifacts.

EAFB-2371/ P-15-005796 (CA-KER-4921). CA-KER-4921 was first recorded as a large, light lithic deposit by archaeologists from Computer Sciences Corporation in 1996. They describe the site as containing four flakes and one fragment of unworked chert (Onzol 1996l). In 2003 Earth Tech reclassified this site as a temporary camp following a Phase II testing Program that involved the excavation of six shovel test pits and one test unit. During this testing program, Earth Tech identified and collected 48 pieces of debitage and 20 faunal remains. Testing results were recorded in detail in the site record. Through testing, Earth Tech archaeologists established that, while subsurface deposits are present, no diagnostic artifacts were identified. The artifact assemblage lacks formal lithic tools or groundstone, and no milling features were identified on the site. Therefore, the site was recommended as ineligible for the NRHP. (Hogan-Conrad and Holmes 2004f).

On June 15, 2012 this site was updated by ECORP Consulting, Inc. as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, no cultural materials were identified within the previously recorded site boundary. This is likely due to Earth Tech's surface collections in 2003

EAFB-2372/ P-15-005797 (CA-KER-4922). CA-KER-4922 was initially recorded as a light prehistoric lithic deposit by Computer Sciences Corporation in 1996. They describe the site as containing eight chert flakes and two chalcedony flakes (Onzol 1996m). The site has not been previously evaluated for eligibility for the NRHP.

On June 15, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, only two chert flakes and one piece of burned caliche were identified within the site boundary. ECORP archaeologists noted heavy vegetation growth and multiple rodent burrows in the area, which may account for the disparity in site constituents.

EAFB-2373/ P-15-005798 (CA-KER-4923). The site was originally recorded by Computer Sciences Corporation and described as a large, light temporary camp containing more than 200 chert, rhyolite, and jasper flakes; 1 obsidian flake, 3 chert biface fragments, 1 chert core, 1 chert uniface, 1 chert unifacial tool, 1 quartz monzonite groundstone fragment (Onzol 1996n). The site was revisited by Earth Tech archaeologists in 2003 for Phase II testing. Earth Tech archaeologists described the site as containing 401 lithic artifacts including two cryptocrystalline silicate (CCS) stage 1 bifaces, one chalcedony flake tool, and fragments of CCS Stage 2 and Stage 4 bifaces, 396 pieces of debitage, 1 metate recovered from site surface, 20 faunal remains (burned, fragmented, indeterminate small mammal), and a triangular-shaped shell ornament fragment (collected). All testing results were recorded in detail in the site record. Through testing, Earth Tech archaeologists established that the site lacks diagnostic artifacts and temporal data, discrete features and loci, substantial faunal assemblage, milling features and substantial groundstone assemblage. The site, therefore, was recommended as not eligible for the NRHP (Hogan-Conrad and Holmes 2003b).

In June of 2012, the site was visited by archaeologists from ECORP Consulting, Inc. as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found the site to be generally consistent with the 2003 Earth Tech record. ECORP archaeologists noted between 250 and 300 flakes, 2 edge-modified flakes, 1 biface fragment, 1 scraper, and 2 metate fragments that fit together. Multiple pieces of fire-affected rock and burned caliche were also observed. ECORP archaeologists noted two flakes located outside of the previous site boundary. In addition, ECORP archaeologists found that the 2003 Earth Tech datum was located outside of the site boundary. The site boundary was extended to include these two artifacts and the 2003 datum.

EAFB-2377/ P-15-005642 (CA-KER-4805). The site was originally recorded in 1996 by Computer Sciences Corporation and was described as large, light temporary camp consisting of more than 100 chert, chalcedony, rhyolite, and obsidian flakes; and several pieces of fire-affected rock (Onzol 1996o). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on May 30, 2012 as part of the Edwards AFB, Oro Verde Solar Project. The flake deposit was found to be consistent with the previous site record. The area was also scattered with burned caliche and fire-affected rock, which is also in agreement with the original site record. The ECORP field crew also identified one red granitic bifacially ground mano fragment with evidence of battering, one chert projectile point fragment (collected), and one brown chalcedony biface fragment. In addition, ECORP archaeologists identified four additional concentrations of fire-affected rock and burned caliche fragments (Concentrations 1 to 4) south and southwest of the 1996 site boundary.

Concentration 1 consists of four fragments of burned caliche, five small unworked rhyolite fragments, and two fragments of fire-affected granitic rock. The size of the cobbles varies from 3 to 5 centimeters in diameter.

Concentration 2 contains approximately 50 fragments of burned caliche, 20 fragments of unworked rhyolite, and several fragments of granitic fire-affected rock. The fire-affected rock fragments range in size from 1 to 15 centimeters diameter and show varied degrees of burning.

Concentration 3 consists of 42 fragments of burned caliche, ranging in size from 2 to 10 centimeters, and 1 fragment of granitic rock. One brown chalcedony edge modified flake was noted just north of Concentration 3.

Concentration 4 contains 10 pieces of burned caliche, 14 pieces of unburned caliche, and 2 pieces of granitic schist.

The site boundary was extended in order to include these concentrations.

EAFB-2378/ P-15-005645 (CA-KER-4808). CA-KER-2378 was initially recorded in 1996 by archaeologists from Computer Sciences Corporation. They describe the site as a prehistoric temporary camp containing more than 30 chert, chalcedony, and basalt flakes; and fire-affected rock (Onzol 1996p). The site has not been previously evaluated for eligibility for the NRHP.

On May 29, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, ECORP archaeologists only located 4 flakes and 1 piece of shatter of the more than 30 flakes noted in the 1996 record. These flakes consist of one rhyolite interior flake, two interior chert flakes, one brown chalcedony interior flake and one piece of chalcedony shatter. They also located 1 quartz projectile point tip fragment, which was collected, and noted approximately 100 fragments of burned caliche and granitic fire-affected rock.

EAFB-2379/ P-15-005644 (CA-KER-4807). The site was initially recorded as a light temporary camp by Computer Sciences Corporation in 1996. They describe the site as containing more than 20 chert and chalcedony flakes, fire-affected rocks, burned faunal bone, and 2 groundstone fragments (Onzol 1996q). The site has not been previously evaluated for eligibility for the NRHP.

On May 29, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP archaeologists recorded 32 flakes, 1 piece of chert shatter, and 1 brown chert exhausted core. Flakes noted include 13 interior, white chert flakes; 4 interior, brown chert flakes; 3 cortical, primary tan chert flakes; 3 interior, grey chert flakes; 3 interior, tan chert flakes; 1 cortical, secondary, grey chert flake; 1 interior, mottled grey chert flake; 1 cortical, primary, brown chert flake; 1 interior quartzite flake; 1 cortical, primary, white chert flake; and 1 interior rhyolite flake. ECORP archaeologists were unable to relocate the fire-affected rock, faunal bone fragments, and groundstone artifacts noted in the 1996 record.

EAFB-2380/ P-15-005644 (CA-KER-4807). EAFB-2379 was initially recorded as a light temporary camp by Computer Sciences Corporation in 1996. They describe the site as containing more than 20 chert and chalcedony flakes, fire-affected rocks, burned faunal bone, and 2 groundstone fragments (Onzol 1996r). The site has not been previously evaluated for eligibility for the NRHP.

On May 29, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP archeologists recorded 30 chert flakes, 1 quartzite flake, 1 rhyolite flake, 1 piece of chert shatter, and 1 brown chert exhausted core. ECORP archaeologists were unable to relocate the fire-affected rock, faunal bone fragments, and groundstone artifacts noted in the 1996 record.

EAFB-2381/ P-1005643 (CA-KER-4806). This site was originally recorded in 1996 by Computer Sciences Corporation as containing more than 100 chert, chalcedony, and rhyolite flakes; 3 manos; 1 metate; a steatite bead; and fire-affected rocks. The steatite bead was collected during that investigation (Onzol 1996s). The site has not been previously evaluated for eligibility for the NRHP.

In May of 2012, archaeologists from ECORP Consulting, Inc. revisited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists relocated 28 of the more than 100 flakes mentioned in the original site record. These flakes consisted of one chalcedony interior flake, one chalcedony cortical secondary flake, one andesite cortical secondary flake, one piece of tan chert shatter, three brown chert interior flakes, four tan chert interior flakes, one mottled white chert cortical secondary flake, five white chert interior flakes, two gray chert interior flakes, one mottled gray chert interior flake, one rhyolite cortical secondary flake, four rhyolite interior flakes, one tan chert edge-modified flake, and one rhyolite interior utilized flake. The ECORP field crew was able to relocate all four groundstone items noted in the 1996 record. These include one unifacial mano, one bifacial mano, one mano fragment, and one metate fragment. The crew also identified one tested cobble and a hearth feature (Feature 1).

Feature 1 is a possible deflated/blown out hearth feature with more than 150 fire-affected rhyolite, andesite, and basalt cobbles. This feature measures 6.5 meters east-west by 8 meters north-south. The feature also contains one andesitic core, two andesite flakes, two chert flakes, and three possible groundstone fragments.

The site boundary was extended to include all observed artifacts and features.

EAFB-2382/ P-15-005647 (CA-KER-4810H). The site was originally recorded by Computer Sciences Corporation in 1997. This record describes the site as containing more than 200 cans (mainly food and beverage cans), more than 50 glass fragments, ceramic fragments, and miscellaneous artifacts (Onzol 1997b). The site has not been previously evaluated for eligibility for the NRHP.

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on May 29, 2012 by ECORP Consulting, Inc. archaeologists. ECORP archaeologists found that all locational, artifactual, and environmental data is consistent with the previous site record. They did note that at least 50 of the more than 200 cans noted are matchstick filler cans.

EAFB-2401/ P-15-005803 (CA-KER-4928H). This site was originally recorded in 1997 by Computer Sciences Corporation as a historic period refuse deposit containing more than 40 matchstick-filler cans; more than 10 sanitary cans; 1 fuel can; 1 large metal tank; 2 buckets with handles; purple glass; cobalt blue glass; aqua blue glass; and 1 complete purple glass jar, which was collected (Onzol 1997c). The site has not been previously evaluated for eligibility for the NRHP.

The site was revisited in May of 2012 by ECORP Consulting, Inc. as part of the Oro Verde Solar Farm Project. ECORP archaeologists identified more than 100 matchstick filler cans, and an intact clear glass bottle with an Illinois Glass Company maker's mark (collected) that dates to between 1915 and 1929 (Toulouse 1971). The ECORP field crew was unable to relocate the sanitary cans, the fuel can, the buckets, or the majority of the previously recorded glass artifacts noted in the 1997 site record. A sun-altered amethyst glass bottle body fragment was found west of the previously recorded site boundary. The site boundary was extended west to include this item.

EAFB-2402/ P-15-005604 (CA-KER-4929). The site was originally recorded in 1999 by Computer Sciences Corporation and was described as a large prehistoric temporary camp containing more than 700 chert, chalcedony, rhyolite, obsidian, basalt, and quartz flakes, 5 artifact concentrations, several pieces of schist, and several pieces of fire-affected rock. One obsidian flake, an obsidian preform, and one basalt projectile point were collected. (McGetrick and Wolfe 1999a). Computer Sciences Corporation revisited the site in 2001 during which an obsidian projectile point fragment was collected. Only the northeast corner of the site was inspected during this visit (McGetrick 2001). In 2009, archaeologists from ECORP Consulting, Inc. tested the site, identifying two large loci (Locus A and B) and excavating five shovel test pits and three test units. All five shovel test pits and one test unit were negative for cultural material. Two test units held sparse subsurface artifacts. Locus A was comprised of three distinct concentrations of lithic material (Concentrations 1-3). Locus B was a large deposit of lithic material on a claypan and an area of low lying dunes. All artifacts in the two loci were 100% surface collected as part of the testing project. All loci, concentrations, and testing results are recorded in detail in the site record (Howard et al. 2009). Based upon GIS data provided by Edwards AFB, this site has been recommended eligible for the NRHP.

On May 18, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, no cultural materials were observed. This is likely due to the 2009 surface collections.

EAFB-3049 (CA-KER-2009H). The site is a historic period homesite first recorded by R.H. Norwood in 1988. Norwood describes the site as containing fence posts, a corral feature, trash dumps, and lumber concentrations that may be the remains of structures (Norwood 1988b). The site has not been previously evaluated for eligibility for the NRHP.

The majority of CA-KER-2009H is located north of the Edwards AFB Boundary. Thus, on June 24, 2012, archaeologists from ECORP Consulting, Inc. visited only the southern portion of the site that is located within the base boundary. They noted that the southern portion of the site contains 1 piece of wire, 1 metal strip, 2 sanitary cans, 3 pieces of milled lumber, and more than 20 colorless glass fragments. The northern portion of the site has not been updated.

EAFB-3092/ P-15-009529 (CA-KER-5786). CA-KER-5786 was originally recorded in 1999 by archaeologists from Computer Sciences Corporation and was described as a prehistoric temporary camp consisting of 1 granitic mano, 1 hammerstone, 1 large granitic cobble that appears to be an anvil, and approximately 26 flakes (McGetrick 1999a). The site has not been previously evaluated for eligibility for the NRHP.

On June 6, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site conditions and constituents were consistent with the original record. ECORP archaeologists collected two items from this site. They collected the granitic mano, and a large orange smooth cobble that appears to have been moved to this location intentionally. This cobble is likely the anvil noted in the 1999 record.

EAFB-3093/ P-15-009533 (CA-KER-5790). The site is a prehistoric multiple feature roasting pit/hearth site that was first recorded in 1999 by archaeologists from Computer Sciences Corporation. They describe the site as containing 3 concentrations of fire-affected rock consisting of approximately 20 to 50 cobbles each (McGetrick 1999b). The site has not been previously evaluated for eligibility for the NRHP.

On May 21, 2012, ECORP Consulting, Inc. archaeologists visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that both the site constituents and conditions were consistent with the previous record.

EAFB-3094/ P-15-009534 (CA-KER-5791). The site is a prehistoric period roasting pit/hearth consisting of a concentration of fire-affected rock. This site was first recorded in 1999 by archaeologists from Computer Sciences Corporation. They describe the site as containing 1 concentration of approximately 50 fire-affected cobbles and a sparse outlying deposit of fire-affected rock (McGetrick 1999c). The site has not been previously evaluated for eligibility for the NRHP.

Archaeologists from ECORP Consulting, Inc. visited this site on May 21, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that all locational, artifactual, and environmental data are consistent with the previous site record.

EAFB-3114/ P-15-009535 (CA-KER-5792H). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as containing one concentration of six cans, two can lids, one ceramic bowl, one glass jar, metal screen and miscellaneous metal fragments. Three matchstick filler cans, and two glass bottles (collected) were noted outside of the concentration (McGetrick 1999d). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. revisited the site in May of 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists located the concentration and artifact deposit noted in the previous site record. In addition, the field crew identified a large, sparse refuse deposit consisting primarily of cans and glass. The scatter contains approximately 45 matchstick-filler cans measuring 4 4/16 inches high by 2 15/16 inches in diameter, dating to between 1917 and 1929 (Simonis n.d.); 4 sanitary cans; 1 external friction can with RUMFORD embossed on the lid; 1 1-gallon rectangular fuel can; 1 4-quart fuel can; 6 5-gallon rectangular fuel cans; 1 large half-circle jerry can; and 1 paint can with holes drilled in the bottom. ECORP archaeologists collected one small internal friction can with stamped ends and the embossing TIRE DOE on the base. Glass artifacts consist of approximately 10 colorless glass fragments, 1 colorless glass bottle with a metal screw top cap, embossed on the shoulder with Federal Law Forbids Sale\Or Reuse Of This Bottle, and the post-1957 Latchford Glass Company maker's mark embossed on the base (Toulouse 1971); 1 colorless glass condiment jar embossed with CAL CONS CO, with a metal screw-top cap, fluted sides, and a large gas blister in its base; 1 colorless glass octagon-shaped jar with an Owens automatic bottle machine scar and the post-1957 Latchford Glass Co. maker's mark on the base (Toulouse 1971); 1 colorless glass bottle with a screw cap, embossed with DES PAT 127687\OWILmark 9\CA PAT OFF\Carrow\Syrup\1 1/2 lbs. net. Wt., and with a Duraglas mark embossed on the base that dates to between1940 and the mid-1950s (Toulouse 1971); 1 colorless glass screw-lid jar; and 1 colorless glass bottle base embossed with H, 1 colorless glass medicine bottle (collected) with a cork stopper finish, WYETH embossed on the body, and the 1924-1969 Whitall-Tatum maker's mark embossed on the base (Toulouse 1971).

EAFB-3115/ P-15-009536 (CA-KER-5793H). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a historic period refuse deposit consisting of 16 matchstick filler cans, 2 internal friction lid cans, a 1-gallon rectangular can, a brown glass bottle, a clear glass olive type bottle, a wine bottle (collected), 2 small pieces of lumber, and a large piece of corrugated roofing/siding. (McGetrick 1999e). In 2010 this site was updated by ECORP Consulting, Inc. ECORP archaeologists identified 27 cans, 5 glass bottles, 1 ceramic fragment, milled lumber, corrugated fiberglass, and corrugated metal. Site boundaries remained unchanged (Sharp 2010b). According to GIS data provided by Edwards AFB, this site has been recommended not eligible for the NRHP.

On May 17, 2012 archaeologists from ECORP Consulting, Inc. revisited the site as part of the Edwards AFB, Oro Verde Solar Project. Archaeologists noted that the site contents and conditions are consistent with the 2010 record.

EAFB-3116/ P-15-009537 (CA-KER-5794). CA-KER-5794 was initially recorded as a prehistoric temporary campsite by Computer Sciences Corporation in 1999. They describe the site as containing more than 80 rhyolite, chert, and chalcedony flakes; 4 schist fragments; 2 obsidian biface fragments; groundstone; 1 concentration of fire-affected rock; and several large burned mammal bone fragments that are noted as being possibly human (McGetrick 1999f). The site has not been previously evaluated for eligibility for the NRHP.

On May 17, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists noted that the site boundary is consistent with the original site record; however, ECORP archaeologists were unable to relocate all of the site constituents noted in the 1999 record. Artifacts noted during the current investigation consist of approximately 60 chert, chalcedony, rhyolite, and basalt flakes. Archaeologists did not relocate the biface fragments, fire-affected rock, schist fragments, groundstone, or the large mammal bones noted in the 1999 record.

EAFB-3140/ P-15-003922 (CA-KER-3922/H). The site was originally recorded by Computer Sciences Corporation in 1994 and was described as a multi-component site containing a prehistoric temporary camp and a historic period refuse deposit (Boyer and Ronning 1994b). This site was later divided into a prehistoric site (EAFB 3188) and a historic period site (EAFB 3140). In 2002, Earth Tech visited the site as part of a Phase II testing project. They recorded the historic component (EAFB-3140) and described it as consisting of a small deposit of SAM glass located in a grove of Joshua Trees. This site was evaluated via survey recordation and archival research, and was recommended as not NRHP eligible (Bark et al. 2003). In 2005 archaeologists from JT3/CH2M Hill relocated and corrected the Earth Tech map (Bark 2005a). The site has not been previously evaluated for eligibility for the NRHP.

On May 22, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, eight pieces of sun-altered amethyst glass were relocated in a grove of Joshua Trees and the site appears consistent with the previous record.

EAFB-3150/ P15-009548 (CA-KER-5805H). The site was first recorded in 1999 by Computer Sciences Corporation. They describe the site as a historic period refuse deposit consisting of three matchstick-filler cans (Greene and McGetrick 1999a). The site has not been previously evaluated for eligibility for the NRHP.

On May 10, 2012, ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. The ECORP archaeologists were able to relocate all three previously noted artifacts; however, these artifacts were not located within the previously recorded site boundary. The site boundary was redrawn to reflect current site conditions.

EAFB-3151/ P-15-009549 (CA-KER-5806). CA-KER-5806 was initially recorded as a light prehistoric lithic deposit by Computer Sciences Corporation in 1999. They describe the site as containing 19 rhyolite flakes and being located in a recent burn area (Greene and McGetrick 1999b). In 2004, this site was updated by JT3/CH2M Hill as part of a site protection program. JT3/CH2M Hill archaeologists were unable to relocate the site and note that it may have been damaged by a nearby revegetation project (Davis and Johannesmeyer 2004). The site has not been previously evaluated for eligibility for the NRHP.

On May 10, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists were able to relocate 8 of the originally noted 19 flakes. They note, however, that the large amount of felled and decomposing brush in the southern half of the site has reduced the ground visibility to less than 5%.

EAFB-3152/ P-15-009550 (CA-KER-5807). The site was first recorded by Computer Services Corporation in 1999 and was described as a prehistoric temporary campsite containing over 100 flakes of mostly chert in a variety of colors, and lesser numbers of rhyolite, quartz, obsidian, and chalcedony; several schist fragment;, and a ground stone fragment (Greene and McGetrick 1999c). In 2004 the site was tested by JT3/CH2M Hill. They expanded the site boundary to contain 3 loci, 3 hearth features and over 4,000 artifacts. Locus 1 is a multipurpose habitation area; Locus 2 is a flaked lithic tool manufacturing area; and Locus 3 is a groundstone manufacturing area. During their testing program, JT3/CH2M Hill excavated 9 test units and collected 4,412 artifacts; however, the results of the excavation units are not provided in the site record. This record includes the NRHP status code indicating that the site is recommended not eligible for the NRHP (McGetrick 2005).

On May 8, 2012, EAFB-3152 was visited by ECORP Consulting, Inc. as part of the Edwards AFB, Oro Verde Solar Project. Likely due to the previous surface collection, ECORP archaeologists could not relocate any of the features or loci noted in the 2004 record. Only two flakes were observed within the previously recorded site boundary.

EAFB-3153/ P-15-009551 (CA-KER-5808). CA-KER-5808 was initially recorded as a light prehistoric lithic deposit by Computer Sciences Corporation in 1999. They describe the site as containing six chert and jasper interior flakes, one cortical chert flake, and one chert biface (Greene and McGetrick 1999d). The site has not been previously evaluated for eligibility for the NRHP.

On May 9, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, ECORP archaeologists were only able to locate two newly recorded rhyolite interior flakes and one chert cortical flake.

EAFB-3154/ P-15-009552 (CA-KER-5809). The site was originally recorded in 1999 by Computer Sciences Corporation. They describe the site as a prehistoric lithic deposit containing 70 interior flakes and 3 cortical flakes. The flakes are mostly chert and range in color from white to tan to dark brown. The record notes that there are also a few chalcedony flakes present. (McGetrick and Greene 1999a). The site has not been previously evaluated for eligibility for the NRHP.

On May 10, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site conditions and constituents were consistent with the original record. One obsidian projectile point (collected) was identified within site boundaries.

EAFB-3155/ P-15-009553 (CA-KER-5810H). The site was originally recorded in 1999 by Computer Sciences Corporation and was described as a historic period refuse deposit consisting of more than 50 matchstick filler cans, paint cans, sanitary cans, sun-altered amethyst glass fragments, antenna wire, barrel straps, chair springs, sheet metal, mesh, milk glass, a spice can, stove burner fragments, an enameled pie tin, light bulb glass, and galvanized metal fragments. A powder can with an unusual hinge closure was collected (Greene and McGetrick 1999e). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting Inc. visited the site on May 11, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists relocated the assemblage noted from the 1999 record and found it to be consistent with the previous site record. ECORP archaeologists found an additional large, sparse refuse deposit of approximately 50 cans southeast of the 1999 site boundary. This assemblage consisted of 36 ice pick-opened matchstick filler cans measuring 2 15/16 by 4 4/16 inches and dating to between 1917 and 1929 (Simonis n.d.), 2 knife-opened matchstick filler cans, 3 church key-opened matchstick filler cans, 1 crushed small matchstick filler can, 5 other unidentifiable matchstick filler cans, 1 matchstick filler can fragment, 4 rotary-opened sanitary cans, 9 Peerless can opener-opened sanitary cans, 1 jab lift-opened sanitary can, 1 cooking oil tin with stamped and soldered ends and a punched vent hole, 1 large sanitary can lid, 3 knife-punched sanitary cans, 4 rotary-opened sanitary cans, 1 P38-opened sanitary can, one large sanitary can with an unknown type of opening, 1 small sanitary can with an unknown type of opening, 4 sanitary can fragments, 1 rectangular meat tin, 1 small internal friction paint can, 1 external friction paint can lid, 1 external friction can lid stamped No, 4 metal fragments embossed Colton Cal.\Acents\9. Gal\...BS, 1 metal strip, and 1 metal fragment. The site boundary was redrawn to accommodate this deposit.

EAFB-3157/ P15-009555 (CA-KER-5812). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a sparse prehistoric lithic deposit of eight chert flakes (McGetrick 1999g). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists revisited the site on May 11, 2012 as part of the Edwards AFB, Oro Verde Solar Project. They were unable to relocate the site at its original mapped location. However, within 50 meters they located a lithic deposit likely associated with EAFB-3157. The deposit consists of one rhyolite cortical flake, four rhyolite interior flakes, one white chert interior flake, one pink chert interior flake, one piece of rhyolite banded shatter, one piece of dark chalcedony shatter, one piece of red jasper shatter, one piece of light red jasper shatter, and one unifacial pink rhyolite leaf-type projectile point (collected). The site boundary was redrawn to reflect current site conditions.

EAFB-3158/ P-15-009556 (CA-KER-5813). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a large, light prehistoric lithic deposit, containing two chert flakes, one chalcedony flake, and two rhyolite flakes. (McGetrick 1999h). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on May 10, 2012 as part of the Edwards AFB, Oro Verde Solar Project. The filed crew found the site to be located immediately north of the previously mapped site boundary. The ECORP archaeologists relocated five flakes; however, they noted the flakes consisted of two white chert interior flakes, two white chert secondary cortical flakes, and one pink rhyolite interior flake. In addition, the crew located two pieces of brown chert shatter, and one leaf-shaped fine grained basalt projectile point (collected) were identified within site boundaries

EAFB-3159/ P-15-009557 (CA-KER-5814H). The site was originally recorded in 1999 by Computer Sciences Corporation. They noted two loci containing historic period refuse deposits consisting of cans, bottles, glass fragments, ceramic fragments, and miscellaneous household type refuse (McGetrick and Greene 1999b). The site has not been previously evaluated for eligibility for the NRHP.

On May 8, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During ECORP's field check, archaeologists were able to relocate both loci at this site. ECORP archaeologists found the site conditions and constituents to be generally consistent with the original site record but noted that most of the originally noted glass fragments were missing. Glass fragments may have been looted or buried. In addition, one pair of eyeglasses was collected during this field check.

EAFB-3160/ P-15-009558 (CA-KER-5815). EAFB-3160 was originally recorded by Computer Sciences Corporation in 1999 and was described as a prehistoric lithic deposit containing more than 200 chert flakes and an obsidian projectile point that was collected (McGetrick 1999i). The site has not been previously evaluated for eligibility for the NRHP.

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on May 9, 2012 by ECORP archaeologists. ECORP archaeologists found that all locational, artifactual, and environmental data are consistent with the previous site record.

EAFB-3161/ P-15-009559 (CA-KER-5816). This site is a prehistoric period large, light temporary camp first recorded in 1999 by Computer Sciences Corporation. They describe the site as a large, light temporary camp containing more than 30 chert flakes and 1 schist fragment (McGetrick 1999j). In 2004, the site was visited by Earth Tech as part of a Phase II testing program. Earth Tech describes the site as containing 55 chert flakes, 1 chert biface, 2 flake tools, and 2 faunal remains. During this testing project, Earth Tech excavated two shovel test pits and collected all surface artifacts. Shovel test pits revealed a sparse, shallow subsurface artifact deposit. This record includes the NRHP status code indicating that the site is recommended not eligible for the NRHP. . Testing results are recorded in detail in the site record (Bark et al. 2004e).

As part of the Edwards AFB, Oro Verde Solar Project, the site was visited on May 14, 2012 by ECORP Consulting, Inc. archaeologists. Despite an intensive search of the area, ECORP archaeologists only identified two chert interior flakes within the previously recorded site boundary. This is likely due to Earth Tech's surface collection in 2004.

EAFB-3162/ P-15-009560 (CA-KER-5817). The site was originally recorded in 1998 by Computer Sciences Corporation and was described as a large, light, prehistoric temporary camp consisting of one schist mano (collected), and more than 150 chert, chalcedony, and rhyolite flakes. The record notes that the majority of artifacts are concentrated in two areas (McGetrick and Wolf 1999b). ECORP archaeologists visited the site on May 12, 2009 as part of the Edwards Air Force Base Damages V Phase II testing project. Seven 50 by 50-centimeter shovel test pits were excavated throughout the site. Three STPs were placed in Concentration 1; three STPs were placed in Concentration 2; and one STP was placed outside of the concentrations. All surface artifacts were collected. One STP was negative for subsurface material, but the other STPs revealed the presence of a sparse subsurface deposit. Testing results were recorded in detail in the site record (Knypstra and Denniston 2009). According to GIS information provided by Edwards AFB, this site has been recommended not eligible for the NRHP.

ECORP archaeologists visited the site on May 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. The site had been surface collected and no artifacts were identified within site boundaries; however, personnel observed additional artifacts 48 meters south of the previously recorded southern site boundary. These artifacts consisted of one mottled white and brown chalcedony interior flake, one piece of chalcedony shatter, one piece of brown chalcedony shatter, and one piece of white chert shatter. The site boundary was redrawn to extend the southern portion of the site to accommodate the newly recorded artifacts.

EAFB-3163/ P-15-009561 (CA-KER-5818). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a large, light temporary camp consisting of more than 150 flakes, 2 serrated unifaces, 2 biface fragments (both collected), and a schist fragment. McGetrick noted that the majority of flakes were chert, with the exception of five rhyolite flakes, five chalcedony flakes, five obsidian flakes, and one jasper flake. (McGetrick 1999k). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on May 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel observed approximately 85 flakes composed primarily of chert material. The color of the chert included tan, white, and brown. One obsidian flake was noted. ECORP personnel were unable to relocate the two unifaces noted in the previous site record. One rhyolite interior flake was located 20 meters east of the site boundary. The eastern site boundary was expanded to encompass this artifact.

EAFB-3164/ P-15-009562 (CA-KER-5819H). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a historic period refuse deposit containing more than 200 cans, including 150 matchstick filler cans, 40 hole-in-cap cans, and 30 sanitary seam cans; approximately 100 glass fragment;, more than 50 ceramic fragments and miscellaneous household refuse (McGetrick 1999l). The site has not been previously evaluated for eligibility for the NRHP.

On May 9, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site conditions and constituents were consistent with the 1999 site record. The addition of one large piece of corrugated metal was noted in the eastern portion of the site.

EAFB-3165/ P-15-009563 (CA-KER-5820). The site was originally recorded by Computer Sciences Corporation in 1999. The site was described as a large, light lithic deposit consisting of more than 150 brown, white, tan, and gray chert/chalcedony flakes; 15 rhyolite flakes; and 2 obsidian flakes (McGetrick 1999m). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on May 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. During this visit, approximately 85 artifacts were observed. These artifacts consisted of lithic flakes of chalcedony, tan and white chert, and purple rhyolite. Two flakes were also found west of the previous western site boundary. One is a white chert interior flake and the other is a red rhyolite interior flake. The site boundary was extended west to encompass the newly identified artifacts.

EAFB-3166/ P-15-009564 (CA-KER-5821). The site was originally recorded by archaeologists from Computer Sciences Corporation in 1999 and was described as a lithic deposit containing 32 rhyolite flakes, 3 chert flakes, and 1 chert biface midsection (McGetrick 1999n). The site has not been previously evaluated for eligibility for the NRHP.

The site was visited on May 10, 2012 by ECORP Consulting, Inc. as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists identified 23 flakes of the originally recorded 35 flakes and 1 newly identified rhyolite biface fragment. ECORP archaeologists were unable to relocate the chert biface fragment mentioned in the 1999 record.

EAFB-3167/ P-15-009565 (CA-KER-5822H). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a historic refuse deposit containing more than 40 cans, 35 of which are sanitary cans; more than 50 glass artifacts; and miscellaneous household refuse. In addition, they collected one sun-altered amethyst glass bottle and one whiskey bottle (McGetrick 1999o). The site has not been previously evaluated for eligibility for the NRHP.

On May 14, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site boundary is consistent with the previous record but the density of the site has been reduced since the time it was first recorded. Artifacts identified during the current project include 11 sanitary cans, 1 key wind tin lid, 1 external friction can, 1 hole-in-cap coffee can with a hand-soldered seam, one tobacco tin lid, 1 colorless glass bottle embossed with OLD QUAKER and 1 whiskey bottle.

EAFB-3168/ P-15-009554 (CA-KER-5811). The site was originally recorded in 1999 by Computer Sciences Corporation. The site was described as a prehistoric large, light lithic deposit containing 80 flakes. The flakes were described as 36 rhyolite interior flakes, 40 chert/chalcedony interior flakes, and 4 chert cortical flakes. One chert flake was noted as having a unifacially modified edge (McGetrick 1999p). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on May 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel noted the site was fairly consistent with the previous site record; however, the crew was only able to relocate approximately 55 of the 80 flakes noted in the previous site record. The crew was unable to relocate the chert flake with the modified edge. During this investigation, a previously unrecorded brown chert biface fragment was identified. Site boundaries were modified to include all artifacts noted.

EAFB-3169/ P-15-009539 (CA-KER-5796). The site was originally recorded by Computer Sciences Corporation in 1999 and was described as a light prehistoric lithic deposit containing 20 white, tan, and brown chert/chalcedony interior flakes; one purple rhyolite interior flake; one brown chert cortical flake; and one tan chert biface fragment (McGetrick 1999q). The site has not been previously evaluated for eligibility for the NRHP.

On May 14, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site boundary was consistent with the previous record. Personnel relocated the previously recorded biface fragment; however, they were only able to relocate 10 of the 23 flakes noted in the original record.

EAFB-3171/ P15-009541 (CA-KER-5798). The site was originally recorded by Computer Sciences Corporation in 1999 as a prehistoric temporary camp containing 100 to 150 pieces of blackened caliche. The pieces of caliche are described as being palm-sized and smaller, pieces distributed over a 16 by 13-meter area that may represent a deflated hearth (McGetrick 1999r). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on May 15, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel relocated the deposit of burned caliche and noted that the description was consistent with the previous site record. In addition, ECORP archaeologists identified a lithic deposit northeast of the site boundary consisting of four obsidian interior flakes, one jasper interior flake, two brown chalcedony interior flakes, one purple rhyolite interior flake, two pieces of purple rhyolite shatter, one piece of brown chalcedony shatter, and one piece of obsidian shatter. The site boundary was extended to the northeast to encompass these newly identified artifacts.

EAFB-3172/ P-15-009542 (CA-KER-5799). This site was originally recorded by Computer Sciences Corporation in 1999 and was described as a prehistoric large, light temporary camp consisting of more than 100 lithic flakes in two loci. Locus 1 was described as containing 75 to 100 purple rhyolite flakes and 10 chert flakes of various colors. Locus 2 was described as consisting of 15 purple rhyolite flakes, 7 tan and white chert flakes, 3 quartz flakes, 1 obsidian flake, and 1 schist fragment. The record notes a scattering of burned caliche throughout Locus 2 but it is stated that it was unclear if the caliche was cultural or related to a brush fire, as similar pieces had been observed throughout the immediate area (McGetrick 1999s). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on May 15, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel observed 50 to 60 flakes in the area designated as Locus 1 in the previous site record. These flakes consisted mostly of purple rhyolite. ECORP archaeologists also noted the presence of one purple rhyolite biface fragment; several pieces of rhyolite shatter; one chalcedony flake; one piece of schist; one red and cream banded rhyolite tested cobble with a possibly ground surface; and two fragments of charred bird bone. The field crew was unable to locate Locus 2, but one chalcedony flake, one rhyolite flake and one piece of schist were identified in the area that had been designated as Locus 2 in the previous site record. A seasonal drainage extends east from the previously mapped location of Locus 2. Erosion related to this drainage may have removed or buried the previously recorded Locus 2. The site boundary was redrawn to reflect these new findings.

EAFB-3173/ P-15-009543 (CA-KER-5800). The site was originally recorded in 1999 by Computer Sciences Corporation and was described as a large prehistoric temporary campsite containing 50 flakes, 1 chert core, 1 rhyolite biface fragment, and 1 *olivella* bead. Flakes consist of 19 tan and white chert/chalcedony interior flakes, 3 tan chert cortical flakes, 16 purple rhyolite interior flakes, 3 rhyolite cortical flakes, 3 obsidian interior flakes, and 6 quartz flakes. Both the *olivella* bead and one obsidian flake were collected (McGetrick 1999t). The site has not been previously evaluated for eligibility for the NRHP.

On May 15, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project and noted that the site boundary is consistent with the previous record. ECORP archaeologists were able to relocate approximately 30 of the 50 flakes noted in the original record along with the previously noted rhyolite biface fragment and chert core. In addition, archaeologists identified one newly recorded rhyolite biface fragment.

EAFB-3174/ P-15-009544 (CA-KER-5801). This site was originally recorded by Computer Sciences Corporation in 1999 and described as a prehistoric large, light temporary camp with two loci. Locus 1 contains 12 chert/chalcedony flakes, 10 rhyolite flakes, and 4 schist fragments. Locus 2 contains 7 chert flakes, and 12 purple rhyolite flakes. Locus 2 also has a small concentration of chert, rhyolite, quartz, and granitic chunks (McGetrick 1999u) The site has not been previously evaluated for eligibility for the NRHP..

ECORP Archaeologists visited the site on May 15, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel were unable to relocate Locus 1. ECORP archaeologists identified approximately 20 flakes in Locus 2 and extended the locus boundary to accommodate a newly recorded deflated hearth feature (Feature 1). Feature 1 is a deflated hearth feature located at the southeast corner of Locus 2. The feature measures approximately 4 meters across, and consists of approximately 20 chunks of fire-affected rock, most of which is caliche, rhyolite, basalt, and granitic material. Two fragments of a granitic mano were found within the hearth feature. One dark brown chert projectile point (collected) was identified south of Feature 1. In addition, the site boundaries were expanded to reflect the current extent of the site constituents.

EAFB-3175/ P-15-009545 (CA-KER-5802). The site was originally recorded by Computer Sciences Corporation in 1999 as a prehistoric large, light temporary camp containing 41 chert and chalcedony flakes, 1 chert biface fragment, 8 schist fragments, and an obsidian projectile point, which was collected (McGetrick 1999v). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Archaeologists visited the site on May 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists were only able to relocate 17 rhyolite, chert, and chalcedony flakes along the southern edge of the previously recorded site boundary. Artifacts observed by ECORP include 12 rhyolite interior flakes, 1 rhyolite secondary flake, 2 tan chert cortical flakes, 2 chalcedony interior flakes, and 1 rhyolite hammerstone. ECORP archaeologists were unable to relocate the chert biface fragment and eight schist fragments noted in the 1999 record.

EAFB-3176/ P-15-009546 (CA-KER-5803). This site is a prehistoric period large, light lithic deposit that was first recorded by Computer Sciences Corporation in 1999. They describe the site as consisting of 23 chert/chalcedony and rhyolite flakes (McGetrick 1999w). The site has not been previously evaluated for eligibility for the NRHP.

ECORP archaeologists visited on May 14, 2012 as part of the Edwards AFB, Oro Verde Solar Project. The ECORP field crew found that the locational, artifactual, and environmental data remain consistent with the previous site record.

EAFB-3177/ P-15-009547 (CA-KER-5804). The site was originally recorded by Computer Sciences Corporation in 1999 as a prehistoric large, light temporary camp containing 12 chert flakes, 7 rhyolite flakes, 1 chalcedony flake and 2 schist fragments (McGetrick 1999x). The site has not been previously evaluated for eligibility for the NRHP.

The site was visited in May of 2012 by ECORP Consulting, Inc. archaeologists as part of the Edwards AFB, Oro Verde Solar Project. Personnel observed 33 flakes and pieces of shatter, 2 edge-modified flakes, a core, a core tool, a mano fragment, and a possible deflated hearth feature (Feature 1).The flake deposit consisted of one mottled white chert interior flake with a retouched edge, one white chert secondary cortical flake with a retouched edge, nine white chert interior flakes, one gray chert interior flake, one tan chert interior flake, one brown chert secondary cortical flake, one piece of red/black chert shatter, one piece of white chert shatter, two pieces of black chert shatter, three chalcedony interior flakes, one butterscotch chalcedony flake, one piece of tan chalcedony shatter, seven rhyolite interior flakes, one rhyolite secondary cortical flake, one gray quartzite interior flake, and two obsidian interior flakes. Feature 1 is a possible deflated hearth consisting of 13 fragments of fire-affected rock in an area measuring 7.5 meters (north-south) by 3 meters (east-west). The site was remapped to reflect the additional artifacts and Feature 1.

EAFB-3186/ P-15-003920 (CA-KER-3920). The site is a prehistoric temporary campsite that was first recorded by Computer Sciences Corporation in 1994. They describe the site as containing a lithic deposit, one biface fragment, one core, and one concentration of fire-affected rock. (Ronning et al. 1994). In 2004, the site was visited by archaeologists from Earth Tech as part of a Phase II testing program. As part of this program, Earth Tech archaeologists modified the original site boundary and excavated shovel test pits and test units. In addition, they collected 147 pieces of debitage, 237 fragments of faunal bone, 1 biface, and 1 core from the site. The site record does not include a discussion on individual shovel test pits, the test unit, or subsurface artifact deposits. This record includes an NRHP status code indicating that the site has been recommended not eligible for the NRHP (Bark et al. 2004f).

As part of the Edwards AFB, Oro Verde Solar Project, CA-KER-3920 was visited on May 23, 2012 by archaeologists from ECORP Consulting, Inc. Despite an intensive search of the area, ECORP archaeologists did not identify any cultural resources within the previously recorded site boundary. This is likely due to Earth Tech's surface collections in 2004.

EAFB-3188 (CA-KER-3922). The site was initially recorded in 1994 by archaeologists from Computer Sciences Corporation and was described as a large prehistoric temporary campsite containing four concentrations of fire-affected rock, a large lithic deposit in a Joshua tree grove, and a possible pot hunter's spoils pile. Computer Sciences Corporation archaeologists noted a historic period refuse deposit on the eastern edge of the site (EAFB-3140) (Boyer and Ronning 1994c). Following the initial site record, EAFB-3188 was updated in both 2005 and 2007 by JTS/CH2M Hill. Both updates found the site to be consistent with the previous record but did note several disturbances to the site including new motorcycle tracks that run through site (Sergejev and Kramme 2007b and Bark 2005b). The site has not been previously evaluated for eligibility for the NRHP.

On May 25, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP archaeologists were able to relocate three out of four fire-affected rock concentrations, not relocating the fire-affected rock concentration on the eastern edge of the site. In addition, archaeologists relocated the presumed pot hunter's spoils pile, a rhyolite core, and noted the presence of multiple chert and rhyolite flakes.

EAFB-3337. The Edwards AFB GIS database contains a shape file for EAFB- 3337 and notes that this site was recorded as part of project 1984-013. It is described as a lithic deposit containing 20 flakes and 1 core. No DPR records appear to exist for this site. The site has not been previously evaluated for eligibility for the NRHP.

On May 31, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that the site contents were consistent with the information in the GIS database.

EAFB-3338. The Edwards AFB GIS database contains a shape file for EAFB- 3338 and notes that this site was recorded as part of project 1984-013. It is described as a lithic deposit containing three flakes. No DPR records appear to exist for this site. The site has not been previously evaluated for eligibility for the NRHP.

On May 29, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, no cultural resources were found within the previously recorded boundary and this site was not relocated.

EAFB-3340. The Edwards AFB GIS database contains a shape file for EAFB- 3340 and notes that this site was recorded as part of project 1984-013. It is described as a lithic deposit containing three flakes. No previous site records appear to exist for this site. The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on June 7, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists identified a lithic deposit containing eight flakes slightly east of the previous shape file. Flakes consisted of three white chalcedony interior flakes, one dark grey chalcedony cortical secondary flake that is highly weathered, two chalcedony interior flakes, one white chert micro-flake and one rhyolite cortical flake. The site was remapped to reflect the correct location and site contents.

EAFB-3341. The Edwards AFB GIS database contains a shape file for EAFB- 3341 and notes that this site was recorded as part of project 1984-013. It is described as a lithic deposit containing five flakes. No DPR records appear to exist for this site. The site has not been previously evaluated for eligibility for the NRHP.

On June 7, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. Despite an intensive search of the area, no cultural resources were found within the previously recorded boundary and this site was not relocated.

EAFB-3347. The Edwards AFB GIS database contains a shape file for EAFB- 3347 and notes that this site was recorded as part of project 1984-013. It is described as a lithic deposit containing five flakes. No previous site records appear to exist for this site. The site has not been previously evaluated for eligibility for the NRHP.

In June of 2012, ECORP Consulting, Inc. archaeologists visited site EAFB-3347 as part of the Edwards AFB, Oro Verde Solar Project. Personnel identified a lithic deposit consisting of five flakes, one piece of shatter, and one piece of fire-affected rock. All site contents were relocated approximately 25 meters south of the previous shape file. The site was remapped to reflect the correct location and site contents.

EAFB-3582. The site was identified through historic period maps by Harriot Spinney in 2004. It is described as a north-south trending historic period road that extends from the northern base boundary to the southern base boundary (Spinney 2004). The site has not been previously evaluated for eligibility for the NRHP.

On June 11, 2012 archaeologists from ECORP Consulting, Inc. visited the portion of the road that bisects the Oro Verde Solar Project Study Area. ECORP archaeologists found that the site is consistent with the previous record.

EAFB-3828. EAFB-3828 is a section of the east-west trending historic period Sopp Road. This road extends east-west through Edwards AFB and extends west past the base boundary for 0.5 mile. Multiple homestead sites are located along the road (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On May 25, 2012 archaeologists from ECORP Consulting, Inc. visited the portion of Sopp Road that bisects the Oro Verde Solar Project Study Area. ECORP archaeologists found that the site conditions are consistent with the previous record. ECORP archaeologists also noted the presence of multiple refuse deposits along the length of the road.

EAFB-3830. EAFB-3830 is an east-west trending historic period unnamed road identified through historic period maps. This road extends east-west through Edwards AFB and extends west past the base boundary for 0.5 mile. Historic maps show multiple homestead sites located along the road (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On May 14, 2012 archaeologists from ECORP Consulting, Inc. visited the portion of EAFB-3830 that bisects the Oro Verde Solar Project Study Area. ECORP archaeologists found that the site conditions are consistent with the previous record.

EAFB-3834. EAFB-3834 is a north-south trending historic period, unnamed, road identified through historic period maps. This road runs north-south along a section line through Edwards AFB, approximately 1 mile west of Division Street (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On May 15 and 21, 2012 archaeologists from ECORP Consulting, Inc. visited the portion of EAFB-3834 that bisects the Oro Verde Solar Project Study Area.. ECORP archaeologists found that the site conditions are consistent with the previous record. A matchstick filler can and a 5-gallon fuel can were noted in association with this road.

EAFB-3836. EAFB-3836 is an east-west trending section of Middle Butte Road (also known as Backus Road) identified through historic period maps. This road was described by Tetra Tech in 2006. They note that the road runs east-west along a section line through Edwards AFB, approximately 1 mile south of Trotter Avenue (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On May 21, 2012, ECORP Consulting visited a portion of this site that runs through the Oro Verde Solar Project Study Area. Only a portion of this road, from Division Street to 0.5 mile east of Division Street, was updated during this survey project. After this point the road was obscured by clay pan but likely continues east past the recorded area. ECORP archaeologists found that the site conditions are consistent with the 2006 Tetra Tech, Inc. description. In addition, ECORP archaeologists recorded one refuse deposit (Concentration 1) located along Backus Road, approximately 400 feet east of Division Street. Two artifacts were collected from the refuse deposit including one egg beater and one metal toy man.

Concentration 1 includes 15 sanitary cans, 4 corrugated sanitary cans, 15 flat top beverage cans, 2 1-quart rectangular fuel cans, and 1 aerosol can. Glass items noted include 22 colorless glass fragments, approximately 35 green glass fragments, approximately 10 amber glass fragments, and 2 cobalt glass fragments. Glass bottles and jars with embossing consist of one milk glass jar with screw top threads that is embossed with PONDS and 11-3 on the base, one colorless glass bottle with a metal screw top cap that is embossed with WISHBONE on the body and DES PAT 169344 on the base, one colorless glass mason jar with a metal screw top cap and a Glass Containers Corporation maker's mark, one colorless rectangular bottle embossed with 29 60 on the base, one colorless glass bottle base with a Thatcher Manufacturing Company maker's mark that dates from 1900 to 1946 (Toulouse 1971), two colorless glass bottle bases with Ball maker's marks, one colorless bottle base with unreadable embossing, one green glass bottle base with a Owens Illinois maker's mark and Duraglas that likely dates to the early 1950s (Toulouse 1971), one green glass bottle base with an Anchor Hocking maker's mark, three green glass bottle bases with Anchor Hocking maker's marks and a red and white applied colored lithograph reading Bubble UP\KISS OF LEMON-KISS OF LIME, and one colorless glass jar with a Hazel Atlas maker's mark dating from 1902 to 1964 (Toulouse 1971). Sub-modern glass artifacts noted include one green glass bottle base with GALLO FLAVOR-GUARD BOTTLE\REFILLING PROHIBITED\40\REG\LAL dating from 1966 to present (Toulouse 1971), one small colorless medicine bottle with a post-1954 Owens Illinois maker's mark and prescription pad type ACL, one green glass bottle base with a post 1954 Owens Illinois maker's mark, one colorless bottle base with a post-1954 Owens Illinois maker's mark, and one amber glass bottle with "NO DEPOSIT" and a post 1954 Owens Illinois maker's mark. Additional artifacts noted in Concentration 1 include two earthenware mug fragments with a white glaze and hand painted fruit pattern, one large piece of pink feldspar, one piece of fire-affected granite, one fender from a bicycle, one triangular metal box with straps and wire attached, one plastic tube with metal coils inside and two product plates with the inscription HY TEMP\HYDRO AIRE LOS ANGELES \REEXAMINATION SERVICE\UL\of\UNDERWRITERS LABORATORIES, one partial license plate holder, and one metal cylinder with a handle. Two artifacts were collected from this assemblage.

Artifacts noted outside of Concentration 1 consist of 8 rotary-opened sanitary cans, 5 church key-opened flat top beverage cans, 3 aerosol cans, 1 rectangular oil can, 1 matchstick filler can, approximately 50 colorless glass bottle fragments, approximately 100 colorless pane glass fragments, approximately 30 amber glass fragments, 1 colorless glass stemmed goblet, 1 cobalt screw cap bottle finish, 1 amber glass bottle with a Fairmount Glass Company maker's mark dating between 1945 and 1960 (Toulouse 1971), 1 amber glass bottle with a Northwestern Glass Company maker's mark, 1 metal muffler, milled wood, and one decorate metal wheel with an axle.

EAFB-3875. EAFB-3875 is an unnamed, unpaved road identified through historic period maps. This road runs south and southeast through Edwards AFB. This road is likely associated with a historic-period mining site located at its eastern terminus (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On June 15, 2012 archaeologists from ECORP Consulting, Inc. visited the portion of EAFB-3875 that bisects the Oro Verde Solar Project Study Area. The portion of this road that runs through the project area is oriented roughly north-south. ECORP archaeologists found that the site conditions are consistent with the previous record.

EAFB-3882. EAFB-3882 is an unnamed, unpaved road identified through historic period maps. This road appears to be an extension of Middle Butte Road and runs roughly northwest-southeast through Edwards AFB. This road is likely associated with the historic period Barnes Airfield/Oro Verde Airport (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On May 31, 2012 archaeologists from ECORP Consulting, Inc. visited the portion of EAFB-3882 that bisects the the Oro Verde Solar Project Study Area. Two small east-west trending portions of this road cross the project area. ECORP archaeologists found that the site conditions are consistent with the previous record. In addition, archaeologists noted a small roadside refuse deposit that is likely associated with EAFB-3882. This deposit contains one small paint can, one external friction can embossed with CANCO, and two small hole-in-cap cans. Hole-in-cap cans were manufactured between 1810 and the late 1930s (Rock 1989).

EAFB-3890. EAFB 3890 is an unnamed, unpaved road identified through historic period maps. This northwest-southeast trending road appears on 1930s maps and is depicted running from the town of Mojave to the Mojave River (Tetra Tech, Inc. 2006). The site has not been previously evaluated for eligibility for the NRHP.

On June 20, 2012 archaeologists from ECORP Consulting, Inc. visited EAFB-3890 as part of the Edwards AFB, Oro Verde Solar Project. Despite intensive searching, only a portion of this road was relocated by ECORP archaeologists. This portion extends southeast from a wood post associated within site EAFB-23 (a historic period homestead) toward another wood post approximately 0.4 mile (600 meters) away. The road continues past the second post, trending southeast for an unknown distance. Two historic period oil/fuel cans were noted along this section of EAFB 3890. Both cans have soldered seams and spouts. One is embossed with 5 US GALLONS. The portions of this road northwest of EAFB-23 were not relocated and may have been obscured by erosion and vegetation growth.

EAFB-4199/ P-15-014206 (CA-KER-7946). The site is a prehistoric large, light lithic deposit originally recorded by JT3/CH2M Hill in 2008. They describe the site as containing six flakes, one edge-modified flake, one core and one schist groundstone fragment (Sergejev 2008). The site has not been previously evaluated for eligibility for the NRHP.

On June 21, 2012 ECORP archaeologists visited EAFB-4199 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists were able to relocate all six flakes, the edge-modified flake, the core, and the schist groundstone fragment noted in the 2008 record; however, field personnel noted that the schist fragment they found did not appear to be ground. ECORP archaeologists found additional artifacts both inside and outside the previous 2008 boundary. In total, ECORP archaeologists noted one white chert core fragment, one gray chert cortical secondary flake, one retouched dark gray chert interior flake, two tan chert cortical secondary flakes, three tan chert interior flakes, one brown chert interior flake, three gray chert interior flakes, one white chert interior flake, one piece of tan chert shatter, two dark brown chert shatter pieces, one clear/orange chalcedony interior flake, one brown chalcedony interior flake, one brown chalcedony cortical secondary flake, one piece of chalcedony shatter, three purple rhyolite interior flakes, four jasper interior flakes, and one obsidian interior flake. Additional artifacts noted include two reddish basalt mano fragments with distinct shoulders that refit and appear fire-affected, one possible ground fragment of an orange-colored aggregate rock, one fragment of unworked schist, and three burned caliche fragments. The site boundary was remapped in order to include the newly identified artifacts.

EAFB-4205/ P-15-014204 (CA-KER-7944). The site was originally recorded by archaeologists from JT3/CH2M Hill and was described as a light prehistoric lithic deposit containing 11 chert flakes and 2 groundstone fragments (Porter-Rodriguez 2008a). The site has not been previously evaluated for eligibility for the NRHP.

On June 18, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists identified 21 chert flakes within the previously recorded site boundary. The two groundstone fragments noted in the 2008 record were not relocated.

EAFB-4217. The site was originally recorded by JT3/CH2M Hill in 2008 and was described as a historic period civilian refuse deposit containing approximately 200 cans, 50 glass bottles, 10 ceramic fragments, 10 tumbler fragments, milled wood, clothes hangers, cold cream jars, auto parts, crown caps, and a license plate which was collected (Sergejev and Porter-Rodriguez 2008b). The site has not been previously evaluated for eligibility for the NRHP.

On May 21, 2012 archaeologists from ECORP Consulting, Inc. visited EAFB-4217 as part of the Edwards AFB, Oro Verde Solar Project. ECORP archaeologists found that all locational, artifactual, and environmental data remain consistent with the previous site record.

EAFB-4223. The site was originally recorded by archaeologists from JT3/CH2M Hill in 2008 and was described as a prehistoric large, light temporary camp. They describe the site as containing two hearth features and four distinct artifact loci, each containing flakes, flaked tools, groundstone, burned faunal bone, and fire-affected rock (Sergejev and Porter-Rodriguez 2008c). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site in June of 2012 as a part of the Edwards AFB, Oro Verde Solar Project. They relocated a portion of the artifacts noted in the 2008 and one of the two previously recorded hearth features (Feature 1).

During the site visit, ECORP Consulting, Inc. archaeologists relocated Feature 1. Feature 1 consisted of two pieces of embedded quartz monzonite. Feature 2, which consisted of four pieces of embedded quartz monzonite, could no longer be identified anywhere in the vicinity of its previously mapped location.

Locus 1 was originally recorded as a deposit of 18 flakes, 1 chert retouched flake, 2 pieces of shatter, a metate fragment, 2 mano fragments, 2 pieces of schist groundstone, more than 10 fire-affected rocks, and 3 pieces of faunal bone. ECORP archaeologists were able to relocate the retouched flake and the shatter, but did not observe the metate fragment, the mano fragments, or the schist groundstone. Thirty flakes of chert, chalcedony and rhyolite were also recorded.

Locus 2 was originally recorded as containing nine flakes, one fire-affected rock, and two faunal bone fragments. ECORP archaeologists relocated seven of the original nine flakes, and it was noted that one chert flake has a retouched edge.

Locus 3 was originally recorded as a deposit of 29 flakes, a rhyolite mano fragment, and 7 fire-affected rocks. ECORP archaeologists could not relocate the mano fragment, and the only fire-affected rock observed was three pieces of burned caliche. Approximately 20 to 30 flakes were found, which was consistent with the original site record.

Locus 4 was originally recorded as a deposit of 14 flakes, 8 pieces of shatter, a piece of schist groundstone, 5 fire-affected rocks, and a small burned faunal bone fragment. ECORP archaeologists relocated three flakes. The remainder of the previously recorded flakes and shatter, the groundstone, the fire-affected rocks, and the faunal bone fragment could not be relocated.

ECORP archaeologists could not relocate the 34 flakes, 6 pieces of shatter, or 3 schist groundstone fragments noted as being outside of the loci in the original site record. However, three previously unrecorded small rhyolite interior flakes were found approximately 40 meters east of the site boundary. A previously unrecorded white chalcedony projectile point fragment was also found, in the northern portion of the site, and was collected. The site boundary was modified to include these items.

EAFB-4224. This site was originally recorded by JT3/CH2M Hill as a prehistoric small, light lithic deposit containing one interior chert flake, one interior rhyolite flake, one cortical chert flake, one piece of chert shatter, one piece of rhyolite shatter, and a brown and white chert Borax Lake wide stem projectile point, which was collected (Sergejev and Porter-Rodriguez 2008d). The site has not been previously evaluated for eligibility for the NRHP.

ECORP Consulting, Inc. archaeologists visited the site on May 23, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel were only able to relocate two flakes and one large piece of quartz shatter within the previously recorded site boundary. Just south of the site boundary, one obsidian interior flake, one brown chalcedony interior flake, one white chert interior flake, one orange chert interior flake, and one rhyolite core were observed. The site boundary was expanded to encompass the newly identified artifacts.

EAFB-4229. The site was originally recorded by JT3/CH2M Hill in 2008 as a prehistoric large, light temporary camp containing 1 artifact concentration, 75 flakes, 15 burned mammal bones, 10 pieces of fire-affected rock, 1 projectile point (collected), and 1 biface fragment (collected). Concentration-1 is located in the western portion of the site and lies 30 meters northwest of the site datum. It consists of approximately 30 cortical and interior chert and rhyolite flakes, 1 interior jasper flake, 1 interior obsidian flake, 1 schist fragment, approximately 10 burned small and large mammal bones, and 10 fire-affected quartz monzonite cobbles (Porter-Rodriguez 2008b). The site has not been previously evaluated for eligibility for the NRHP.

ECORP archaeologists visited the site on May 23, 2012 as part of the Edwards AFB, Oro Verde Solar Project. ECORP personnel found it to be generally consistent with the original site record. ECORP archaeologists noted one previously unrecorded rhyolite core within the previously recorded artifact concentration. In addition, they found one rhyolite tertiary flake approximately 30 meters south of the 2008 site boundary. The site boundary was extended south to include this flake.

EAFB-4230/ P-15-014392 (CA-KER-8055H). CA-KER-8055H is a historic period refuse deposit recorded by Computer Sciences Corporation in 2008. They describe the site as containing 20 porcelain fragments, 2 earthenware fragments, 1 glass bottle neck, 1 glass juicer fragment, 1 steel pot, 1 metal tent stake, 1 wood tent stake, and milled lumber. One hand pump sprayer was collected during the Computer Sciences Corporation investigation (Porter-Rodriguez 2008c). The site has not been previously evaluated for eligibility for the NRHP.

On June 7, 2012 archaeologists from ECORP Consulting, Inc. visited the site as part of the Edwards AFB, Oro Verde Solar Project. During this intensive survey, ECORP archaeologists found that the site was consistent with the previous record; however, they could not relocate the glass bottle neck or the juicer fragment noted in the previous record. One additional artifact was found. This was an earthenware rim fragment with white glaze and a multiple blue band design. The site boundary remains the same as previously recorded.

6.1.3 Isolated Finds

A total of 123 isolated finds were also discovered during the field survey. Isolated finds consist of just one or two individual artifacts with no other associated cultural material. Of the 123 recorded isolates, 44 are historic in age and 79 are prehistoric. A detailed list of all 123 isolated finds is provided in Table D-3 in Appendix D and DPR records for the isolates are provided in Appendix G.

6.2 Results of the Gen-Tie Routing Options Reconnaissance Survey

On July 3, 2012 ECORP archaeologists conducted a reconnaissance survey of the Gen-Tie route options study area. During this preliminary investigation, ECORP personnel traversed both the linear route options and the block study area to the northwest, observing environmental conditions and identifying areas of potential archaeological sensitivity. A total of 67 previously-recorded resources overlap or are immediately adjacent to the Gen-Tie route options study area (see Table C-4 in Appendix C). Of these, two were visited (CA-KER-3528/P-15-3528H [Road Grade] and CA-KER-3459/P-15-3549H [Los Angeles Aqueduct]), and 11 potentially historic additional features were identified (Figure 6-1).

The historic road grade (Feature 1) crosses into the Gen-Tie route options study area along Purdy Road (see Figure 6-1). Currently, the road grade consists of a two track dirt road that shows evidence of recent and continual use. Light modern refuse deposits were also noted along the observed extent. The Los Angeles Aqueduct (Feature 2) is a contributor to an NRHP eligible district. Crossing into the Gen-Tie route options study area along Oak Creek Road, the Los Angeles Aqueduct has been fully encased in cement within the observed area.

A total of 11 newly-identified, potentially historic features were also identified within the Gen-Tie route options survey area. Of these, nine were identified through the reconnaissance survey and two were identified during preliminary research. The nine features identified via field observation include two residential structures along the west side of Lone Butte Road (Features 3 and 4), a homestead ruin along the south side of Reed Avenue (Feature 5), a single foundation ruin at the southeast intersection of Silver Queen Road and Sierra Highway (Feature 6), two adjacent structures along the south side of Silver Queen Road (Feature 7), one agricultural/industrial complex at the northwest corner of Holt Street and Big Inch Pipeline Road (Feature 8), and one pit and refuse deposit south of Oak Creek Road (Feature 9).

Preliminary research indicated two areas of archaeologically sensitivity within close proximity of the Gen-Tie route options survey area. The ruins of Reefer City (Feature 10), a historic period mining settlement, are located along White Moor Mine Road, to the north-northwest of its intersection with Silver Queen Road. The second sensitive area, a historic period Labor Camp (Feature 11), is located to the north of Reefer City, along the east side of Goldtown Road.

No new sites were recorded, and the previously recorded sites were not updated reconnaissance survey of the Gen-Tie route options study area. A more detailed investigation will be conducted pending the determination of a preferred Gen-Tie route by the developer.

Figure 6-1 redacted to protect confidential cultural resources data

7.0 SUMMARY AND RECOMMENDATIONS

7.0 SUMMARY AND RECOMMENDATIONS

ECORP Consulting, Inc. (ECORP) conducted a Phase I cultural resources inventory in support of the proposed Oro Verde Solar Project (Oro Verde) near the town of Mojave, Kern County, California. The Project Study Area includes 5,692 acres under consideration for the siting of an Enhanced Use Lease (EUL) Solar Facility on Edwards Air Force Base (AFB) and 3,085 acres under consideration for siting an approximate 14-linear-mile Gen-Tie transmission line. Because the Solar Facility Study Area is located on federal lands under the jurisdiction of Edwards AFB, compliance with Section 106 of the National Historic Preservation Act (NHPA) is required. The Gen-Tie line is located on private owned lands under the jurisdiction of Kern County and on lands managed by the U.S. Bureau of Land Management (BLM). As a result, compliance is required with both Section 106 of the National Historic Preservation Act (NHPA) and the cultural resources requirements of the California Environmental Quality Act (CEQA).

As part of this cultural resources inventory project, Edwards AFB Cultural Resources Staff conducted an in-house records search to examine site records and reports they have on file for the EUL Solar Facility Study Area. For the proposed Gen-Tie Line routes, ECORP archaeologists conducted a cultural resources records search at the Southern San Joaquin Valley Information Center (SSJVIC), located at California State University, Bakersfield to determine the extent of previous cultural resources investigations and recorded resources within a 0.5-mile (800-meter) radius of the proposed Gen-Tie routes. These records searches indicated that 44 percent (2,505 acres) of the entire 5,692-acres EUL Study Area either had not been previously surveyed, or had not been surveyed within the past 10 years. Additionally, four large sites previously determined eligible for the National Register of Historic Places (NRHP) and covering 635 acres were added to the surveyed area in order to assess their current conditions. Thus, 3,140 acres of the 5,692-acre EUL Solar Facility Study Area were intensively surveyed during this project.

ECORP archaeologists conducted fieldwork in two phases. The first phase consisted of intensive pedestrian survey of the above-noted 3,140-acre portion of the EUL Solar Facility Study Area on Edwards AFB. The second phase consisted of a reconnaissance-level survey of potential Gen-Tie routes.

As a result of intensive pedestrian survey of the 3,140-acre portion of the EUL Solar Facility Study Area, 203 newly-recorded archaeological resources were identified. These include 80 archaeological sites and 123 isolated finds. Of the 80 newly-recorded archaeological sites, 58 are prehistoric sites and 22 are historic age sites. Newly recorded sites include 49 prehistoric lithic deposits, 8 prehistoric temporary camps, 1 prehistoric roasting pit/hearth feature, 5 historic period agricultural features, 16 historic period refuse deposits, and 1 historic period earthworks site. Of the 123 isolated finds, 44 are historic in age and 79 are prehistoric.

Preliminary recommendations of eligibility for the National Register of Historic Places (NRHP) were generated, based on surface data collected during this inventory, for all 80 newly identified sites in the EUL Study Area. Isolated finds by definition are not sites and are not eligible for inclusion in the NRHP because of their extremely limited information potential. No further work is necessary on the 123 isolated finds recorded during this study. Of the 80 newly recorded sites, 43 are likely ineligible for the NRHP and 37 are potentially eligible for the NRHP pending formal evaluation through subsurface testing and/or archival research. These 37 recourses include 9 prehistoric temporary camps (OV-029, OV-038, OV-054, OV-124, OV-142, OV-210, OV-219, OV-233, and OV-235), 26 prehistoric lithic deposits (OV-006, OV-30, OV-70, OV-72, OV-86, OV-106, OV-107, OV-109, OV-129, OV-130, OV-131, OV-134, OV-139, OV-150, OV-166, OV-184, OV-188, OV-189, OV-193, OV-198, OV-200, OV-204, OV-221, OV-225, OV-240, and OV-241), 1 single feature hearth site (OV-192), and 1 historic period refuse deposit (OV-062). These sites may have sufficient data potential to qualify for eligibility to the NRHP; however, further study of the sites through test excavation and/or archival research is needed to make formal eligibility determinations. The remaining 43 newly recorded sites are likely ineligible for the NRHP. These 43 sites contain few artifacts, are unlikely to contain subsurface deposits, and/or are unlikely to provide significant additional data beyond what has already been recorded (see Table D-1 in Appendix D for details).

In addition to the newly recorded resources, ECORP archaeologists field checked and updated 121 previously recorded sites within the EUL Solar Facility Study Area. Updated sites consist of 37 historic period sites and 84 prehistoric sites. Historic period sites updated consist of 18 refuse deposits, 8 homesites, 8 roads and trails, and 3 agricultural features. Previously recorded prehistoric sites consist of 40 temporary camps, 39 lithic deposits, 4 roasting pits/hearths, and 1 milling station. Eight updated sites have previously been determined eligible for the NRHP. These consist of six prehistoric temporary camps (CA-KER-1168/P-15-001168 [EAFB-303], CA-KER-1769/ P-15-001769 [EAFB-374], CA-KER-1771/P-15-001771 [EAFB-385], CA-KER-2009/P-15-002009 [EAFB-562], CA-KER-2016/P-15-002016 [EAFB-568], and CA-KER-4929/P-15-005804 [EAFB-2402]) and two historic period homesites (CA-KER-2523H/P-15-002523 [EAFB-17] and CA-KER-2290H [EAFB-845]). Twenty-two previously recorded sites have been determined not eligible for the NRHP and 91 previously recorded sites have not been formally evaluated for NRHP eligibility. See Table D-2 in Appendix D for a more detailed description of site eligibility.

Preliminary recommendations of eligibility for the NRHP were also generated for the 91 previously recorded sites in the EUL Study Area that were not previously evaluated. Of these, 50 are potentially eligible for the NRHP. These include 46 prehistoric sites and 4 historic period sites. These sites may have sufficient data potential to qualify for eligibility to the NRHP; however, further study of the sites through test excavation and/or archival research is needed to make formal eligibility determinations. The remaining 41 sites are likely ineligible for the NRHP. These 41 sites contain few artifacts, are unlikely to contain subsurface deposits, and/or are unlikely to provide significant additional data beyond what has already been recorded (see Table D-2 in Appendix D). In addition, one prehistoric temporary campsite previously recommended as NRHP-eligible (CA-KER-4929/P-15-005804 [EAFB-2402]) is now recommended as not eligible for the NRHP based on the sparse nature of subsurface deposits found during previous testing of the site and the lack of any surface manifestations of the site found during the field check of the site conducted as part of this study.

During the reconnaissance survey of the Gen-Tie Study Area, ECORP personnel traversed the proposed route options observing environmental conditions and identifying areas of potential archaeological sensitivity. A total of 67 previously-recorded resources overlap or are immediately adjacent to the Gen-Tie route options study area (see Table C-4 in Appendix C). Of these, two were visited (CA-KER-3528/P-15-3528H [Road Grade] and CA-KER-3459/P-15-3549H [Los Angeles Aqueduct]), and 11 potentially historic additional features were identified. No new sites were recorded and no previously recorded sites were updated within the Gen-Tie Study Area. A more detailed investigation, including intensive pedestrian survey, will be conducted once the Gen-Tie route alternatives are identified for analysis.

It is recommended that, once a preferred Solar Facility footprint is identified within the EUL Study Area, all archaeological resources located within the footprint that have been identified as potentially eligible for the NRHP be formally evaluated for the NRHP through detailed recordation, subsurface testing, and/or archival research. If any resources are formally determined eligible by Edward AFB as a result of the investigations, effects to those resources from the proposed solar facility should be assessed. Appropriate treatment measures for adverse effects that cannot be avoided should be developed and implemented in consultation with State Historic Preservation Officer (SHPO). In addition, once alternative Gen-Tie routes are identified for further analysis, an intensive pedestrian survey of the selected Gen-Tie route alternatives should be conducted in order to identify and record new resources and to field check and update previously recorded resources. Any resources identified during this survey should be evaluated for inclusion in the NRHP and California Register of Historical Resources (CRHR) with effects from the proposed project assessed and appropriate treatment measures developed and implemented for adverse effects that cannot be avoided, in compliance with Section 106 of the NHPA and the cultural resources requirements of CEQA.

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9.0 REPORT AND FIELD PERSONNEL

9.0 REPORT AND FIELD PERSONNEL

9.1 Report Preparers

Robert Cunningham, Primary Author
2007 B.A., Anthropology, University of California, Los Angeles
Years of experience: 8

Wendy Blumel, Contributing Author
2003 M.A., Anthropology, Louisiana State University, Baton Rouge, Louisiana
2000 B.A., Anthropology, Beloit College, Beloit, Wisconsin
Years of Experience: 5

Kristina Lindgren, Contributing Author
2001 B.A., Anthropology, California State University San Bernardino, San Bernardino
Years of experience: 10

Elizabeth Denniston, Assistant Project Manager/Contributing Author
2007 M.A., Anthropology, California State University, Los Angeles, California
1997 B.A., Anthropology, Minnesota State University, Moorhead, Minnesota
Years of experience: 14

Evelyn Chandler, Project Manager/Contributing Author
1989 B.A., Anthropology, University of Redlands
1989 B.A., Political Science, University of Redlands
Years of experience: 17

9.2 Field Personnel

Robert Cunningham, Field Director
2007 B.A., Anthropology, University of California, Los Angeles
Years of experience: 8

Kristina Lindgren, Crew Chief
2001 B.A., Anthropology, California State University San Bernardino, San Bernardino
Years of experience: 10

Wendy Blumel, Field Archaeologist
2003 M.A., Anthropology, Louisiana State University, Baton Rouge, Louisiana
2000 B.A., Anthropology, Beloit College, Beloit, Wisconsin
Years of Experience: 5

Richard Shepard/RPA, Field Archaeologist
1997 M.A. Archaeology, University of California Los Angeles, Los Angeles
1979 B.A. Journalism, California State University Fresno, Fresno
Years of experience: 17

Escee Lopez/RPA, Field Archaeologist
2010 B.A. Anthropology, California State University Fullerton, Fullerton
Years of Experience: 4

Christina Peterson, M.A., Field Archaeologist
2008 M.A. Southwestern Studies, New Mexico Highlands University, Las Vegas, New Mexico
2002 B.A. Anthropology, San Diego State University, San Diego
Years of Experience: 10

DRAFT REPORT
PHASE I CULTURAL RESOURCES INVENTORY FOR THE ORO VERDE SOLAR PROJECT, NEAR THE TOWN OF MOJAVE, KERN COUNTY, CALIFORNIA AND WITHIN MANAGEMENT REGION 1 EDWARDS AIR FORCE BASE, CALIFORNIA

Prepared By:
Robert Cunningham, Wendy Blumel, Elizabeth Denniston, Kristina Lindgren
and Evelyn Chandler,
ECORP CONSULTING, INC.
215 North 5th Street
Redlands, California 92374

Prepared For:
412 TW/CEVN, Environmental Management Office
Base Historic Preservation Officer
5 East Popson Avenue, Building 2650A
Edwards Air Force Base, California 93524-1130
(661) 277-7077

and

Sun Edison
44 Montgomery Street
Suite #2200
San Francisco, CA 94104

U.S. Geological Survey 7.5-minute Quadrangles:
Bissell (1973) and Soledad Mtn. (1973)

Keywords: Antelope Valley, Edwards Air Force Base, Kawaiisu, Kitanemuk, Literature Review, Records Search, Rosamond Lake, Solar Facility, Town of Mojave, Transmission Line

April 2013

APPENDIX B **SITE LOCATION MAPS (CONFIDENTIAL)**

Appendix B redacted to protect confidential cultural resources data

Table C-1
Previous Investigations within the EUL Solar Facility

Author(S) and EAFB Report Number	Year	Description
University of California, Los Angeles (EAFB # 1976-E)	1976	Linear survey encompassing 865 acres
Greenwood & Associates (EAFB # 1980-A)	1980	Two block surveys encompassing 172 acres
Base Historic Preservation Officer (EAFB # 1984-013)	1984	Block survey encompassing 834 acres
Base Historic Preservation Officer (EAFB # 1984D-JUD)	1984	Two block surveys encompassing 1046 acres
Base Historic Preservation Officer (EAFB # 1985K-JUD)	1985	Two block surveys encompassing 1012 acres
Norwood and Hagan (EAFB # 1989-200)	1989	Block survey encompassing 15 acres
Computer Sciences Corporation (EAFB # 1993-087)	1993	Block survey encompassing 86 acres
Radian International (EAFB # 1996-F)	1996	Three linear surveys encompassing 267 acres
Computer Sciences Corporation (EAFB # 1997-B)	1997	Nine block surveys encompassing 1434 acres
Computer Sciences Corporation (EAFB # 1999-474)	1999	Two block surveys encompassing 99 acres
Computer Sciences Corporation (EAFB # 1999-T)	1999	Block survey encompassing 518 acres
Jones & Stokes (EAFB # 1999-G)	1999	Block survey encompassing 4 acres
CH2M HILL (EAFB # 2003-1181)	2003	Four linear survey encompassing 10 acres
Earth Tech (EAFB # 2004-I)	2004	Four block surveys encompassing 666 acres
CH2M HILL (EAFB # 2005-O)	2005	Block survey encompassing 104 acres
Earth Tech (EAFB # 2006-H)	2006	Block survey encompassing 1442 acres
ASM Affiliates, Inc. (EAFB # 2007-G)	2007	Block survey encompassing 1376 acres
CH2M HILL (EAFB # 2008-H)	2008	Fourteen block surveys encompassing 2211 acres
ASM Affiliates, Inc. (EAFB # 2011-UNK)	2011	Block survey encompassing 1950 acres

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Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4	2285H	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Norwood, R.H. DPR Record (1988); Bark, Richard G. Homestead Well Updated (2001); Porter-Rodriquez, J. and T. Venne Field Check (2008); Cunningham, Robert, Martin Jorgenson, Martin Nienstedt, and Vince Parsick DPR Record (2011)
5	2481H	Eligible	Historic	Homesite	Structurally Complex, Small	Anonymous EAFB Historical Inventory (1980); Kramme S. and Porter-Rodriguez, J. Field Check (2008)
9	2125/H	Not Evaluated	Historic	Homesite	Structurally Complex, Large	Norwood, R.H. and T. Wessel DPR Record (1988); Maier E. and M. Basham Field Check (2005)
10	2735H	Not Eligible	Historic	Homesite	Structurally Complex, Large	Anonymous EAFB Historical Inventory (1980); Norwood, R. H. DPR Record (1990); Boyer, Barry and Margaret Ronning DPR Record (1994); Greene G., and S. Lillard DPR Record (1996); Maier, E. Field Check (2005); Smallwood J., G. Burns, B. Dwyer and M. Jorgenson DPR Record (2010)
16	2530H	Not Eligible	Historic	Homesite	Structurally Complex, Large	Norwood, R.H. DPR Record (1989); Boyer, B., M. Hangan, and C. Parker DPR Record (1996); Bark, Richard G. Homestead Well Updated (2001); Ashkar, S., C. Havelaar, H. Davis DPR Record (2003)
17	2523H	Eligible	Historic	Homesite	Structurally Complex, Large	Anonymous EAFB Historical Inventory (1980); Norwood, R. H. DPR Record (1989); Boyer, B., M. Hangan, and C. Parker DPR Record (1996); Bark, Richard G. Field Check (2008); Smallwood, J., B. Burns, B. Dwyer, and M. Jorgenson DPR Record (2010)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
23	1709H	Not Eligible	Historic	Homesite	Structurally Complex, Large	McIntire, M., J. Foster, T. Schuster, M. Swernoff, and M. Wendorf BLM Inventory Report (1980); McIntire, M., J. Foster, T. Schuster, M. Swernoff, and M. Wendorf DPR Record (1993); Shaver, Chris Homestead Well Updated (1998); Bark, Richard G. and A. Nicol-Bark Field Check (2007);Ballester, Daniel, Melanie Knypstra, Stephen Pappas, and Michelle Villalba DPR Record (2009); Ballester, Daniel, Melanie Knypstra, Stephen Pappas, and Michelle Villalba Field Check (2009)
24	6609H	Not Eligible	Historic	Refuse Deposit	Civilian	Anonymous EAFB Historical Inventory (1980); Gueyger, A. and C. Havelaar Field Check (2001); Puckett, H., and A. Nicol-Bark DPR Record (2004)
303	1168	Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Wessel, R., A. Toren, K. Miller, S. Dies, and L Schupp Wessel BLM Inventory Record (1980); Boyer, B., M. Hanlan, L McGetrick, C. Onzol and C. Parker DPR Record (1996); Arnett, A., C. Bouscaren, D. Kay, S. Hogan-Conrad, K. Guardado, T. Reece, B. Jones,and K. McLean DPR Record (2003); D'Arcy L. and B. Gohacki Conditional Assessment (2010)
304	1169	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Wessel, R., A. Toren, K. Miller, S. Dies, S. Robinson and W. Pink BLM Inventory Record (1980)
306	1170	Not Evaluated	Prehistoric	Lithic Deposit	Flaking Station	Wessel, R., A. Toren, K. Miller, S. Dies, S. Robinson and W. Pink BLM Inventory Record (1980)
373	1768	Not Eligible	Prehistoric	Lithic Deposit	Large, Dense Lithic Deposit	Norwood, R. H. DPR Record (1984); C. Bouscaren, B. Jones, K. Guardado, and N. Harris DPR Record (2002)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
374	1769	Eligible	Prehistoric	Temporary Camp	Small, Light Temporary Camp	Norwood, R. H. DPR Record (1984); N. Harris, C. Bouscaren, B. Jones, K. Guardardo, K. McLean, M. Caldwell and R. Bark DPR Record (2002); Bark, Richard G. Continuation Sheet Update (2007)
375	1770	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Norwood, R. H. DPR Record (1984); Harris, N., C. Bouscaren, D. McIntosh, and D. McLean DPR Record (2002); Bark, Richard G. Continuation Sheet Update (2007)
385	1771	Eligible	Prehistoric	Temporary Camp	Large, Dense Temporary Camp	Norwood, R. H. DPR Record (1984); Garza T. de la, M. Hangan, J. Johannesmeyer, and L. McGetrick DPR Record (1996); Bouscaren C., B. Jones, K. Guardado, M. Pritchard Parker, K. McLean, A. Arnett, S. Hogan-Conrad, and T. Reece DPR Record (2003); Bark, Richard G.and David Burrell DPR Report (2004)
395	1772/H	Not Eligible	Historic	Refuse Deposit	Civilian	Norwood, R. H. and M. Phillips DPR Record (1984); Pappas, Stephen, Daniel Ballester, Melania Knypstra, and Michelle Villalba DPR Record (2009); Pappas, Stephen, Daniel Ballester, Melania Knypstra, and Michelle Villalba Field Check (2009)
422	1776	Not Evaluated	Prehistoric	Lithic Deposit	Large, Dense Lithic Deposit	Norwood, R. H. DPR Record (1984)
426	1777	Not Eligible	Prehistoric	Temporary Camp	Large, Dense Temporary Camp	Norwood, R. H. DPR Record (1984); Sergejev, I., S. Kramme, and J. Porter-Rodriguez DPR Record (2008); Pappas, Stephen, Daniel Ballester, Melanie Knypstra, and Michelle Villalba DPR Record (2009); Pappas, Stephen, Daniel Ballester, Melanie Knypstra, and Michelle Villalba Field Check (2009)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
427	1778	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Norwood R.H. and M. Phillips DPR Record (1984)
428	1779	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Norwood R.H. DPR Record (1984)
429	1780	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Norwood R.H. and M. Phillips DPR Record (1984)
430	2009/H	Not Evaluated	Historic	Refuse Deposit	Civilian	Norwood R.H. and M. Phillips DPR Record (1984)
562	2009/H	Eligible	Prehistoric	Temporary Camp	Large, Dense Temporary Camp	Norwood R.H. DPR Record (1988); Jones, B., T. Reece, S. Hogan-Conrad, K. Guardado, C. Bouscaren, A. Arnett, K. McLean, and D. Kay DPR Record (2003); Bark, Richard G. and Larry McGetrick Field Check (2004); Sergejev, I. DPR Record (2006); Sergejev, I. and Steve Kramme Field Check (2006); Sergejev, I. and S. Kramme DPR Record (2007); D'Arcy L. and, G. Kulevich Condition Assessment (2010)
567	2015/H	Not Eligible	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Norwood, R.H. DPR Record (1985); Warren, K., and A. Ruelas Homestead Well Updated (1998); Prichard Parker, M., A. Arnett, B. Jones, M. Caldwell, N. Harris, C. Bouscaren, K. McKlean, J. Keasling, R. Bark, K. Guardardo, and H. Puckett DPR Record (2002); Giambastiani, Mark, Micah Hale, Aaron Kenney, Langdon Plaster, Michael Garnsey, and Andrea Catacora Field Check (2005); Bark, Richard G. Field Check (2005); Sergejev, I. and E. Maier Field Check (2006)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
568	2016	Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Norwood, R.H. DPR Record (1985); Boyer, B., M. Hangan, J. Johannesmeyer, C. Onzol, and C. Parker DPR Record (1996 and 1997); Sergejev, I. and Erica Maier Field Check (2006); Sergejev, I. and Steve Kramme Field Check (2007)\
569	2010	Not Evaluated	Prehistoric	Lithic Deposit	Large, Dense Lithic Deposit	Davis, G. and R.H. Norwood DPR Record (1985)
570	2011	Not Evaluated	Prehistoric	Lithic Deposit	Small, Dense Lithic Deposit	Davis, G., R.H. Norwood, K. Brann Adams DPR Record (1985)
632 (Locus of EAFB-562)	2125/H	Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Unknown
836	N/A	Not Evaluated	Historic	Agricultural Feature	Isolated Well and Refuse	Norwood, R.H. DPR Record (1986); Giambastiani, Mark, Micah Hale, Aaron Kenney, Langdon Plaster, Michael Garnsey, and Andrea Catacora. Field Check (2005)
837	2284H	Not Evaluated	Historic	Homesite	Structurally Simple, Small	Norwood, R.H. and T. Wessel DPR Record (1988); Bark, Richard G. Homestead Well Updated (1998)
838	2289H	Not Eligible	Historic	Homesite	Structurally Complex, Large	Norwood, R.H. and T. Wessel DPR Record (1988); Norwood, R.H. Field Check (1988); Warren, K., A. Ruelas Homestead Well Update (1998); Puckett H., J. Keasling, A. Arnett, and D. Mcintosh DPR Record, (2002); Giambastiani, Mark, Micah Hale, Aaron Kenney, Langdon Plaster, Michael Garnsey, and Andrea Catacora. Field Check (2005)
839	N/A	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Norwood, R.H. DPR Record (1986); Howard, V. and M. Clement DPR Record (1994)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
845	2290H	Eligible	Historic	Homesite	Structurally Simple, Small	Norwood, R.H. and T. Wessel DPR Record (1988); Storey, Noelle, C.L. Shaver Homestead Well Updated (1998); Giambastiani, Mark, Micah Hale, Aaron Kenney, Langdon Plaster, Michael Gransey, and Andrea Catacora. Field Check (2005)
950	N/A	Not Evaluated	Historic	Agricultural Feature	Isolated Well and Refuse	Norwood R. H. and T. Wessel Field Check (1988); Howard, V., and M. Clement DPR Record (1994)
1037	N/A	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Norwood R.H. Field Check (1989)
1038	7267	Not Eligible	Historic	Refuse Deposit	Civilian	Norwood R.H. Field Check (1989); Norton, W.L. and K. Syda DPR Record (1998); Puckett, H., H. Spinney, and A. Nicol-Bark DPR Record (2004)
1340	4773/H	Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Howard, V. and M. Clement DPR Record (1994); Storey, Noelle,and C.L. Shaver Homestead Well Updated (1998); Johannesmeyer, Jim, Barry Boyer, Erica Maier,and Cole Parker DPR Record (2005); D'Arcy, L., and B. Gohacki Condition Assessment (2010)
1343	N/A	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Unknown
1344	4787H	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Howard V. and M. Clement DPR Record (1994); Giambastiani, Mark, Micah Hale, Aaron Kenney, Langdon Plaster, Micheal Garnsey, and Andrea Catacora. Field Check (2005)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
1345	4788H	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Howard V. and M. Clement DPR Record (1994); Cooper, R., and K. Warren Homestead Well Updated (1998); Giambastiani, Mark, Micah Hale, Aaron Kenney, Michael Garnsey, Langdon Plaster, and Andrea Catacora. Field Check (2005)
1346	4774H	Not Evaluated	Historic	Homesite	Structurally Simple, Small	Howard V. and M. Clement DPR Record (1994)
1347	N/A	Not Evaluated	Historic	Agricultural Feature	Isolated Well	Howard V. and M. Clement DPR Record (1994)
2240	2284/H	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Boyer, B., T. de la Garza, G. Greene, M. Hangan, J. Johannesmeyer, S. Lillard, L. McGetrick, C. Onzol DPR Record (1996); Pritchard Parker, M., R. Bark, K. McLean and A. Arnett DPR Record (2002)
2243	4826	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Boyer B., M. Hangan, C. Onzol DPR Record (1996)
2244	4815	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Garza, T. de la, G. Greene, J. Johannesmeyer, and L. McGetrick DPR Record (1996)
2245	4790H	Not Evaluated	Historic	Refuse Deposit	Construction Debris	Boyer B., M. Hangan, and C. Onzol DPR Record (1996)
2247	4791	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Boyer, B., and J. Johannesmeyer DPR Record (1996); Bouscaren, C., S. Hogan-Conrad, B. Jones, A. Arnett, K. Guardado, and T. Reece DPR Record (2003)
2249	4792	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Boyer, B., and M. Hangan DPR Record (1996); Bark, Richard G., K. McLean and A. Arnett DPR Record (2002)
2250	4214	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Boyer, B., and M. Hangan DPR Record (1996)
2251	4583	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Boyer, B., M. Hangan, and J. Johannesmeyer DPR Record (1996)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
2252	4828	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Boyer, B., M. Hangan, and J. Johannesmeyer DPR Record (1996)
2253	4829	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Boyer, B., and M. Hangan DPR Record (1996)
2254	4584	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	M. Hangan, and C. Parker DPR Record (1996)
2255	4793	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	B. Boyer, G. Greene, M. Hangan DPR Record (1996). C. Bouscaren, B. Jones, A. Arnett, K. Guardado, and T. Reece DPR Record (2003)
2257	4832	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, J. Johannesmeyer, and C. Onzol DPR Record (1996)
2258	4825	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	M. Hangan, and B. Boyer DPR Record (1996)
2259	4816	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, J. Johannesmeyer, and C. Parker DPR Record (1996)
2260	4830H	Not Evaluated	Historic	Refuse Deposit	Civilian	B. Boyer, G. Greene, and M. Hangan DPR Record (1996).
2261	4585	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, J. Johannesmeyer, and C. Parker DPR Record (1996)
2262	4817	Not Evaluated	Prehistoric	Temporary Camp	Large, Dense Temporary Camp	G. Greene, B. Boyer, J. Johannesmeyer, and M. Hangan DPR Record (1996)
2263	4818	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	B. Boyer, M. Hangan, and C. Onzol DPR Record (1996)
2264	4619	Not Eligible	Prehistoric	Roasting Pit/Hearth	Single Feature	G. Greene and S. Lillard DPR Record (1996). C. Bouscaren, A. Arnett, S. Hogan-Conrad, T. Reece and B. Jones DPR Record (2003)
2316	4821	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, J. Johannesmayer, and C. Parker DPR Record (1996)
2317	4833H	Not Evaluated	Historic	Refuse Deposit	Civilian	B. Boyer, M. Hangan, J. Johannesmeyer, and C. Onzol DPR Record (1996)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
2367	4799	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	M. Hangan, J. Johannesmeyer, L. McGetrick, and C. Parker DPR Record (1996)
2368	4800	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	M. Hangan, J. Johannesmeyer, L. McGetrick, and C. Parker DPR Record (1996)
2369	4801	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, and M. Hangan DPR Record (1996).
2370	4802	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	B. Boyer, M. Hangan, L. McGetrick, and C. Onzol DPR Record (1996)
2371	4921	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	B. Boyer, M. Hangan, L McGetrick, and C. Onzol DPR Record (1996). C. Bouscaren, A. Arnett, K. Guardado, D. Kay, T. Reece, K. McLean, and S. Hogan-Conrad DPR Record (2003)
2372	4922	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	B. Boyer, M. Hangan, L. McGetrick, and C. Parker DPR Record (1996)
2373	4923	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, L. McGetrick, and C. Parker DPR Record (1996). C. Bouscaren, A. Arnett, K. Guardado, B. Jones, D. Kay, S. HoganConrad, and K. McLean DPR Record (2003)
2377	4805	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	T. de la Garza, M. Hangan, J. Johannesmeyer, and L. McGetrick DPR Record (1996)
2378	4808	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	T. de la Garza, M. Hangan, J. Johannesmeyer, and L. McGetrick DPR Record (1996)
2379	4807	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	T. de la Garza, M. Hangan, J. Johannesmeyer, and L. McGetrick DPR Record (1996)
2380	4809	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, J. Johannesmeyer, and C. Parker DPR Record (1996)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
2381	4806	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	B. Boyer, M. Hangan, J. Johannesmeyer, and C. Parker DPR Record (1996)
2382	4810H	Not Evaluated	Historic	Refuse Deposit	Civilian	B. Boyer, M. Hangan, and C. Parker DPR Record (1996)
2401	4928H	Not Evaluated	Historic	Refuse Deposit	Civilian	B. Boyer, M. Hangan, C. Onzol, and C. Parker DPR Record (1997)
2402	4929	Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick and S. Wolfe DPR Record (1999). L. McGetrick Field Check (2001). Jennifer Howard, Marina Adame, Christina Peterson, and Josh Smallwood DPR Record (2009). Jennifer Howard, Marina Adame, Christina Peterson, and Josh Smallwood Field Check Updated (2009)
3037	4773/H	Not Evaluated	Historic	Agricultural Feature	Isolated Well	V. Howard and M. Clement Earth Tech ARCHAEOLOGICAL SITE RECORD (1994)
3049	2009H	Not Evaluated	Historic	Homesite	Structurally Simple, Small	R. Norwood, G. Davis, S. Lillard, and K. Braun-Adams DPR Record (1985). R.H. Norwood DPR Record (1988)
3050	2015/H	Not Eligible	Historic	Agricultural Feature	Isolated Well	R.H. Norwood DPR Record (1985). K. Warren, and A. Ruelas Earth Tech HOMESTEAD WELL UPDATE FOR EDWARDS AFB (1998). H. Puckett, R. Bark, J. Keasling, A. Arnett, and D. Mcintosh DPR Record (2002). R. G. Bark Field Check (2005). Mark Giambastiani, Micah Hale, Aaron Kenney, Langdon Plaster, Michael Garnsey, and Andrea Catacora Field Check (2005)
3092	5786	Not Evaluated	Prehistoric	Lithic Deposit	Flaking Station	L. McGetrick, J. Foradas, L. Solis, and L Rehberger DPR Record (1999)
3093	5790	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Multiple Features	L. McGetrick, L. Solis, and L Rehberger DPR Record (1999)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3094	5791	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	L. McGetrick, L. Solis, and L. Rehberger DPR Record (1999)
3114	5792H	Not Evaluated	Historic	Refuse Deposit	Civilian	L. McGetrick and K. Lark DPR Record (1999)
3115	5793H	Not Eligible	Historic	Refuse Deposit	Civilian	L. McGetrick and K. Lark DPR Record (1999)
3116	5794	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick and K. Lark DPR Record (1999)
3140	3922/H	Not Eligible	Historic	Refuse Deposit	Civilian	Barry Boyer and Margaret Ronning Computer Science Corp. ARCHAEOLOGICAL SITE RECORD (1994). H. Puckett, R. Bark, J. Keasling, and K. Guardardo DPR Record (2002). Richard G. Bark DPR Record (2005)
3150	5805H	Not Evaluated	Historic	Refuse Deposit	Civilian	L. McGetrick, S. Wolfe, and M. Ronning DPR Record (1999)
3151	5806	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	K. Davis and J. Johannesmeyer Field Check (2004). L. McGetrick, M. Ronning, and S. Wolfe DPR Record (1999)
3152	5807	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999).C. Parker, L. McGetrick, J. Johannesmeyer, and B. Boyer DPR Record (2004). K. Davis and J. Johannesmeyer JT3/CH2M HILL Field Check (2004)
3153	5808	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999)
3154	5809	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999)
3155	5810H	Not Evaluated	Historic	Refuse Deposit	Civilian	G. Greene and L. McGetrick DPR Record (1999)
3157	5812	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3158	5813	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999)
3159	5814H	Not Evaluated	Historic	Refuse Deposit	Civilian	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999)
3160	5815	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick, and S. Wolfe DPR Record (1999)
3161	5816	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick, and S. Wolfe DPR Record (1999). M. Pritchard Parker, K. McLean DPR Record (2002)
3162	5817	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick, M. Campbell, and S. Wolfe DPR Record (1999). J. Porter-Rodriguez & T. Venne JT3/CH2MHILL Field Check (2008). J. Howard, M. Adame, C. Peterson, and J. Smallwood DPR Record (Updated 2009).
3163	5818	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick, M. Campbell, and S. Wolfe DPR Record (1999)
3164	5819H	Not Evaluated	Historic	Refuse Deposit	Civilian	L. McGetrick and S. Wolfe DPR Record (1999)
3165	5820	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick and S. Wolfe DPR Record (1999)
3166	5821	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick and S. Wolfe DPR Record (1999)
3167	5822H	Not Evaluated	Historic	Refuse Deposit	Civilian	G. Greene, L. McGetrick, and S. Wolfe DPR Record (1999)
3168	5811	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick and S. Wolfe DPR Record (1999)
3169	5796	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick and S. Wolfe DPR Record (1999)
3171	5798	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	L. McGetrick and S. Wolfe DPR Record (1999)
3172	5799	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick and S. Wolfe DPR Record (1999)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3173	5800	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick and S. Wolfe DPR Record (1999)
3174	5801	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick and S. Wolfe DPR Record (1999)
3175	5802	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick and S. Wolfe DPR Record (1999)
3176	5803	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	L. McGetrick and S. Wolfe DPR Record (1999)
3177	5804	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	L. McGetrick and S. Wolfe DPR Record (1999)
3186	3920	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Margaret Ronning, Lori Wear, and Frank West Computer Science Corp. ARCHAEOLOGICAL SITE RECORD (1994). M. Pritchard Parker, C. Bouscaren, K. McLean, M. Caldwell, and R. Bark DPR Record (2002)
3187	3921H	Not Eligible	Historic	Refuse Deposit	Civilian	Barry Boyer Computer Science Corp. ARCHAEOLOGICAL SITE RECORD (1994). H. Puckett, R. Bark, J. Keasling, and K. Guardardo DPR Record (2002).
3188	3922/H	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Barry Boyer and Margaret Ronning Computer Science Corp. ARCHAEOLOGICAL SITE RECORD (1994). R. G. Bark JT3/CH2MHILL Field Check (2005). Ivan Sergejev and Steve Kramme JT3/CH2MHILL Field Check (2007)
3337	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Unknown
3338	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Unknown
3339	N/A	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	Unknown
3340	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Unknown

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3341	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Unknown
3342	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Unknown
3343	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Unknown
3344	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	R. Wessel, A. Toren, K. Miller, S. Dies, and L. Schupp Wessel BLM Cultural Resource Inventory Record (1980). Mark Giambastiani, Micah Hale, Aaron Kenney, Langdon Plaster, Michael Garnsey, and Andrea Catacora ASM Field Check (2005).
3347	6410	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Unknown
3582	N/A	Not Evaluated	Historic	Roads and Trails	Paved	Harriot E. Spinney SITES.DBF: DATA RECORD SHEET (2004)
3587	6792	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Mark Giambastiani, Micah Hale, Aaron Kenney, Michael Garnsey, Langdon Plaster, and Andrea Catacora DPR Record (2005)
3588	6793	Not Eligible	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Mark Giambastiani, Aaron Kenney, Michael Garnsey, Langdon Plaster, and Andrea Catacora DPR Record (2005)
3589	6794H	Not Evaluated	Historic	Refuse Deposit	Civilian	Mark Giambastiani, Micah Hale, Aaron Kenney, Michael Garnsey, Langdon Plaster, and Andrea Catacora DPR Record (2005)
3590	N/A	Not Eligible	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005). M. Basham and E. Maier JT3/CH2M HILL Field Check (2005)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3592	6797	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005).
3593	6798H	Not Evaluated	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3594	6799	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Mark Giambastiani, Micah Hale, Michael Garnsey, Aaron Kenney, Langdon Plaster, and Andrea Catacora DPR Record (2005)
3595	6800	Not Evaluated	Prehistoric	Lithic Deposit	Small, Light Lithic Deposit	Mark Giambastiani, Aaron Kenney, Michael Garnsey, Langdon Plaster, and Andrea Catacora DPR Record (2005). Ivan Sergejev DPR Record (Updated 2008)
3596	6801	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3598	3803H	Eligible	Historic	Homesite	Miscellaneous Machinery/Equipment	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3599	6804	Not Eligible	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Micah Hale, Aaron Kenney, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3600	6805H	Eligible	Historic	Refuse Deposit	Civilian	Langdon Plaster and Andrea Catacora DPR Record (2005)
3601	6806H	Not Evaluated	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3602	6807H	Not Evaluated	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3603	6808H	Not Evaluated	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3605	6810H	Not Evaluated	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott WOlf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3606	6811H	Not Evaluated	Historic	Refuse Deposit	Civilian	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3608	6812	Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Mark Giambastiani, Aaron Kenney, Michael Garnsey, Langdon Plaster, and Andrea Catacora DPR Record (2005)
3622	N/A	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Mark Giambastiani, Langdon Plaster and Andrea Catacora DPR Record (2005)
3623	6762	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, and Micheal Garnsey DPR Record (2004)
3624	6763	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, and Micheal Garnsey DPR Record (2005)
3625	6764	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, and Michael Garnsey DPR Record (2004)
3626	6765	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, and Michael Garnsey DPR Record (2005)
3628	6766	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3629	N/A	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3631	N/A	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Mark Giambastiani, Langdon Plaster, and Andrea Catacora DPR Record (2005)

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
3632	N/A	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Micah Hale, Aaron Kenney, Michael Garnsey, Scott Wolf, Dave Iverson, and Andrea Catacora DPR Record (2005)
3633	N/A	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Mark Giambastiani, Langdon Plaster, and Andrea Catacora DPR Record (2005)
3634	6762	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	R. Bark, M. Basham, D. Burrell, and L. McGetrick DPR Record (2005)
3635	6763	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	R. Bark, M. Basham, D. Burrell, and L. McGetrick DPR Record (2005)
3636	6764	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	R. Bark, M. Basham, D. Burrell, and L. McGetrick DPR Record (2005)
3637	6765	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	B. Boyer, J. Johannesmeyer, E. Maier, and C. Parker DPR Record (2005)
3638	6766	Not Evaluated	Prehistoric	Lithic Deposit	Small, Dense Lithic Deposit	R Bark, M. Basham, D. Burrell, and L. McGetrick DPR Record (2005)
3652	6821H	Not Evaluated	Historic	Agricultural Feature	Windmill	M. Giambastiani, M. Hale, A. Kenney, M. Garnsey, L. Plaster, and A. Catacora DPR Record (2005)
3653	6822H	Not Evaluated	Historic	Agricultural Feature	Windmill	M. Giambastiani, M. Hale, A. Kenney, M. Garnsey, L. Plaster, and A. Catacora DPR Record (2005)
3655	6823H	Not Evaluated	Historic	Refuse Deposit	Civilian	M. Giambastiani, M. Hale, A. Kenney, M. Garnsey, L. Plaster, and A. Catacora DPR Record (2005)
3828	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown
3830	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown
3834	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown
3836	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown
3875	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown
3882	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown
3890	N/A	Not Evaluated	Historic	Roads and Trails	Unpaved	Unknown

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Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4168	8051	Not Evaluated	Prehistoric	Temporary Camp	Large, Dense Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4169	8052	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4170	7567	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4171	7568	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4172	7569	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4173	7570	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4174	7571	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4175	7572	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4176	7573H	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Ivan Sergejev and Steve Kramme DPR Record (2008)
4177	7574	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4178	7575	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	Ivan Sergejev and Steve Kramme DPR Record (2008)
4180	8053	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4181	N/A	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008). Jennifer Howard, Marina Adame, Christina Peterson, and Joshua Smallwood DPR Record (2009)
4182	7566	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4183	8012	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008)
4184	8013H	Not Evaluated	Historic	Refuse Deposit	Civilian	Ivan Sergejev and Steve Kramme DPR Record (2008)

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EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4185	8014H	Not Evaluated	Historic	Refuse Deposit	Civilian	Ivan Sergejev and Steve Kramme DPR Record (2008)
4186	8015	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4187	8016	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4188	N/A	Not Eligible	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and Steve Kramme DPR Record (2008). S. Pappas, D. Ballester, M. Knypstra, and M. Villalba DPR Record (2009)
4189	7579	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	Ivan Sergejev and Steve Kramme DPR Record (2008)
4190	8005	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev and Steve Kramme DPR Record (2008)
4191	8006	Not Evaluated	Prehistoric	Temporary Camp	Large, Dense Temporary Camp	James Johannesmeyer and Steve Kramme DPR Record (2008)
4192	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and James Johannesmeyer DPR Record (2008)
4193	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and James Johannesmeyer DPR Record (2008)
4194	N/A	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	Ivan Sergejev, S. Kramme, and J. Johannesmeyer DPR Record (2008)
4195	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev, S. Kramme, and J. Johannesmeyer DPR Record (2008)
4196	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, S. Kramme, and J. Johannesmeyer DPR Record (2008)
4197	N/A	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	Ivan Sergejev and S. Kramme DPR Record (2008)
4198	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and S. Kramme DPR Record (2008)
4199	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev and S. Kramme DPR Record (2008)

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EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4200	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Sergejev, Ivan, S. Kramme, and J Porter-Rodriguez DPR Record (2008)
4201	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Sergejev, Ivan, S. Kramme, and J Porter-Rodriguez DPR Record (2008)
4202	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4203	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, B. Boyer, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4204	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4205	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4206	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008). S. Kramme SITES.DBF: DATA RECORD SHEET (2008)
4207	N/A	Not Evaluated	Historic	Refuse Deposit	Civilian	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4208	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4209	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev and S. Kramme DPR Record (2008)
4210	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Sergejev I., B. Boyer, J. Johannesmeyer, S. Kramme DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008)
4211	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Flaking Station	I. Sergejev and S. Kramme DPR Record (2008)
4212	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev and S. Kramme DPR Record (2008)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4213	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev and S. Kramme DPR Record (2008)
4214	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, S. Kramme, J. Porter-Rodriguez, and T. Venne DPR Record (2008)
4215	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	Ivan Sergejev, J. Porter-Rodriguez, and T. Venne DPR Record (2008)
4216	N/A	Not Evaluated	Historic	Refuse Deposit	Civilian	Ivan Sergejev, B. Boyer, and J. Johannesmeyer DPR Record (2008)
4217	N/A	Not Evaluated	Sub Modern	Submodern Deposit	Submodern Refuse	Ivan Sergejev, B. Boyer, and J. Johannesmeyer DPR Record (2008)
4218	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev, J. Johannesmeyer, J. Porter-Rodriguez, and T. Venne DPR Record (2008)
4219	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, J. Porter-Rodriguez, and T. Venne DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008)
4220	N/A	Not Evaluated	Historic	Refuse Deposit	Civilian	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008). S. Kramme SITES.DBF: DATA RECORD SHEET (2008)
4221	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Porter-Rodriguez, and T. Venne DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008)
4222	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev, J. Porter-Rodriguez, and T. Venne DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4223	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, S. Kramme, J. Johannesmeyer, J. Porter-Rodriguez, and T. Venne DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008). S. Kramme SITES.DBF: DATA RECORD SHEET (2008)
4224	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev, J. Porter-Rodriguez, and T. Venne DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008). S. Kramme SITES.DBF: DATA RECORD SHEET (2008)
4225	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4226	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4227	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Light Lithic Deposit	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4228	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, and S. Kramme DPR Record (2008)
4229	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, S. Kramme, J. Johannesmeyer, J. Porter-Rodriguez, and T. Venne DPR Record (2008)
4230	N/A	Not Evaluated	Historic	Refuse Deposit	Civilian	J. Porter-Rodriguez, S. Kramme, J. Johannesmeyer, and T. Venne DPR Record (2008)
4231	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Johannesmeyer, S. Kramme, J. Porter-Rodriguez, and T. Venne DPR Record (2008). J. Porter-Rodriguez SITES.DBF: DATA RECORD SHEET (2008). S. Kramme SITES.DBF: DATA RECORD SHEET (2008)
4232	N/A	Not Evaluated	Prehistoric	Base Camp/Village	Base Camp/Village	Ivan Sergejev, S. Kramme, and J. Johannesmeyer DPR Record (2008)

Table C-2
Previously Recorded Cultural Resources within the EUL Solar Facility

EAFB Number (EAFB)	Trinomial (CA-KER-)	Eligibility Status	Era	Site Type	Site Descriptions	Reference
4233	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, S. Kramme, and J. Johannesmeyer DPR Record (2008)
4234	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, S.Kramme, J. Johannesmeyer, J. Porter-Rodriguez, and T. Venne. DPR Record (2008). Gloriella Cardenas, J. Porter-Rodriguez, L. D'Arcy, G. Kulevich DPR Record (2010)
4235	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, S.Kramme, J. Johannesmeyer, J. Porter-Rodriguez, and T. Venne DPR Record (2008)
4236	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	I. Sergejev, J. Porter-Rodriguez, and T. Venne DPR Record (2008)
4237	N/A	Not Evaluated	Historic	Refuse Deposit	Civilian	I. Sergejev, J. Johannesmeyer, S. Kramme, and T. Venne DPR Record (2008). I. Sergejev SITES.DBF: DATA RECORD SHEET (2008)
4238	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, and S. Kramme DPR Record (2008)
4239	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, J. Johannesmeyer, S. Kramme, and T. Venne DPR Record (2008)
4240	N/A	Not Evaluated	Prehistoric	Temporary Camp	Large, Light Temporary Camp	Ivan Sergejev, S.Kramme, J. Johannesmeyer, and T. Venne. DPR Record (2008)
4241	N/A	Not Evaluated	Prehistoric	Roasting Pit/Hearth	Single Feature	Ivan Sergejev, S.Kramme, J. Johannesmeyer, and T. Venne. DPR Record (2008)
4242	N/A	Not Evaluated	Prehistoric	Lithic Deposit	Large, Dense Lithic Deposit	Ivan Sergejev, S.Kramme, J. Johannesmeyer, and T. Venne DPR Record (2008)

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Table C-3
Previous Investigations within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Author(s)	Report Title and Number	Year	Location Relative to Study Area
Peak, Ann	Assessment of archaeological resources- California State Department of Transportation freeway project of 12.4 miles near Mojave, Kern County (KE-00873)	1974	Linear Survey; Intersects project area Northwest-Southeast
Clewlow, C.W.	Archaeological Resources Along the Proposed LNG Gas Transmission Pipeline from Point Conception to Arvin, and Arvin to El Cajon, CA (KE-02012)	1976	Block Survey; 300m South of project area
Robinson, Robert	A cultural resources investigation associated with the Mojave Public Utility District's Sewage Treatment Facility (KE-00276)	1977	Block Survey; 500m North, 100m East of project area
Garfinkel, Alan P. and Joanne Kerbavaz	Negative archaeological survey report DOT-09-KER-14, PM 12.6/16.1, Charge Unit 09-201, EA 204-300 (KE-00423)	1983	Linear Survey; Immediately South/Southeast from project area
Uli, and Robert Schiffman	Archaeological Investigation for Western Energies Inc. Wind Generator Farm West of Mojave, Kern County, CA (KE-01662)	1983	Block Survey; Immediately North of project area
Sutton, Mark Q.	Archaeological Survey of the Camelot Specific Plan Site (KE-01592)	1983	Block Survey, Overlaps central project area
Weil, Edward, Jill Weisbord, and ER Blakley	Cultural Resources Literature Search, Records Check and Sample Field Survey for the California Portion of The Celeron/All American Pipeline Project (KE-01772)	1984	Linear Survey; 300m North of project area
Macko, Michael,	Sylmar Expansion Project: Cultural Resources Inventory and Significance Evaluation, Final Report Volumes 1 and 2, and Addendum (KE-00634)	1985	Block Survey, Directly North of project area
McManus, J.	Negative Archaeological Survey for Soil Removal (KE-01769)	1986	Block Survey; 100m East, 1700m South/Southeast from project area
Proctor, Martha and Jack Edell	Negative Archaeological Survey Report for Widening Route 14 from P.M. 12.6 to 16.1- Also Water Line Easement (KE-00888)	1986	Linear Survey; 300m Northwest of project area
Schiffman, Robert	Archaeological Investigation of Seawest Energy Group, Inc. 640 Acre Wind Generator Farm, Kern County, California (KE-01215)	1986	Block Survey; Immediately North of project area
Schiffman, Robert	Archaeological Investigation for Sea West's Wind Energy Farm West of Mojave, Kern County, Ca (KE-01279)	1987	Block Survey; Immediately North of project area
Schiffman, Robert	Archaeological Investigation for Parcel Map No. 8747, Kern County, Ca (KE-01309)	1988	Block Survey; Immediately South of project area
Lewis Pruett, Catherine	Environmental Impact Evaluation: An Archaeological Assessment for Tentative Tract No. 5157, Mojave, Kern County (KE-00904)	1989	Block Survey; 700m North of project area

Table C-3
Previous Investigations within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Author(s)	Report Title and Number	Year	Location Relative to Study Area
Lewis Pruett, Catherine	Environmental Impact Evaluation: An Archaeological Assessment for Tentative Tract No. 5211, Mojave, Kern County (KE-00905)	1989	Block Survey; Immediately North of project area
Lewis Pruett,Catherine and Kathy Ptomey	Environmental Impact Evaluation: An Archaeological Assessment for Parcel Map No. 5815 Mojave, Kern Co.(KE-00969)	1989	Block Survey; 400m North/Northeast of project area
Parr, Robert	Archaeological assessment of a proposed residential and commercial center near the city of Mojave, Kern County, California (KE-00804)	1989	Block Survey; Overlaps project area
Parr, Robert	An archaeological assessment of 320 acres of the Mojave Propsed Specific Plan, Mojave, Kern County, California (KE-00808)	1989	Block Survey; 700m North of project area
Schmidt, James	Cultural Resources Investigation: TTM No. 5286, Near the City of Mojave, Kern County (KE-01495)	1990	Block Survey; 700m North of project area
McGuire, Kelly	A cultural resources inventory and limited evaluation of the proposed Mojave Pipeline Corridor in California and Arizona (KE-00641)	1990	Linear Survey; heading Northwest- Southeast, 800m North of project area
Parr, Robert	Archaeological assessment of tentative tract no. 5323 near Mojave, Kern County, California (KE-00818)	1990	Block Survey; 1900m (1mile, 500m) South of project area
Parr, Robert	Archaeological assessment of 400 acres of land near Mojave, Kern County, California (KE-00819)	1990	Block Survey; 100m South of project area
Schiffman, Robert	Archaeological Investigation for Lots 1-50, Tentative Tract #4917, Mojave, CA (KE-01359)	1990	Block Survey; 300m South of project area
Schiffman, Robert	Archaeological Investigation of Tentative Housing Tract (KE-02156)	1990	Block Survey; 200m South of project area
Hanna, David C.	Archaeological Survey of the Camelot Specific Plan Amendment, a 160-Acre Property in Mojave, Kern County, California. (KE-00470)	1990	Block Survey, Directly North of project area
Wohlgemuth, Eric and Kelly McGuire	A Cultural Resources Inventory of a Pipeline Corridor Expansion Tract and Re-Route in Kern County, Ca (KE-01807)	1991	Linear Survey; heading Northwest- Southeast, 250m North of project area
Schiffman, Robert	Archaeological Investigation of 7.12 Acre Parcel APN 427-02027 Section 21, Township 11N., Range 12W. Mojave, Kern County, CA (KE-01406)	1991	Block Survey; Immediately North of project area
Macko, Michael, Jeanne Binning, David Earle, and Paul Langenwalter	National Register eligibility determinations for historic resources along the proposed AT&T Lightguide System, Victorville to Bakersfield, California (KE-00633)	1993	Linear Survey; Immediately South of project area

Table C-3
Previous Investigations within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Author(s)	Report Title and Number	Year	Location Relative to Study Area
Laylander, Don	Negative Archaeological Survey Report. Highway project description: District 09, Kern County, Route 14, Post Miles 12.9 - 14.4, Expenditure Authorization 952137 (KE-00050)	1995	Block Survey; 300m South of project area
Hayden, William, Michael Macko, and David Earle	Class III Intensive Survey of Five Land Exchange Sites for Hughes Land Company in the Rosamond and Palmdale Areas, Los Angeles and Kern Counties, California (KE-01993)	1995	Block Survey, Overlaps eastern project area
Science Applications International Corp.	Cultural Resources Investigation Pacific Pipeline Emidio Route (Including West Liebre Gulch Ridge Alignment and Mojave Alternatives) L.A. and Kern Counties, Ca (KE-01028)	1996	Linear Survey; 600m Southeast of project area
Kimball, Marcia	Cultural Resource Testing and Evaluation Report for the Cory and Minn Parcels of the Loomis Land Exchange (KE-00101)	1996	Block Survey, Overlaps Eastern project area
Fleagle, Dorothy	An Archaeological Assessment of Ninety-Four Acres North of the Mojave/Rosamond Landfill, Kern County, CA (KE-02193)	1998	Block Survey; 2100m (1mile, 500m) South of project area
Parr, Robert	Archaeological Assessment of the Niklor Chemical Company Manufacturing and Transfer Facility South of Mojave, Kern County, CA (KE-01924)	1998	Block Survey; Immediately North of project area
Scott, Barry	Cultural Resources Inventory Report for the AT&T Corp. Cable Upgrade Project, Los Angeles, Kern, and San Luis Obispo Counties, CA (KE-02323)	1999	Linear Survey; Immediately West of project area
Hudlow, Scott	Negative Archaeological Survey Report: Reconstruction on Panama Road Between S. "H" Street and Comanche Road, County of Kern Roads Department (KE-02450)	1999	Linear Survey; heading West-East, directly along project line
Hudlow, Scott	Negative Historic Survey Report: Asphalt Overlay of Oak Creek Road (KE-02406)	2000	Linear Survey; heading Southeast- Northeast, directly along project line
Hudlow, Scott	Negative Archaeological Survey Report: Oak Creek Road, Kern County Roads Department (KE-02438)	2000	Linear Survey; heading Southeast- Northeast, directly along project line
Washington, Daphne	Draft Environmental Impact Report: Mojave-Rosamond Sanitary Landfill Vol. 1 of 2 (KE-02813)	2002	Block Survey; 1600m (1mile) South of project area
Underwood, Jackson and James Cleland	Cultural Resources Survey of Line 1903, All American Pipeline Conversion Project from Mettler, Kern County, CA to Daggett, San Bernardino County, CA (KE-03239)	2002	Linear Survey; 300m North of project area

Table C-3
Previous Investigations within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Author(s)	Report Title and Number	Year	Location Relative to Study Area
Fleagle, Dorothy	A Cultural Resources Assessment for Approximately 500 Acres for the Mojave/Rosamond Sanitary Landfill Addition Northeast of the Existing Landfill, South of Mojave, Kern Co., Ca (KE-03085)	2005	Block Survey; Immediately South of project area
Fleagle, Dorothy	A Cultural Resources Assessment for Tentative Tract #6545, 39.41 Acres West of the City of Mojave, Kern County, CA (KE-03180)	2005	Block Survey; Immediately East of project area
Schiffman, Robert and Alan Gold	Cultural Resource Survey for a 29.54-Acre Parcel, Tract Number 6640, on Koch Street, in the City of Mojave, Eastern Kern County, CA (KE-03228)	2005	Block Survey; 200m North of project area
Norwood, Richard	Phase I Cultural Resource Investigation for a 35-Acre Property Southeast of the Intersection of 25th Street and Camelot Boulevard, Mojave, Kern County, California (KE-03264)	2005	Block Survey, 150m North of central project area
Nilsson, Elena	Archaeological Inventory of the First and Second Los Angeles Aqueducts and Selected Access Roads, Kern, Inyo, and Los Angeles Counties, CA (KE-03534)	2006	Linear Survey; Intersects project area Southwest-Northeast
Switalski, Hubert	Archaeological Survey for the Proposed Extension of Discovery 12 kV Distribution Line Circuit to the Privated Residence at 2915 Douglas Street, Mojave, Kern County, Ca (KE-03572)	2006	Block Survey; 800m North of project area
Ahmet, Koral, Roger Mason, and Sara Bholat	Cultural Resources Survey Report for Antelope Transmission Project: Segments 2 & 3 Los Angeles and Kern Counties (KE-03546)	2006	Block Survey; Immediately South of project area
Schiffman, Robert and Alan Gold	Cultural Resource Survey for a 310 Acre Parcel Near the Intersection of Purdy Avenue and United Street Near the City of Mojave, Eastern Kern County, CA (KE-03387)	2006	Block Survey; Immediately South of project area
Wlodarski, Robert	Proposed Cell Site-Cingular Wireless Telecommunication Site NL0258-03(AVEK) Located @ Sierra Hwy., North of Silver Queen Rd. in the City of Mojave (KE-03183)	2006	Block Survey; 600m West of project area
Hudlow, Scott	A Phase I Cultural Resource Survey for APN 427-007-031, Al Mirage Apartments, Mojave, Kern County, CA (KE-03463)	2006	Block Survey; 800m North of project area
Pruett, Catharine L.	Cultural Resources Assessment of Tentative Tract 6666, a 36-Acre Parcel South of Mojave, Kern County, California (KE-03263)	2006	Block Survey, 150m North of central project area
Pruett, Catharine L.	Cultural Resources Assessment of Tentative Tract 6587, a 77-Acre Parcel West of Mojave, Kern County, California (KE-03181)	2006	Block Survey, Directly between project area
Ahmet, Koral and Roger Mason	Cultural Resources Survey Report for Antelope Transmission Project: Segment 3, Option C, Kern County, Ca (KE-03547)	2007	Block Survey; 300m Southwest of project area

Table C-3
Previous Investigations within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Author(s)	Report Title and Number	Year	Location Relative to Study Area
Hudlow, Scott	A Phase I Cultural Resource Survey for AERO Energy Wind Power Project, Application 4, Kern County, CA (KE-03490)	2007	Block Survey; 500m South of project area
Price, Barry A., Mary Clark Baloian, Robert Lichtenstein, and Marc Linder	Confidential Specialist Report: Cultural Resources Inventory for the Tehachapi Renewable Transmission Project Kern, Los Angeles, and San Bernardino Counties, California (KE-03941)	2009	Block Survey; 50m South of project area
Fleagle, Dorothy	A Cultural Resources Assessment for 160 Acres of Bureau of Land Management Land Adjacent to the Mojave/Rosamond Sanitary Landfill Buffer, Kern County, California (KE-03611)	2009	Block Survey; Immediately East of project area
Fleagle, Dorothy	A Cultural Resources Assessment for 120 Acres for the Mojave/Rosamond Sanitary Landfill Buffer, South of The City of Mojave, Kern County, California	2009	Block Survey; Immediately East of project area
DeCarlo, Mathew and Rebecca S. Orfila	A Cultural Resources Assessment of 40 Acres Near Mojave (APN 427-080-13, 14, 15), Mojave, Kern County, California (KE-03887)	2009	Block Survey; Immediately East of project area
Gust, Sherri and Veronica Harper	Archaeological Assessment, Segment 3B Tehachapi Renewable Distribution Project, 12 kV Distribution Line, Kern County, California (KE-03698)	2009	Linear Survey; Immediately South of project area
Pruett, Catharine L.	Cultural Resources Assessment of Approximately 40 Acres Southwest of Mojave, Kern County, California (KE-03600).	2009	Block Survey, Directly on project area
Ferguson, A.	Culture Testing Report for the Alta Oak Creek Mojave Wind Project, Kern County, California (KE-03779)	2010	Block Survey; Immediately North of project area
Leach-Palm, Laura, Paul Brandy, Jay King, Pat Mikkelsen, Libby Seil, Lindsay Hartman, Jill Bradeen, Bryan Larson, Joseph Freeman, Julia Costello, Jeffrey Rosenthal, and Deborah Jones	Cultural Resources Inventory of Caltrans District 6 Rural Conventional Highways in Fresno, Western Kern, Kings, Madera, and Tulare Counties Summary of Methods and Findings (KE-03777)	2010	Linear Survey; 200m Northwest of project area
Orfila, Rebecca S.	Re: Archaeological Survey for the Southern California Edison Company: Repair and Maintenance Activities for Three (3) Power Poles on the Discovery 12kV and Keene 12kV Circuits, Kern County, California (O&MIO#301186; SYS ID#1003-0310-2525, -4319, and... (KE-04006)	2010	Block Survey; Directly on project area

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Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
Within Gen-Tie Route Options Study Area	3528	3528H	Historic	Road Grade	Macko, Archaeological Site Record (1993)
Within Gen-Tie Route Options Study Area	3529	3529H	Historic	Railroad segment (Southern Pacific)	Macko, Archaeological Site Record (1993)
Within Gen-Tie Route Options Study Area	3536	3536	Historic	Los Angeles Aqueduct Road	Macko, M., Archaeological Site Record (1993)
Within Gen-Tie Route Options Study Area	3549	3549H	Historic	Los Angeles Aqueduct	Costello, J., J. Marvin, and J. Tordoff, Archaeological Site Record (1992), Costello, J. and J. Marvin, Archaeological Site Record Update (1993), Underwood, J., DPR Record Update (2000)
Within Gen-Tie Route Options Study Area	4761	4415H	Historic	Refuse deposit	Samuelson et al., Site Record (1995)
Within Gen-Tie Route Options Study Area	4762	4416H	Historic	Refuse deposit	Samuelson et al., Site Record (1995)
Within Gen-Tie Route Options Study Area	12497	7039	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12498	7040	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12499	7041	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12500	7042	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12501	7043	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12502	7044	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12503	7045	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12504	7046	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12505	7047	Prehistoric	Artifact scatter and rock feature	Ahmet et al., DPR Record (2006)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
Within Gen-Tie Route Options Study Area	12506	7048	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12507	7049	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12508	7050	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12509	7051	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12510	7052	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12511	7053	Prehistoric	Lithic scatter	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12705	7163H	Historic	Labor camp	Brown and Lippman, DPR Record (2002)
Within Gen-Tie Route Options Study Area	12718	7176/H	Prehistoric/ Historic	Lithic scatter/ Refuse deposit	Brown and Lippman, DPR Record (2002)
Within Gen-Tie Route Options Study Area	13802	7737H	Historic	Refuse deposit	Blotner et al., DPR Record (2010)
Within Gen-Tie Route Options Study Area	13840	7748	Prehistoric	Temporary Camp with a hearth feature	Way, K.R., and K.S. Norwood, DPR Record (2008)
Within Gen-Tie Route Options Study Area	13841	7749	Prehistoric	Artifact scatter	Way and norwood, DPR Record (2008)
Within Gen-Tie Route Options Study Area	13904	7789H	Historic	Segment of UPRR, Creal Spur/railroad	Calicher, H., R. Rolston, and N. Lawson, DPR Record (2009)
Within Gen-Tie Route Options Study Area	13914	7798H	Historic	Refuse deposit	Fergusson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	13915	7799H	Historic	Refuse deposit	Fergusson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	13931	7815H	Historic	Historic period road	Fergusson, A., N. Lawson, B. Harmon, E. Peters, R. Rolston, and H. Calicher, DPR Record (2009)
Within Gen-Tie Route Options Study Area	807	807	Prehistoric	Lithic scatter	Eggers, Site Record Form (1974)
Within Gen-Tie Route Options Study Area	14894	8319H	Historic	Refuse deposit	Hudlow, DPR Record (2010)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
Within Gen-Tie Route Options Study Area	14966	8354	Historic	Refuse deposit	DeCarlo and Guenther (2009)
Within Gen-Tie Route Options Study Area	13686	8373H	Historic	Refuse deposit	McCormick, DPR Record (2008)
Within Gen-Tie Route Options Study Area	15521	8486H	Historic	Refuse deposit	Ewers, DPR Record (2011)
Within Gen-Tie Route Options Study Area	6675	N/A	Prehistoric	Lithic flake (Isolate)	Sutton, Site Record (1983)
Within Gen-Tie Route Options Study Area	6676	N/A	Prehistoric	Lithic Scatter (Isolate)	Sutton, Site Record (1983)
Within Gen-Tie Route Options Study Area	6677	N/A	Prehistoric	Lithic flake, chalcedony scraper (Isolate)	Sutton, Site Record (1983)
Within Gen-Tie Route Options Study Area	6679	N/A	Prehistoric	Obsidian Projectile Point Midsecton (Isolate, Collected)	Sutton, Site Record (1983)
Within Gen-Tie Route Options Study Area	7725	N/A	Prehistoric	Lithic flake and broken metate (Isolate)	Pruett et al., Isolate Record (1989)
Within Gen-Tie Route Options Study Area	7730	N/A	Prehistoric	Lithic flake (Isolate)	Schiffman, Isolate Record (1990)
Within Gen-Tie Route Options Study Area	7731	N/A	Prehistoric	Lithic flake (Isolate)	Schiffman, Isolate Record (1990)
Within Gen-Tie Route Options Study Area	12482	N/A	Historic	SCA glass bottle fragments (Isolate)	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12483	N/A	Prehistoric	Lithic flake (Isolate)	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12484	N/A	Prehistoric	Lithic flake (Isolate)	Ahmet et al., DPR Record (2006)
Within Gen-Tie Route Options Study Area	12790	N/A	Prehistoric	Lithic biface (Isolate)	Blind et al., DPR Record (2007)
Within Gen-Tie Route Options Study Area	12791	N/A	Prehistoric	Lithic flake (Isolate)	Blind, H., F.H. Arellano, L. MacDonald, L. Schrader, and A. Monastero, DPR Record (2007)
Within Gen-Tie Route Options Study Area	13683	N/A	Prehistoric	Lithic flake (Isolate)	McCormick, DPR Record (2008)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
Within Gen-Tie Route Options Study Area	13828	N/A	Prehistoric	Lithic tool (Isolate)	Way, DPR Record (2008)
Within Gen-Tie Route Options Study Area	13939	N/A	Historic	Glass bottle (Isolate)	Lawson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	13948	N/A	Historic	Solder-dot can (Isolate)	Lawson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	13951	N/A	Prehistoric	Lithic flake (Isolate)	Lawson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	13952	N/A	Prehistoric	Lithic flakes (Isolate)	Lawson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	13989	N/A	Historic	Solder-dot cans (Isolate)	Lawson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	14001	N/A	Historic	Solder-dot can (Isolate)	Lawson et al., DPR Record (2009)
Within Gen-Tie Route Options Study Area	15523	N/A	Historic	Coke bottle (Isolate)	Cardenas, DPR Record (2011)
Within Gen-Tie Route Options Study Area	15548	N/A	Historic	Matchstick-filler cans (Isolate)	Ewers, DPR Record (2011)
Within Gen-Tie Route Options Study Area	15549	N/A	Historic	Hole-in-cap can (Isolate)	Ewers, DPR Record (2011)
Within Gen-Tie Route Options Study Area	12208	N/A	Prehistoric	Lithic flake (Isolate)	Fleagle and Pruett, DPR Record (2005)
Within Gen-Tie Route Options Study Area	12481	N/A	Historic	Two pieces of SCA glass	Ahmet, Koral, Sara Bholat, Nicole Hofmeister, Maria Espinoza and Evan Crabtree, DPR Record (2006)
Within Gen-Tie Route Options Study Area	13693	N/A	Prehistoric	Lavender striped chert point	Strudwick, Ivan and Heather Drought, DPR Record (2009)
Within Gen-Tie Route Options Study Area	13940	N/A	Historic	Solder top milk can situated among modern trash	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
Within Gen-Tie Route Options Study Area	13987	N/A	Prehistoric	Flake scraper	Lawson, N., C. Calicher, B. Harmon, E. Peters, R. Rolston, and A. Fergusson, DPR Record (2009)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
Within Gen-Tie Route Options Study Area	13988	N/A	Historic	Prince Albert tobacco tin, two complete solder dot cans, and one crushed decomposed solder dot can	Lawson, N., C. Calicher, B. Harmon, E. Peters, R. Rolston, and A. Fergusson, DPR Record (2009)
Immediately adjacent to the Central Portion	13801	7736H	Historic	Refuse deposit	Blotner et al., DPR Record (2010)
Immediately adjacent to the Central Portion	4763	N/A	Historic	Old Sierra Highway	Samuelson et al., DPR Record (1995); Glennon, DPR Record (2001)
Immediately adjacent to the Central Portion	13814	N/A	Historic	Sanitary can (Isolate)	Smolik and Blotner, DPR Record (2010)
25 meters West of Northern Portion	12480	N/A	Prehistoric	Two interior flakes	Ahmet, Koral, Sara Bholat, Nicole Hofmeister, Maria Espinoza and Evan Crabtree, DPR Record (2006)
25 meters West of Northern Portion	12491	N/A	Prehistoric	Chalcedony interior flake	Ahmet, Koral, Sara Bholat, and Evan Crabtree, DPR Record (2006)
30 meters west of the Eastern Portion	13807	N/A	Historic	Oil can (Isolate)	Smolik and Blotner, DPR Record (2010)
30 meters west of the Eastern Portion	13808	N/A	Historic	Oil can (Isolate)	Smolik and Blotner, DPR Record (2010)
30 meters west of the Eastern Portion	13809	N/A	Historic	Solder-dot can (Isolate)	Smolik and Blotner, DPR Record (2010)
30 meters west of the Eastern Portion	13810	N/A	Historic	Coca-cola glass bottle base (Isolate)	Smolik and Blotner, DPR Record (2010)
30 meters west of the Eastern Portion	13811	N/A	Historic	Pepsi-cola glass bottle fragments (Isolate)	Smolik, DPR Record (2010)
40 meters east of the Eastern Portion	4764	N/A	Prehistoric	Lithic core (Isolate)	Samuelson et al., DPR Record (1995)
40 meters north of the Eastern Portion	15582	N/A	Prehistoric	Lithic flake (Isolate)	Fleagle, DPR Record (2009)
45 meters east of the Eastern Portion	15583	N/A	Prehistoric	Lithic flake (Isolate)	Fleagle, DPR Record (2009)
45 meters south of the Central Portion	15542	N/A	Historic	Tobacco tin (Isolate)	Cardenas, DPR Record (2011)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
45 meters west of the Eastern Portion	13806	N/A	Historic	Solder-dot can (Isolate)	Smolik and Blotner, DPR Record (2010)
50 meters west of the Eastern Portion	13812	N/A	Historic	Coca-cola glass bottle base (Isolate)	Smolik, DPR Record (2010)
50 meters South of Southern Portion	5703	IF-KER-4841H	Historic	Small, vertical mining shaft	Whitley, D., Archaeological Site Record (1997)
50 meters Southeast of Northern Portion	13924	7808H	Historic	Small sparse can scatter	Fergusson, A., H. Calicher, R. Rolston, DPR Record (2009)
50 meters West of Northern Portion	13941	N/A	Historic	Solder dot can	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
50 meters West of Northern Portion	13942	N/A	Historic	Solder dot can	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
60 meters north of the Central Portion	2717	2717	Prehistoric	Lithic Scatter (Metate Fragments)	Parr, Archaeological Site Record (1990)
60 meters northeast of the Central Portion	3530	3530H	Historic	Atchison, Topeka & Santa Fe Railroad access road segment	Underwood, DPR Record (2000)
60 meters south of the Central Portion	2724	2724	Prehistoric/ Historic	Roasting Pit with several fragments of insulator glass	Parr, Archaeological Site Record (1990)
65 meters east of the Eastern Portion	10013	N/A	Prehistoric	Lithic flake (Isolate)	Schiffman, Isolate Record (1988)
75 meters east of the Eastern Portion	4811	4430/H	Historic	Structural remains and refuse deposit	Haslouer et al., DPR Record (1995)
95 meters south of the Eastern Portion	10012	N/A	Prehistoric	Lithic flake (Isolate)	Schiffman, Isolate Record (1988)
100 meters West of Northern Portion	3537	3537	Historic	Current two-lane asphalt-concrete road	Macko, M., Archaeological Site Record (1993)
130 meters south of the Central Portion	15541	N/A	Historic	Beverage can (Isolate)	Cardenas, DPR Record (2011)
135 meters north of the Eastern Portion	15581	N/A	Prehistoric	Lithic flake (Isolate)	Fleagle, DPR Record (2009)
150 meters east of the Eastern Portion	15580	N/A	Prehistoric	Lithic flake/ tool (Isolate)	Fleagle, DPR Record (2009)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
175 meters east of the Central Portion	12206	6911H	Historic	Refuse deposit	Fleagle, DPR Record (2005)
180 meters west of the Eastern Portion	758	758	Prehistoric	Lithic scatter	Eggers, Site Record Form (1974)
200 meters West of Northern Portion	12797	7218	Prehistoric	Sparse lithic scatter	Blind, H., F.H. Arellano, L. Schrader, L. MacDonald, and A. Monastero, DPR Record (2007)
200 meters West of Northern Portion	13944	N/A	Historic	Solder top can lid	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
240 meters north of the Central Portion	15522	N/A	Historic	Lithic flake (Isolate)	Cardenas, DPR Record (2011)
250 meters east of the Eastern Portion	15584	N/A	Prehistoric	Lithic flake (Isolate)	Fleagle, DPR Record (2009)
250 meters East of Southern Portion	7491	IF-KER-0241	Prehistoric	Rhyolite flake; isolated record	Schiffman, R., DPR Isolated Record (1988)
250 meters West of Northern Portion	13945	N/A	Historic	Enamel wash basin and one solder top condensed milk can	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
260 meters east of the Eastern Portion	7716	N/A	Prehistoric	Lithic flake (Isolate)	Parr et al., DPR Record (1989)
275 meters west of the Central Portion	13947	N/A	Prehistoric	Lithic flake (Isolate)	Lawson et al., DPR Record (2009)
300 meters east of the Central Portion	13946	N/A	Historic	Solder-dot can (Isolate)	Lawson et al., DPR Record (2009)
300 meters West of Northern Portion	13910	7794H	Historic	Segments of riveted iron pipe	Harmon, R., E. Peters, and H. Calicher, DPR Record (2009)
330 meters east of the Eastern Portion	7722	N/A	Prehistoric	Metate (Isolate)	Parr et al., DPR Record (1989)
35 meters east of the Central Portion	15174	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)
350 meters north of the Eastern Portion	13813	N/A	Historic	Ceramic fragments (Isolate)	Smolik and Blotner, DPR Record (2010)
350 meters Southwest of Southern Portion	4828	4447H	Historic	Early 1900s- Modern Mining camp/homestead	Whitley, D. and J. Simon, Archaeological Site Record (1995)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
350 meters West of Northern Portion	14015	N/A	Historic	Two solder dot cans	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
380 meters east of the Central Portion	560	560H	Historic	Atchison, Topeka & Santa Fe Railroad grade (Recommended as eligible for NRHP)	Sutton and Tremblay, Archaeological Site Survey Record (1977); Haynal et al., DPR Record (1988); Macko, Archaeological Site Record (1993); McGetrick and Onzol, Archaeological Site Record (1994); Hayden et al., Archaeological Site Record (1995); Lark et al., DPR Record (1995); Kimball and Cunkelman, DPR Record (1996); O'Brien, DPR Record (1998); Underwood, DPR Record (2000); Wedding, DPR Record (2001); Puckett, Update for EAFB Cultural Resources (2007)
380 meters east of the Central Portion	15175	N/A	Prehistoric	Lithic tool (Isolate)	Murphy et al., DPR Record (2009)
400 meters east of the Eastern Portion	15178	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)
400 meters South of Northern Portion	14013	N/A	Historic	SCA glass fragment	Lawson, N., C. Calicher, B. Harmon, E. Peters, R. Rolston, and A. Fergusson, DPR Record (2009)
400 meters Southwest of Northern Portion	13835	N/A	Prehistoric	Obsidian biface thinning flake	Larsen, K., C. Davis, M. Shier and S. Brewer, DPR Record (2010)
400 meters West of Northern Portion	13943	N/A	Historic	Two widely dispersed solder top cans	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
400 meters West of Northern Portion	13983	N/A	Historic	C-ration can and a mason jar lid	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
405 meters north of the Western Portion	10715	N/A	Prehistoric	Lithic flake (Isolate)	Underwood, DPR Record (2000)
425 meters north of the Eastern Portion	13815	N/A	Historic	SCA glass bottle base (Isolate)	Smolik and Blotner, DPR Record (2010)
425 meters north of the Eastern Portion	13822	N/A	Historic	Solder-dot can (Isolate)	Smolik and Blotner, DPR Record (2010)
440 meters south of the Central Portion	15543	N/A	Historic	Glass bottle base (Isolate)	Cardenas, DPR Record (2011)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
460 meters east of the Eastern Portion	15176	N/A	Prehistoric	Lithic flake/ tool (Isolate)	Murphy et al., DPR Record (2009)
465 meters east of the Eastern Portion	15182	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)
480 meters east of the Eastern Portion	15180	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)
485 meters west of the Western Portion	13997	N/A	Historic	Solder-dot can (Isolate)	Lawson et al., DPR Record (2009)
490 meters east of the Eastern Portion	15179	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)
490 meters east of the Eastern Portion	15184	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)
490 meters north of the Eastern Portion	13800	7735H	Historic	Refuse deposit	Blotner et al., DPR Record (2010)
490 meters west of the Western Portion	14016	N/A	Historic	Solder-dot cans and one tobacco tin (Isolate)	Lawson et al., DPR Record (2009)
495 meters east of the Eastern Portion	15177	N/A	Prehistoric	Lithic flake/ tool (Isolate)	Murphy et al., DPR Record (2009)
500 meters North of Northern Portion	14069	N/A	Prehistoric	White chalcedony waste flake	Uli, Jim, Archaeological Isolated Find Record (1983)
500 meters Southwest of Southern Portion	4827	4446H	Historic	Mining Camp	Whitley, D. and J. Simon, Archaeological Site Record (1995)
510 meters north of the Eastern Portion	13804	N/A	Historic	Sanitary can (Isolate)	Smolik and Blotner, DPR Record (2010)
520 meters east of the Eastern Portion	15181	N/A	Prehistoric	Lithic shatter (Isolate)	Murphy et al., DPR Record (2009)
520 meters west of the Western Portion	13995	N/A	Historic	Solder-dot can (Isolate)	Lawson et al., DPR Record (2009)
520 meters west of the Western Portion	13996	N/A	Prehistoric	Lithic tool (Isolate)	Lawson et al., DPR Record (2009)
525 meters north of the Eastern Portion	13816	N/A	Historic	Metal kerosene lamp base (Isolate)	Smolik, DPR Record (2010)
535 meters east of the Eastern Portion	15183	N/A	Prehistoric	Lithic flake (Isolate)	Murphy et al., DPR Record (2009)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
550 meters South of Northern Portion	12716	7174H	Historic	Large historic borrow pit and structural remains	Brown, Brad, DPR Record (2002)
550 meters South of Northern Portion	14703	8269H	Historic	Small campsite with assorted refuse deposit	Lawson, N., E. Peters, and B. Harmon, DPR Record (2009)
560 meters west of the Western Portion	13909	7793H	Historic	Refuse deposit	Fergusson et al., DPR Record (2009)
565 meters north of the Eastern Portion	13803	N/A	Historic	SCA glass bottle fragment (Isolate)	Smolik, DPR Record (2010)
580 meters north of the Central Portion	15547	N/A	Historic	Brown glass bottle (Isolate)	Ewers, DPR Record (2011)
600 meters north of the Eastern Portion	13820	N/A	Historic	Glass jug fragments (Isolate)	Smolik, DPR Record (2010)
600 meters northeast of the Central Portion	2554	2554H	Historic	Refuse deposit	Pruett and Ptomey, Archaeological Site Record (1990)
600 meters South of Northern Portion	14701	8267	Prehistoric	Small quarry with lithic deposits	Fergusson, A., H. Calicher, R. Rolston, DPR Record (2009)
600 meters South of Northern Portion	13963	N/A	Historic	Solder top can and galvanized steel bucket	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
600 meters West of Northern Portion	13692	7692H	Historic	Can scatter	Drought, Heather, and Molly Valasik, DPR Record (2009)
600 meters West of Northern Portion	13979	N/A	Prehistoric	Small, white chert flake	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
650 meters north of the Eastern Portion	13805	N/A	Historic	Sanitary can (Isolate)	Smolik and Blotner, DPR Record (2010)
650 meters northwest of the Central Portion	14068	N/A	Prehistoric	Projectile point (Isolate)	Uli, Archaeological Isolate Find Record (1983)
665 meters north of the Central Portion	15532	N/A	Historic	Match-stick filler can and a broken glass 7-Up bottle (Isolate)	Cardenas, DPR Record (2011)
680 meters north of the Eastern Portion	13821	N/A	Historic	Wooden posts (Isolate)	Smolik and Blotner, DPR Record (2010)
695 meters north of the Central Portion	15531	N/A	Historic	Match-stick filler can (Isolate)	Ewers, DPR Record (2011)

Table C-4
Previously Recorded Resources within 0.5 Mile of the Gen-Tie Transmission Line Routing Options

Location Relative to Project Study Area	Primary Number (P-15-)	Trinomial (CA-KER-)	Age or Period of Resource	Description	Reference
700 meters north of the Eastern Portion	13798	7733H	Historic	Refuse deposit	Blotner et al., DPR Record (2010)
700 meters north of the Eastern Portion	13819	N/A	Historic	Cone-top can (Isolate)	Smolik and Blotner, DPR Record (2010)
700 meters South of Northern Portion	13921	7805H	Historic	Widely dispersed scatter of cans	Lawson, N., E. Peters, and B. Harmon, DPR Record (2009)
700 meters South of Northern Portion	13933	N/A	Historic	SCA bottle base	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
700 meters South of Northern Portion	13992	N/A	Historic	Flattened solder dot milk can	Lawson, N., C. Calicher, B. Harmon, E. Peters, R. Rolston, and A. Fergusson, DPR Record (2009)
700 meters South of Northern Portion	13994	N/A	Historic	Single hole in top can	Lawson, N., C. Calicher, B. Harmon, E. Peters, R. Rolston, and A. Fergusson, DPR Record (2009)
710 meters north of the Eastern Portion	13817	N/A	Historic	Glass bottle fragment (Isolate)	Smolik and Blotner, DPR Record (2010)
725 meters north of the Central Portion	15545	N/A	Historic	Matchstick-filler can (Isolate)	Ewers, DPR Record (2011)
725 meters north of the Eastern Portion	13797	7732H	Historic	Refuse deposit	Smolik, DPR Record (2010)
740 meters north of the Central Portion	12467	N/A	Historic	Structure	Hudlow, DPR Record, (2006)
750 meters north of the Eastern Portion	13799	7734H	Historic	Refuse deposit	Blotner et al., DPR Record (2010)
800 meters Southwest of Southern Portion	4829	4448H	Historic	1900-1910 gold mill	Whitley, D. and J. Simon, Archaeological Site Record (1995)
810 meters north of the Central Portion	15530	N/A	Historic	Sanitary cans (Isolate)	Ewers, DPR Record (2011)
900 meters South of Northern Portion	14700	8266	Prehistoric	Small, light lithic scatter	Harmon, R., H. Calicher, and E. Peters, DPR Record (2009)
900 meters South of Northern Portion	13953	N/A	Historic	Solder dot condensed milk can	Lawson, N., C. Calicher, B. Harmon, E. Peters, and R. Rolston, DPR Record (2009)
0.7 mile (1.12 kilometers) northeast	P15-000319	319	Prehistoric	Lithic scatter	Humbert et al. Site Record (1974)

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Table D-1
Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
002				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of cans unlikely to yield additional significant data beyond what has already been recorded.
005				Prehistoric	Small, Light Lithic Deposit (5D)	Likely Ineligible; No Further Work Recommended	Sparse deposit of four chert flakes with no diagnostic artifacts. Little diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
006				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Deposit of 16 artifacts with potential for subsurface deposits.
010				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of four lithics flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
012				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of cans ceramics, and glass, likely representing roadside refuse; unlikely to yield any significant data beyond what has already been recorded.
016				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
029				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Site contains one hearth feature and two lithic tools.
030				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 12 lithic artifacts with diversity of material types and some tools present.

Table D-1
Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
038				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Sparse deposit of FAR and four lithic artifacts.
042				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Deposit of glass, ceramics, one can, and construction material that appears to represent roadside refuse disturbed by modern dumping. Unlikely to yield significant additional data beyond what has already been recorded.
047				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of two cans and one bottle, unlikely to yield additional data beyond what has already been recorded.
048				Historic	Fenceline Agricultural feature (53C)	Likely Ineligible; No Further Work Recommended	No associated cultural material. Likely represents the remains of a historic fence line. Unlikely to yield any significant additional data beyond what has already been recorded.
049				Historic	Fenceline Agricultural feature (53C)	Likely Ineligible; No Further Work Recommended	No associated cultural material. Unlikely to provide any additional significant data beyond what has already been recorded.
050				Historic	Fenceline Agricultural feature (53C)	Likely Ineligible; No Further Work Recommended	No associated cultural material. Unlikely to provide any additional significant data beyond what has already been recorded.
054				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Deposit of FAR, 23 lithics, and bone.
058				Prehistoric	Small, Light Lithic Deposit (5D)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.

Table D-1
Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
060				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of five chert flakes with no diagnostic artifacts. Little diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
061				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of eight chert and chalcedony flakes with no diagnostic artifacts. Little diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
062				Historic	Civilian Refuse Deposit (50A)	Potentially Eligible; Archival Research Recommended	Substantial refuse deposit of 11 concentrations with the potential to provide insight into the economic strategies and consumer behavior of depositors. Archival research may provide information on past ownership and possible residency on the land.
063				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of 11 flakes with no diagnostic artifacts. Little diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
070				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Moderately dense deposit of 30 flakes and 1 tool consisting of diverse materials.

Table D-1
Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
072				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 14 flakes and one tool distributed over a large area. Some diversity of material types. Potential for subsurface deposits.
075				Historic	Fenceline Agricultural feature (53C)	Likely Ineligible; No Further Work Recommended	No associated cultural material. Likely represents the remains of a historic fence line. Unlikely to yield any significant additional data other than what has already been recorded.
083				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse refuse deposit of 10 cans distributed over a large area. Unlikely to provide any significant additional data beyond what has already been recorded.
086				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 31 flakes. Little diversity in material types. No diagnostic artifacts. Potential for subsurface deposits.
093				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of four chalcedony flakes with no diagnostic artifacts. No diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
096				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of four flakes and 1 FAR with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.

Table D-1
Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
106				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Ten artifacts located on a stabilized dune. Potential for subsurface deposits.
107				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Six artifacts located on a stabilized dune. Potential for subsurface deposits.
109				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Deposit of four artifacts situated on low ground between low-lying dunes. There is a potential that this deposits represents material eroding out of the adjacent dunes. Potential for subsurface deposits in the dunes.
115				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of household refuse. Unlikely to provide any additional significant data beyond what has already been recorded.
121				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of eight cans. Unlikely to provide any additional significant data beyond what has already been recorded.
124				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Six hearths and one concentration of lithic artifacts. Site situated on a dune. Potential for subsurface deposits.
125				Historic	Fenceline Agricultural feature (53C)	Likely Ineligible; No Further Work Recommended	No associated cultural material. Likely represents the remains of a historic fence line. Unlikely to yield any significant additional data other than what has already been recorded.
129				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Forty artifacts of diverse material composition located in an area of sand dunes. Potential for subsurface deposits.

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Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
130				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 10 artifacts with some material diversity. Potential for subsurface deposits.
131				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 14 artifacts with some material diversity. Potential for subsurface deposits.
134				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Deposit of more than 60 artifacts with material diversity. Potential for subsurface deposits.
135				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of cans and lumber only. Unlikely to provide any additional significant data beyond what has already been recorded.
139				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Deposit of 30 lithic artifacts and some bone. Diverse material composition. Potential for subsurface deposits.
140				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of cans, glass, ceramics, and lumber. Unlikely to provide any additional significant data beyond what has already been recorded.
142				Prehistoric	Large, Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Sparse deposit of five lithic artifacts, one FAR, and one groundstone. Potential for subsurface deposits.
146				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of household refuse. Unlikely to provide any additional significant data beyond what has already been recorded.
150				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 14 lithic artifacts and 2 FAR. Some material diversity. Potential for subsurface deposits.

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OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
162				Historic	Other (600)	Likely Ineligible; No Further Work Recommended	Two earthen berms with no artifacts. Unlikely to provide any additional significant data beyond what has already been recorded.
166				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Deposit of 12 lithic artifacts, one FAR, and one pecked stone. Diversity of material types. Site situated on a dune. Potential for subsurface deposits.
167				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	One concentration of household refuse, likely represents a roadside deposit. Unlikely to provide any additional significant data beyond what has already been recorded.
180				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	One concentration of cans and a survey marker. Unlikely to provide any additional significant data beyond what has already been recorded.
181				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	One concentration of household refuse. Unlikely to provide any additional significant data beyond what has already been recorded.
184				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 50 flakes, one core, and one projectile point of diverse materials, Potential for subsurface deposits.
186				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of eight chert and chalcedony flakes with no diagnostic artifacts. Little diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.

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Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
188				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 24 flakes. Some material diversity. Potential for subsurface deposits.
189				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 14 flakes and 2 FAR. Potential for subsurface deposits.
191				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three lithic artifacts. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
192				Prehistoric	Single Feature (15A)	Potentially Eligible; Testing Recommended	Hearth feature and two flakes. Potential for subsurface deposits.
193				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 23 flakes, one edge modified flake, and and 1 FAR. Some material diversity. Potential for subsurface deposits.
197				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of seven chert flakes with no diagnostic artifacts and no diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
198				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of nine flakes and one core. Some material diversity. Site situated on a dune. Potential for subsurface deposits.
200				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 33 lithics and 1 FAR. Some diversity in material types. Potential for subsurface deposits.

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OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
202				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of six flakes and shatter with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
204				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Sparse deposit of 11 lithics and 1 tool with diversity of materials represented. Potential for subsurface deposits.
207				Prehistoric	Small, Light Lithic Deposit (5D)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
209				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of 10 flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
210				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Deposit of over 100 lithic artifacts with FAR and groundstone. Site situated on a dune. Potential for subsurface deposits.
213				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
219				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Sparse deposit of 25 flakes, 2 edge modified flakes, and 5 FAR. Some diversity of lithic materials. Potential for subsurface deposits.

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Newly-Recorded Archaeological Sites Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
220				Prehistoric	Small, Light Lithic Deposit (5D)	Likely Ineligible; No Further Work Recommended	Deposit of four chert flakes with no diagnostic artifacts and no diversity in material. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
221				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Deposit of 60 flakes and shatter and one FAR. Some material diversity. Potential for subsurface deposits.
225				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Substantial deposit of 152 lithic artifacts with at least one diagnostic artifact (projectile point). Some diversity of material types. Potential for subsurface deposits.
232				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of 13 chert and chalcedony flakes and shatter with no diagnostic artifacts. Little material diversity. Unlikely to yield significant data beyond what has already been recorded.
233				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Site contains a deflated hearth and 19 flakes. Some material diversity. Potential for subsurface deposits.
235				Prehistoric	Large, Light Temporary Camp (2B)	Potentially Eligible; Testing Recommended	Site contains 1 hearth feature, 8 chert flakes, one edge modified chert flake, and an obsidian biface. Potential for subsurface deposits.

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OV Number (OV-)	Primary Number (P-15-)	Trinomial (CA-KER-)	EAFB Number (EAFB-)	Cultural Context	Resource Description (EAFB Type)	Preliminary Eligibility Recommendation	Comments
238				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of seven chert flakes with no diagnostic artifacts and no diversity in material. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
240				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Substantial deposit 42 flakes and 1 tool of diverse materials. Potential for subsurface deposits.
241				Prehistoric	Large, Light Lithic Deposit (5B)	Potentially Eligible; Testing Recommended	Substantial deposit 50 flakes. Potential for subsurface deposits.
245				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of four chert flakes with no diagnostic artifacts and no diversity in material. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
246				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of four flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
247				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three cans. Unlikely to provide any additional significant data beyond what has already been recorded.
248				Prehistoric	Large, Light Lithic Deposit (5B)	Likely Ineligible; No Further Work Recommended	Sparse deposit of three flakes with no diagnostic artifacts. Unlikely to yield significant data beyond what has already been recorded.
249				Historic	Civilian Refuse Deposit (50A)	Likely Ineligible; No Further Work Recommended	Two concentrations of cans, metal, and glass. Unlikely to provide any additional significant data beyond what has already been recorded.

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Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
9	2125H	NA	Historic	Structurally Complex, Large Homesite (52D)	Not Previously Evaluated	Potentially Eligible; Testing and Archival Research Recommended	Recommend a detailed investigation and archival research to formally evaluate the site.
10	2735/H	002735	Historic	Structurally Complex, Large Homesite (52D)	Recommended Not Eligible	N/A	N/A
16	2530H	002530	Historic	Structurally Complex, Large Homesite (52D)	Recommended Not Eligible	N/A	N/A
17	2523H	002523	Historic	Structurally Complex, Large Homesite (52D)	Recommended Eligible	N/A	N/A
23	1709H	NA	Historic	Structurally Complex, Large Homesite (52D)	Recommended Not Eligible	N/A	N/A
24	6609H	011371	Historic	Civilian Refuse Deposit (50A)	Recommended Not Eligible	N/A	No evidence of this site was observed during the current survey.
303	1168	001168	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Eligible	N/A	N/A
304	1169	NA	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	No evidence of this site was observed during the current survey.
306	1170	NA	Prehistoric	Flaking Station (5E)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	No evidence of this site was observed during the current survey.
373	1768	001768	Prehistoric	Large, Dense Lithic Deposit (5A)	Recommended Not Eligible	N/A	N/A
374	1769	001769	Prehistoric	Small, Light Temporary Camp (2D)	Recommended Not Eligible	N/A	N/A

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
375	1770	001770	Prehistoric	Large, Light Lithic Deposit (5B)	Recommended Not Eligible	N/A	N/A
385	1771	001771	Prehistoric	Large, Dense Temporary Camp (2A)	Recommended Eligible	N/A	N/A
395	1772H	001772	Historic	Civilian Refuse Deposit (50A)	Recommended Not Eligible	N/A	N/A
422	1776	NA	Prehistoric	Large, Dense Lithic Deposit (5A)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 80 lithics of diverse material types. Potential for subsurface deposits.
426	1777	001777	Prehistoric	Large, Dense Temporary Camp (2A)	Recommended Not Eligible	N/A	N/A
427	1778	001778	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Sparse scatter of 45 chert flakes. Potential for subsurface deposits.
428	1779	001779	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Sparse scatter of 31 flakes with some material diversity. Potential for subsurface deposits.
429	1780	001780	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Concentrated deposit of 32 flakes with a unifacially worked tool. Potential for subsurface deposits.
430	1781H	001781	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Potentially Eligible; Archival Research Recommended	Two features, including a well, and refuse concentration. Archival research recommended to determine past ownership and possible residency of the land.

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
562	2009	002009	Prehistoric	Large, Dense Temporary Camp (2A)	Recommended Eligible	N/A	N/A
568	2016	002016	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Eligible	N/A	N/A
569	2010	002010	Prehistoric	Large, Dense Lithic Deposit (5A)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Substantial deposits with four artifact concentrations of over 500 lithics with at least one core and biface fragment. Possibility of midden noted in original site record. Potential for subsurface deposits.
570	2011	002011	Prehistoric	Small, Dense Lithic Deposit (5C)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Dense deposit of 2 lithic concentrations and more than 100 outlying flakes. Possibility of subsurface deposits.
837	2284H	002284	Historic	Structurally Simple, Small Homesite (52A)	Not Previously Evaluated	Potentially Eligible; Testing and Archival Research Recommended	Homesite containing a possible foundation, well, rock ring, two fence lines, metal pipe, and a privy pit. Disturbed by grading and vandalism. Privy pit may contain subsurface deposits.
839	NA	NA	Historic	Well, isolated Agricultural feature (53A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Agricultural site containing an earthen loading dock, dirt pile, and small artifact scatter. No structure. Sparse cultural material deposits. Unlikely to provide any additional significant data beyond what has already been recorded.

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
845	2290H	NA	Historic	Structurally Simple, Small Homesite (52A)	Recommended Eligible	N/A	N/A
950	NA	NA	Historic	Well, isolated Agricultural Feature (53A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse refuse deposit containing cans, glass, one ceramic, one shell fragment, a metal bucket, and a toy wagon. The well was not relocated. No structure. Sparse cultural material deposits. Unlikely to provide any additional significant data beyond what has already been recorded.
1343	NA	NA	Historic	Well, isolated Agricultural Feature (53A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not relocated during survey
2240	2284/H	002284	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
2244	4815	005654	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Only one flake found in site boundary during current survey. Unlikely to provide any additional significant data beyond what has already been recorded.
2245	4790H	005603	Historic	Construction Debris Refuse Deposit (50C)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of chert chunks, amethyst glass, and construction materials. No structure or features. Few diagnostic artifacts. Unlikely to provide any additional significant data beyond what has already been recorded.

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
2247	4791	005604	Prehistoric	Large, Light Lithic Deposit (5B)	Recommended Not Eligible	N/A	N/A
2249	4792	005605	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
2251	4583	005600	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 19 flakes. Site situated on a dune. Potential for subsurface deposits.
2252	4828	005667	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of three rhyolite flakes with no diagnostic artifacts and no diversity in material. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
2253	4829	005668	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 41 flakes, 2 bifaces, 1 groundstone, and 1 FAR. Some material diversity. Potential for subsurface deposits.
2254	4584	005601	Prehistoric	Small, Light Lithic Deposit (5D)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Only one flake found in site boundary during current survey. Unlikely to provide any additional significant data beyond what has already been recorded.
2255	4793	005606	Prehistoric	Large, Light Lithic Deposit (5B)	Recommended Not Eligible	N/A	N/A

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
2257	4832	005671	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 16 flakes of diverse materials and 1 metate. Potential for subsurface deposits.
2258	4825	005664	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of nine flakes of diverse materials. Potential for subsurface deposits.
2259	4816	005655	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 33 flakes of diverse materials, 2 bifaces, FAR and a hearth feature. Potential for subsurface deposits.
2260	4830H	005669	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of cans and glass. No features present. Unlikely to provide any additional significant data beyond what has already been recorded.
2261	4585	005602	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible: Testing Recommended	Deposit of six flakes and one FAR. Site situated on a dune. Potential for subsurface deposits.
2262	4817	005656	Prehistoric	Large, Dense Temporary Camp (2A)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 60+ flakes, 1 groundstone, and a hearth feature. Potential for subsurface deposits.
2263	4818	005657	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	No evidence of site found during current survey.
2264	4619	005658	Prehistoric	Single Feature (15A)	Recommended Not Eligible	N/A	N/A
2265	4820	005659	Prehistoric	Isolated portable metate or mortar (4C)	Recommended Not Eligible	N/A	N/A

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
2316	4821	005660	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of one flake, one chert chunk, and one groundstone. Unlikely to provide any additional significant data beyond what has already been recorded.
2317	4833H	005672	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of 2-3 cans. Unlikely to provide any additional significant data beyond what has already been recorded.
2367	4799	005625	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 14+ flakes, 1 expedient tool, and 3 FAR. Potential for subsurface deposits.
2368	4800	005626	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 20+ flakes of diverse materials, 1 core, 1 biface, schist, and 1 FAR. Potential for subsurface deposits.
2369	4801	005627	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	No evidence of site was found during current survey.
2370	4802	005369	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 40+ flakes and 1 FAR. Artifacts located on a stabilized dune. Potential for subsurface deposits.
2371	4921	005796	Prehistoric	Large, Light Lithic Deposit (5B)	Recommended Not Eligible	N/A	N/A

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
2372	4922	005797	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of 2-10 flakes with little material diversity and no diagnostic artifacts. Unlikely to provide any additional significant data beyond what has already been recorded.
2373	4923	005798	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
2377	4805	005642	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 100+ flakes of diverse materials, 2 tools, groundstone, and 4 concentrations of FAR. Potential for subsurface deposits.
2378	4808	005645	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Sparse deposit of flakes of diverse materials, one tool, and FAR. Potential for subsurface deposits.
2379	4807	005644	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 33 flakes of diverse materials and one core. FAR, bone, and groundstone previously noted. Potential for subsurface deposits.
2380	4809	005646	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 34 flakes of diverse materials and one core. FAR, bone, and groundstone previously noted. Potential for subsurface deposits.

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EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
2381	4806	005643	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of flakes of diverse materials, two expedient tools, groundstone, and a hearth. Potential for subsurface deposits.
2382	4810H	005647	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of cans, glass, and ceramics. Likely represents a single roadside dumping event. Unlikely to provide any additional significant data beyond what has already been recorded.
2401	4928H	005803	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of cans and glass. No features present. Likely represents a single dumping event. Unlikely to provide any additional significant data beyond what has already been recorded.
2402	4929	005804	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Eligible	Likely Ineligible; No Further Work Recommended	Previous subsurface testing revealed sparse subsurface deposits. No evidence of the site was found during the current survey. Previous testing has likely exhausted the research potential of this site.
3049	2009H	NA	Historic	Structurally Simple, Small Homesite (52A)	Not Previously Evaluated	Potentially Eligible; Archival Research and Detailed Documentation Recommended	Majority of site extends off Base boundary and was not updated during current survey. Further investigation needed to evaluate site.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3092	5786	009529	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 26 flakes, groundstone, and anvil. Potential for subsurface deposits.
3093	5790	009533	Prehistoric	Multiple Features (15B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Three concentrations of FAR situated on a claypan with no associated cultural material. Negligible potential of subsurface deposits. Unlikely to provide any additional significant data beyond what has already been recorded.
3094	5791	009534	Prehistoric	Single Feature (15A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Concentration of FAR situated on a claypan with no associated cultural material. Negligible potential of subsurface deposits. Unlikely to provide any additional significant data beyond what has already been recorded.
3114	5792	009535	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Large, sparse deposit of household refuse with no features. Unlikely to yield significant additional data beyond what has already been documented.
3115	5793H	009536	Historic	Civilian Refuse Deposit (50A)	Recommended Not Eligible	N/A	N/A
3116	5794	009537	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 60+ flakes of diverse materials. Tools, FAR, and groundstone previously noted. Potential for subsurface deposits.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3140	3922/H	003922	Historic	Civilian Refuse Deposit (50A)	Recommended Not Eligible	N/A	N/A
3150	5805H	009548	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of 3 cans. Unlikely to yield any additional significant data beyond what has already been documented.
3151	5806	009549	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of 8+ rhyolite flakes with no diagnostic artifacts. No diversity in material composition. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
3152	5807	009550	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
3153	5808	009551	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of 3 flakes with limited material diversity. Likely represents a single episode of lithic reduction. Unlikely to yield significant data beyond what has already been recorded.
3154	5809	009552	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 70+ flakes and one projectile point. Some material diversity. Potential for subsurface deposits.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3155	5810H	009553	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of household refuse with no associated features. Unlikely to yield significant additional information beyond what has already been recorded.
3157	5812	009555	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 10+ flakes of diverse materials and 1 projectile point. Potential for subsurface deposits.
3158	5813	009556	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 6 flakes with some materials diversity and 1 projectile point. Potential for subsurface deposits.
3159	5814H	009557	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of household refuse. Unlikely to produce significant data beyond what has already been recorded.
3160	5815	009558	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 200+ flakes and 1 projectile point. Potential for subsurface deposits.
3161	5816	P15-009559	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
3162	5817	009560	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
3163	5818	009561	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 80+ flakes of diverse materials. Tools previously noted. Potential for subsurface deposits.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3164	5819H	009562	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of cans, glass, and ceramics. Unlikely to produce significant data beyond what has already been recorded.
3165	5820	009563	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 80+ flakes of diverse materials. Potential for subsurface deposits.
3166	5821	009564	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 25+ flakes of diverse materials and at least 1 biface. Potential for subsurface deposits.
3167	5822H	009565	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of cans and glass. Unlikely to produce significant data beyond what has already been recorded.
3168	5811	009554	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 55+ flakes of diverse materials and two tools. Potential for subsurface deposits.
3169	5796	009539	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 20+ flakes with some materials diversity and 1 biface. Potential for subsurface deposits.
3171	5798	009541	Prehistoric	Single Feature (15A)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	One hearth feature with 12 flakes of diverse materials. Potential for subsurface deposits.
3172	5799	09542	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 60+ flakes of diverse materials, schist, and groundstone. Potential for subsurface deposits.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3173	5800	009543	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 30+ flakes of diverse materials. 2 bifaces and 1 bead. Potential for subsurface deposits.
3174	5801	009544	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	One hearth feature, 20+ flakes of diverse materials, and 1 projectile point. Potential for subsurface deposits.
3175	5802	009545	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of at least 17 flakes of diverse material with 1 diagnostic artifact. Potential for subsurface deposits.
3176	5803	009546	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 20+ flakes with some materials diversity. Potential for subsurface deposits.
3177	5804	009547	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Hearth feature, groundstone, and a deposit of 30+ flakes of diverse materials. Potential for subsurface deposits.
3186	5811	009554	Prehistoric	Large, Light Temporary Camp (2B)	Recommended Not Eligible	N/A	N/A
3188	3922/H	NA	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Large site with possible hearth features and associated lithic deposit. Potential for subsurface deposits.
3337	NA	NA	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 20+ flakes and 1 core. Site situated on a dune. Potential for subsurface deposits.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3338	NA	NA	Prehistoric	Small, Light Lithic Deposit (5D)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Previously noted to contain only 3 flakes. No evidence of site found during current survey.
3340	NA	NA	Prehistoric	Small, Light Lithic Deposit (5D)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of 8 flakes with no diagnostic artifacts and little material diversity. Unlikely to produce significant data beyond what has already been recorded.
3341	NA	NA	Prehistoric	Small, Light Lithic Deposit (5D)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Previously noted to contain only 5 flakes. No evidence of site found during current survey.
3347	NA	NA	Prehistoric	Small, Light Lithic Deposit (5D)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Sparse deposit of 6 flakes and 1 FAR. Site situated on a dune. Potential for subsurface deposits.
3582	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. Unlikely to produce significant data beyond what has already been recorded.
3828	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. Unlikely to produce significant data beyond what has already been recorded. Homesites along road should be recorded and evaluated separately from road.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3830	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. Unlikely to produce significant data beyond what has already been recorded. Homesites along road should be recorded and evaluated separately from road.
3834	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. Unlikely to produce significant data beyond what has already been recorded.
3836	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. One associated roadside refuse deposit recorded during current survey. Site is unlikely to produce significant data beyond what has already been recorded.
3875	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. Unlikely to produce significant data beyond what has already been recorded.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
3882	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. One associated roadside refuse deposit recorded during current survey. Site is unlikely to produce significant data beyond what has already been recorded.
3890	NA	NA	Historic	Unpaved Roads and Trails (58A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Not a well-known main travel route through the area. Unlikely to produce significant data beyond what has already been recorded.
4199	7946	014206	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 30+ flakes of diverse materials, groundstone, and FAR. Potential for subsurface deposits.
4205	7944	014204	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 20+ chert flakes. Groundstone previously noted on site. Potential for subsurface deposits.
4217	NA	NA	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Deposit of household refuse. Unlikely to provide any additional significant data beyond what has already been recorded.
4223	NA	NA	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Multiple hearth features, four loci of flakes of diverse materials, and groundstone. Possibility of subsurface deposits.

Table D-2
Previously-Recorded Archaeological Sites Updated Within the Oro Verde EUL Survey Area

EAFB Number (EAFB-)	Trinomial (CA-KER-)	Primary Number (P-15-)	Cultural Context	Resource Description (EAFB Type)	Previous Evaluation	Preliminary Eligibility Recommendation	Comments
4224	NA	NA	Prehistoric	Large, Light Lithic Deposit (5B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Sparse deposit 8-10 flakes of diverse material and one projectile point. Possibility of subsurface deposits.
4229	NA	NA	Prehistoric	Large, Light Temporary Camp (2B)	Not Previously Evaluated	Potentially Eligible; Testing Recommended	Deposit of 75+ flakes of diverse materials, 1 projectile point, 1 biface and FAR. Possibility of subsurface deposits.
4230	8055H	014392	Historic	Civilian Refuse Deposit (50A)	Not Previously Evaluated	Likely Ineligible; No Further Work Recommended	Sparse deposit of household refuse. Unlikely to yield additional significant data beyond what has already been recorded.

Table D-3
Newly-Recorded Isolated Finds Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	EAFB Number	Cultural Context	Site / Isolate	Resource Description
003-I			Prehistoric	Isolate	Projectile point
007-I			Prehistoric	Isolate	Lithic flake
009-I			Historic	Isolate	Complete bottle
011-I			Prehistoric	Isolate	Mano fragment
013-I			Prehistoric	Isolate	Two lithic flakes
014-I			Historic	Isolate	Matchstick Filler (MSF) can
017-I			Prehistoric	Isolate	Utilized flake
018-I			Historic	Isolate	Two MSF cans
019-I			Prehistoric	Isolate	Lithic flake
020-I			Historic	Isolate	Two MSF cans
021-I			Historic	Isolate	MSF can
022-I			Historic	Isolate	MSF can
023-I			Historic	Isolate	Hole-in-cap (HIC) can
024-I			Historic	Isolate	MSF can
025-I			Historic	Isolate	MSF can
026-I			Prehistoric	Isolate	Lithic flake
027-I			Prehistoric	Isolate	Two lithic flakes
033-I			Historic	Isolate	MSF can
037-I			Prehistoric	Isolate	Lithic flake
039-I			Prehistoric	Isolate	Two lithic flakes
040-I			Prehistoric	Isolate	Lithic flake
041-I			Prehistoric	Isolate	Two lithic flakes
043-I			Prehistoric	Isolate	Lithic flake
044-I			Historic	Isolate	HIC can
045-I			Prehistoric	Isolate	Lithic flake
051-I			Prehistoric	Isolate	Lithic flake
053-I			Prehistoric	Isolate	Two lithic flakes
056-I			Historic	Isolate	Rectangular can
059-I			Prehistoric	Isolate	Lithic flake
065-I			Prehistoric	Isolate	Lithic flake
067-I			Prehistoric	Isolate	Lithic flake
068-I			Prehistoric	Isolate	Lithic flake
069-I			Historic	Isolate	MSF can
071-I			Prehistoric	Isolate	Lithic flake
074-I			Prehistoric	Isolate	Two lithic flakes
076-I			Prehistoric	Isolate	Lithic flake
077-I			Historic	Isolate	Bullet casing
078-I			Historic	Isolate	Flat top beverage can
079-I			Historic	Isolate	MSF can
080-I			Prehistoric	Isolate	Lithic flake
081-I			Historic	Isolate	MSF can
082-I			Historic	Isolate	Flat top beverage can
085-I			Prehistoric	Isolate	Lithic flake
087-I			Historic	Isolate	Sun-altered amethyst (SAM) glass fragments
088-I			Historic	Isolate	One HIC and one sanitary can
089-I			Prehistoric	Isolate	Two lithic flakes
090-I			Historic	Isolate	Bullet casing

Table D-3
Newly-Recorded Isolated Finds Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	EAFB Number	Cultural Context	Site / Isolate	Resource Description
091-I			Prehistoric	Isolate	Lithic flake
092-I			Historic	Isolate	MSF or HIC can
095-I			Historic	Isolate	HIC can
097-I			Prehistoric	Isolate	Lithic flake
098-I			Prehistoric	Isolate	Two lithic flakes
100-I			Prehistoric	Isolate	Lithic flake and utilized core
101-I			Prehistoric	Isolate	Shatter fragment
102-I			Historic	Isolate	HIC can
103-I			Prehistoric	Isolate	Lithic flake
104-I			Prehistoric	Isolate	Lithic flake
108-I			Prehistoric	Isolate	Mano
110-I			Prehistoric	Isolate	Lithic flake and shatter fragment
111-I			Prehistoric	Isolate	Projectile point fragment
112-I			Historic	Isolate	MSF can
114-I			Historic	Isolate	Bottle base
119-I			Historic	Isolate	Metal wash basin
122-I			Historic	Isolate	Rectangular fuel can
123-I			Prehistoric	Isolate	Lithic flake
127-I			Prehistoric	Isolate	Two lithic flakes
128-I			Prehistoric	Isolate	Lithic flake
132-I			Prehistoric	Isolate	Two lithic flakes
136-I			Prehistoric	Isolate	Two lithic flakes
138-I			Prehistoric	Isolate	Lithic flake
141-I			Prehistoric	Isolate	Two lithic flakes
143-I			Prehistoric	Isolate	Lithic flake
144-I			Prehistoric	Isolate	Two lithic flakes
147-I			Prehistoric	Isolate	Two lithic flakes
148-I			Prehistoric	Isolate	Lithic flake
149-I			Historic	Isolate	Flat top beverage can and bottle base
151-I			Historic	Isolate	MSF can
152-I			Historic	Isolate	Rectangular can
154-I			Historic	Isolate	MSF can
155-I			Historic	Isolate	Enamelware canteen
156-I			Prehistoric	Isolate	Lithic flake
158-I			Prehistoric	Isolate	Lithic flake
159-I			Prehistoric	Isolate	Two lithic flakes
160-I			Prehistoric	Isolate	Lithic flake
161-I			Prehistoric	Isolate	Lithic flake and projectile point
164-I			Historic	Isolate	Flat top beverage can and pocket tobacco tin
168-I			Historic	Isolate	Flat top beverage can
169-I			Prehistoric	Isolate	Lithic flake
170-I			Prehistoric	Isolate	Lithic flake and exhausted core
171-I			Historic	Isolate	Flat top beverage can
172-I			Prehistoric	Isolate	Lithic flake and shatter fragment
174-I			Prehistoric	Isolate	Two lithic flakes
176-I			Prehistoric	Isolate	Lithic flake

Table D-3
Newly-Recorded Isolated Finds Within the Oro Verde EUL Survey Area

OV Number (OV-)	Primary Number (P-15-)	EAFB Number	Cultural Context	Site / Isolate	Resource Description
177-I			Prehistoric	Isolate	Lithic flake
178-I			Prehistoric	Isolate	Lithic flake
179-I			Prehistoric	Isolate	Lithic flake
182-I			Historic	Isolate	MSF can
183-I			Prehistoric	Isolate	Lithic flake
187-I			Prehistoric	Isolate	Lithic flake
190-I			Historic	Isolate	Pocket tobacco tin
194-I			Prehistoric	Isolate	Lithic flake
195-I			Historic	Isolate	MSF can
196-I			Prehistoric	Isolate	Lithic flake
199-I			Prehistoric	Isolate	Lithic flake
203-I			Prehistoric	Isolate	Lithic flake
205-I			Historic	Isolate	Pocket tobacco tin
208-I			Prehistoric	Isolate	Groundstone fragment and lithic flake
211-I			Prehistoric	Isolate	Lithic flake
212-I			Prehistoric	Isolate	Lithic flake
216-I			Historic	Isolate	Fragmented amber glass bottle
217-I			Prehistoric	Isolate	Lithic flake
218-I			Prehistoric	Isolate	Lithic flake
222-I			Prehistoric	Isolate	Shatter fragment
224-I			Prehistoric	Isolate	Lithic flake
226-I			Prehistoric	Isolate	Two lithic flakes
227-I			Historic	Isolate	Pocket tobacco tin
228-I			Historic	Isolate	Rectangular fuel can
231-I			Prehistoric	Isolate	Lithic flake
234-I			Prehistoric	Isolate	Two lithic flakes
236-I			Prehistoric	Isolate	Two lithic flakes
242-I			Prehistoric	Isolate	Lithic flake and shatter fragment
243-I			Historic	Isolate	Pocket tobacco tin
244-I			Prehistoric	Isolate	Lithic flake

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APPENDIX E DPR SITE RECORDS FOR NEWLY-RECORDED SITES (CONFIDENTIAL)

Appendix E redacted to protect confidential cultural resources data

Appendix F redacted to protect confidential cultural resources data

APPENDIX G DPR RECORDS FOR NEWLY-RECORDED ISOLATE FINDS (CONFIDENTIAL)

Appendix G redacted to protect confidential cultural resources data

B6. Paleontology Records Search

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

tel 213.763.DINO
www.nhm.org

NATURAL
HISTORY
MUSEUM
LOS ANGELES COUNTY

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

11 July 2014

ECORP Consulting, Inc.
215 North 5th Street
Redlands, CA 92374

Attn: Wendy Blumel, Senior Archaeologist

re: Paleontological resources for the proposed Oro Verde Solar Project, Project # 2012-003.001, from west of Mojave to the Bissell Hills, Kern County, project area

Dear Wendy:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Oro Verde Solar Project, Project # 2012-003.001, from west of Mojave to the Bissell Hills, Kern County, project area as outlined on the portion of the Monolith, Mojave, Soledad Mountain, and Bissell USGS topographic quadrangle maps that you sent to me via e-mail on 26 June 2014. We do not have any vertebrate fossil localities that lie within the proposed project site boundaries, but we do have localities nearby from sedimentary deposits similar to those that occur in the proposed project area.

In the elevated terrain of the Bissell Hills, in the far southeastern portion of the proposed project area, the bedrock exposures are composed of plutonic igneous rocks that will not contain any recognizable fossils. There are smaller exposures of the plutonic igneous rocks in elevated terrain closer to the Antelope Valley Freeway (Highway 14) and around Standard Hill in the middle portion of the proposed project area. Most of the elevated terrain of Standard Hill though has exposures of the early to middle Miocene Gem Hill Formation, a coarse rock unit composed of igneous rock fragments, that is unlikely to contain any significant vertebrate fossils.

The great majority of the proposed project area has surficial deposits of younger Quaternary Alluvium, derived as alluvial fan deposits from the Tehachapi Mountains to the northwest. These deposits are unlikely to contain significant vertebrate fossil remains, at least in the uppermost layers, although there are areas of finer-grained dune sands that potentially contain significant fossil vertebrate remains. Our closest vertebrate fossil locality from these Quaternary deposits is LACM 7891, southwest of the western portion of the proposed project area near the California Aqueduct between the Tehachapi Mountains and the Rosamond Hills north of Willow Springs, that produced a fossil specimen of camel, *Hemiauchenia*. Our next closest vertebrate fossil locality from these Quaternary deposits is LACM 3722, west-northwest of the western portion of the proposed project area and found during excavation for a sewer line within the city of Tehachapi, that produced a specimen of fossil horse, *Equus*. South of the middle southern portion of the proposed project area, north of the eastern side of Lancaster, our vertebrate fossil locality LACM 7853 from these Quaternary deposits produced a fossil fauna of small vertebrates from screen washing matrix including coachwhip, *Masticophis*, leaf-nosed snake, *Phyllorhynchus*, lyre snake, *Trimorphodon biscutatus*, desert iguana, *Dipsosaurus dorsalis*, whiptail lizard, *Aspidoscelis tigris*, alligator lizard, *Elgaria*, desert spiny lizard, *Sceloporus magister*, side-blotched lizard, *Uta stansburiana*, desert night lizard, *Xantusia vigilis*, skink, *Plestiodon*, cottontail rabbit, *Sylvilagus audubonii*, wood rat, *Neotoma*, deer mouse, *Peromyscus*, pocket gopher, *Thomomys bottae*, kangaroo rat, *Dipodomys*, pocket mouse, *Perognathus*, ground squirrel, *Ammospermophilus leucurus*, and camel, *Camelops*. A little further south, but still on the north side of Lancaster, our fossil vertebrate locality LACM 7884 produced a fossil specimen of camel, *Camelops hesternus*.

Excavations in the exposures of igneous rocks in some of the elevated terrain of proposed project area will not uncover any recognizable fossils. Excavations in the coarse deposits of the Gem Hill Formation around Standard Hill in the proposed project area are highly unlikely to encounter significant vertebrate fossils. Surface grading or shallow excavations in the Quaternary alluvial fan deposits exposed in the great majority of the proposed project area are unlikely to encounter any significant fossil vertebrate remains. Deeper excavations in the latter areas that extend down into older Quaternary deposits, however, may well uncover significant vertebrate fossils. Any substantial excavations in the finer-grained sedimentary deposits in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

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

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

B7. Cultural Resources Assessment – Gen-Tie Routes

DRAFT

CULTURAL RESOURCES ASSESSMENT OF THE GEN-TIE ROUTES FOR EDWARDS AIR FORCE BASE (AFB) SOLAR PROJECT, KERN COUNTY, CALIFORNIA

Prepared for:

Edwards AFB Solar, LLC
11512 El Camino Real, Suite 370
San Diego, California 920130
Contact: Simon Day

Prepared by:

Elizabeth Denniston, MA, RPA
and
Micah J. Hale, Ph.D., RPA

DUDEK
38 Marengo Avenue
Pasadena, California 91101

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1 INTRODUCTION

A Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) is being prepared by the U.S. Air Force (USAF) and the County of Kern, California (County) to evaluate, at a project level, the impacts of the Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project (formerly known as Oro Verde Solar Project). A Request for Qualifications was issued on February 3, 2017, by the USAF for solar development through the EUL program. Edwards AFB Solar, LLC has been selected by the USAF as the Highest Rate Offeror. Edwards AFB Solar, LLC will construct, operate, and maintain a utility-scale solar photovoltaic (PV) energy-generating facility on the Edwards AFB property. Edwards AFB Solar, LLC will file an application with the County for a franchise agreement and/or Conditional Use Permit (CUP) for routing a generation tie (gen-tie) transmission line from the proposed solar facility to the privately owned Westwind Substation in the first phase of the project and to Southern California Edison Windhub Substation in subsequent phases. For purposes of this report, the project only addresses the proposed gen-tie routes extending from Edwards AFB to the Windhub Substation and is referred to as the Gen-Tie Routes for Edwards AFB Solar EUL Project or proposed project.

Dudek was retained by Edwards AFB Solar, LLC to conduct a cultural resources study in support of the gen-tie transmission lines for proposed project. This cultural resources study is intended to characterize and describe cultural resources identified within the gen-tine transmission line area of potential effects (APE) that could be affected by ground-disturbing activities.

This study was completed under the provisions of local regulations as well as the California Environmental Quality Act (CEQA). Public Resources Code (PRC) Section 5024.1, Title 14 California Code of Regulations (CCR) Section 15064.5 of the CEQA Guidelines, and PRC Sections 21083.2 and 21084.1 were also used as basic guidelines for this cultural resources study (Governor's Office of Planning and Research 1998). PRC Section 5024.1 requires the identification and evaluation of cultural resources to determine their eligibility for the California Register of Historical Resources (CRHR). The CRHR is a listing of the state's historical resources, and it indicates which properties are to be protected from substantial adverse change, as defined in CEQA, to the extent prudent and feasible.

1.1 Project Location

The project is located in the southern portion of Kern County, in central California, directly south of the community of Mojave, approximately 11 miles southeast of the City of Tehachapi, approximately 3 miles southwest of California City, and approximately 47 miles southeast of the

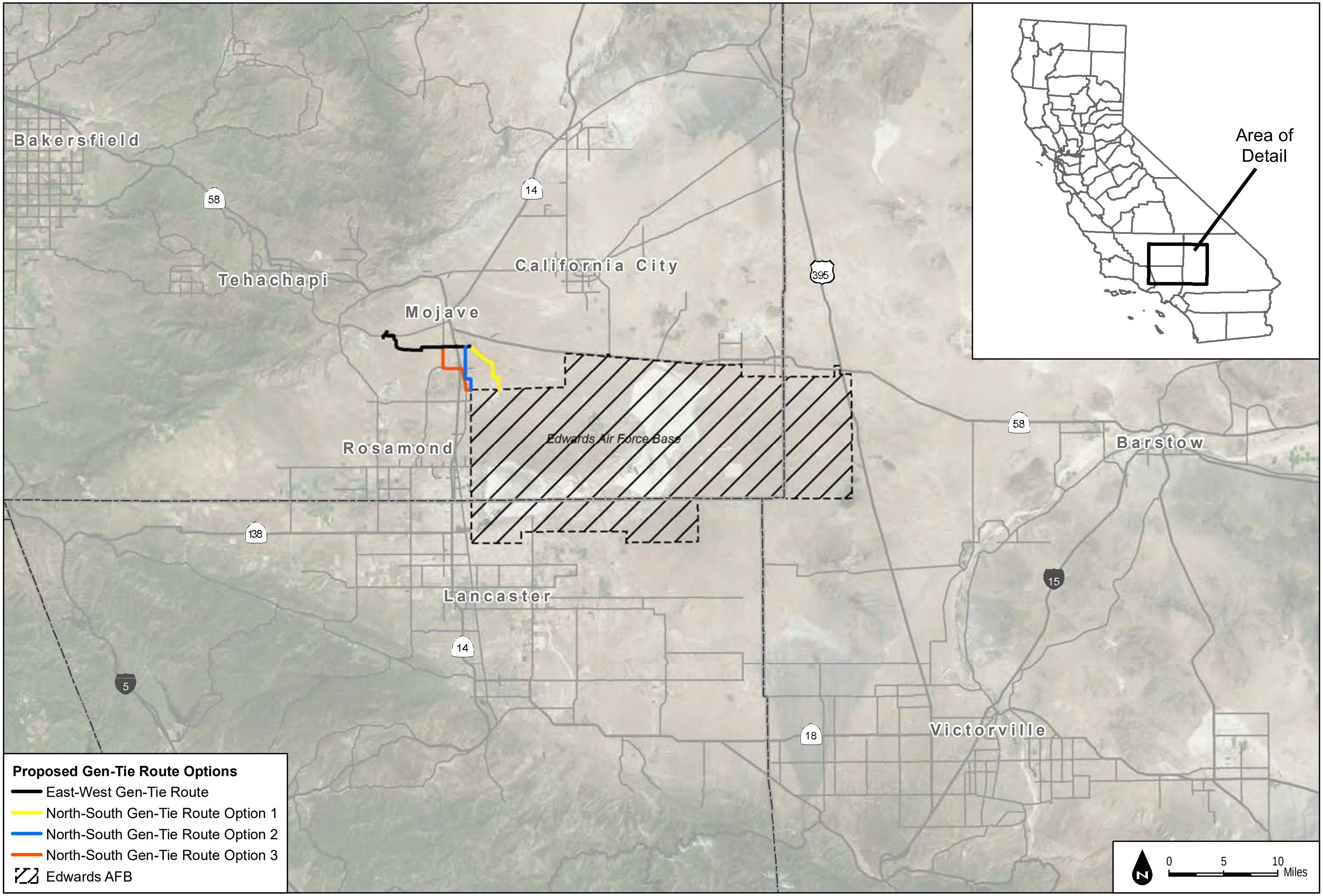
City of Bakersfield (Figure 1). Locational information for the project is provided in Table 1, below and on Figure 2.

Table 1
Locational Information

Quadrangle (7.5')	Township	Range	Sections
Monolith	11N	13W	16, 17, 20, 21, 27, 28
Mojave	11N	13W	22, 24, 25, 27, 27
Mojave	11N	12W	19, 20, 21, 26, 27, 28, 29, 30, 31, 32, 33
Sanborn	11N	12W	26, 36, 36
Bissell	10N	12W	1, 7, 12
Soledad Mountain	10N	12W	3, 4, 5, 10, 15

1.2 Proposed Gen-Tie Line Corridor

A 230 kV gen-tie would connect the Edwards AFB solar generation site with the existing and privately owned electrical substation, the Westwind Substation, in the first phase of the project, and to the Southern California Edison Windhub Substation in subsequent phases of the project. The proposed gen-tie may be a shared facility with other solar projects in the future. In general, the gen-tie route can be broken down in to two categories based on the direction of the corridor—a north–south connection and an east-west connection. There are three options for the north–south gen-tie connection and the project would include only one of these three north-south route options. There are two options for the east–west gen-tie connection and the proposed project would include only one of these two east–west route options. The three options for the north–south gen-tie routes are described first, and the two options for the east–west gen-tie routes are described second.



Terra Gen, 2017; Edwards AFB; Bing Maps

Figure 1: REGIONAL

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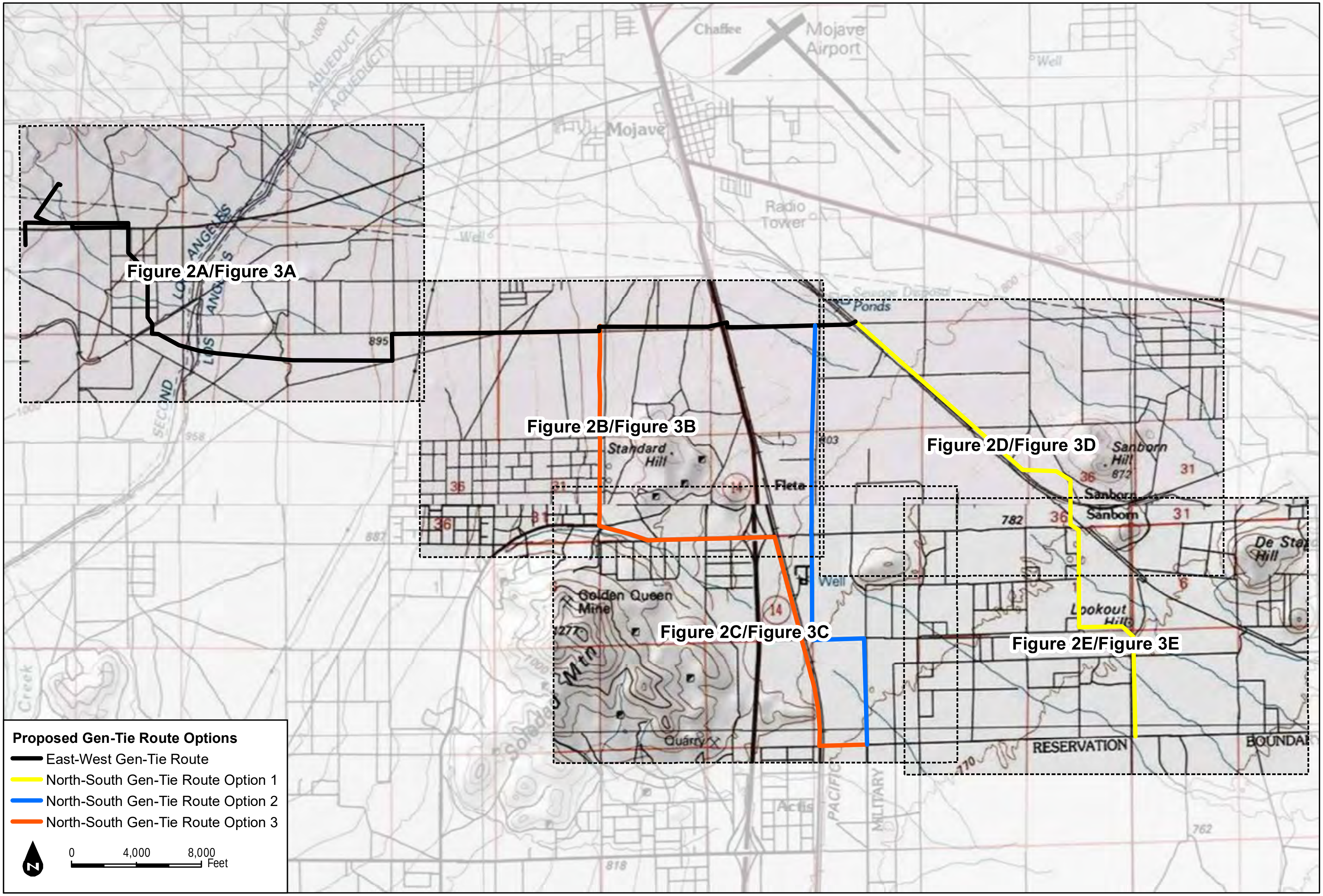

USGS 7.5-Minute Series Sanborn, Mojave, Monolith, Bissell, Soledad Mountain Quadrangles; Terra Gen, 2017

Figure 2: VICINITY MAP

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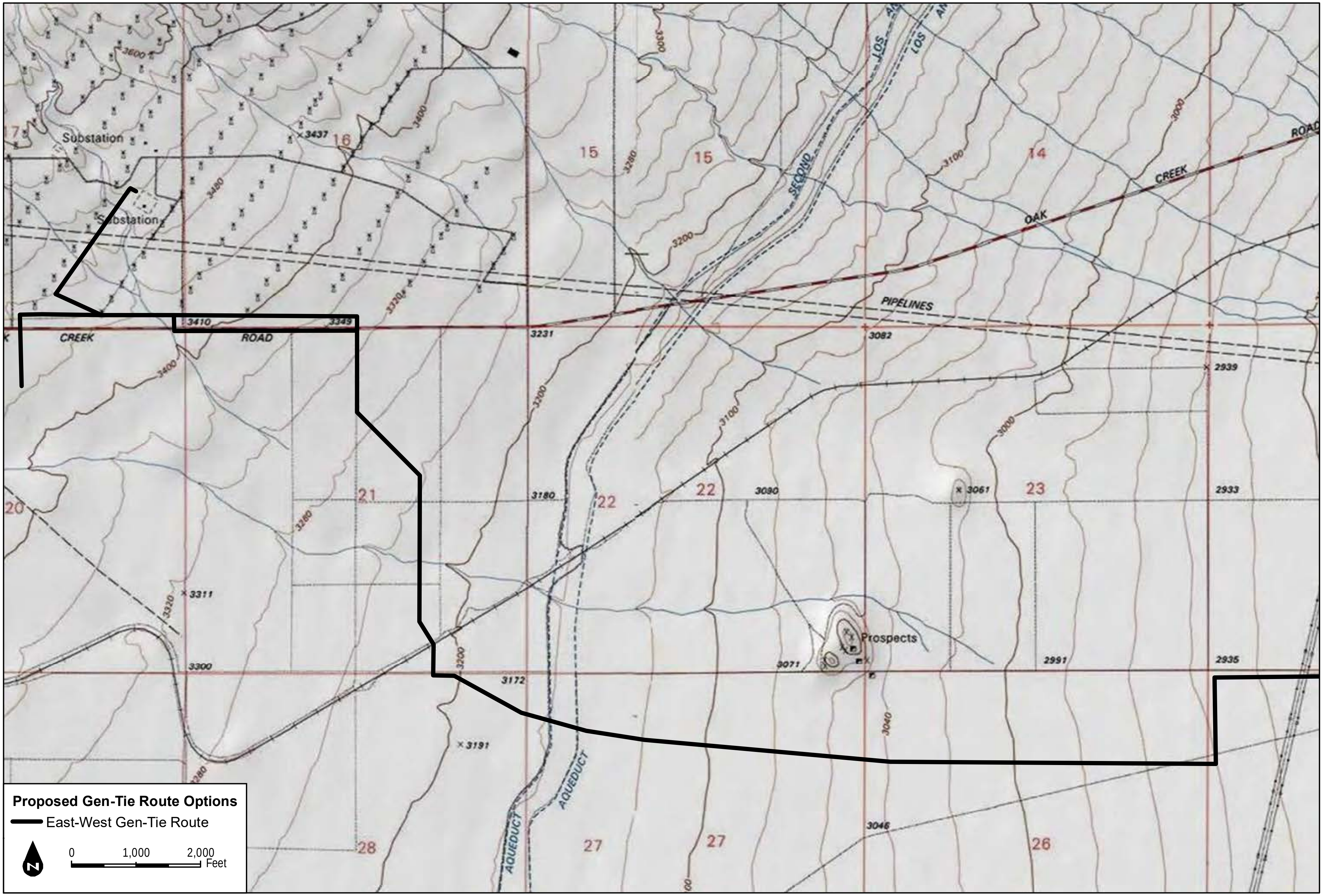

USGS 7.5-Minute Series Monolith, Mojave Quadrangles; Terra Gen, 2017

Figure 2A: VICINITY MAP

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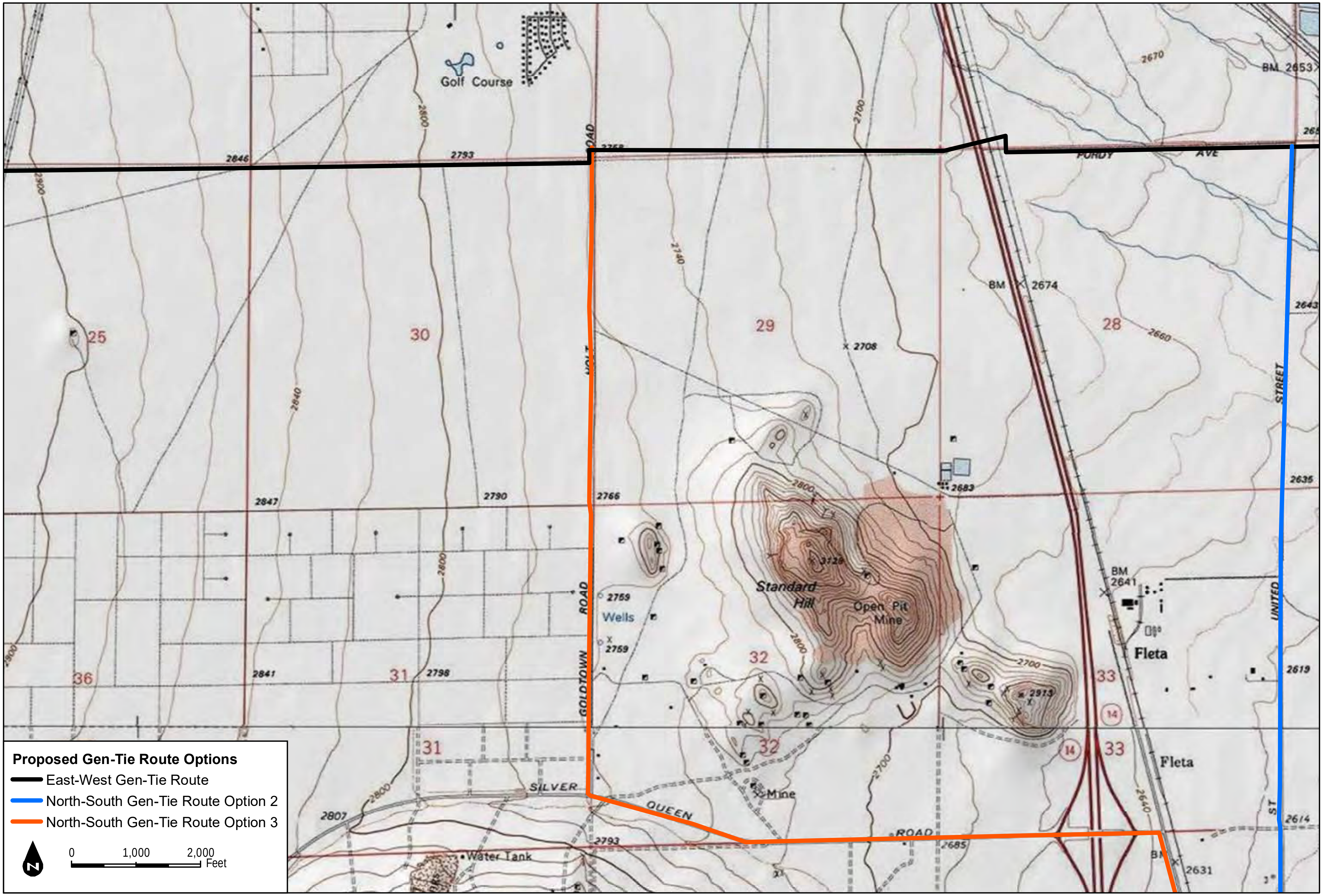

USGS 7.5-Minute Series Mojave Quadrangle; Terra Gen, 2017

Figure 2B: VICINITY MAP

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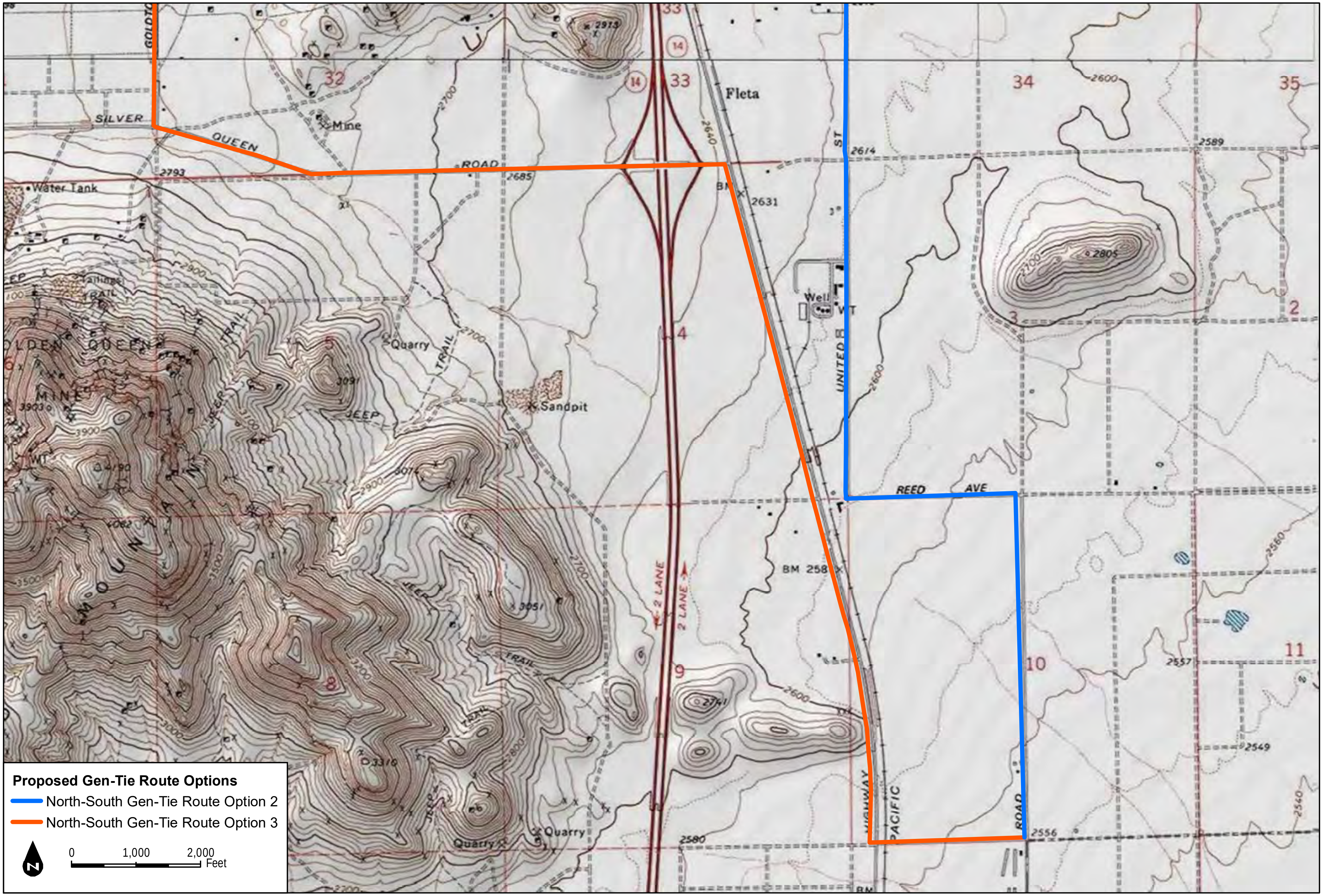

USGS 7.5-Minute Series Soledad Mountain Quadrangle; Terra Gen, 2017

Figure 2C: VICINITY MAP

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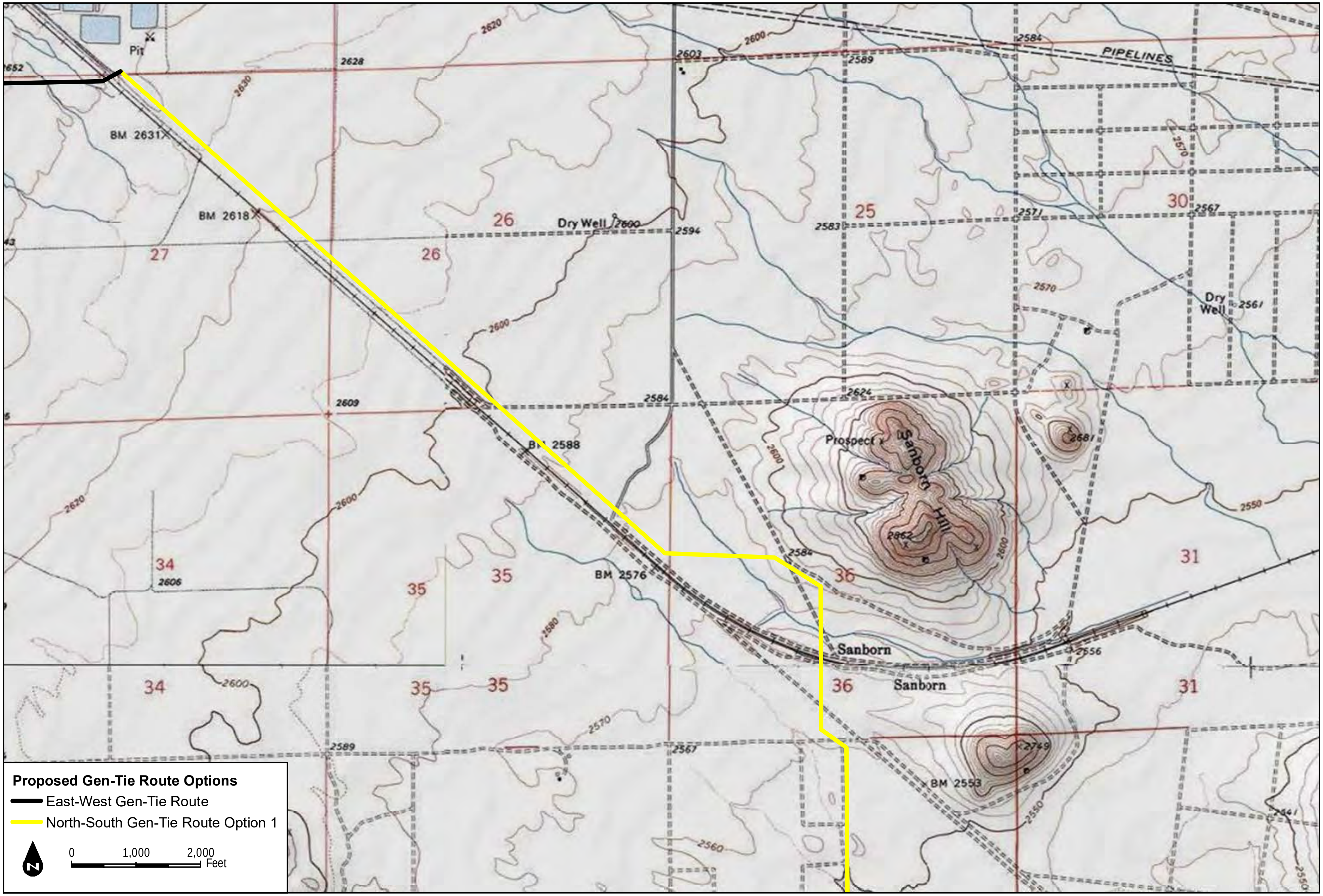

USGS 7.5-Minute Series Mojave, Sanborn, Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2D: VICINITY MAP

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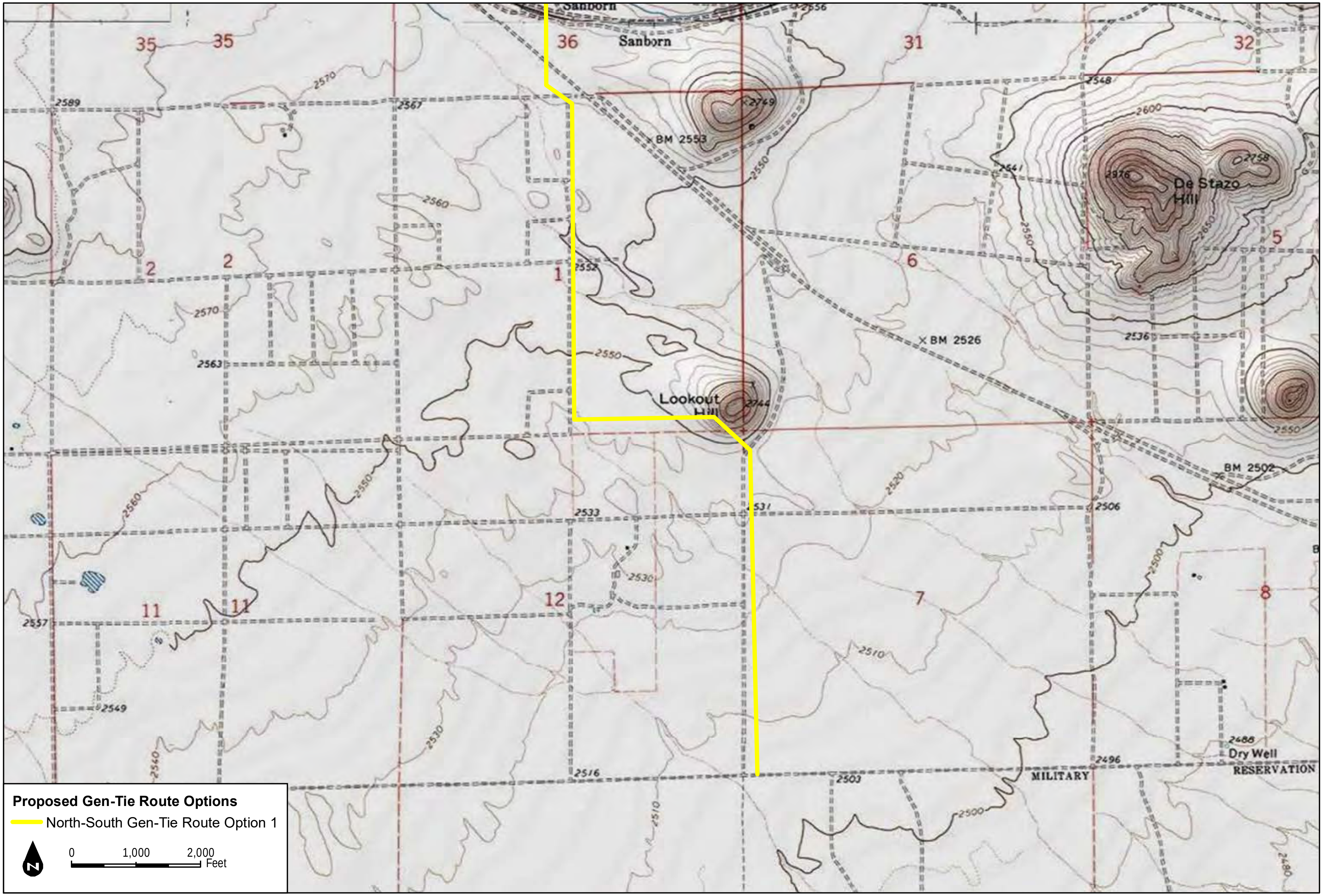

USGS 7.5-Minute Series Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2E: VICINITY MAP

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1.2.1 North-South Gen-Tie Routes

From the proposed solar generation site to the approximate intersection of Purdy Avenue and United Street, there are two gen-tie route options, and from the proposed solar generation site to the intersection of Holt Street and Purdy Avenue, there is a third gen-tie route option. These north–south route options include the following: (1) North–South Gen-Tie Route Option 1: an approximately 5.6-mile-long gen-tie route on the east that generally runs from the Edwards AFB solar generation site north adjacent to 20th Street, west adjacent to East Reed Avenue, north adjacent to 15th Street, then generally follows the north side of the Burlington Northern Santa Fe (BNSF) Railway and finally runs west to the intersection of Purdy Avenue and the BNSF; (2) North–South Gen-tie Route Option 2: an approximately 4.5-mile-long gen-tie route that generally runs from the northwestern edge of the Edwards AFB solar generation site north on Lone Butte Road, west on West Reed Avenue, and north on United Street where it intersects with Purdy Avenue; (3) North–South Gen-tie Route Option 3: an approximately 6-mile-long gen-tie route that generally runs from the northwestern edge of the Edwards AFB solar generation site directly west to Sierra Highway and runs along Sierra Highway to the intersection with Silver Queen Road; the gen-tie route runs directly west along Silver Queen Road for 1.8 miles and heads north of Gold Town Road, which turns into Holt Street, where the route intersects with Purdy Avenue.

Figures 2 through 6 show the approximate location of each the north–south gen-tie route options; the North–South Gen-Tie Route Option 1 is shown in yellow; the North–South Gen-Tie Route Option 2 is shown in blue; and the North–South Gen-Tie Route Option 3 is shown in red.

1.2.2 East-West Gen-Tie Routes

Figure 2 shows the approximate location of the east–west gen-tie route in black and includes two route options, Options A and B, along Oak Creek Road. The proposed project would include only one of these options for the east-west gen-tie route. More specifically, from the intersection of the North–South Gen-Tie Option 1 and Purdy Avenue, the east–west gen-tie is approximately 9.8 miles, in length and would run west along Purdy Avenue for approximately 5.5 miles and then would run south of Purdy Avenue, but north of Decatur Avenue for approximately 2.9 miles and then turn north back to Purdy Avenue. From Purdy Avenue, the east–west gen-tine line would run north and northwest for approximately 1.3 miles to Oak Creek Road. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option A would run north of Oak Creek Road and Option B would run south of Oak Creek Road. From these two options, the east–west gen-tie route would run 0.4 miles before jogging northwest for 0.4 miles and connecting to the Westwind Substation or Windhub Substation. Table 2 provides a brief description of the three north-south route options and the two east-west route options.

Table 2
Proposed Gen-Tie Route Options

Option	Description
1	5.6-mile-long gen-tie route; runs from the AFB solar generation site north to the intersection of Purdy Avenue and the BNSF.
2	4.5-mile-long gen-tie route; runs from the northwestern edge of the AFB solar generation site to the intersection of United Street and Purdy Avenue.
3	6-mile-long gen-tie route; runs from the northwestern edge of the AFB solar generation site to the intersection of Holt Street and Purdy Avenue.
1-A	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option A would run north of Oak Creek Road.
1-B	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option B would run south of Oak Creek Road

1.3 Definition of Area of Potential Effect

The cultural resources APE is defined as all of the potential gen-tie transmission line routes along with a 50-foot (15.4 meters [m]) buffer on either side of the line. In total, the lines are approximately 25.9 miles (41.7 kilometers [km]) in length, and the APE covers approximately 313.9 acres. One previous survey, conducted in 2010, covered both of the east-west alignment options (Hudlow 2010). This area was not resurveyed, but spot-checked instead, confirming the 2010 existing conditions. In addition, previously recorded resources along the east-west alignment options were visited to assess their current state.

Of the three north-south alignments, an intensive-level pedestrian survey was completed for North–South Gen-Tie Route Options 1 and 2, and a project-level analysis of cultural resources is presented for these options. Pedestrian survey of North–South Gen-Tie Route Option 3 has yet to occur, so an archival analysis of North–South Gen-Tie Route Option 3 is presented, based on records search data. Therefore, a total of 241.2 acres of the APE has been intensively surveyed, and the inventory of 72.7 acres consists of records search data only.

1.4 Report Structure

Several chapters follow this introductory Chapter 1. Chapter 2 outlines the regulations to which the project adheres. Chapter 3 references existing environmental and cultural setting information and research design. Chapter 4 is a description of the methods used to accomplish this study. The results are summarized in Chapter 5, followed by a summary of the results and management recommendations in Chapter 6. All references cited are provided in a bibliography, along with selected references for further reading and guidance. Several confidential appendices contain relevant information such as location maps for sites and isolates (Appendix A), and site forms (Appendix B).

2 REGULATORY SETTING

The treatment of cultural resources located on the project site is governed by federal, state and local laws and regulations. There are specific criteria for determining whether prehistoric and historic sites or objects are significant and/or protected by law. For instance, federal and state significance criteria generally focus on the resource's integrity and uniqueness, its relationship to similar resources, and its potential to contribute important information to scholarly research. As a whole, the laws and regulations seek to avoid impacts to significant prehistoric or historic resources, and, when avoidance is not feasible, to mitigate those impacts to less than significant levels. In some cases, mitigation can be achieved through "preservation in place" techniques; but when such techniques are infeasible, mitigation can be accomplished via data recovery.

2.1 Federal

2.1.1 36 CFR 800 and Section 106 of the NHPA

The National Historic Preservation Act (NHPA) established the National Register of Historic Places (NRHP) and the President's Advisory Council on Historic Preservation (ACHP), and provided that states may establish State Historic Preservation Officers (SHPOs) to carry out some of the functions of the NHPA. Most significantly for federal agencies responsible for managing cultural resources, Section 106 of the NHPA directs that "[t]he head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP." Section 106 also affords the ACHP a reasonable opportunity to comment on the undertaking (16 U.S.C. 470f).

36 Code of Federal Regulations, Part 800 (36 CFR 800) implements Section 106 of the NHPA. It defines the steps necessary to identify historic properties (those cultural resources listed in or eligible for listing in the NRHP), including: consultation with federally recognized Native American tribes to identify resources with important cultural values; determine whether or not they may be adversely affected by a proposed undertaking; and outline the process for eliminating, reducing, or mitigating the adverse effects.

The content of 36 CFR 60.4 defines criteria for determining eligibility for listing in the NRHP. The significance of cultural resources identified during an inventory must be formally evaluated for historical significance in consultation with the California SHPO to determine if the resources are eligible for inclusion in the NRHP. Cultural resources may be considered eligible for listing if they possess integrity of location, design, setting, materials, workmanship, feeling, and association. The criteria for determining eligibility are essentially the same in content and order as those outlined under the California Environmental Quality Act (CEQA), but the criteria under NHPA are labeled A through D (rather than 1–4 under CEQA).

Regarding criteria A through D of Section 106, the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, cultural resources, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

A. Are associated with events that have made a significant contribution to the broad patterns of our history; or
B. Are associated with the lives of persons significant in our past; or
C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Have yielded or may be likely to yield, information important in prehistory or history [36 CFR 60.4].

The current evaluation of prehistoric cultural resources was performed with the intent of assessing historical significance under Criterion D. The ability of an archaeological site to yield important information to history or prehistory is based upon the site's ability to address specific research themes. The research themes addressed in this study are presented in Chapter 3, and these derive from the cultural resources overview presented in this chapter, above.

The ACHP provides methodological and conceptual guidance for identifying historic properties. In 36 CFR 800.4, the steps necessary for identifying historic properties include:

- Determine and document the APE (36 CFR 800.16(d)
- Review existing information on historic properties within the APE, including preliminary data
- Confer with consulting parties to obtain additional information on historic properties or concerns about effects to these
- Consult with Native American tribes (36 CFR 800.3(f)) to obtain knowledge on resources that are identified with places which they attach cultural or religious significance
- Appropriate fieldwork (including phased identification and evaluation)

- Apply NRHP criteria to determine a resource eligibility for NRHP listing

Fulfilling these steps is generally thought to constitute a reasonable effort to identify historic properties within the APE for an undertaking. The obligations of a federal agency must also assess whether an undertaking will have an adverse effect on cultural resources. An undertaking will have an adverse effect when:

> "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property hat qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" (36 CFR Part 800.5(1)).

The process of determining whether an undertaking may have an adverse effect requires the federal agency to confer with consulting parties in order to appropriately consider all relevant stakeholder concerns and values. Consultation regarding the treatment of a historic property may result in a Programmatic Agreement (PA) and/or Memorandum of Agreement (MOA) between consulting parties that typically include the lead federal agency, State Historic Preservation Officer (SHPO), and Native American tribes if they agree to be signatories to these documents. Treatment documents—whether resource-specific or generalized—provide guidance for resolving potential or realized adverse effects to known historic properties or to those that may be discovered during implementation of the undertaking. In all cases, avoidance of adverse effects to historic properties is the preferred treatment measure and it is generally the burden of the federal agency to demonstrate why avoidance may not be feasible. Avoidance of adverse effects may not be feasible if it would compromise the objectives of an undertaking that can be reasonably said to have public benefit. Other non-archaeological considerations about the benefit of an undertaking may also apply, resulting in the determination that avoidance is not feasible. In general, avoidance of adverse effects is most difficult when a permitted undertaking is being implemented, such as identification of an NRHP-eligible archaeological resource during earthmoving.

2.2 State

2.2.1 California Environmental Quality Act

2.2.1.1 The California Register of Historic Resources (Public Resources Code section 5020 et seq.)

In California, the term "historical resource" includes but is not limited to "any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California" (California Public Resources Code section 5020.1(j)). In 1992, the California legislature established CRHR "to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change" (California Public Resources Code section 5024.1(a)). A resource is eligible for listing in the CRHR if the State Historical Resources Commission determines that it is a significant resource and that it meets any of the following National Register of Historic Places (NRHP) criteria:

1. Associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. Associated with the lives of persons important in our past.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. Has yielded, or may be likely to yield, information important in prehistory or history.

(California Public Resources Code section 5024.1(c).) Resources less than 50 years old are not considered for listing in the CRHR, but may be considered if it can be demonstrated that sufficient time has passed to understand the historical importance of the resource (see 14 CCR, section 4852(d)(2)).

The CRHR protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources. The criteria for the CRHR are nearly identical to those for the NRHP, and properties listed or formally designated as eligible for listing on the NRHP are automatically listed on the CRHR, as are the state landmarks and points of interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys. The State Historic Preservation Officer maintains the CRHR.

2.2.1.2 Native American Historic Cultural Sites (California Public Resources Code section 5097 et seq.)

The Native American Historic Resources Protection Act (Public Resources Code section 5097, et seq.) addresses the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction; establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project; and establishes the NRHC to resolve disputes regarding the disposition of such remains. In addition, the Native American Historic Resource Protection Act makes it a misdemeanor punishable by up to 1 year in jail to deface or destroy an Indian historic or cultural site that is listed or may be eligible for listing in the CRHR.

2.2.1.3 California Native American Graves Protection and Repatriation Act

The California Native American Graves Protection and Repatriation Act (California Repatriation Act), enacted in 2001, requires all state agencies and museums that receive state funding and that have possession or control over collections of human remains or cultural items, as defined, to complete an inventory and summary of these remains and items on or before January 1, 2003, with certain exceptions. The California Repatriation Act also provides a process for the identification and repatriation of these items to the appropriate tribes.

2.2.1.4 California Environmental Quality Act Statues and Guidelines

As described further below, the following CEQA statutes and CEQA Guidelines are relevant to the analysis of archaeological and historic resources:

1. California Public Resources Code section 21083.2(g): Defines "unique archaeological resource."
2. California Public Resources Code section 21084.1 and CEQA Guidelines section 15064.5(a): Defines historical resources. In addition, CEQA Guidelines section 15064.5(b) defines the phrase "substantial adverse change in the significance of an historical resource. It also defines the circumstances when a project would materially impair the significance of a historical resource.
3. California Public Resources Code section 5097.98 and CEQA Guidelines section 15064.5(e): These statutes sets forth standards and steps to be employed following the accidental discovery of human remains in any location other than a dedicated ceremony.
4. California Public Resources Code sections 21083.2(b)-(c) and CEQA Guidelines section 15126.4: These statutes and regulations provide information regarding the mitigation framework for archaeological and historic resources, including options of preservation-

in-place mitigation measures; identifies preservation-in-place as the preferred manner of mitigating impacts to significant archaeological sites.

Under CEQA, a project may have a significant effect on the environment if it may cause "a substantial adverse change in the significance of an historical resource" (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(b)). An "historical resource" is any site listed or eligible for listing in the CRHR. The CRHR listing criteria are intended to examine whether the resource in question: (a) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (b) is associated with the lives of persons important in our past; (c) embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or (d) has yielded, or may be likely to yield, information important in pre-history or history.

The term "historical resource" also includes any site described in a local register of historic resources, or identified as significant in a historical resources survey (meeting the requirements of California Public Resources Code section 5024.1(q)).

CEQA also applies to "unique archaeological resources". Public Resources Code section 21083.2(g) defines a "unique archaeological resource" as any archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

In 2014, CEQA was amended to applies to "tribal culture resources" as well, but the amendment did not provide a definition for such resources or identify how they were to be evaluated or mitigated. (Pub.Res.Code §§ 21084.2 and 21084.3.) Instead, Public Resources Code section 21083.09 required that the Office of Planning and Resource develop and adopt guidelines for analyzing "tribal cultural resources" by July 1, 2016. As of the effective date of this Draft EIR, however, those guidelines have not been finalized or adopted. Consequently, this EIR addresses only historic resources and unique archaeological resources.

All historical resources and unique archaeological resources – as defined by statute – are presumed to be historically or culturally significant for purposes of CEQA (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(a)). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(a)). A site or resource that does not meet the definition of "historical resource" or "unique archaeological resource" is not considered significant under CEQA and need not be analyzed further. (Public Resources Code section 21083.2(a); CEQA Guidelines section 15064.5(c)(4)).

Under CEQA and significant cultural impact results from a "substantial adverse change in the significance of an historical resource [including a unique archaeological resource]" due to the "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (CEQA Guidelines section 15064.5(b)(1); California Public Resources Code section 5020.1(q)). In turn, the significance of a historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register; or
2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
3. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register as determined by a lead agency for purposes of CEQA.

CEQA Guidelines section 15064.5(b)(2).

Pursuant to these sections, the CEQA first evaluates evaluating whether a project site contains any "historical resources," then assesses whether that project will cause a substantial adverse change in the significance of a historical resource such that the resource's historical significance is materially impaired.

When a project significantly affects a unique archeological resources, CEQA imposes special mitigation requirements. Specifically, "[i]f it can be demonstrated that a project will cause damage to a unique archeological resource, the lead agency may require reasonable efforts to be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. Examples of that treatment, in no order of preference, may include, but are not limited to, any of the following:"

1. "Planning construction to avoid archeological sites."
2. "Deeding archeological sites into permanent conservation easements."
3. "Capping or covering archeological sites with a layer of soil before building on the sites."
4. "Planning parks, greenspace, or other open space to incorporate archeological sites."

Pub. Resources Code section 21083.2(b)(1)-(4).

If these "preservation in place" options are not feasible, mitigation may be accomplished through data recovery. (Pub.Res. Code § 21083.2(d); CEQA Guidelines § 15126.4(b)(3)(C).) Public Resources Code section 21083.2(d) states that "[e]xcavation as mitigation shall be restricted to those parts of the unique archeological resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archeological resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource, if this determination is documented in the environmental impact report."

These same requirements are set forth in slightly greater detail in CEQA Guidelines section 15126.4(b)(3), as follows:

(A) Preservation in place is the preferred manner of mitigating impacts to archeological sites. Preservation in place maintains the relationship between artifacts and the archeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site.

(B) Preservation in place may be accomplished by, but is not limited to, the following:

1. Planning construction to avoid archeological sites;
2. Incorporation of sites within parks, greenspace, or other open space;
3. Covering the archeological sites with a layer of chemically stable soil before building tennis courts, parking lots, or similar facilities on the site[; and]

4. Deeding the site into a permanent conservation easement.

(C) When data recovery through excavation is the only feasible mitigation, a data recovery plan, which makes provision for adequately recovering the scientifically consequential information from and about the historical resource, shall be prepared and adopted prior to any excavation being undertaken.

Note that, when conducting data recovery, "[i]f an artifact must be removed during project excavation or testing, curation may be an appropriate mitigation." (Ibid.) However, "[d]ata recovery shall not be required for an historical resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the archeological or historic resource, provided that determination is documented in the EIR and that the studies are deposited with the California Historical Resources Regional Information Center." (CEQA Guidelines section 15126.4(b)(3)(D).)

2.2.2 California Health and Safety Code

CEQA Guidelines section 15064.5 assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. As described below, these procedures are detailed in PRC section 5097.98.

California law protects Native American burials, skeletal remains, and associated grave goods, regardless of their antiquity, and provides for the sensitive treatment and disposition of those remains. Health and Safety Code section 7050.5 requires that if human remains are discovered in any place other than a dedicated cemetery, no further disturbance or excavation of the site or nearby area reasonably suspected to contain human remains shall occur until the County coroner has examined the remains (section 7050.5b). PRC Section 5097.98 also outlines the process to be followed in the event that remains are discovered. If the coroner determines or has reason to believe the remains are those of a Native American, the coroner must contact the Native American Heritage Commission (NAHC) within 24 hours (section 7050.5c). The NAHC will notify the Most Likely Descendant (MLD). With the permission of the landowner, the MLD may inspect the site of discovery. The inspection must be completed within 48 hours of notification of the MLD by the NAHC. The MLD may recommend means of treating or disposing of, with appropriate dignity, the human remains and items associated with Native Americans.

2.3 Local

2.3.1 Kern County General Plan

2.3.1.1 Kern County Land Use, Conservation, Open Space Element of the General Plan

Section 1.10.3 of the Land Use, Conservation, Open Space Element of the Kern County General Plan (General Plan) identifies the county's policy and implementation measures that guide the preservation of cultural resources in Kern County. These measures are provided below:

Policy 25.
The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.

Implementation Measure K.
Coordinate with the California State University, Bakersfield's Archaeology Inventory Center.

Implementation Measure L.
The County shall address archaeological and historical resources for discretionary projects in accordance with CEQA.

Implementation Measure M.
In areas of known paleontological resources, the County should address the preservation of these resources where feasible.

Implementation Measure N.
The County shall develop a list of Native American organizations and individuals who desire to be notified of proposed discretionary projects. This notification will be accomplished through the established procedures for discretionary projects and CEQA documents.

Implementation Measure O.
On a project specific basis, the County Planning Department shall evaluate the necessity for the involvement of a qualified Native American monitor for grading or other construction activities on discretionary projects that are subject to a CEQA document. (Kern County Planning Department 2009)

2.3.1.2 Kern County Energy Element of the General Plan

Section 5.4.7 of the Energy Element of the General Plan encourages development of transmission lines in urban areas to limit impacts, and identifies the following policies with respect to transmission line development:

1. The County should encourage the development and upgrading of transmission lines and associated facilities (e.g., substations) as needed to serve Kern County's residents and access the County's generating resources, insofar as transmission lines do not create significant environmental or public health and safety hazards.
2. The County shall review all proposed transmission lines and their alignments for conformity with the Land Use, Conservation, and Open Space Element of this General Plan.
3. In reviewing proposals for new transmission lines and/or capacity, the County should assert a preference for upgrade of existing lines and use of existing corridors where feasible.
4. The County should work with other agencies in establishing routes for proposed transmission lines.
5. The County should discourage the siting of above-ground transmission lines in visually sensitive areas.
6. The County should encourage new transmission lines to be sited/configured to avoid or minimize collision and electrocution hazards to raptors. (Kern County Planning Department 2009).

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3 PROJECT SETTING

The natural and cultural setting for Edwards AFB and the Mojave Desert in general has been extensively documented in several key monographs. Several research designs have also been completed for both general and specific research topics spanning the entire range of human occupation of the local area and general region.

Refer to the documents listed in Section 3.1 that contain detailed information on the natural and cultural setting, as well as research designs and interpretive summaries. These documents served as the primary source of information guiding this inventory.

3.1 Key Source Documents

- Edwards AFB Integrated Cultural Resources Management Plan (Loechl et al. 2012)
- Standards and Procedures Manual for the Archaeological Data Center and Curatorial Functions of the Curation Facility at Edwards Air Force Base (Crosby 2010)
- Cultural Resources Overview and Management Plan for Edwards AFB, Volume 1, Overview of Prehistoric Cultural Resources (Earle et. al. 1997)
- Cultural Resources Overview and Management Plan for Edwards AFB, Volume 2, Overview of Historic Cultural Resources (Earle et. al. 1998)

In addition to the documents listed above any other relevant cultural resources investigation monographs were also obtained and reviewed. A complete list of references is located in the Section 7.

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4 METHODS

Dudek reviewed the previous survey work and associated reports completed in the APE, and conducted an intensive-level pedestrian survey of North–South Gen-Tie Route Options 1 and 2. The East-West Gen-Tie Route was shown to be recently surveyed, so resources along the alignment were spot-checked. North–South Gen-Tie Route Option 3 was not surveyed at this time. The following section discusses the methods used for both of these efforts.

4.1 Previous Work Review

On April 21 and May 15, 2017, Dudek completed a search of the California Historical Resources Information System (CHRIS) at the Southern San Joaquin Valley Information Center (SSJVIC), located on the campus of California State University, Bakersfield. This search included mapped prehistoric, historical, and built-environment resources; Department of Parks and Recreation (DPR) site records; technical reports; archival resources; and ethnographic references. Additional consulted sources included historical maps of the project site, the NRHP, the CRHR, the California Historic Property Data File, and the lists of California State Historical Landmarks, California Points of Historical Interest, and the Archaeological Determinations of Eligibility.

4.2 Cultural Resources Pedestrian Survey

Dudek Archaeologists conducted the intensive-level pedestrian survey on February 24, 2017 using standard archaeological procedures and techniques. All field practices met the Secretary of Interior's standards and guidelines for a cultural resources inventory. The intensive-level survey methods consisted of a pedestrian survey conducted in parallel transects spaced no more than 15 meters apart over the entire project site. Deviations from transects only occurred in areas containing steep slopes, dense vegetation, or impassible natural features. Within each transect, the ground surface was examined for prehistoric artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools, ceramics, fire- affected rock), soil discoloration that might indicate the presence of a cultural midden, soil depressions, features indicative of the current or former presence of structures or buildings (e.g., standing exterior walls, post holes, foundations), and historic artifacts (e.g., metal, glass, ceramics, building materials). Ground disturbances such as burrows, cut banks, and drainages were also visually inspected for exposed subsurface materials. No artifacts were collected during the surveys.

Where cultural materials were encountered, Dudek collected all data necessary to complete the appropriate State of California DPR 523 series forms. Following California Office of Historic Preservation (OHP) guidelines, any cultural material more than 45 years old was recorded as an archaeological site, built environment resource, or isolate, as appropriate. All fieldwork was documented using field notes and iPad technology with close-scale field maps, and aerial photographs. Location-specific photographs were taken using an Apple 3rd Generation IPad equipped with 8 mega-pixel (MP) resolution and georeferenced PDF maps of the project site. Accuracy of this device ranged between 3 and 10 meters. All field notes, photographs, and records related to the current study are on file at Dudek's Pasadena, California office. These locations are presented in confidential Appendix A. Groups of three (3) or more artifacts in a 50-meter diameter area, as well as any solitary fence posts or other such markers, isolated hearths, rock cairns, rock rings, rock alignments, trails, rock art, bedrock milling features, and whole millingstones, were classified as prehistoric or historic period sites. Finds of one or two artifacts were recorded as isolates. Sites were classified according to the site type definitions contained in Appendix P of the Operations Manual. However, not all site types were identified during the inventory. Generally, archaeological sites within the study area include non-military historic period sites (refuse deposits, homesites, agricultural features, ranching features, mining-related sites, and other miscellaneous types), historic period military sites (aircraft crash sites, targets, encampments, non-aboriginal human remains, and other types), and prehistoric sites (temporary camps, lithic deposits, ceramic deposits, individual features such as cairns, and cremated human remains).

Sites and isolates were given temporary field numbers using the prefix "SS" along with the designation "S" for site and "ISO" for isolate. The numbering system is continuous for the archaeological sites and isolates, with assignment of field numbers as the survey progressed. Finds of one or two artifacts were recorded as isolates. Sites were classified according to the site type definitions contained in Appendix P of the Operations Manual. However, not all site types were identified during the inventory. Archaeological sites within the project APE include non-military historic period refuse deposits and prehistoric lithic deposits.

Following fieldwork, DPR 523 series forms were prepared for all newly recorded resources, including primary record, archaeological site record, location map, sketch map forms, and additional forms as needed. All completed DPR forms are presented herein as Appendix B. DPR forms for all newly recorded archaeological resources will be submitted to the SSJVIC, which will issue primary numbers for all newly recorded resources and trinomials for all newly recorded archaeological sites.

5 RESULTS

5.1 Background Research

5.1.1 Previously Conducted Cultural Resource Studies

The SSJVIC records indicate that between 1977 and 2013, 29 previous cultural resources technical investigations have been conducted that are within, immediately adjacent to, or cross the APE(Confidential Appendix C) . Of these 29, nine previous studies have been completed since 2010 (KE-3777, -4247, -4159, -4260, -4276, -4359, -4633, -4648, and -4649). Two of these (KE-04276 and -04359) overlap the northwest third of North–South Gen-Tie Route Option 3 while the remaining seven (KE-3777, -4247, -4159, -4260, -4633, -4648, and -4649) intersect, or overlap, the East-West Gen-Tie Route (Options A and B). All 29 technical investigations are summarized in Table 3.

Table 3
Previous Technical Studies Within the Project APE

Report Number (KE-)	Authors	Date	Title	APE Component
KE-00276	Robinson, R. W.	1977	A Cultural Resources investigation associated with the Mojave Public Utility District's Sewage Treatment Facility	North-South (N-S) Option 1
KE-00423	Garfinkel, Alan P. and Kerbavaz, Joanne	1983	Negative archaeological survey report DOT- 09-KER-14, PM 12.6/16.1, Charge Unit 09-201, EA 204-300	East-West (E-W) and N-S Option 3
KE-00888	Proctor, Martha and Edell, Jack	1986	Negative Archaeological Survey Report for Widening Route 14 from P.M. 12.6 to 16.1- Also Water Line Easement	E-W and N-S Option 3
KE-01769	Weigel, Lawrence E., McManus, James, and Schuster, Terry	1986	Negative Archaeological Survey Report for Soil Removal	N-S Option 2
KE-01278	Schiffman, Robert A.	1987	Archaeological Investigation for Sea West's 427 Acre Wind Energy Farm Along Oak Creek Pass Road, Kern County, California	E-W
KE-00804	Parr, Robert E.	1989	Archaeological Assessment of a Proposed Residential and Commercial Center Near the City of Mojave, Kern County, California	N-S Option 1 and N-S Option 2
KE-00013	Schiffman, Robert A.	1990	Archaeological Investigation of Parcel Map #9486 and Parcel Map #9271 Section I, Township 10N, Range 12W. Kern County, California	N-S Option 1
KE-00470	Hanna, David C. and Cheever, Dayle M.	1990	An Archaeological Survey of the Camelot Specific Plan Amendment, a 160-Acre Property in Mojave, Kern County, California	E-W

Table 3
Previous Technical Studies Within the Project APE

Report Number (KE-)	Authors	Date	Title	APE Component
KE-00633	Macko, Michael E., Binning, Jeanne D., Earle, David D., and Langenwalter, Paul E.	1993	National Register Eligibility Determinations for Historic Resources Along the Proposed AT&T Lightguide System, Victorville to Bakersfield, California	E-W
KE-01028	Unknown	1996	Cultural Resources Investigation Pacific Pipeline Emidio Route (Including West Liebre Gulch Ridge Alignment and Mojave Alternatives) L.A. and Kern Counties, CA	E-W and N-S Option 3
KE-01902	Whitley, David S. and Simon, Joseph M.	1996	Phase II Test Excavations and Determinations of Significance at CA-KER- 4693H and -4695H, Soledad Mountain, Mojave, Kern County, California	N-S Option 3
KE-02323	Demos-Petropoulous, Francine, McGowan, Dana, Scott, Barry, O'Brien, Teresa, Norton, Bill, and Rause, Wendy	1999	Cultural Resources Inventory Report for the AT&T Corp. Cable Upgrade Project, Los Angeles, Kern, and San Luis Obispo Counties, California	N-S Option 1
KE-02678	Schiffman, Robert A.	2002	Archaeological Investigation for Parcel Map No. 10787, Kern County, California	N-S Option 2
KE-03085	Fleagle, Dorothy	2005	A Cultural Resources Assessment for Approximately 500 Acres for the Mojave/Rosamond Sanitary Landfill Addition Northeast of the Existing Landfill, South of Mojave, Kern County, California	N-S Option 1
KE-03387	Schiffman, Robert A. and Gold, Alan P.	2006	Cultural Resource Survey for a 310 Acre Parcel Near the Intersection of Purdy Avenue and United Street Near the City of Mojave, Eastern Kern County, California	E-W
KE-03387	Schiffman, Robert A. and Gold, Alan P.	2006	Cultural Resource Survey for a 310 Acre Parcel Near the Intersection of Purdy Avenue and United Street Near the City of Mojave, Eastern Kern County, California	N-S Option 2
KE-03534	Nilsson, Elena, Bevill, Russel, Kelly, Michael S., and Dwyer, Erin	2006	Archaeological Inventory of the First and Second Los Angeles Aqueducts and Selected Access Roads, Kern, Inyo, and Los Angeles Counties, CA	E-W
KE-03490	Hudlow, Scott M.	2007	A Phase I Cultural Resource Survey for AERO Energy Wind Power Project, Application 4, Kern County, California	E-W
KE-03600	Pruett, Catherine Lewis	2009	A Cultural Resources Assessment of Approximately 40 Acres Southwest of Mojave, Kern County, California	E-W
KE-04053	Lawson, Natalie	2009	Cultural Resources Inventory Report for the Alta Oak Creek Mojave Wind Project, Kern County, California	E-W

Table 3
Previous Technical Studies Within the Project APE

Report Number (KE-)	Authors	Date	Title	APE Component
KE-03777	Palm-Leach, Laura, Brandy, Paul, King, Jay, Mikkelsen, Pat, Seil, Libby, Hartman, Lindsay, Bradeen, Jill, Larson, Bryan, Freeman, Joseph, Costello, Julia, Rosenthal, Jeffrey, and Jones, Deborah	2010	Cultural Resources Inventory of Caltrans District 6 Rural Conventional Highways in Fresno, Western Kern, Kings, Madera, and Tulare Counties Summary of Methods and Findings	E-W
KE-04247	Lawson, Natalie and Cardenas, Gloriella	2010	Class III Cultural Resources Survey of the North Sky River Wind Energy Project, Kern County, California.	E-W
KE-04159	Cardenas, Gloriella	2011	Cultural Resources Inventory Report for the Alta Infill II Wind Energy Project Project, Kern County, California	E-W
KE-04260	Hudlow, Scott M.	2011	A Phase I Cultural Resource Survey for Seven Kern Desert Solar Farm Sites, Kern County, California	E-W
KE-04276	Schmidt, James	2012	Archaeological Survey Report for Southern California Edison Company's EKWRA Telecommunications Subtransmission Line Project Corridor on Bureau of Land Management Parcels Near Mojave, Kern County, California.	N-S Option 3
KE-04359	Ramirez, Robert, Hunt, Kevin, and Haas, Hannah	2013	Addendum Report: Phase I Cultural Resources Survey for the RE Columbia Two Solar Project, Mojave, Kern County, California	E-W and N-S Option 3
KE-04633	Hoffman, Laura and Denniston, Liz	2013	Cultural and Paleontological Resources Monitoring and Discovery Report for the RE Columbia 3 LLC Solar Facility Project, Kern County, California	E-W
KE-04648	Ramirez, Robert, Haas, Hannah, and Hunt, Kevin	2014	Cultural Resources Study for RE Clearwater Solar Project, Mojave, Kern County, California	E-W
KE-04649	Ramirez, Robert, Daitch, David, and Hunt, Kevin	2015	Archaeological and Paleontological Monitoring Report for the Camelot Solar Project, Mojave, Kern County, California	E-W

5.1.2 Previously Recorded Cultural Resources

The SSJVIC records indicate that 33 cultural resources have been recorded within, immediately adjacent to, or intersecting the project APE (Confidential Appendix C). These 33 consist of 28 historic-era resources (7 archaeological sites, 9 historic built environment resources, and 12 historic isolates) and 5 prehistoric resources (3 prehistoric sites and 2 prehistoric isolates).

The seven historic sites consist of five historic trash scatters, one survey marker, and one borrow pit with structural remains. Historic built environment resources (n=9) include six road segments, one transmission line, one railroad segment, and the Los Angeles Aqueduct. Prehistoric sites identified consist of two lithic scatters, and one quarry site.

Of the 33 resources previously recorded: one has been determined eligible for listing in the NRHP with concurrence from the SHPO (P-15-003549/CA-KER-3549H: Los Angeles Aqueduct) and two (P-15-003929/CA-KER-3929H: LA-Owens River Road and P-15-002050/P-15-003366/P-15-000560/ CA-KER-2050H: Union Pacific Railroad) appear eligible for the CRHR and NRHP through survey evaluation, although no formal evaluation has been made. The 14 isolated finds are not eligible for the CRHR or NRHP by definition, and the 16 remaining resources have not been evaluated for the CRHR or NRHP. Details pertaining to all 33 resources, including current conditions, are provided below in Table 4, organized by alignment option.

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
003528	3528H	Historic	7R (Identified in Survey; Not evaluated)	2014 (Way, K. R., R. Dinarte, and A. Ginther); 2012 (Ineligible on site form); 2010 (Hudlow, Scott); 1993 (Macko, M.)	Unnamed road	No change from 2010 assessment	East-West (E-W)
003534	3534H	Historic	7R (Identified in Survey; Not evaluated)	2013 (C. Higgins et al.); 1993 (Macko, M)	Unnamed road	No change from 2010 assessment	E-W
003537	3537	Historic	7R (Identified in Survey; Not evaluated)	2010 (Lawson, N.); 1993 (Macko, M.)	Oak Creek Road	No change from 2010 assessment	E-W
003549	3549H	Historic	2B (Determined eligible)	2015 (Newcomb, Alyssa and R. Knierim); 2013 (Kellawan, R., D. Martinez, and C. Connolly); 2010 (Fergusson, H. Calicher, R. rolston, N. Lannon); 2009 (Helvin, Steven, and Rebecca Flores)	Los Angeles Aqueduct	No change from 2010 assessment	E-W

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
003929	3929H	Historic	3D (Appears eligible as contributor)	1999 (Byrd, David); 1997 (Van Bueren, Thad); 1993 (Costello, J., J. Marvin, and C. Brownson); 2000 (Underwood, J.); 1993 (Costello, J. and J. Marvin); 1993 (Macko, M.)	Freighter route/LA-Owens River Road	No change from 2010 assessment	E-W
012716	7174H	Historic	7R (Identified in Survey; Not evaluated)	2002 (Brown, Brad)	Borrow pit and structural remains	No change from 2010 assessment	E-W
013683	--	Prehistoric	6Z (Found ineligible through survey evaluation)	2008 (McCormick, S.)	Isolate: flake	Could not be relocated	E-W
013814	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K.)	Isolate: can	No change from 2010 assessment	E-W
013963	--	Historic	6Z (Found ineligible through survey evaluation)	2009 (Lawson, N., C. Calicher, R. Harmon, E. Peters, and R. Rolston)	Isolate: can and steel bucket	No change from 2010 assessment	E-W
014700	8266	Prehistoric	7R (Identified in Survey; Not evaluated)	2009 (Harmon, R., H. Calicher and E. Peters)	Lithic scatter	No change from 2010 assessment	E-W
014701	8267	Prehistoric	7R (Identified in Survey; Not evaluated)	2009 (Ineligible on record)	Quarry or prospect site	No change from 2010 assessment	E-W
015544	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Candenas, Glonella)	1934 Survey Marker	No change from 2010 assessment	E-W
017096	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Maier, E. and Lambert, K.)	Trash scatter of cans and glass	No change from 2010 assessment	E-W
017097	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Maier, E. and Lambert, K.)	Trash scatter of cans and glass	No change from 2010 assessment	E-W
017098	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Maier, E. and Lambert, K.)	Trash scatter of cans and glass	No change from 2010 assessment	E-W
017119	--	Historic	6Z (Found ineligible through survey evaluation)	2011 (Rolston, R., J. McDermott, and K. Lambert)	Isolate: can	Could not be relocated	E-W

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
017121	--	Historic	6Z (Found ineligible through survey evaluation)	2011 (Rolston, R., J. McDermott, and K. Lambert)	Isolate: can	No change from 2010 assessment	E-W
017305	--	Historic	7R (Identified in Survey; Not evaluated)	2013 (Lucas, T. and C. Higgins)	State Route 14/Aerospace Highway	No change from 2010 assessment	E-W
018681	10204H	Historic	7R (Identified in Survey; Not evaluated)	2014 (Dice, Michael)	LADWP Owens Gorge 230kV transmission line	No change from 2010 assessment	E-W
002050/ 003366/ 000560/ 017333	2050H	Historic	3CD (Appears eligible for CR as contributor)	2009 (Calicher, H., R. Rolston, N. Lawson)	Union Pacific Railroad and associated spurs	No change from 2010 assessment	E-W North-South (N-S) Option 1
013801	7736H	Historic	7R (Identified in Survey; Not evaluated)	2010 (Blotner, N., K. Smolik, S. Clowery)	Trash scatter of metal, glass, butchered bone	No change from 2010 assessment	N-S Option 2
013802	--	Historic	7R (Identified in Survey; Not evaluated)	2010 (Blotner, N., K. Smolik, S. Clowery)	Trash scatter of glass	No change from 2010 assessment	N-S Option 2
013806	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	Could not be relocated	N-S Option 2
013807	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	No change from 2010 assessment	N-S Option 2
013808	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	Could not be relocated	N-S Option 2
013809	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	No change from 2010 assessment	N-S Option 2
013810	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: bottle base	Could not be relocated	N-S Option 2
013811	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K.)	Isolate: can	Could not be relocated	N-S Option 2

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
013812	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K.)	Isolate: can	Could not be relocated	N-S Option 2
000807	--	Prehistoric	7R (Identified in Survey; Not evaluated)	1974 (Eggers, A.V.)	Lithic scatter	No change from 2010 assessment	N-S Option 3
004763	--	Historic	7R (Identified in Survey; Not evaluated)	2001 (Glennon)	Sierra Highway	No change from 2010 assessment	N-S Option 3
004764	--	Prehistoric	6Z (Found ineligible through survey evaluation)	1995 (Samuelson, Ann, Bryan Mischke, John Yelding-Slone, and Charlene Gross)	Isolate: lithic core	Could not be relocated	N-S Option 3
004765	--	Historic	6Z (Found ineligible through survey evaluation)	1995 (Samuelson, Ann, Bryan Mischke, John Yelding-Slone, and Charlene Gross)	Isolate: Glass insulator	No change from 2010 assessment	N-S Option 3

5.1.2.1 Resources Determined Significant

Los Angeles Aqueduct (P-15-003549/CA-KER-3549H)

Intersecting the western end of the east-west gen-tie line, the Los Angeles Aqueduct is listed in the CRHR and has previously been determined eligible for listing in the NRHP with concurrence from the SHPO. The entire length of the aqueduct was found eligible under Criterion 1/A, and some segments were found eligible under Criterion 3/C (Costello and Marvin 1992, as cited in Panich et al. 2010: 33).

5.1.2.2 Resources Likely Significant

Los Angeles-Owens River Road (P-15-003929/CA-KER-3929H)

Intersecting the western end of the east-west gen-tie line, the Los Angeles-Owens River Road was established as a freighter route in the late 1860s and was graded in the early 20th century (Byrd 1999). A 1994 evaluation of the road determined that the road appears eligible for listing at a local level under Criterion 1/A; however visits in 1997 (Van Bueren) and 1999 (Byrd 1999) indicate that the road segments they consider do not appear to be eligible for listing due to a lack of integrity.

Atchison, Topeka & Santa Fe Railroad Line (P-15-002050/P-15-003366/P-15-000560/ CA-KER-2050H)

Intersecting the eastern portion of the east-west alignment, and the southern portion of North–South Gen-Tie Route Options 1 and 3, this railroad alignment was originally constructed as part of the Southern Pacific Railroad line in 1882. In 1884, Atchison, Topeka & Santa Fe purchased the line, extending it through the Antelope Valley. Running from Mojave, California to Topack, Arizona, the line is still in use and has been maintained and improved over the decades. Several segments of the line have been recorded, concluding that the Atchison, Topeka & Santa Fe Railroad line appear eligible for listing in the NRHP as a separate listing and/or a contributor to an existing District (Puckett 2007, Kellawan et al., 2014).

5.1.3 Map and Historic Aerial Photography Research

Additional archival research for this project included review of plat maps (California Surveyor's General Office 1856, 1899, 1901, 1935) and historic topographic maps. Historic topographic maps consulted include USGS 1943, 1947, 1954, 1957, and 1964 (Historic Aerials 2016).

Plat maps indicate early land surveys and transportation routes throughout the region (California Surveyor's General Office 1856, 1899, 1901). The 1935 Dependent Resurvey plat map depicts a number of roads and railroad lines crossing the APE (California Surveyor's General Office 1935).

Historic maps show that the APE and vicinity were only sparsely developed in the first decades of the twentieth century. A 1908 topographic map of the Los Angeles Aqueduct shows that the APE fell within the Mojave Division (Division Number 8) for the construction of the aqueduct, which extended from Pinto Station to the north end of A.V. Cottonwood Siphon (City of Los Angeles Water Department 1908). Railroad stations are indicated at Chaffee, Gloster, and Mojave on this map.

By 1915, the aqueduct was fully constructed and mining activity is visible at Willow Springs, Rosamond, and Treasure Mine (USGS 1915). At this time, the community of Mojave served as aqueduct construction headquarters, and the community was fully surveyed and mapped by the 1943 map. Gold Town is visible in 1943 to the south of the project area, with the majority of structures having dissipated by 1957 (Historic Aerials 2016).

5.2 Cultural Resources Survey

Dudek conducted intensive-level pedestrian surveys of 241.2 acres of the APE. Visits to sites recorded during the 2010 field effort exhibited little to no change in existing conditions. Transects were spaced 15 meters (45 feet) apart. Visibility in the APE was excellent, averaging over 90%.

Although some seasonal grasses were present and obscured the view slightly, archaeologists generally had excellent visual access to the APE. In many cases, artifacts found were partially buried as a result of natural alluvial and aeolian processes. Shallowly and partially buried surface deposits are anticipated because of the relatively active nature of this alluvial plain. The very dry sediments and frequent high winds indicate the possible, though unlikely, presence of substantial intact, subsurface archaeological resources in the APE. However, intentionally buried deposits (such as refuse dumps) associated with identified historic archaeological sites in the general vicinity may be present.

5.2.1 Newly Identified Cultural Resources

During the current field efforts, Dudek archaeologists newly identified and recorded six cultural resources: two isolates and four sites. California DPR 523 Series forms for all recorded resources are included as Appendix B.

5.2.1.1 SS-I-04

Isolated artifact SS-I-04 is located along the eastern portion of the east-west gen-tie route alignment, along the north side of Purdy Avenue to the west of Highway 14. The isolate is a piece of prehistoric white chert flake debitage. The flake is unifacially worked along one edge; it measures 30 × 25 × 5 millimeters. Soil is yellowish brown sand with granitic inclusions. Vegetation consists of sparse Joshua trees and juniper with native and invasive species of grasses. Disturbances in the immediate area include construction activities associated with the road and an existing solar farm to the south along with areas of alluvial and aeolian sediments.

5.2.1.2 SS-I-14

Situated along the eastern portion of the east-west gen-tie route alignment, to the south of Purdy Avenue and east of Highway 14, isolated artifact SS-I-14 consists of three glass fragments from a single vessel. The glass is a light purple milk glass, embossed with "…NGRAMS…" along the neck. Because milk glass was made using manganese dioxide, white milk glass used in cold cream and cosmetic jars turns a milky purple color when exposed to sunlight for extended periods. These types of jars commonly date from approximately 1900 through the 1920s (Lindsey 2017). Vegetation consists of sparse Joshua trees and juniper with sparse creosote and grasses. Soil is a dark yellowish brown sand with granitic inclusions. Disturbances in the area include construction activities associated with the road along with areas of alluvial and aeolian sediments.

5.2.1.3 SS-S-10

Situated at the southeastern portion of North-South Gen-Tie Route Option 1, site SS-S-10 is a prehistoric lithic scatter measuring 130 m (northeast-southwest) x 63 m (northwest-southeast). The site is composed of approximately 30 lithic flakes of brown rhyolite and obsidian. The majority of the flakes are obsidian interior flakes, although one secondary rhyolite and two obsidian biface thinning flakes were also observed. Obsidian from this site may be coming from Coso region, depending on the time it was occupied. The site is situated approximately 70 meters south of Lookout Hill within an alluvial plain. Vegetation consists of sparse Joshua trees and juniper with sparse creosote and grasses. Soil is a dark yellowish brown sand with granitic inclusions. Disturbances in the area include All Terrain Vehicle use along with areas of alluvial and aeolian sediments.

5.2.1.4 SS-S-11

Site SS-S-11 is a historic can scatter along the eastern portion of the East-West Gen-Tie Route alignment, to the north side of Purdy Avenue to the west of Highway 14. Measuring 605 feet (east-west) x 223 feet (north-south), the site is composed of a light scatter of approximately 50 cans and appear to be a discrete single use dumping site. Can types observed included venthole filler condensed milk cans, church-key opened beverage cans, and double seam sanitary-type food cans totaling. Although no measurements were possible due to deterioration, all of the cans appear to date to sometime between the 1930s and 1950s based on morphological characteristics (Simonis n.d.).

Vegetation consists of sparse Joshua trees and juniper with sparse creosote and grasses. Soil is a dark yellowish brown sand with granitic inclusions. Disturbances in the area include construction activities associated with the road along with areas of alluvial and aeolian sediments.

5.2.1.5 SS-S-23

Site SS-S-23 is a historic can scatter southeastern portion of North–South Gen-Tie Route Option 1. Measuring 260 feet (northwest-southeast) x 98 feet (northeast-southwest), the site is composed of a light scatter of sanitary and church-key opened beverage cans totaling approximately 20 rotary-opened sanitary food cans, and four church-key opened beverage cans. Although no measurements were possible due to deterioration, all of the cans appear to date to sometime between the 1930s and 1950s based on morphological characteristics (Simonis n.d.).

Vegetation consists of sparse Joshua trees and juniper with sparse creosote and grasses. Soil is a dark yellowish brown sand with granitic inclusions. Disturbances in the area include construction activities associated with the road.

5.2.1.6 SS-S-30

Situated at the southeastern portion of North–South Gen-Tie Route Option 1, site SS-S-30 is a dense prehistoric lithic scatter measuring 75 meter (northeast-southwest) x 55 meter (northeast-southwest). The site is composed of approximately 50 lithic flakes of brown rhyolite and obsidian, with rhyolite being the primary material. Obsidian from this site may be coming from the Coso region, depending on the time it was occupied. The majority of the flakes were interior flakes, although primary, secondary, and biface thinning flakes were also observed. The site is situated approximately 300 meters west of Lookout Hill within an alluvial plain. Vegetation consists of sparse Joshua trees and juniper with sparse creosote and grasses. Soil is a dark yellowish brown sand with granitic inclusions. Disturbances in the area include evidence of off-road travel.

6 FINDINGS AND RECOMMENDATIONS

6.1 Summary of Findings

A total of 39 cultural resources were identified in the APE, including 16 isolates, 14 archaeological sites, and 9 built environment resources. By definition, archaeological isolates are not eligible as significant resources under the CRHR or the NRHP and no further work is necessary in regards to these. Table 5 provides an overview of all identified impacts to resources and any associated mitigation measures necessary to reduce impacts.

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
East-West (E-W)	P-15-003528	Unnamed road	Historic	7R (Identified in Survey; Not evaluated)	The road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact No mitigation required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
E-W	P-15-003534	Unnamed road	Historic	7R (Identified in Survey; Not evaluated)	The road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact No mitigation required
E-W	P-15-003537	Oak Creek Road	Historic	7R (Identified in Survey; Not evaluated)	Oak Creek Road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
E-W	P-15-003549	Los Angeles Aqueduct	Historic	2B (Determined eligible)	The Aqueduct was determined eligible listing in the NRHP with concurrence from the state historic preservation office; however, the construction of transmission towers will not impact the resource.	No impact/adverse effects No mitigation required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
E-W	P-15-003929	Los Angeles-Owens River Road	Historic	3D (Appears eligible as contributor)	Los Angeles-Owens River Road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
E-W	P-15-012716	Borrow pit and structural remains	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	P-15-013683	Isolate: flake	Prehistoric	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	P-15-013814	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	P-15-013963	Isolate: can and steel bucket	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	P-15-014700	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
E-W	P-15-014701	Quarry or prospect site	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	P-15-015544	1934 Survey Marker	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	P-15-017096	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	P-15-017097	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	P-15-017098	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	P-15-017119	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
E-W	P-15-017121	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	P-15-017305	State Route 14/Aerospace Highway	Historic	7R (Identified in Survey; Not evaluated)	State Route 14 has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
E-W	P-15-018681	LADWP Owens Gorge 230kV transmission line	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	SS-I-04	Isolate: lithic	Prehistoric	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	SS-S-11	Trash scatter of cans	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	SS-I-14	Isolate: glass	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
E-W, North-South (N-S) Option 1	P-15-002050/ P-15-003366/ P-15-000560/ P-15-017333	Union Pacific Railroad and associated spurs	Historic	3CD (Appears eligible for CR as contributor)	The site has not been fully evaluated; however, the construction of transmission towers will not impact the resource.	No impact/adverse effects No mitigation required
N-S Option 1	SS-S-10	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
N-S Option 1	SS-S-23	Trash scatter of cans	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
N-S Option 1	SS-S-30	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
N-S Option 2	P-15-013801	Trash scatter of metal, glass, butchered bone	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
N-S Option 2	P-15-013802	Trash scatter of glass	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
N-S Option 2	P-15-013806	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	P-15-013807	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	P-15-013808	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	P-15-013809	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	P-15-013810	Isolate: bottle base	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	P-15-013811	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	P-15-013812	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3	P-15-000807	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required

Table 5
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
N-S Option 3	P-15-004763	Sierra Highway	Historic	7R (Identified in Survey; Not evaluated)	Sierra Highway has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
N-S Option 3	P-15-004764	Isolate: lithic core	Prehistoric	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3	P-15-004765	Isolate: Glass insulator	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required

6.2 Impact Analysis/ Project Effects

A full analysis of project impacts/effects is not possible at this time because North–South Gen-Tie Route Option 3 has not been completely inventoried, and consideration of avoidance feasibility for all resources is ongoing. Therefore, impacts/effects to unevaluated cultural resources cannot be determined. Isolated finds by definition; however, are not sites and therefore not eligible for inclusion in the CRHR or NRHP. As a result, no impacts will occur to the 16 isolated finds (14 previously recorded and 2 newly recorded).

Of the 23 archaeological or built environment resources that were identified within the APE, one (P-15-003549/CA-KER-3549H: Los Angeles Aqueduct) has been determined eligible for listing in the CRHR/NRHP and two (P-15-003929/CA-KER-3929H: LA-Owens River Road and P-15-002050/P-15-003366/P-15-000560/CA-KER-2050H: Union Pacific Railroad) appear eligible for the CRHR and NRHP through survey evaluation. (see Table 5).

Implementation of any project option, however, would not result in significant impacts or adverse effects any of these CRHR or NRHP listed or eligible cultural resources. The gen-tie line would span these resources, with towers placed systematically to ensure avoidance. As a result, the construction of a gen-tie would not degrade the character-defining qualities of the significant resources or materially alter their physical components.

6.2.1 Unavoidable Impacts/Effects

At this time, consideration of the feasibility of avoidance and alternative selection is underway and incomplete. Therefore, a determination as to whether project implementation will result in unavoidable impacts/effects to cultural resources cannot be made. If avoidance is not feasible for any or all of the unevaluated resources, further work will need to be completed to determine the significance of the resources and/or impacts/effects.

6.2.2 No Significant Impact/ No Adverse Effect

North-South Option 2 has been intensively surveyed, resulting in the identification of seven isolated finds. As no archaeological sites or built environment resources were identified along this route, no significant impact or adverse effect would occur. Because none of the resources along the remaining route options have been evaluated for significance and the feasibility of avoidance has not been determined, no determination regarding the significance of impacts, or lack thereof can be made.

6.2.3 Significant Impacts/Adverse Effects

A total of 20 archaeological sites or built environment resources have been identified in the APE that have not been evaluated for significance. Should project implementation be unable to avoid these resources, the project would have the potential to significantly impact the resources under CEQA, and have the potential for an adverse effect under Section 106 of the NHPA. However, since these resources have not been evaluated for significance and the feasibility of avoidance has not been determined, no determination regarding the significance of impacts can be made. Likewise, appropriate mitigation cannot be developed until significance determinations of unavoidable resources have been completed.

Based on the large volume of previous research in the vicinity of each option, however, it is Dudek’s professional opinion that most of the identified, unevaluated cultural resources would not produce information that would result in a recommendation of significance under CEQA or Section 106 of the NHPA.

6.2.4 Further Considerations

North–South Gen-Tie Route Options 1 and 3 traverse a depositional environment where the likelihood of encountering significant subsurface deposits is relatively higher than in neighboring areas. Therefore, there is a moderate potential for encountering significant buried archaeological deposits during earth-moving activities for project implementation. Such inadvertent discoveries would result in a significant impact under CEQA or adverse effect under Section 106 of the NHPA if such resources were found to be significant due to damage incurred during the discovery and evaluation process.

Furthermore, there is always the potential to discovery human remains and grave goods during project implementation. Such discoveries would also be considered a significant impact under CEQA and an adverse effect under Section 106 of the NHPA.

6.3 Management Recommendations

This cultural resources study does not include formal significance evaluations for any of the encountered resources. Isolated cultural material is not considered significant and isolates are generally not eligible to be considered historical resources under CEQA or historic properties under Section 106 of the NHPA. If the archaeological sites recorded in the APE cannot be avoided, they must be evaluated for significance and eligibility for CRHR or NRHP listing in order to analyze the significance of impacts prior to proposing mitigation, including forms of avoidance that involve capping or other physical alteration of the resource setting.

Therefore, Dudek recommends formal significance evaluation of any cultural resources that cannot be avoided through project design or other forms of avoidance provided in CEQA.

Three resources that are eligible for or listed in the CRHR and NRHP are within the APE (P-15-003549/CA-KER-3549H/Los Angeles Aqueduct, P-15-003929/CA-KER-3929H/LA-Owens River Road, and P-15-002050/P-15-003366/P-15-000560/CA-KER-2050H/Union Pacific Railroad). The gen-tie line would span across these resources, with towers placed systematically to ensure avoidance. As a result, implementation of any project option would not result in significant impacts or adverse effects to any of these resources. No further work is warranted on these resources.

Cultural resources monitoring is recommended during earth-moving activities associated with project implementation within 500 feet of known cultural resources, and on an occasional (spot check) basis to ensure that inadvertent discoveries are properly treated. A cultural resources monitoring plan should be developed in conjunction with the project proponent and lead agencies to guide monitoring activities and delineate the locations and intensity of monitoring.

In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County coroner shall be immediately notified of the discovery. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County coroner has determined, within two working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the County coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the NAHC must immediately notify those persons it believes to be the most likely descendant from the deceased Native American. The most likely descendant shall complete their inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

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CONFIDENTIAL
APPENDIX A
Resource Location Maps

Redacted from Public Version

CONFIDENTIAL
APPENDIX B
Department of Parks and Recreation
Series 523 Forms

Redacted from Public Version

CONFIDENTIAL
APPENDIX C
Records Search Results

Redacted from Public Version

B8. Cultural Resources Inventory and Evaluation – Gen-Tie Routes

DRAFT

CULTURAL RESOURCES INVENTORY AND EVALUATION FOR THE GEN-TIE ROUTES FOR EDWARDS AIR FORCE BASE (AFB) SOLAR PROJECT, KERN COUNTY, CALIFORNIA

Prepared for:

Edwards AFB Solar, LLC
11512 El Camino Real, Suite 370
San Diego, California 920130
Contact: Simon Day

Prepared by:

Micah J. Hale, Ph.D., RPA
Jay Scott Wolf, BA
and
Elizabeth Denniston, MA, RPA

DUDEK
38 Marengo Avenue
Pasadena, California 91101

MARCH 2018

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1 INTRODUCTION

A Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) is being prepared by the U.S. Air Force (USAF) and the County of Kern, California (County) to evaluate, at a project level, the impacts of the Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project (formerly known as Oro Verde Solar Project). A Request for Qualifications was issued on February 3, 2017, by the USAF for solar development through the EUL program. Edwards AFB Solar, LLC has been selected by the USAF as the Highest Rate Offeror. Edwards AFB Solar, LLC will construct, operate, and maintain a utility-scale solar photovoltaic (PV) energy-generating facility on the Edwards AFB property. Edwards AFB Solar, LLC will file an application with the County for a franchise agreement and/or Conditional Use Permit (CUP) for routing a generation tie (gen-tie) transmission line from the proposed solar facility to the privately owned Westwind Substation in the first phase of the project and to Southern California Edison Windhub Substation in subsequent phases. For purposes of this report, the project only addresses the proposed gen-tie routes extending from Edwards AFB to the Windhub Substation and is referred to as the Gen-Tie Routes for Edwards AFB Solar EUL Project or proposed project.

In general, the gen-tie route can be broken down into two categories based on the direction of the corridor—a north–south connection and an east-west connection. There were originally three options for the north–south gen-tie connection (North–South Gen-Tie Route Option 1, North–South Gen-Tie Route Option 2, and North–South Gen-Tie Route Option 3) and two options for the east–west gen-tie connection (East-West Gen-Tie Route Option 1-A and East-West Gen-Tie Route Option 1-B). North–South Gen-Tie Route Option 3 was later removed from consideration, resulting in the consideration of two north-south connection corridors (Options 1 and 2). The proposed project would include only one of these two north-south route options and one of the two east–west route options.

Dudek was retained by Edwards AFB Solar, LLC to conduct a cultural resources study in support of the gen-tie transmission lines for proposed project. In February 2017, four of the five route options (North–South Gen-Tie Route Option 1, North–South Gen-Tie Route Option 2, East-West Gen-Tie Route Option 1-A and East-West Gen-Tie Route Option 1-B) were examined to characterize and describe cultural resources within the potential gen-tine transmission line area of potential effects (APE) that could be affected by ground-disturbing activities.

The February 2017 investigation reviewed previous survey work and associated reports completed within the APE for all five gen-tie connection options, and conducted an intensive-level pedestrian survey of North–South Gen-Tie Route Options 1 and 2 (Denniston and Hale 2017a). The East-West Gen-Tie Route was shown to be recently surveyed, therefore resources along the alignment were spot-checked to assess current conditions. A cursory analysis, limited to all previously-conducted research, was completed for North–South Gen-Tie Route Option 3 during the February 2017 investigation. In November 2017, an intensive-level pedestrian survey of North–South Gen-Tie Route Option 3, which was later removed from consideration, was completed and the results were presented separately (Denniston and Hale 2017b). Although North–South Gen-tie Route Option 3 is no longer under consideration, the results of the investigation are included for the purpose of providing a complete cultural inventory for the proposed project.

As a result of the February and November, 2017 investigations, a total of 49 previously and newly recorded resources were identified within the project APE. These resources included 18 isolates, 22 archaeological resources, and 9 built environment resource. It was determined that 7 of these 49 resources would potentially be impacted by the proposed project. The current report details the testing and analysis of the 7 potentially impacted resources.

This study is compliant with provisions of local regulations, the California Environmental Quality Act (CEQA), and Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulation, 36 Code of Federal Regulations (CFR) 800. While the transmission line corridors studied herein are located on lands under the jurisdiction of Kern County, Edwards AFB has federal Section 106 consultation obligations for the Edwards Solar generation plant located on federal lands. The transmission lines are a connected action for the purposes of Edwards AFB Section 106 consultation, and this study complies with federal regulations to assist in the federal consultation process.

Public Resources Code (PRC) Section 5024.1, Title 14 California Code of Regulations (CCR) Section 15064.5 of the CEQA Guidelines, and PRC Sections 21083.2 and 21084.1 were also used as basic guidelines for this cultural resources study (Governor's Office of Planning and Research 1998). PRC Section 5024.1 requires the identification and evaluation of cultural resources to determine their eligibility for the California Register of Historical Resources (CRHR). The CRHR is a listing of the state's historical resources, and it indicates which properties are to be protected from substantial adverse change, as defined in CEQA, to the extent prudent and feasible.

1.1 Project Location

The project is located in the southern portion of Kern County, in central California, directly south of the community of Mojave, approximately 11 miles southeast of the City of Tehachapi, approximately 3 miles southwest of California City, and approximately 47 miles southeast of the City of Bakersfield (Figure 1). Locational information for the project is provided in Table 1, below and on Figures 2, 2A through 2E.

Table 1
Locational Information

Quadrangle (7.5')	Township	Range	Sections
Monolith	11N	13W	16, 17, 20, 21, 27, 28
Mojave	11N	13W	22, 24, 25, 27, 27
Mojave	11N	12W	19, 20, 21, 26, 27, 28, 29, 30, 31, 32, 33
Sanborn	11N	12W	26, 36, 36
Bissell	10N	12W	1, 7, 12
Soledad Mountain	10N	12W	3, 4, 5, 10, 15

1.2 Proposed Gen-Tie Line Corridor

A 230 kV gen-tie would connect the Edwards AFB solar generation site with the existing and privately owned electrical substation, the Westwind Substation, in the first phase of the project, and to the Southern California Edison Windhub Substation in subsequent phases of the project. The proposed gen-tie may be a shared facility with other solar projects in the future. In general, the gen-tie route can be broken down in to two categories based on the direction of the corridor—a north–south connection and an east-west connection. There were originally three options for the north–south gen-tie connection and the project would include only one of these. There are two options for the east–west gen-tie connection and the proposed project would include only one of the two east–west route options. The options for the north–south gen-tie routes are described first, and the options for the east–west gen-tie routes are described second.

Figures 2 through 2E show the proposed location of each of the gen-tie route options; the North–South Gen-Tie Route Option 1 is shown in yellow; the North–South Gen-Tie Route Option 2 is shown in blue; North–South Gen-Tie Route Option 3 (removed from consideration) is shown in red; and East-West Gen-Tie Route Options 1-A and 1-B in black.

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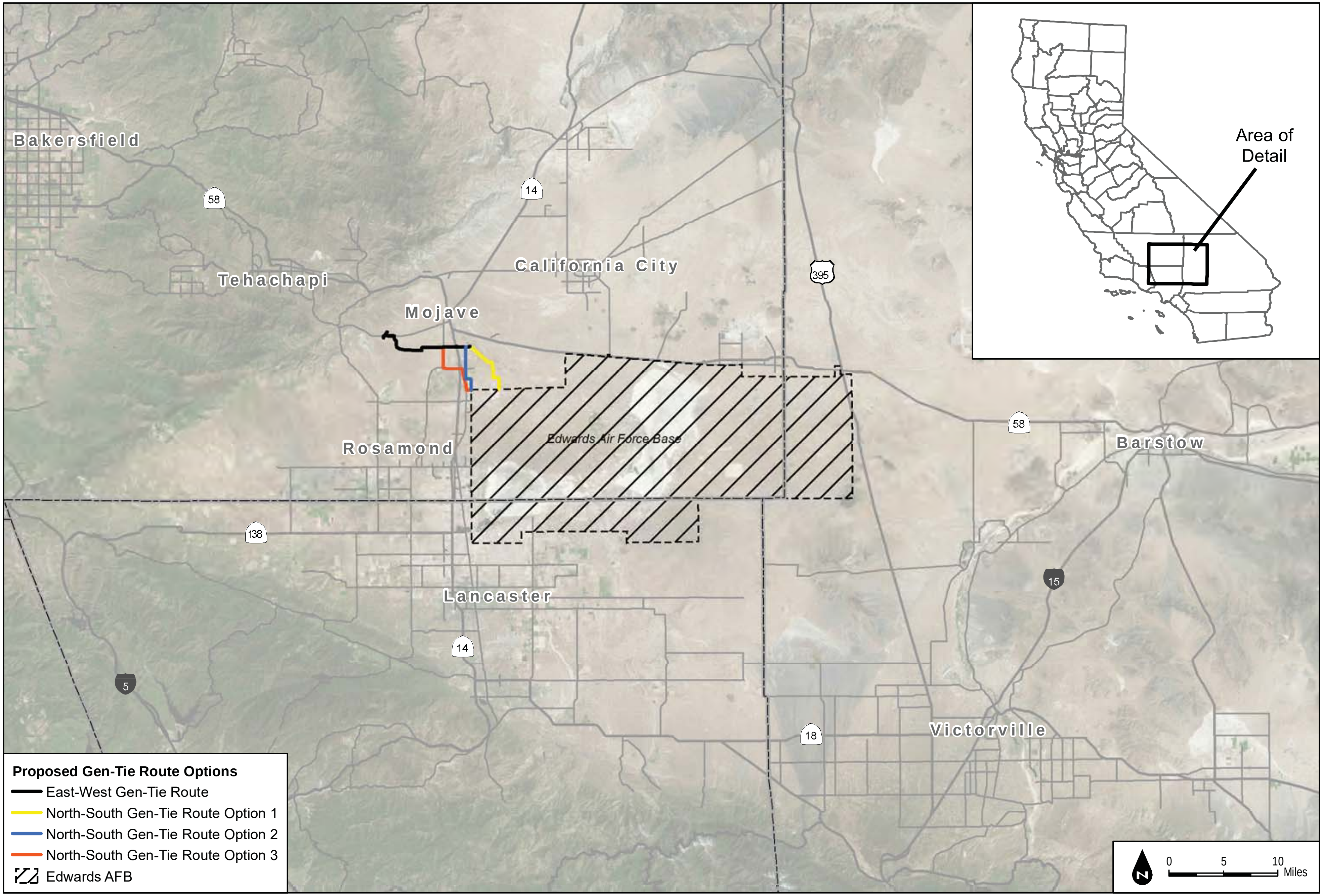

Terra Gen, 2017; Edwards AFB; Bing Maps

Figure 1: REGIONAL

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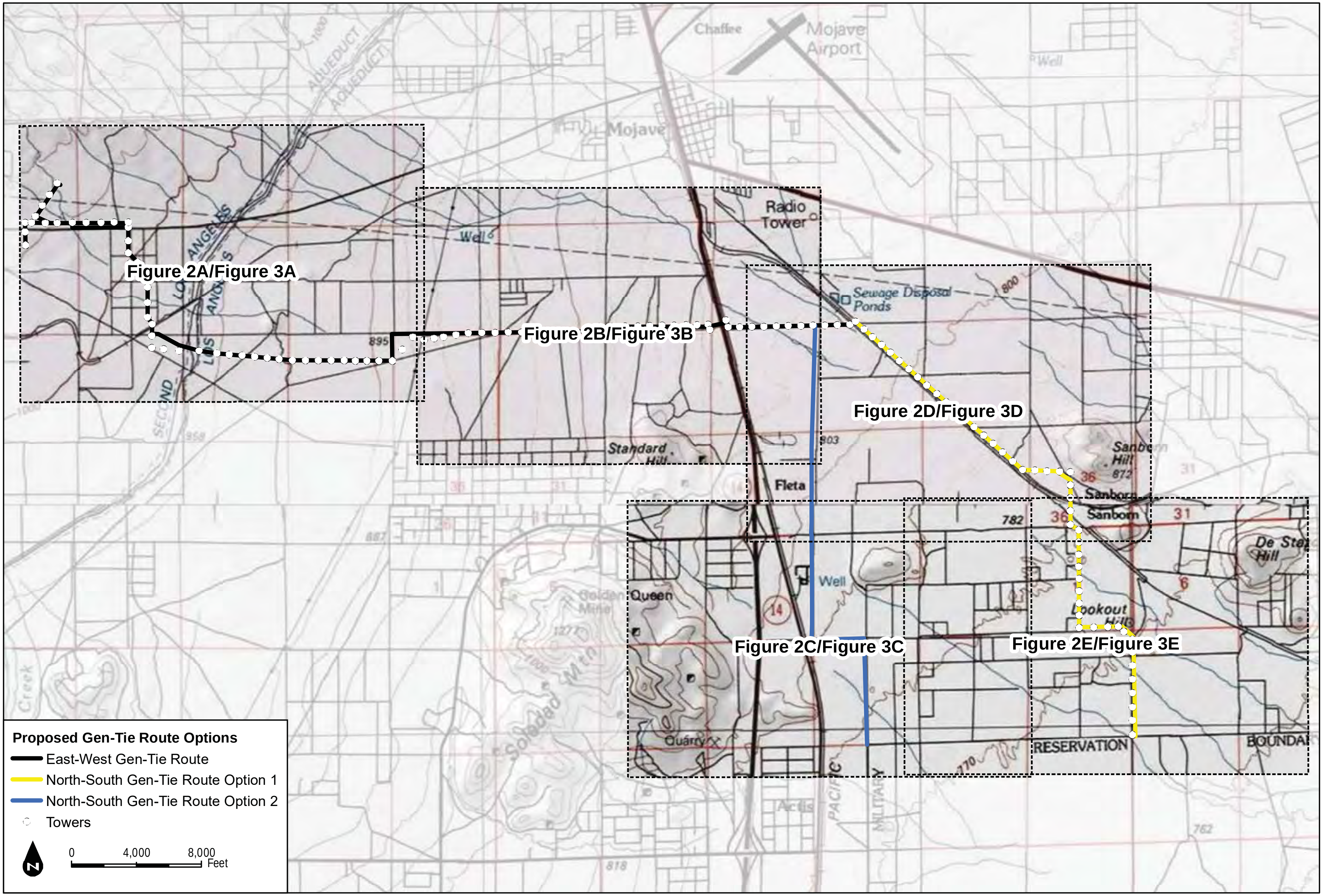

USGS 7.5-Minute Series Sanborn, Mojave, Monolith, Bissell, Soledad Mountain Quadrangles; Terra Gen, 2017

Figure 2: VICINITY MAP

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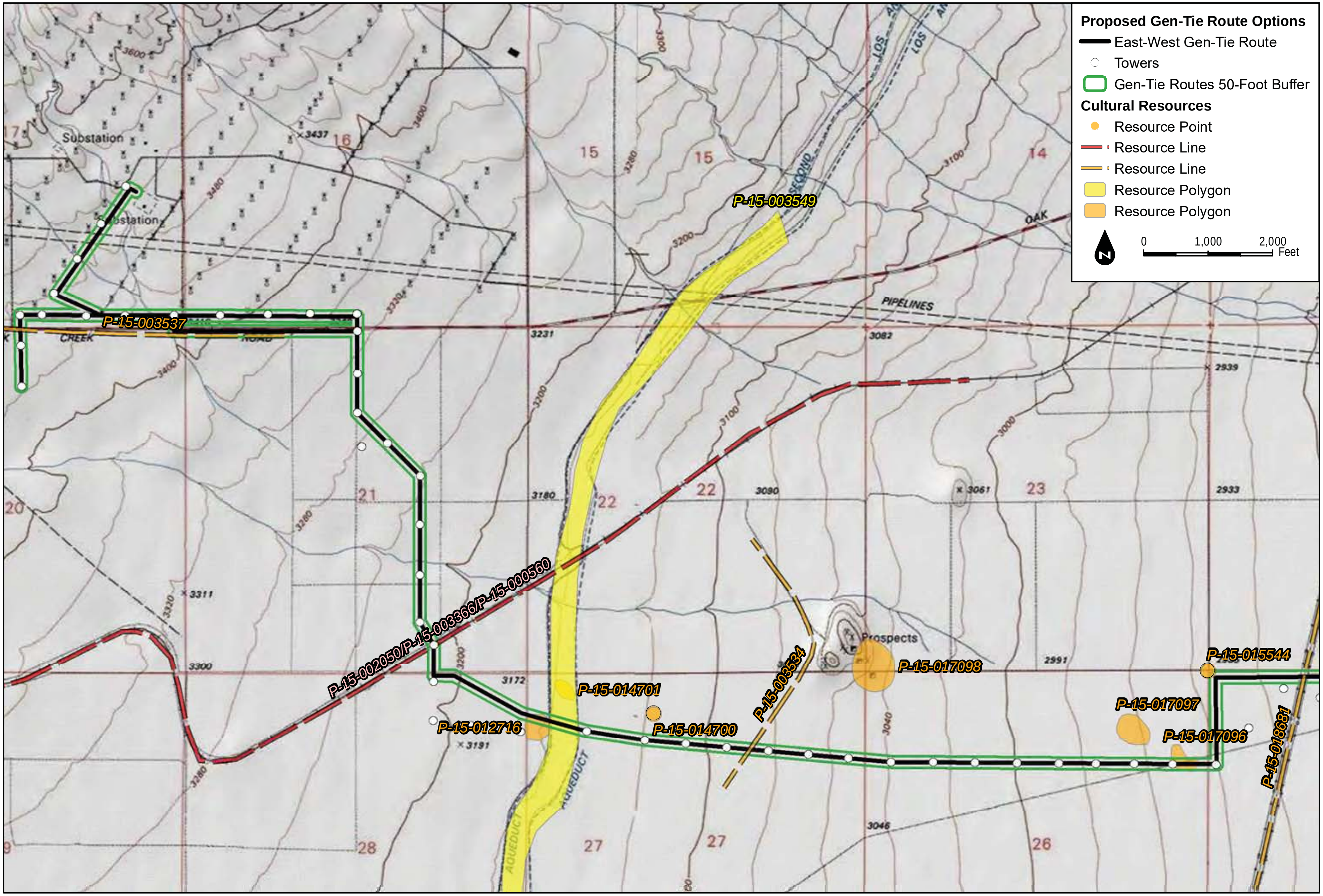

USGS 7.5-Minute Series Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2A: VICINITY MAP

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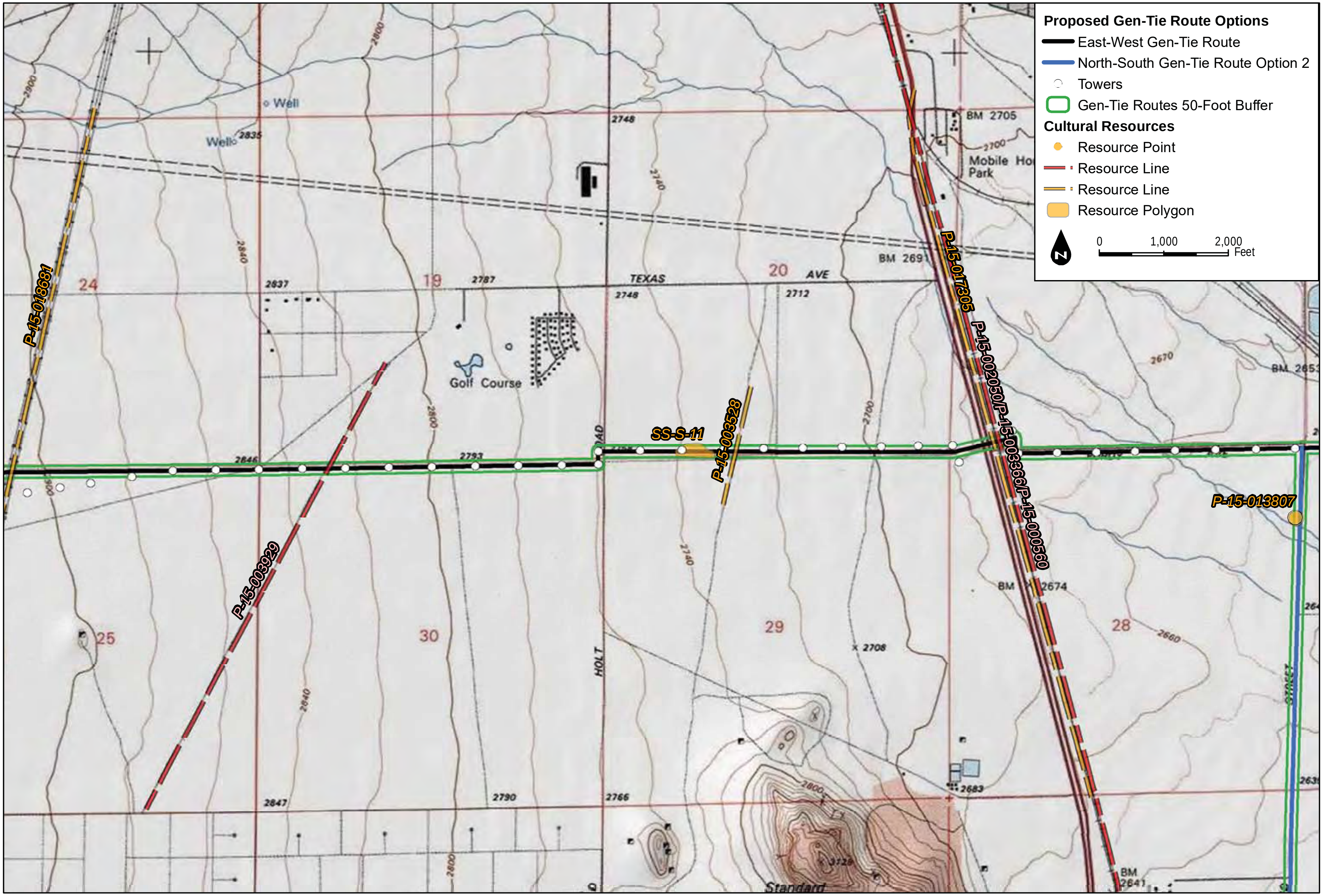

USGS 7.5-Minute Series Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2B: VICINITY MAP

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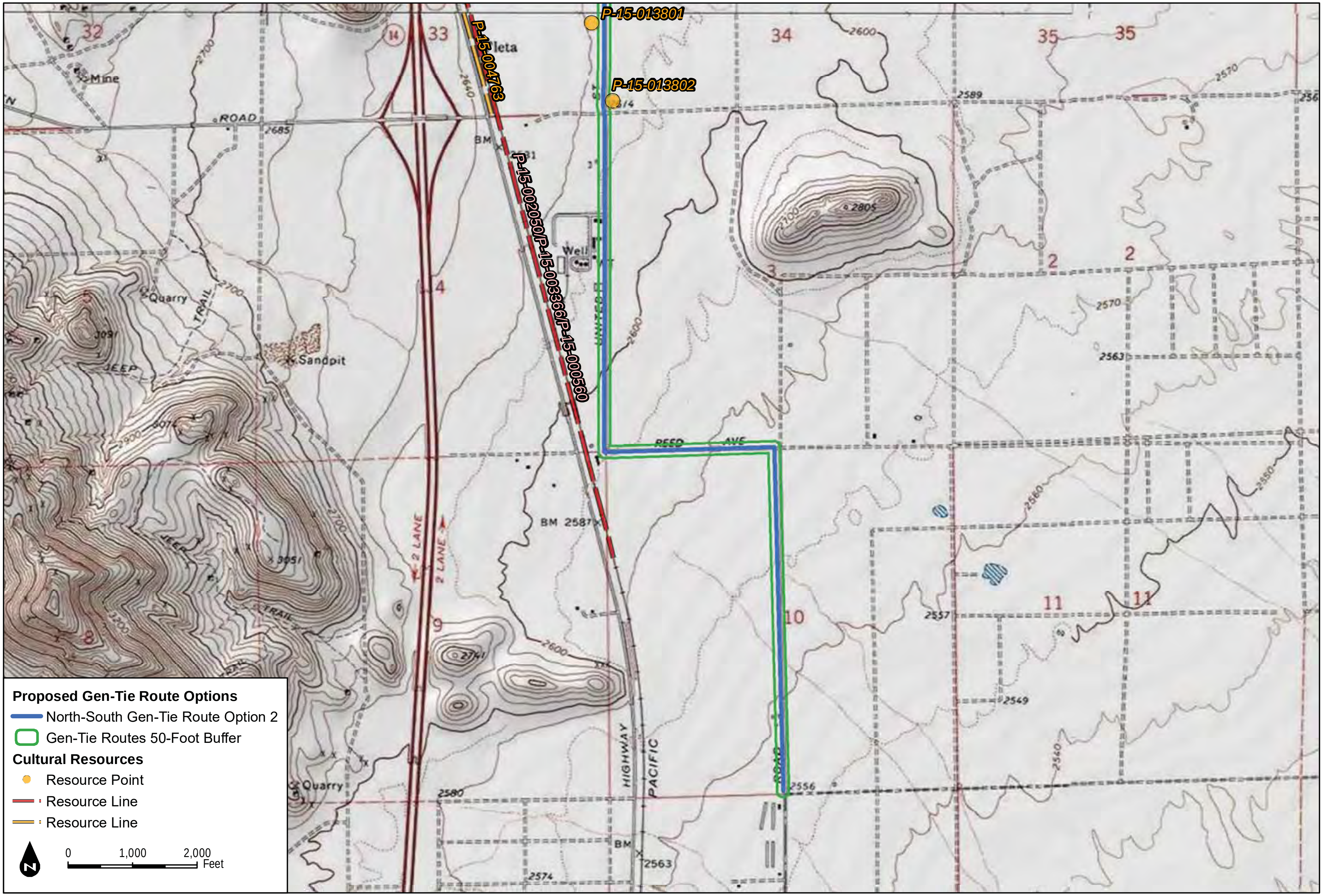

USGS 7.5-Minute Series Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2C: VICINITY MAP

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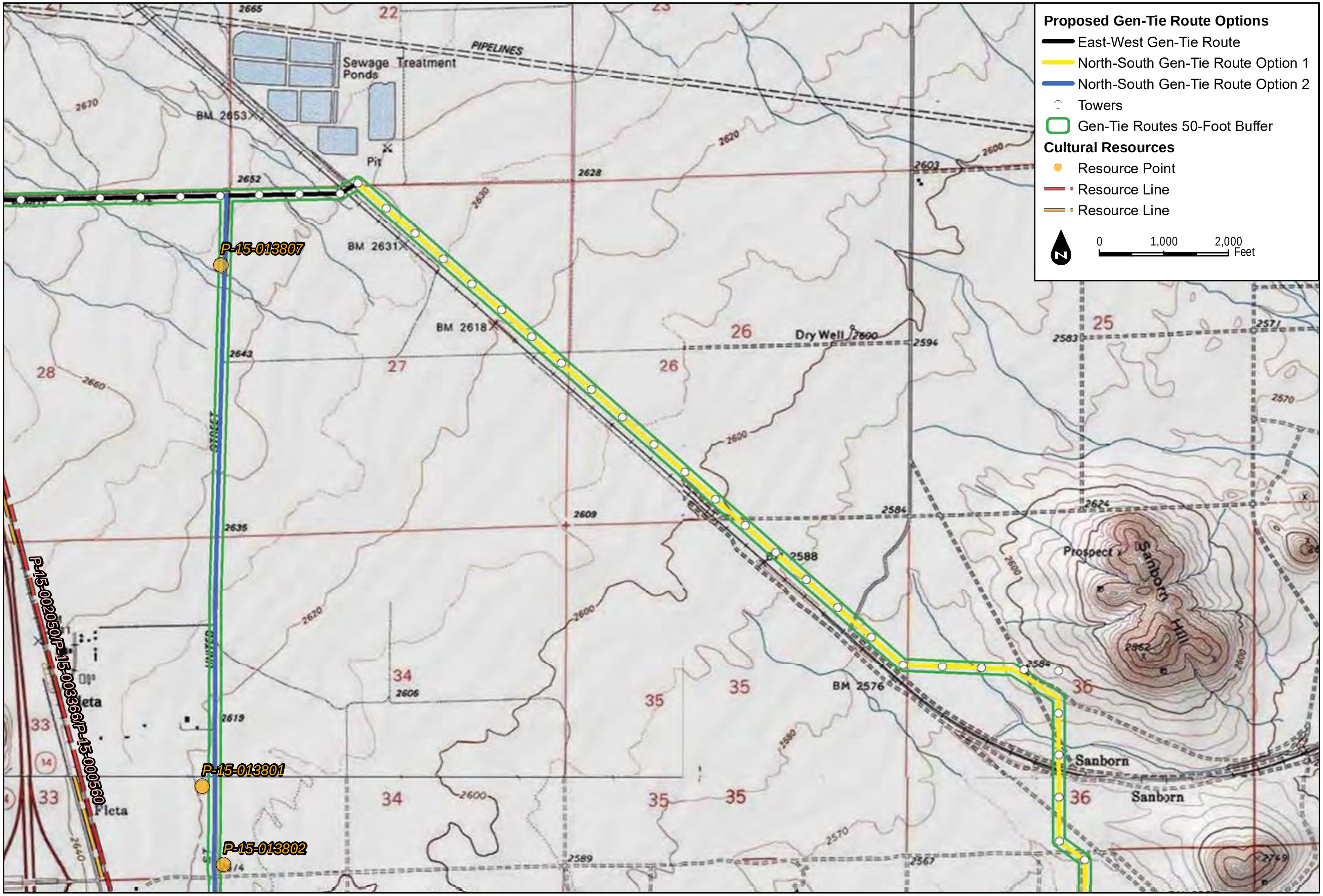

USGS 7.5-Minute Series Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2D: VICINITY MAP

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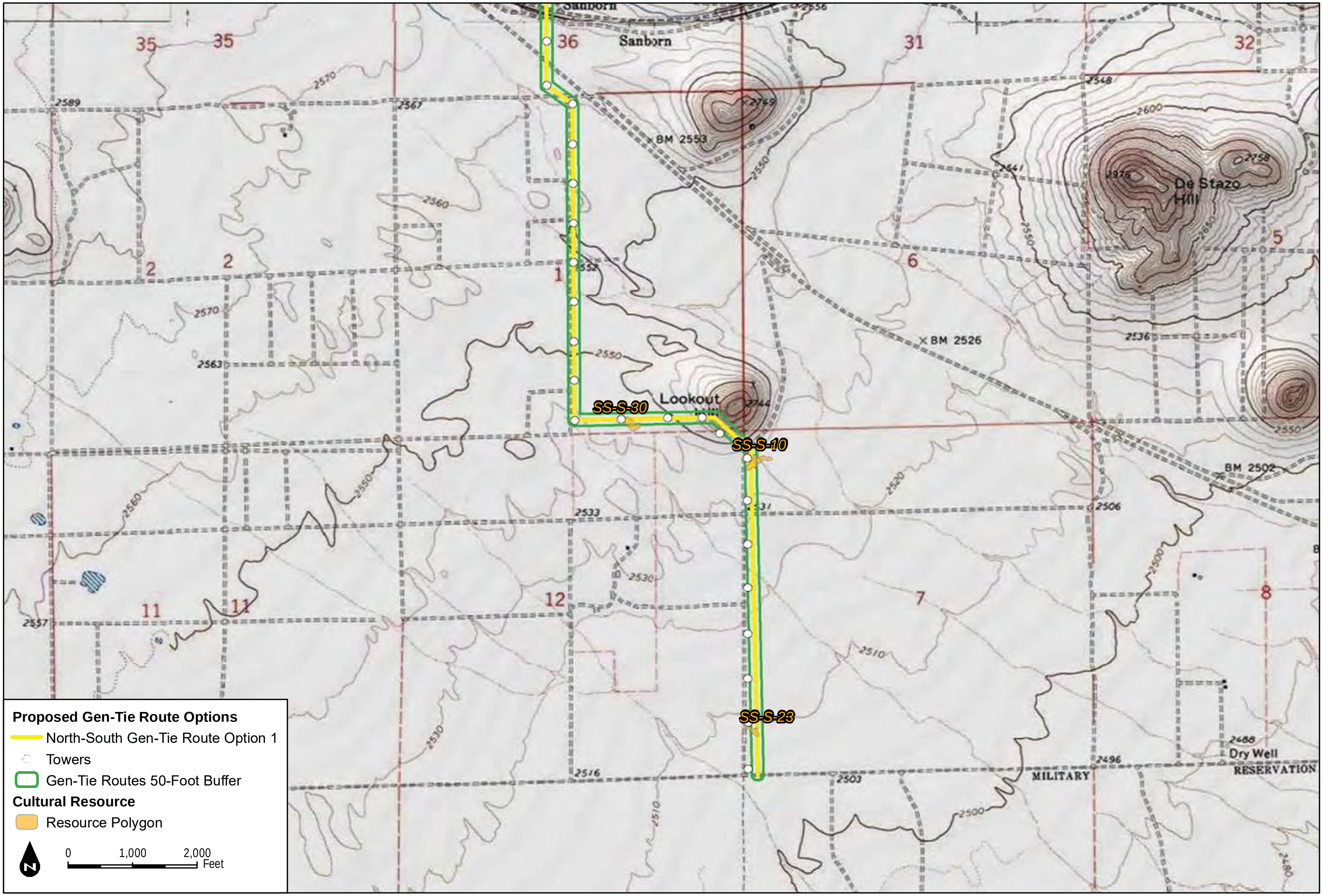

USGS 7.5-Minute Series Soledad Mountain, Bissell Quadrangles; Terra Gen, 2017

Figure 2E: VICINITY MAP

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1.2.1 North-South Gen-Tie Routes

From the proposed solar generation site to the approximate intersection of Purdy Avenue and United Street, there are two gen-tie route options. These north–south route options include the following: (1) North–South Gen-Tie Route Option 1: an approximately 5.6-mile-long gen-tie route on the east that generally runs from the Edwards AFB solar generation site north adjacent to 20th Street, west adjacent to East Reed Avenue, north adjacent to 15th Street, then generally follows the north side of the Burlington Northern Santa Fe (BNSF) Railway and finally runs west to the intersection of Purdy Avenue and the BNSF; (2) North–South Gen-tie Route Option 2: an approximately 4.5-mile-long gen-tie route that generally runs from the northwestern edge of the Edwards AFB solar generation site north on Lone Butte Road, west on West Reed Avenue, and north on United Street where it intersects with Purdy Avenue; and (3) North–South Gen-tie Route Option 3. Option 3 was removed from consideration, but was approximately 6-mile-long gen-tie route that generally runs from the northwestern edge of the Edwards AFB solar generation site directly west to Sierra Highway and runs along Sierra Highway to the intersection with Silver Queen Road; the gen-tie route runs directly west along Silver Queen Road for 1.8 miles and heads north of Gold Town Road, which turns into Holt Street, where the route intersects with Purdy Avenue.

1.2.2 East-West Gen-Tie Routes

Figure 2 shows the approximate location of the east–west gen-tie route in black and includes two route options, Options A and B, along Oak Creek Road. The proposed project would include only one of these options for the east-west gen-tie route. More specifically, from the intersection of the North–South Gen-Tie Option 1 and Purdy Avenue, the east–west gen-tie is approximately 9.8 miles, in length and would run west along Purdy Avenue for approximately 5.5 miles and then would run south of Purdy Avenue, but north of Decatur Avenue for approximately 2.9 miles and then turn north back to Purdy Avenue. From Purdy Avenue, the east–west gen-tine line would run north and northwest for approximately 1.3 miles to Oak Creek Road. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option A would run north of Oak Creek Road and Option B would run south of Oak Creek Road. From these two options, the east–west gen-tie route would run 0.4 miles before jogging northwest for 0.4 miles and connecting to the Westwind Substation or Windhub Substation. Table 2 provides a brief description of the three north-south route options and the two east-west route options.

Table 2
Proposed Gen-Tie Route Options

Option	Description
1	5.6-mile-long gen-tie route; runs from the AFB solar generation site north to the intersection of Purdy Avenue and the BNSF.
2	4.5-mile-long gen-tie route; runs from the northwestern edge of the AFB solar generation site to the intersection of United Street and Purdy Avenue.
3 (Removed from Consideration)	6-mile-long gen-tie route; runs from the northwestern edge of the AFB solar generation site to the intersection of Holt Street and Purdy Avenue.
1-A	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option A would run north of Oak Creek Road.
1-B	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option B would run south of Oak Creek Road

1.3 Definition of Area of Potential Effect

The cultural resources APE is defined as all five potential gen-tie transmission line routes along with a 50-foot (15.4 meters [m]) buffer on either side of the line. Although North–South Gen-tie Route Option 3 is no longer under consideration, the alignment is included in the defined APE for the purposes of providing a complete cultural inventory for the proposed project. In total, the five lines total approximately 25.9 miles (41.7 kilometers [km]) in length, and the APE covers approximately 313.9 acres. One previous survey, conducted in 2010, covered both of the east-west alignment Options 1-A and 1-B (Hudlow 2010). This area, measuring 9.5 miles (15.3 km) and 115.2 acres, was not resurveyed, but spot-checked, confirming the 2010 existing conditions. As a result, of the 313.9-acre APE, 115.2 acres were spot-checked and 198.7 acres were intensively surveyed.

1.4 Report Structure

Several chapters follow this introductory Chapter 1. Chapter 2 outlines the regulations to which the project adheres. Chapter 3 references existing environmental and cultural setting information and research design. Chapter 4 is a description of the methods used to accomplish this study. The results are summarized in Chapter 5, followed by the significance evaluations in Chapter 6. Findings and recommendations are presented in Chapter 7. All references cited are provided in a bibliography, along with selected references for further reading and guidance. Confidential appendices include location maps for sites and isolates (Appendix A) and site forms (Appendix B).

2 REGULATORY SETTING

The treatment of cultural resources located on the project site is governed by federal, state and local laws and regulations. There are specific criteria for determining whether prehistoric and historic sites or objects are significant and/or protected by law. For instance, federal and state significance criteria generally focus on the resource's integrity and uniqueness, its relationship to similar resources, and its potential to contribute important information to scholarly research. As a whole, the laws and regulations seek to avoid impacts to significant prehistoric or historic resources, and, when avoidance is not feasible, to mitigate those impacts to less than significant levels. In some cases, mitigation can be achieved through "preservation in place" techniques; but when such techniques are infeasible, mitigation can be accomplished via data recovery. While the transmission line corridors studied herein are located on lands under the jurisdiction of Kern County, Edwards AFB has federal Section 106 consultation obligations for the Edwards Solar generation plant located on federal lands. The transmission lines are a connected action for the purposes of Edwards AFB Section 106 consultation, and this study complies with federal regulations to assist in the federal consultation process.

2.1 Federal

2.1.1 36 CFR 800 and Section 106 of the NHPA

The National Historic Preservation Act (NHPA) established the National Register of Historic Places (NRHP) and the President's Advisory Council on Historic Preservation (ACHP), and provided that states may establish State Historic Preservation Officers (SHPOs) to carry out some of the functions of the NHPA. Most significantly for federal agencies responsible for managing cultural resources, Section 106 of the NHPA directs that "[t]he head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP." Section 106 also affords the ACHP a reasonable opportunity to comment on the undertaking (16 U.S.C. 470f).

36 Code of Federal Regulations, Part 800 (36 CFR 800) implements Section 106 of the NHPA. It defines the steps necessary to identify historic properties (those cultural resources listed in or eligible for listing in the NRHP), including: consultation with federally recognized Native American tribes to identify resources with important cultural values; determine whether or not they may be adversely affected by a proposed undertaking; and outline the process for eliminating, reducing, or mitigating the adverse effects.

The content of 36 CFR 60.4 defines criteria for determining eligibility for listing in the NRHP. The significance of cultural resources identified during an inventory must be formally evaluated for historical significance in consultation with the California SHPO to determine if the resources are eligible for inclusion in the NRHP. Cultural resources may be considered eligible for listing if they possess integrity of location, design, setting, materials, workmanship, feeling, and association. The criteria for determining eligibility are essentially the same in content and order as those outlined under the California Environmental Quality Act (CEQA), but the criteria under NHPA are labeled A through D (rather than 1–4 under CEQA).

Regarding criteria A through D of Section 106, the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, cultural resources, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

A. Are associated with events that have made a significant contribution to the broad patterns of our history; or

B. Are associated with the lives of persons significant in our past; or

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Have yielded or may be likely to yield, information important in prehistory or history [36 CFR 60.4].

The current evaluation of prehistoric cultural resources was performed with the intent of assessing historical significance under Criterion D. The ability of an archaeological site to yield important information to history or prehistory is based upon the site's ability to address specific research themes. The research themes addressed in this study are presented in Chapter 3, and these derive from the cultural resources overview presented in this chapter, above.

The ACHP provides methodological and conceptual guidance for identifying historic properties. In 36 CFR 800.4, the steps necessary for identifying historic properties include:

- Determine and document the APE (36 CFR 800.16(d)
- Review existing information on historic properties within the APE, including preliminary data
- Confer with consulting parties to obtain additional information on historic properties or concerns about effects to these

- Consult with Native American tribes (36 CFR 800.3(f)) to obtain knowledge on resources that are identified with places which they attach cultural or religious significance
- Appropriate fieldwork (including phased identification and evaluation)
- Apply NRHP criteria to determine a resource eligibility for NRHP listing

Fulfilling these steps is generally thought to constitute a reasonable effort to identify historic properties within the APE for an undertaking. The obligations of a federal agency must also assess whether an undertaking will have an adverse effect on cultural resources. An undertaking will have an adverse effect when:

> "an undertaking may alter, directly or indirectly, any of the characteristics of a historic property hat qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" (36 CFR Part 800.5(1)).

The process of determining whether an undertaking may have an adverse effect requires the federal agency to confer with consulting parties in order to appropriately consider all relevant stakeholder concerns and values. Consultation regarding the treatment of a historic property may result in a Programmatic Agreement (PA) and/or Memorandum of Agreement (MOA) between consulting parties that typically include the lead federal agency, State Historic Preservation Officer (SHPO), and Native American tribes if they agree to be signatories to these documents. Treatment documents—whether resource-specific or generalized—provide guidance for resolving potential or realized adverse effects to known historic properties or to those that may be discovered during implementation of the undertaking. In all cases, avoidance of adverse effects to historic properties is the preferred treatment measure and it is generally the burden of the federal agency to demonstrate why avoidance may not be feasible. Avoidance of adverse effects may not be feasible if it would compromise the objectives of an undertaking that can be reasonably said to have public benefit. Other non-archaeological considerations about the benefit of an undertaking may also apply, resulting in the determination that avoidance is not feasible. In general, avoidance of adverse effects is most difficult when a permitted undertaking is being implemented, such as identification of an NRHP-eligible archaeological resource during earthmoving.

2.2 State

2.2.1 California Environmental Quality Act

The California Register of Historic Resources (Public Resources Code section 5020 et seq.)

In California, the term "historical resource" includes but is not limited to "any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California" (California Public Resources Code section 5020.1(j)). In 1992, the California legislature established CRHR "to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change" (California Public Resources Code section 5024.1(a)). A resource is eligible for listing in the CRHR if the State Historical Resources Commission determines that it is a significant resource and that it meets any of the following National Register of Historic Places (NRHP) criteria:

1. Associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. Associated with the lives of persons important in our past.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. Has yielded, or may be likely to yield, information important in prehistory or history.

(California Public Resources Code section 5024.1(c).) Resources less than 50 years old are not considered for listing in the CRHR, but may be considered if it can be demonstrated that sufficient time has passed to understand the historical importance of the resource (see 14 CCR, section 4852(d)(2)).

The CRHR protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources. The criteria for the CRHR are nearly identical to those for the NRHP, and properties listed or formally designated as eligible for listing on the NRHP are automatically listed on the CRHR, as are the state landmarks and points of interest. The CRHR also includes properties designated under local ordinances or identified through local historical resource surveys. The State Historic Preservation Officer maintains the CRHR.

2.2.1.1 Native American Historic Cultural Sites (California Public Resources Code section 5097 et seq.)

The Native American Historic Resources Protection Act (Public Resources Code section 5097, et seq.) addresses the disposition of Native American burials in archaeological sites and protects such remains from disturbance, vandalism, or inadvertent destruction; establishes procedures to be implemented if Native American skeletal remains are discovered during construction of a project; and establishes the NRHC to resolve disputes regarding the disposition of such remains. In addition, the Native American Historic Resource Protection Act makes it a misdemeanor punishable by up to 1 year in jail to deface or destroy an Indian historic or cultural site that is listed or may be eligible for listing in the CRHR.

2.2.1.2 California Native American Graves Protection and Repatriation Act

The California Native American Graves Protection and Repatriation Act (California Repatriation Act), enacted in 2001, requires all state agencies and museums that receive state funding and that have possession or control over collections of human remains or cultural items, as defined, to complete an inventory and summary of these remains and items on or before January 1, 2003, with certain exceptions. The California Repatriation Act also provides a process for the identification and repatriation of these items to the appropriate tribes.

2.2.1.3 California Environmental Quality Act Statues and Guidelines

As described further below, the following CEQA statutes and CEQA Guidelines are relevant to the analysis of archaeological and historic resources:

1. California Public Resources Code section 21083.2(g): Defines "unique archaeological resource."
2. California Public Resources Code section 21084.1 and CEQA Guidelines section 15064.5(a): Defines historical resources. In addition, CEQA Guidelines section 15064.5(b) defines the phrase "substantial adverse change in the significance of an historical resource. It also defines the circumstances when a project would materially impair the significance of a historical resource.
3. California Public Resources Code section 5097.98 and CEQA Guidelines section 15064.5(e): These statutes sets forth standards and steps to be employed following the accidental discovery of human remains in any location other than a dedicated ceremony.
4. California Public Resources Code sections 21083.2(b)-(c) and CEQA Guidelines section 15126.4: These statutes and regulations provide information regarding the mitigation

framework for archaeological and historic resources, including options of preservation-in-place mitigation measures; identifies preservation-in-place as the preferred manner of mitigating impacts to significant archaeological sites.

Under CEQA, a project may have a significant effect on the environment if it may cause "a substantial adverse change in the significance of an historical resource" (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(b)). An "historical resource" is any site listed or eligible for listing in the CRHR. The CRHR listing criteria are intended to examine whether the resource in question: (a) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (b) is associated with the lives of persons important in our past; (c) embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or (d) has yielded, or may be likely to yield, information important in pre-history or history.

The term "historical resource" also includes any site described in a local register of historic resources, or identified as significant in a historical resources survey (meeting the requirements of California Public Resources Code section 5024.1(q)).

CEQA also applies to "unique archaeological resources". Public Resources Code section 21083.2(g) defines a "unique archaeological resource" as any archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

In 2014, CEQA was amended to applies to "tribal culture resources" as well, but the amendment did not provide a definition for such resources or identify how they were to be evaluated or mitigated. (Pub.Res.Code §§ 21084.2 and 21084.3.) Instead, Public Resources Code section 21083.09 required that the Office of Planning and Resource develop and adopt guidelines for analyzing "tribal cultural resources" by July 1, 2016. As of the effective date of this Draft EIR, however, those guidelines have not been finalized or adopted. Consequently, this EIR addresses only historic resources and unique archaeological resources.

All historical resources and unique archaeological resources – as defined by statute – are presumed to be historically or culturally significant for purposes of CEQA (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(a)). The lead agency is not precluded from determining that a resource is a historical resource even if it does not fall within this presumption (California Public Resources Code section 21084.1; CEQA Guidelines section 15064.5(a)). A site or resource that does not meet the definition of "historical resource" or "unique archaeological resource" is not considered significant under CEQA and need not be analyzed further. (Public Resources Code section 21083.2(a); CEQA Guidelines section 15064.5(c)(4)).

Under CEQA and significant cultural impact results from a "substantial adverse change in the significance of an historical resource [including a unique archaeological resource]" due to the "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired" (CEQA Guidelines section 15064.5(b)(1); California Public Resources Code section 5020.1(q)). In turn, the significance of a historical resource is materially impaired when a project:

1. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register; or
2. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
3. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register as determined by a lead agency for purposes of CEQA.

CEQA Guidelines section 15064.5(b)(2).

Pursuant to these sections, the CEQA first evaluates evaluating whether a project site contains any "historical resources," then assesses whether that project will cause a substantial adverse change in the significance of a historical resource such that the resource's historical significance is materially impaired.

When a project significantly affects a unique archeological resources, CEQA imposes special mitigation requirements. Specifically, "[i]f it can be demonstrated that a project will cause damage to a unique archeological resource, the lead agency may require reasonable efforts to be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. Examples of that treatment, in no order of preference, may include, but are not limited to, any of the following:"

1. "Planning construction to avoid archeological sites."
2. "Deeding archeological sites into permanent conservation easements."
3. "Capping or covering archeological sites with a layer of soil before building on the sites."
4. "Planning parks, greenspace, or other open space to incorporate archeological sites."

Pub. Resources Code section 21083.2(b)(1)-(4).

If these "preservation in place" options are not feasible, mitigation may be accomplished through data recovery. (Pub.Res. Code § 21083.2(d); CEQA Guidelines § 15126.4(b)(3)(C).) Public Resources Code section 21083.2(d) states that "[e]xcavation as mitigation shall be restricted to those parts of the unique archeological resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archeological resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource, if this determination is documented in the environmental impact report."

These same requirements are set forth in slightly greater detail in CEQA Guidelines section 15126.4(b)(3), as follows:

(A) Preservation in place is the preferred manner of mitigating impacts to archeological sites. Preservation in place maintains the relationship between artifacts and the archeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site.

(B) Preservation in place may be accomplished by, but is not limited to, the following:

1. Planning construction to avoid archeological sites;
2. Incorporation of sites within parks, greenspace, or other open space;
3. Covering the archeological sites with a layer of chemically stable soil before building tennis courts, parking lots, or similar facilities on the site[; and]

4. Deeding the site into a permanent conservation easement.

(C) When data recovery through excavation is the only feasible mitigation, a data recovery plan, which makes provision for adequately recovering the scientifically consequential information from and about the historical resource, shall be prepared and adopted prior to any excavation being undertaken.

Note that, when conducting data recovery, "[i]f an artifact must be removed during project excavation or testing, curation may be an appropriate mitigation." (Ibid.) However, "[d]ata recovery shall not be required for an historical resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the archeological or historic resource, provided that determination is documented in the EIR and that the studies are deposited with the California Historical Resources Regional Information Center." (CEQA Guidelines section 15126.4(b)(3)(D).)

2.2.2 California Health and Safety Code

CEQA Guidelines section 15064.5 assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. As described below, these procedures are detailed in PRC section 5097.98.

California law protects Native American burials, skeletal remains, and associated grave goods, regardless of their antiquity, and provides for the sensitive treatment and disposition of those remains. Health and Safety Code section 7050.5 requires that if human remains are discovered in any place other than a dedicated cemetery, no further disturbance or excavation of the site or nearby area reasonably suspected to contain human remains shall occur until the County coroner has examined the remains (section 7050.5b). PRC Section 5097.98 also outlines the process to be followed in the event that remains are discovered. If the coroner determines or has reason to believe the remains are those of a Native American, the coroner must contact the Native American Heritage Commission (NAHC) within 24 hours (section 7050.5c). The NAHC will notify the Most Likely Descendant (MLD). With the permission of the landowner, the MLD may inspect the site of discovery. The inspection must be completed within 48 hours of notification of the MLD by the NAHC. The MLD may recommend means of treating or disposing of, with appropriate dignity, the human remains and items associated with Native Americans.

2.3 Local

2.3.1 Kern County General Plan

2.3.1.1 Kern County Land Use, Conservation, Open Space Element of the General Plan

Section 1.10.3 of the Land Use, Conservation, Open Space Element of the Kern County General Plan (General Plan) identifies the county's policy and implementation measures that guide the preservation of cultural resources in Kern County. These measures are provided below:

Policy 25.

The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.

Implementation Measure K.

Coordinate with the California State University, Bakersfield's Archaeology Inventory Center.

Implementation Measure L.

The County shall address archaeological and historical resources for discretionary projects in accordance with CEQA.

Implementation Measure M.

In areas of known paleontological resources, the County should address the preservation of these resources where feasible.

Implementation Measure N.

The County shall develop a list of Native American organizations and individuals who desire to be notified of proposed discretionary projects. This notification will be accomplished through the established procedures for discretionary projects and CEQA documents.

Implementation Measure O.

On a project specific basis, the County Planning Department shall evaluate the necessity for the involvement of a qualified Native American monitor for grading or other construction activities on discretionary projects that are subject to a CEQA document. (Kern County Planning Department 2009)

2.3.1.2 2.3.1.2 Kern County Energy Element of the General Plan

Section 5.4.7 of the Energy Element of the General Plan encourages development of transmission lines in urban areas to limit impacts, and identifies the following policies with respect to transmission line development:

1. The County should encourage the development and upgrading of transmission lines and associated facilities (e.g., substations) as needed to serve Kern County's residents and access the County's generating resources, insofar as transmission lines do not create significant environmental or public health and safety hazards.
2. The County shall review all proposed transmission lines and their alignments for conformity with the Land Use, Conservation, and Open Space Element of this General Plan.
3. In reviewing proposals for new transmission lines and/or capacity, the County should assert a preference for upgrade of existing lines and use of existing corridors where feasible.
4. The County should work with other agencies in establishing routes for proposed transmission lines.
5. The County should discourage the siting of above-ground transmission lines in visually sensitive areas.
6. The County should encourage new transmission lines to be sited/configured to avoid or minimize collision and electrocution hazards to raptors. (Kern County Planning Department 2009).

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3 PROJECT SETTING

The natural and cultural setting for Edwards AFB and the Mojave Desert in general has been extensively documented in several key monographs. Several research designs have also been completed for both general and specific research topics spanning the entire range of human occupation of the local area and general region.

Refer to the documents listed in Section 3.1 that contain detailed information on the natural and cultural setting, as well as broader research designs and interpretive summaries. These documents served as the primary source of information guiding this inventory and evaluation.

3.1 Key Source Documents

- Edwards AFB Integrated Cultural Resources Management Plan (Loechl et al. 2012)
- Standards and Procedures Manual for the Archaeological Data Center and Curatorial Functions of the Curation Facility at Edwards Air Force Base (Crosby 2010)
- Cultural Resources Overview and Management Plan for Edwards AFB, Volume 1, Overview of Prehistoric Cultural Resources (Earle et. al. 1997)
- Cultural Resources Overview and Management Plan for Edwards AFB, Volume 2, Overview of Historic Cultural Resources (Earle et. al. 1998)

In addition to the documents listed above any other relevant cultural resources investigation monographs were also obtained and reviewed. A complete list of references is located in the Section 7.

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4 RESEARCH METHODS AND DESIGN

4.1 Project Research Design

This research design was adapted from Hale et al. (2010) for a similar evaluation program that focused on a mixed set of prehistoric archaeological sites and historic period refuse deposits (HPRDs) in similar geologic settings. Minor revisions have been made to this research design to accommodate variation in site type and data potential. Archaeological sites evaluated as part of the Edwards Gentie study have much lower data potential those identified by Hale et al. (2010), and thus very little project-specific alterations to the research design are warranted.

Given that broader, base-wide research themes have been outlined in the recent EAFB ICRMP and in other associated documents (Earle 1997; Earle et al. 1997; Greene 2000), the following discussions will focus on themes pertinent to prehistoric and historical resources. Relevant overviews (Budinger and Spinney 2004; Computer Sciences Corporation 2001; McGetrick et al. 2002, McGetrick et al. 2003), as well as other project-specific reports, were consulted as necessary regarding research issues. Clearly, this research design relies heavily on the volume of archaeological literature from Edwards AFB given the proximity of the current Edwards Gentie alignment to the installation, and association with the proposed Edwards Solar energy generation facility onboard.

4.1.1 Prehistoric Archaeological Sites

4.1.1.1 Kern County Energy Element of the General Plan Early and Middle Holocene Occupations in the Antelope Valley

Early and middle Holocene occupations on EAFB are largely inferred from small numbers of time sensitive artifacts. However, results of previous research in and around the Bissell Basin (Giambastiani and Basgall 2000; Giambastiani et al. 2007) and around Rosamond Dry Lake (Basgall and Overly 2004) indicate that sites dating to the Lake Mohave (10,000-7000 B.P.) and Pinto (7000-4000 B.P.) period are present on the installation. Although the ages and nature of such occupations continue to be debated, the artifact deposits that were left behind are normally sparse, dominated by flaked stone tools and debris that were manufactured from a wide variety of lithic materials. These occupations represent short-term camps by groups of highly mobile hunter-gatherers taking advantage of seasonal resource abundances that were encountered during long-distance settlement shifts. In general, sites of Lake Mohave age are rare at EAFB, although Holmes (2004) and Budinger and Spinney (2004) note that eight sites on Edwards AFB have yielded Lake Mohave and/or Silver Lake points. Indeed, a recent evaluation at EAFB-2290, a site that extends more than 4 kilometers (km) along the eastern shoreline of Rosamond Dry Lake and contains multiple depositional loci, identified six Lake Mohave points and one Silver Lake point (Basgall and Overly 2004). The points were obtained from several disparate locations across the site, but most Lake Mohave specimens were found in association with flaked stone assemblages that contained crescents, bifaces, retouched flakes, and debitage. Other sites in the vicinity noted by Holmes (2004) and Budinger and Spinney (2004) manifest similar lithic assemblages.

McGetrick et al. (2003:Table 9) report 15 projectile points from another part of Edwards AFB: three Lake Mojave points, two Silver Lake, three Pinto, two Elko, one Cottonwood arrow point, and four non-diagnostic points. More than half of these points date to the early and middle Holocene (Lake Mojave, Silver Lake, and Pinto). The presence of the older point forms is not unexpected given that old Quaternary landforms characterize surface deposits in the area (see McGetrick et al. 2003). Additional evidence for early and middle Holocene occupations comes from obsidian hydration readings on Coso obsidian. McGetrick et al. (2003:Table 8, Figure 7) report 40 obsidian hydration readings with a rind of 7.1 microns or greater, consistent with Pinto and older occupations (see Hale et al. 2009). Within this sample, 16 specimens have hydration rinds greater than 10.1, implying Silver Lake, Lake Mojave, and possibly earlier occupations.

In another study, McGetrick et al. (2002:Table 15, Figure 7) report 193 obsidian hydration readings (essentially all Coso obsidian) that are greater than 7.1 microns—i.e., Pinto-age or older. More than one quarter ($n = 51$) of these specimens have hydration readings of 10.1 microns or greater, implying Silver Lake or Lake Mojave occupations. In addition, of the 231 projectile points, 54 may date to the Lake Mojave period (including six Silver Lake points and four as Great Basined Stemmed points). Nineteen others are ascribed to the Pinto period (see McGetrick et al. 2002:Table 17). Thus, taken together, chronometric data from across the installation show ample evidence of early and middle Holocene occupation. The nature of these occupations on the installation is less understood, however, given the low proportion of datable habitation sites in relation to lithic deposits and other low density sites.

Considering just Pinto period sites, the long-standing notion that such deposits are relatively few and far between in the Antelope Valley (e.g., Earle et al. 1997; Sutton 1988, 1993) is gradually being eliminated from contemporary overviews of EAFB prehistory (Greene 2000; Horne and McDougall 2005; Loechl et al. 2002). At least 11 sites have yielded Pinto points, and Greene (2000:163) noted that “Pinto sites are concentrated on the west shore of Rosamond Dry Lake.” Although some (e.g., Byrd 1996) have maintained that the lack of radiocarbon dates of Pinto age at EAFB continues to limit evidence for such occupations, the composite of obsidian hydration data from the base clearly indicates a substantial Pinto presence (Basgall and Overly 2004; Giambastiani and Basgall 2000). Indeed, hydration composites presented by Basgall and Overly (2004:61) indicate a peak in obsidian discard during the Pinto period. Horne and McDougall (2005) have noted the recovery of a Pinto point from EAFB-313 on the southern side of Rogers

Dry Lake (EAFB-313), but appear to have misclassified a Pinto point as a Humboldt form at EAFB-380 on the northeastern side of the lake, and have claimed Pinto-age obsidian hydration measurements from EAFB-894 and EAFB-2118, which are also located northeast of Rogers Dry Lake. As previously discussed regarding early and middle Holocene obsidian hydration readings, obsidian use is quite robust during Pinto times.

In general, Pinto lithic assemblages are similar to Lake Mohave assemblages, being composed of bifaces, retouched flakes, and debitage, but with increasing and regular numbers of millingstones and handstones. Flaked stone assemblages are usually represented by a wide variety of lithic types. Volcanic stones, such as basalt, rhyolite, and felsite, and other tough materials like quartz, were evidently preferred for use in manufacturing projectile points and bifaces. Rhyolite in particular seems to have been important to Pinto technology in the Antelope Valley, so much so that Glennan (1970, 1971) proposed a "Rhyolite Tradition" that was central to Pinto-age adaptations. Undoubtedly, the abundance of toolstone-quality rhyolite at EAFB, particularly in the western half of the base, was a key factor promoting its frequent and preferential use during Pinto times.

As for milling tools, Loechl et al. (2002:III-8H) pointed out that ground stone artifacts appear to be relatively scarce at Pinto sites found in the western Mojave Desert as compared to sites in the eastern Mojave. Evidence for this is meager at best. In fact, data from Fort Irwin (Basgall 1993; Basgall and Hall 1993, 1994a), Twentynine Palms (Basgall and Giambastiani 2000; Basgall et al. 2002; Hall 2002), and EAFB (Giambastiani and Basgall 2000) show that Pinto sites situated outside of the eastern Mojave do contain substantial amounts of milling equipment. At the Goldstone site in particular (located at Fort Irwin), no less than 191 milling stones and 36 hand stones were recovered from eight habitation loci dating primarily to the Pinto period (Basgall and Hall 1994a). In a summary of Fort Irwin milling technology, Basgall and Hall (1994b) also suggested that Pinto assemblages contain a greater ratio of milling tools to flaked stone tools (1:4) than those of any other time period. It is not clear yet whether this pattern is evident at Pinto sites aboard EAFB. It is likely that at least some of the numerous large habitation sites situated along the shorelines of Rosamond and Rogers lakes contain datable Pinto age deposits, but test excavations have not been focused at these encampments.

4.1.1.2 Late Holocene Occupations at Edwards AFB in the Antelope Valley

On the opposite end of the temporal spectrum, late Holocene sites, especially those that postdate 1500 B.P. are quite common throughout the western Mojave, in Antelope Valley (Robinson 1987; Sutton 1988, 1993), Fremont Valley (Sutton 1991), and especially at EAFB (Alcock and Torres 1995; Bupp et al. 1998; Byrd 1996; Byrd et al. 1994; Giambastiani and Basgall 1999; Taşkiran et al. 1997; Titus et al. 1997). Some late prehistoric sites at EAFB are actually composed of multiple activity loci and artifact concentrations. For example, nine sites examined by Byrd (1996) west of Rogers Dry Lake consisted of some 39 individual loci. In the southern part of Rogers Lake, Taşkiran et al. (1997) identified 16 loci at site LAN-863; seven were tested, at least half of which are undoubtedly late Holocene manifestations. Elsewhere, two sites located in the Farm Drop Zone, LAN-1158 and LAN-1296, contain 11 loci altogether (Gross 1990), and KER-1922 at Buckhorn Springs contains 36 separate loci (Bupp et al. 1998). Many loci at late Holocene sites show considerable functional variation, with assemblages that demonstrate a focus on milling activities or stoneworking (and sometimes both) or with the presence of a light midden (Byrd 1996; Byrd et al. 1994; Taşkiran et al. 1997). Other late Holocene sites, including many with single components, are clustered around dry lakebeds, at major springs, and in upland areas where rock outcrops suitable for milling are present (Basgall and Overly 2004; Bupp et al. 1998; Byrd 1996; Byrd et al. 1994; Johnson et al. 1996). Still others are small lithic deposits left over from opportunistic lithic manufacturing or individual roasting pits; these are quite common throughout the installation (Giambastiani et al. 2006; Hale et al. 2009).

Late Holocene campsites appear to be abundant around Rogers Dry Lake (Byrd 1996; Byrd et al. 1994; Giambastiani et al. 2006; Horne and McDougall 2005; Pritchard-Parker and Puckett 2002; Pritchard-Parker et al. 1999). Numerous short-term encampments are distributed at varying distances from the current, contiguous playa shoreline, their locations presumed to reflect horizontal shifts in the lake margin and/or the former presence of temporary but productive habitats alongside interior pans and drainages. Added to the fact that many late Holocene sites contain multiple components, the late prehistoric record around Rogers Dry Lake is one that was likely generated by the regular use of lakeshore areas during seasonal abundances of plant and animal resources. This land-use pattern appears to have started sometime during the Gypsum period (4000-1500 B.P.) but peaked after 1500 B.P. Byrd et al. (1994) noted the relative dearth of known Gypsum period sites at EAFB beyond Rogers Dry Lake, citing KER-526 as evidence of an early Gypsum logistical settlement where two phases of occupation document repeated use over an extended period of time. This site is comparable to others in the area (e.g., EAFB-310; Giambastiani et al. 2008); as a group, such deposits testify to a strategy of regional settlement mobility that was perhaps tethered to fluctuations in resource productivity along the margins of the lake.

Also of interest is evidence in site assemblages for long-distance trade and/or mobility during late Holocene times. Various marine shell beads and other fragments of marine shell are common at many sites, with represented taxa including the olive snail (*Olivella biplicata*), Pismo clam (*Tivela stultorum*), abalone (*Haliotis* spp.), cockles (*Clinocardium nutallii*, *Laevicardium elatum*), and mussel (*Mytilus* spp.). Obsidian artifacts from project sites derive exclusively from the Coso Volcanic Field in eastern California, attesting to regular contact with areas to the north. The presence of many different cryptocrystalline (chert) and rhyolite materials in site assemblages (Byrd et al. 1994) reflects a sphere of local toolstone procurement that extended up to 50 km from the eastern shore of Rogers Dry Lake. The regular occurrence of these artifacts in late Holocene sites at EAFB affords much promise for reconstructions of post-Gypsum settlement adaptations and patterns of residential mobility in the Antelope Valley.

The apparent drop in obsidian use on EAFB, implied by a decline in hydration rim readings that postdate the arrival of the bow and arrow after about 1500 B.P., is not well understood. Given the strong presence of Coso obsidian on EAFB throughout the Holocene, it is perplexing that such a quality toolstone material would be supplanted by lower quality local raw materials. It may be that the small size of most arrow points recovered in the Mojave requires much smaller raw material masses than darts, with arrow points able to be manufactured from small, non-uniform flakes (see Basgall and Giambastiani 1999, Yohe 1993). This being true, local cherts, basalts, and other materials may have been just as suitable for arrow point manufacture, especially if it avoided some possible costs associated with procuring Coso obsidian. Another contributing factor may be that the increased average success of hunters using bow and arrow technology resulted in smaller foraging radii overall, thereby decreasing annual ranges and direct access to Coso obsidian (see also Delacorte 1990). Recently, Bark (2017) sampled obsidian artifacts for sourcing and hydration analysis from multiple curated collections across Edwards AFB, finding no apparent gap in obsidian hydration readings. Bark (2017) concluded that sampling bias created a false impression of hunter-gatherer obsidian use over time and emphasized broader sampling over theoretical exploration. It remains to be seen whether Bark's (2017) study applies to a broader region than just that surrounding Edwards AFB; that is, whether or not decrease in access to Coso obsidian actually occurred in the Mojave Desert.

Finally, the effects of environmental change on prehistoric adaptations are not well understood. Gardner (2007) presented a strong case for environmental sensitivity of Mojave Desert populations, suggesting that several punctuated droughts between 1200 and 650 B.P. were sufficient to generate socioeconomic change among western Mojave aboriginal groups. Drawing on an extensive database of well-dated deposits, several technological and social shifts appear to be strongly correlated with these environmental shifts. In particular, rather than abandoning desert environments, populations intensified the exploitation of higher-cost resources and were subsequently able to support larger aggregates of people.

4.2 Historic Chronology and Refuse Disposal

Issues regarding the chronology of historical resources involve different and typically more robust datasets than for prehistoric resources, given the availability of various forms of documentation, the commonality of certain time-sensitive artifacts, and the relative ease with which such artifacts can be ascribed an age. Moreover, questions regarding the chronology and deposition of refuse deposits can be applied to various other kinds of historical archaeological sites, given that homesites and other such resources are typically dated by refuse (EAFB 2010:C-16). Refuse deposits can also be good indicators of financial disposition, etc. The Antelope Valley witnessed various waves of settlement in the first half of the 1900's motivated by different factors, such as the availability of water (or lack thereof), transportation routes, access to supplies, etc. These waves of settlement have been thoroughly documented (see EAFB 2010; Pucket and Peyton 2008; Tetra Tech and Jones and Stokes 2004). Early settlements in the late 1800's and early 1900's were negatively affected by fluctuations in the availability of water. The next wave of settlement was truncated by the Great Depression, causing many homesteads and land patent claims to fail. Large scale regional influences, such as environment and economy, had profound effects at the household level in the Antelope Valley and creative solutions were often sought by individuals struggling for success in the Mojave Desert. Examples of such creativity include homesteaders turning to mining or mining labor, or a turn to dry-farming. Another good example is the success of illegal distilleries operating in the Antelope Valley during the Prohibition era. The relatively rich historical record provides an opportunity to understand ordinary historic period refuse deposits in a greater regional context, provided they contain sufficient data. While the composition of refuse deposits generally points to household consumption, spatial patterning of these sites across the landscape can inform on both local and non-local refuse disposal.

Despite the richness of the historical record, it is difficult to associate historic period refuse deposits to specific individuals, homesteads, land patent claims, or desert land entries because of the general lack of artifacts or features that are personalized, or that are noted in documents (see Parker 2004; Tetra Tech and Jones and Stokes 2004). As a result, the main challenge with refuse deposits is to assess the earliest possible date for deposition (based on the latest artifact for single dump points), and to determine if the location of the deposit is meaningfully associated with nearby homesites or land claims. Such information gives more interpretive potential to the assemblage in terms of composition. These kinds of data are relevant when considering changes in patterns of refuse disposal over time and whether there are differences in disposal between the different waves of settlement. In particular, if certain refuse deposits are not associated with homesites in their immediate vicinity, what motivated individuals to dispose of refuse in that particular location? More generally, what were the primary factors used to select areas for refuse disposal (i.e., ease of access, concealment, removal of waste to distant locations)? Certainly, introduction and widespread use of automobiles affected refuse disposal patterns as individuals were better able to travel greater distances to remove rubbish from homesites. The automobile probably factored large along the west shore of Rosamond Lake where individuals seeking to avoid refuse disposal fees at the municipal landfill transported rubbish to relatively distant locations (see Giambastiani et al. 2006). For the current study, emphasis is placed on the few historic period refuse deposits that could not be avoided; unfortunately, none of these are associated with notable homesite or land patent claims and none embody a level of diversity that could enable detailed investigation.

4.3 Site-Specific Research Questions

Beyond the broader topics already touched on, evaluation data can be used to address a range of questions specific to individual sites. Many such questions can be divided into several main themes that are relevant to prehistoric and/or historic archaeological sites.

4.3.1 Chronology

Judging by the size and diversity of their assemblages, both of the prehistoric sites tested during the current project appear to represent relatively short-term occupations. Chronological indicators were provisional, limited to inferences about technological attributes, and perhaps evidence of artifact weathering; though a few radiocarbon dates were obtained but have not been processed yet. Evaluated historical sites (all refuse deposits) contain artifacts that together represent broad time frames indicating the dump events were composed of materials from mixed occupations. Because chronological controls are essential to any archaeological investigation, it is important to ask a few basic questions concerning the temporal data potential of evaluated sites:

- Can the chronological placement of project sites be determined with Phase I or II data?
- What kinds of chronometric data can project sites provide? Of those obtained during survey and testing, how well do they correlate in terms of the age estimates they provide (e.g., projectile point types versus obsidian hydration dates)?
- Are there data indicating the presence of multiple occupation episodes at project sites?
- Do marker artifacts appear to fit with temporal patterns recognized in the region? Are there any unique diagnostic items present?
- Can chronometric data from project sites help to refine local dating schemes?

4.3.2 Technology, Subsistence, and Settlement Organization

In examining prehistoric sites, the study of lithic technologies (flaked and ground stone) often provides clues to the placement of sites within associated subsistence-settlement regimes and offers insight to the various functions and emphases of site occupations. At historical sites, the kinds of artifacts present, the activities they represent, and their overall proportions can give some indication of where refuse originated, by whom it was generated, and why it was abandoned at its place of discard. Among many others, the following questions apply:

- What kinds of manufacturing and tool use activities are represented at the prehistoric sites in the project area?
- What can be inferred from the composition of lithic assemblages about the kinds of resources and habitats exploited by the site inhabitants?
- Do observed lithic technologies at prehistoric sites have any implications for residential mobility and settlement ranges? What does the lithic material profile indicate about the source origins and how raw materials might have arrived at the project sites?
- What is the nature of refuse at historic sites? Are proportions of consumptive, household, industrial, and other artifacts substantial enough to derive context of origin(s)?
- Are any maker's marks on historical artifacts indicative of specific places of manufacture? Do they provide any information about where particular goods might have been purchased or otherwise obtained?

4.3.3 Structure and Integrity of Cultural Deposits

Data bearing on the temporal and physical integrity of project sites are critical to assessments of significance, data potential, and management needs. The degree to which temporally discrete components remain, in accordance with their structural integrity, must be considered in making recommendations for future investigations and/or resource protection. To the extent that site integrity enhances or devalues the interpretive potential of a cultural deposit, it may contribute to or detract from its scientific value:

- Do inclusive chronometric data from the project sites permit the identification and definition of temporally and/or spatially discrete prehistoric occupations or historic dumps?
- Are the definitions of discrete components supported by multiple, independent chronological controls, and if so, how similar are their age estimates?
- Is there substantial evidence of occupational "overprinting"? How has this affected the temporal integrity of habitation components or refuse deposits?

4.4 Inventory Methods

Dudek reviewed the previous survey work and associated reports completed in the APE, and conducted an intensive-level pedestrian survey of the five gen-tie connection options (North–South Gen-Tie Route Option 1, North–South Gen-Tie Route Option 2, East-West Gen-Tie Route Option 1-A and East-West Gen-Tie Route Option 1-B). North–South Gen-Tie Route Options 1 and 2. The East-West Gen-Tie Route was shown to be recently surveyed, so resources along the alignment were spot-checked. Although North–South Gen-tie Route Option 3 is no longer under consideration, the results of the investigation are included for the purpose of providing a complete cultural inventory for the proposed project.

4.4.1 Background Research

On April 21 and May 15, 2017, Dudek completed a search of the California Historical Resources Information System (CHRIS) at the Southern San Joaquin Valley Information Center (SSJVIC), located on the campus of California State University, Bakersfield. This search included mapped prehistoric, historical, and built-environment resources; Department of Parks and Recreation (DPR) site records; technical reports; archival resources; and ethnographic references. Additional consulted sources included historical maps of the project site, the NRHP, the CRHR, the California Historic Property Data File, and the lists of California State Historical Landmarks, California Points of Historical Interest, and the Archaeological Determinations of Eligibility.

4.4.2 Cultural Resources Pedestrian Survey

Dudek Archaeologists conducted the intensive-level pedestrian survey in February and November, 2017 using standard archaeological procedures and techniques. All field practices met the Secretary of Interior's standards and guidelines for a cultural resources inventory. The intensive-level survey methods consisted of a pedestrian survey conducted in parallel transects spaced no more than 15 meters apart over the entire project site. Deviations from transects only occurred in areas containing steep slopes, dense vegetation, or impassible natural features. Within each transect, the ground surface was examined for prehistoric artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools, ceramics, fire- affected rock), soil discoloration that might indicate the presence of a cultural midden, soil depressions, features indicative of the current or former presence of structures or buildings (e.g., standing exterior walls, post holes, foundations), and historic artifacts (e.g., metal, glass, ceramics, building materials). Ground disturbances such as burrows, cut banks, and drainages were also visually inspected for exposed subsurface materials. No artifacts were collected during the surveys.

Where cultural materials were encountered, Dudek collected all data necessary to complete the appropriate State of California DPR 523 series forms. Following California Office of Historic Preservation (OHP) guidelines, any cultural material more than 45 years old was recorded as an archaeological site, built environment resource, or isolate, as appropriate. All fieldwork was documented using field notes and iPad technology with close-scale field maps, and aerial photographs. Location-specific photographs were taken using an Apple 3rd Generation IPad equipped with 8 mega-pixel (MP) resolution and georeferenced PDF maps of the project site. Accuracy of this device ranged between 3 and 10 meters. All field notes, photographs, and records related to the current study are on file at Dudek's Pasadena, California office. These locations are presented in confidential Appendix A. Groups of three (3) or more artifacts in a 50-meter diameter area, as well as any solitary fence posts or other such markers, isolated hearths, rock cairns, rock rings, rock alignments, trails, rock art, bedrock milling features, and whole millingstones, were classified as prehistoric or historic period sites. Finds of one or two artifacts were recorded as isolates. Sites were classified according to the site type definitions contained in Appendix P of the Operations Manual. However, not all site types were identified during the inventory. Generally, archaeological sites within the study area include non-military historic period sites (refuse deposits, homesites, agricultural features, ranching features, mining-related sites, and other miscellaneous types), historic period military sites (aircraft crash sites, targets, encampments, non-aboriginal human remains, and other types), and prehistoric sites (temporary camps, lithic deposits, ceramic deposits, individual features such as cairns, and cremated human remains).

Sites and isolates were given temporary field numbers using the prefix “SS” along with the designation “S” for site and “I” for isolate. The numbering system is continuous for the archaeological sites and isolates, with assignment of field numbers as the survey progressed. Finds of one or two artifacts were recorded as isolates.

Following fieldwork, DPR 523 series forms were prepared for all newly recorded resources, including primary record, archaeological site record, location map, sketch map forms, and additional forms as needed. All completed DPR forms are presented herein as Appendix B. DPR forms for all newly recorded archaeological resources will be submitted to the SSJVIC, which will issue primary numbers for all newly recorded resources and trinomials for all newly recorded archaeological sites.

4.5 Evaluation Methods

Where archaeological sites were identified that could not be avoided through project design changes or other means, archaeological significance evaluation was completed to understand the significance of the impacted resources under CEQA and Section 106, and to provide appropriate management recommendations for further treatment. Site testing was completed from February 26 through March 2, 2018.

Evaluation methods were designed to be consistent with the goals and directives for fieldwork outlined in the EAFB ICRMP, which are also applicable to the overall Edwards Gentie project (EAFB 2009). The primary goal of field and analytical methods in the ICRMP is to generate data relevant for evaluating historical significance and eligibility for NRHP listing of prehistoric and historic cultural resources. Notwithstanding modifications of terminology to suit the ICRMP, the field and lab methods have been developed and honed over decades of study in the Mojave Desert (see Basgall 1993; Basgall and Giambastiani 2000; Giambastiani and Basgall 1999; Hall 1993, McGuire and Hall 1988). In general, the methods derive from prehistoric research but the theoretical underpinnings are flexible enough to have been adapted for historic site evaluation. A heavy emphasis on surface inventories—also echoed in the ICRMP—is well suited to desert cultural deposits that are commonly aggregated in surface or near-surface contexts due to prolonged or accelerated erosion. Subsurface methods—while standard practice for NRHP evaluations—were designed to accommodate the range of depositional variability that can be encountered in desert contexts. In all, the methods employed herein achieved data requirements for CRHR and NRHP evaluations while affording a kind of flexibility that allowed for reactionary allocation of field effort to maximize data potential of unanticipated deposits or assemblage constituents.

Within the confines of available field methodologies, none were necessarily excluded as possibilities for use at historic period sites. However, in keeping with the evaluation by Hale et al. (2010), fieldwork levels for evaluated HPRDs were limited to surface analysis and the collection of unique diagnostic artifacts. Excavations at HPRDs were limited to sites with the potential for buried deposits, or that appeared to have overlapping dumping episodes. HPRDs were sparse accumulations of historic debris with limited diversity and little to no potential for subsurface deposits. More intensive excavations would have generated redundant data and would not likely have discovered unique artifacts or changed significance evaluations. The surface analysis focused on recording morphology, condition, technology, and function of each artifact class. Interpretations of the analytical data derived from a functional perspective; one that considered the economics of consumption through patterns of artifact discard. This is not dissimilar to the interpretation of prehistoric artifacts, keeping in mind the idea that socioeconomic adaptation was built on utilitarian technologies.

The basic laboratory and analytical methods used to treat project site collections include post-field processing, cataloging, standard artifact analysis, artifact-specific analysis, and special studies. The analysis of historical artifacts was directed toward placing artifacts into broad functional and temporal classes. This was accomplished using classificatory and dating schemes contained in the Intermountain Antiquities Computer System (IMACS) handbook and in various other references concerning the identification, manufacture, and dating of historical artifacts (e.g., Fike 1987; Godden 1964; Newman 1970; Rock 1987; Toulouse 1971; Wilson and Wilson 1968). Bottle websites (such as that of BLM) and other online resources were also used to identify maker's marks and manufacturing styles. While artifact recovery generally focused on the collection of diagnostic items, other small refuse such as glass, nails, and ceramics was recovered, identified, classified, and analyzed either individually or in batches as deemed appropriate. Such bulk refuse was not curated unless it represented a unique artifact class.

Upon arriving at each tested site, the first task was to relocate the site datum in order to confirm that survey crews were on the correct site, and to relocate any items, deposits, or features identified during survey. Next, a systematic surface inspection was performed to relocate artifacts and features identified during the survey and to delineate site boundaries. This was completed by a thorough traverse of the site and by marking artifacts and features with pin-flags. Formed artifacts (e.g., flaked and ground stone tools, pottery, beads) were double flagged with a blue flag; unmodified flakes were flagged with single flags of any color other than blue. Any concentrations of artifacts or features were triple-flagged in multiple colors. Pin-flags were also used to denote the edges of lithic concentrations and occupational loci within site boundaries.

Once a prehistoric site was adequately flagged, it was subjected to some form of surface collection and/or inspection. Sites containing some minimum density of surface artifacts in a concentrated area were sampled with Controlled Surface Collection (CSC) units; also known as Surface Recovery Units (SRUs) on Edwards AFB. The minimum size of a CSC collection cell is 5-x-5-m; additional or adjacent cells were typically labeled with a letter (i.e., A, B, etc.) under the same CSC number while Discontiguous cells were given a new CSC number. CSCs are flexible units, allowing for detailed mapping, or collection depending on field conditions and constraints. Controlled inventory using CSCs was intended to supplement the collection of all artifacts located outside these units. Where artifact densities were too low to warrant a CSC, situations, general “grab sample” collections were made to supplement individually collected piece plots. Grab samples are simply general surface collections that do not record individual artifact provenience. Given the nature of both evaluated prehistoric sites, the number of CSCs was low, as were the numbers of collected artifacts in general.

Excavations generally proceeded in two stages. First, where cultural deposits were expected to have at least moderate depth, a series of exploratory shovel test pits (STPs) was allocated to better gauge the horizontal extent of buried deposits, to identify any zones of artifact density, and to expose and compare depositional strata across and between sites. From one to a few of these units, each measuring .5-x-.25-m in size, were allocated according to the size of each site, the presence of sedimentary depth, and overall artifact yields. All STPs were excavated in arbitrary 20-cm levels to minimum depths of 60 cm, or until culturally sterile strata were encountered. STPs were also used to test sites boundaries providing a better understanding of subsurface distribution from a management perspective. Where STPs showed the presence of relatively dense artifact deposits, standard Test Units (TUs) were excavated adjacent to or near productive STPs in order to continue investigations in those areas. These were 1-x-.5-m units, excavated in arbitrary 10-cm levels, to depths varying between 10 and 120 cm, depending on rates of artifact recovery. At sites where cultural deposits were obviously surficial, larger surface scrape units (SSUs) measuring anywhere from 1-x-1 to 2-x-2-m in size were excavated in order to augment artifact recovery by removing greater volumes of shallow cultural matrix. All excavated deposit soils, regardless of unit size or depth, was screened through 1/8-in. (3 mm) mesh. Typically, most of the excavated sites were terminated between 20 and 40 cm below the ground surface, when either a hard-pan surface or a calcareous B-horizon was encountered. Unit sidewall profiles were drawn and photographed where appropriate, with small soil samples being taken for Munsell color comparisons and constituent classification. All recovered cultural materials were collected and returned to the Dudek laboratory for processing and analysis.

Each site was also mapped using a Trimble Pathfinder GPS receiver to plot all formed artifacts, surface collection units, excavation units, and the boundaries of any defined loci and features. GPS was also used to record site boundaries, landform edges, drainages, roads, and areas demonstrating civilian impacts. In addition to mapping, a series of overview photographs was taken to show the site landscape setting. Detail photographs were also taken of features or other site attributes when appropriate.

Historic period refuse deposits were evaluated with a mixed approach. As was obvious from the geologic setting, historic period sites lacked subsurface deposits and have small to moderate quantities of redundant surface artifacts, often occurring as singular, well-defined artifact concentrations. The extensive collection of these artifacts was neither desirable nor necessary, and in-field recording was used instead to recover functional and temporal data from surface scatters. In rare circumstances, the excavation of an STP was required to determine the presence of buried artifacts from possible overlapping dump events. The limited nature and obvious geologic setting at the current set of historic sites warranted reduced levels of work similar to those evaluated by Hale et al. (2009), but unlike evaluation programs by Giambastiani et al. (2007, 2008).

CSCs were not used at HPRDs because they would generate too many items of a redundant nature. For this reason, surface collections at historical sites were limited to piece-plot recovery. It was also possible to obtain needed functional and temporal data through detailed surface inventories for glass, cans, ceramics, and other kinds of artifacts. These inventories included the documentation of legible maker's marks, counts of specific artifact types, and functional assessments where warranted.

As for excavation procedures, STPs were rarely used at historical sites because they were all sparse, surficial artifact deposits. One reason for this is because most historical refuse deposits are relatively rich in surface artifacts, particularly small constituents like glass shards, nails, wood, bits of metal, charcoal, and other similar remains. In most cases, surface inventories and piece plot collection sufficed. Where excavation was necessary, only STPs were needed to test for buried materials not evident on the surface. For the most part, the use of in-field inventories reduced the overall need for artifact recovery, in that many items (like cans) were of the same manufacturing type and age and others (like glass shards) provide comparatively few data by themselves.

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5 RESULTS

5.1 Inventory Results

5.1.1 Background Research

5.1.1.1 Previously Conducted Cultural Resource Studies

The SSJVIC records indicate that between 1977 and 2013, 29 previous cultural resources technical investigations have been conducted that are within, immediately adjacent to, or cross the APE (Confidential Appendix C). Of these 29, nine previous studies have been completed since 2010 (KE-3777, -4247, -4159, -4260, -4276, -4359, -4633, -4648, and -4649). Two of these (KE-04276 and -04359) overlap the northwest third of North–South Gen-Tie Route Option 3 while the remaining seven (KE-3777, -4247, -4159, -4260, -4633, -4648, and -4649) intersect, or overlap, the East-West Gen-Tie Route (Options 1-A and 1-B). All 29 technical investigations are summarized in Table 3.

Table 3
Previous Technical Studies Within the Project APE

Report Number (KE-)	Authors	Date	Title	APE Component
KE-00276	Robinson, R. W.	1977	A Cultural Resources investigation associated with the Mojave Public Utility District's Sewage Treatment Facility	North-South (N-S) Option 1
KE-00423	Garfinkel, Alan P. and Kerbavaz, Joanne	1983	Negative archaeological survey report DOT- 09-KER-14, PM 12.6/16.1, Charge Unit 09-201, EA 204-300	East-West (E-W) and N-S Option 3*
KE-00888	Proctor, Martha and Edell, Jack	1986	Negative Archaeological Survey Report for Widening Route 14 from P.M. 12.6 to 16.1- Also Water Line Easement	E-W and N-S Option 3*
KE-01769	Weigel, Lawrence E., McManus, James, and Schuster, Terry	1986	Negative Archaeological Survey Report for Soil Removal	N-S Option 2
KE-01278	Schiffman, Robert A.	1987	Archaeological Investigation for Sea West's 427 Acre Wind Energy Farm Along Oak Creek Pass Road, Kern County, California	E-W
KE-00804	Parr, Robert E.	1989	Archaeological Assessment of a Proposed Residential and Commercial Center Near the City of Mojave, Kern County, California	N-S Option 1 and N-S Option 2
KE-00013	Schiffman, Robert A.	1990	Archaeological Investigation of Parcel Map #9486 and Parcel Map #9271 Section I, Township 10N, Range 12W. Kern County, California	N-S Option 1

Table 3
Previous Technical Studies Within the Project APE

Report Number (KE-)	Authors	Date	Title	APE Component
KE-00470	Hanna, David C. and Cheever, Dayle M.	1990	An Archaeological Survey of the Camelot Specific Plan Amendment, a 160-Acre Property in Mojave, Kern County, California	E-W
KE-00633	Macko, Michael E., Binning, Jeanne D., Earle, David D., and Langenwalter, Paul E.	1993	National Register Eligibility Determinations for Historic Resources Along the Proposed AT&T Lightguide System, Victorville to Bakersfield, California	E-W
KE-01028	Unknown	1996	Cultural Resources Investigation Pacific Pipeline Emidio Route (Including West Liebre Gulch Ridge Alignment and Mojave Alternatives) L.A. and Kern Counties, CA	E-W and N-S Option 3*
KE-01902	Whitley, David S. and Simon, Joseph M.	1996	Phase II Test Excavations and Determinations of Significance at CA-KER- 4693H and -4695H, Soledad Mountain, Mojave, Kern County, California	N-S Option 3*
KE-02323	Demos-Petropoulous, Francine, McGowan, Dana, Scott, Barry, O'Brien, Teresa, Norton, Bill, and Rause, Wendy	1999	Cultural Resources Inventory Report for the AT&T Corp. Cable Upgrade Project, Los Angeles, Kern, and San Luis Obispo Counties, California	N-S Option 1
KE-02678	Schiffman, Robert A.	2002	Archaeological Investigation for Parcel Map No. 10787, Kern County, California	N-S Option 2
KE-03085	Fleagle, Dorothy	2005	A Cultural Resources Assessment for Approximately 500 Acres for the Mojave/Rosamond Sanitary Landfill Addition Northeast of the Existing Landfill, South of Mojave, Kern County, California	N-S Option 1
KE-03387	Schiffman, Robert A. and Gold, Alan P.	2006	Cultural Resource Survey for a 310 Acre Parcel Near the Intersection of Purdy Avenue and United Street Near the City of Mojave, Eastern Kern County, California	E-W
KE-03387	Schiffman, Robert A. and Gold, Alan P.	2006	Cultural Resource Survey for a 310 Acre Parcel Near the Intersection of Purdy Avenue and United Street Near the City of Mojave, Eastern Kern County, California	N-S Option 2
KE-03534	Nilsson, Elena, Bevill, Russel, Kelly, Michael S., and Dwyer, Erin	2006	Archaeological Inventory of the First and Second Los Angeles Aqueducts and Selected Access Roads, Kern, Inyo, and Los Angeles Counties, CA	E-W
KE-03490	Hudlow, Scott M.	2007	A Phase I Cultural Resource Survey for AERO Energy Wind Power Project, Application 4, Kern County, California	E-W

Table 3
Previous Technical Studies Within the Project APE

Report Number (KE-)	Authors	Date	Title	APE Component
KE-03600	Pruett, Catherine Lewis	2009	A Cultural Resources Assessment of Approximately 40 Acres Southwest of Mojave, Kern County, California	E-W
KE-04053	Lawson, Natalie	2009	Cultural Resources Inventory Report for the Alta Oak Creek Mojave Wind Project, Kern County, California	E-W
KE-03777	Palm-Leach, Laura, Brandy, Paul, King, Jay, Mikkelsen, Pat, Seil, Libby, Hartman, Lindsay, Bradeen, Jill, Larson, Bryan, Freeman, Joseph, Costello, Julia, Rosenthal, Jeffrey, and Jones, Deborah	2010	Cultural Resources Inventory of Caltrans District 6 Rural Conventional Highways in Fresno, Western Kern, Kings, Madera, and Tulare Counties Summary of Methods and Findings	E-W
KE-04247	Lawson, Natalie and Cardenas, Gloriella	2010	Class III Cultural Resources Survey of the North Sky River Wind Energy Project, Kern County, California.	E-W
KE-04159	Cardenas, Gloriella	2011	Cultural Resources Inventory Report for the Alta Infill II Wind Energy Project Project, Kern County, California	E-W
KE-04260	Hudlow, Scott M.	2011	A Phase I Cultural Resource Survey for Seven Kern Desert Solar Farm Sites, Kern County, California	E-W
KE-04276	Schmidt, James	2012	Archaeological Survey Report for Southern California Edison Company's EKWRA Telecommunications Subtransmission Line Project Corridor on Bureau of Land Management Parcels Near Mojave, Kern County, California.	N-S Option 3*
KE-04359	Ramirez, Robert, Hunt, Kevin, and Haas, Hannah	2013	Addendum Report: Phase I Cultural Resources Survey for the RE Columbia Two Solar Project, Mojave, Kern County, California	E-W and N-S Option 3*
KE-04633	Hoffman, Laura and Denniston, Liz	2013	Cultural and Paleontological Resources Monitoring and Discovery Report for the RE Columbia 3 LLC Solar Facility Project, Kern County, California	E-W
KE-04648	Ramirez, Robert, Haas, Hannah, and Hunt, Kevin	2014	Cultural Resources Study for RE Clearwater Solar Project, Mojave, Kern County, California	E-W
KE-04649	Ramirez, Robert, Daitch, David, and Hunt, Kevin	2015	Archaeological and Paleontological Monitoring Report for the Camelot Solar Project, Mojave, Kern County, California	E-W

* Removed from consideration

5.1.1.2 Previously Recorded Cultural Resources

The SSJVIC records indicate that 33 cultural resources have been recorded within, immediately adjacent to, or intersecting the project APE (Confidential Appendix C). These 33 consist of 28 historic-era resources (7 archaeological sites, 9 historic built environment resources, and 12 historic isolates) and 5 prehistoric resources (3 prehistoric sites and 2 prehistoric isolates).

The 7 historic sites consist of 5 historic trash scatters, 1 survey marker, and 1 borrow pit with structural remains. Historic built environment resources (n=9) include 6 road segments, 1 transmission line, 1 railroad segment, and the Los Angeles Aqueduct. Prehistoric sites identified consist of 3 lithic scatters, and 1 quarry site.

Of the 33 resources previously recorded: one has been determined eligible for listing in the NRHP with concurrence from the SHPO (P-15-003549/CA-KER-3549H: Los Angeles Aqueduct) and two (P-15-003929/CA-KER-3929H: LA-Owens River Road and P-15-002050/P-15-003366/P-15-000560/ CA-KER-2050H: Union Pacific Railroad) appear eligible for the CRHR and NRHP through survey evaluation, although no formal evaluation has been made. The 14 isolated finds are not eligible for the CRHR or NRHP by definition, and the 16 remaining resources have not been evaluated for the CRHR or NRHP. Details pertaining to all 33 resources, including current conditions, are provided below in Table 4, organized by alignment option.

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
003528	3528H	Historic	7R (Identified in Survey; Not evaluated)	2014 (Way, K. R., R. Dinarte, and A. Ginther); 2012 (Ineligible on site form); 2010 (Hudlow, Scott); 1993 (Macko, M.)	Unnamed road	No change from 2010 assessment	East-West (E-W)
003534	3534H	Historic	7R (Identified in Survey; Not evaluated)	2013 (C. Higgins et al.); 1993 (Macko, M)	Unnamed road	No change from 2010 assessment	E-W
003537	3537	Historic	7R (Identified in Survey; Not evaluated)	2010 (Lawson, N.); 1993 (Macko, M.)	Oak Creek Road	No change from 2010 assessment	E-W

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
003549	3549H	Historic	2B (Determined eligible)	2015 (Newcomb, Alyssa and R. Knierim); 2013 (Kellawan, R., D. Martinez, and C. Connolly); 2010 (Fergusson, H. Calicher, R. rolston, N. Lannon); 2009 (Helvin, Steven, and Rebecca Flores)	Los Angeles Aqueduct	No change from 2010 assessment	E-W
003929	3929H	Historic	3D (Appears eligible as contributor)	1999 (Byrd, David); 1997 (Van Bueren, Thad); 1993 (Costello, J., J. Marvin, and C. Brownson); 2000 (Underwood, J.); 1993 (Costello, J. and J. Marvin); 1993 (Macko, M.)	Freighter route/LA-Owens River Road	No change from 2010 assessment	E-W
012716	7174H	Historic	7R (Identified in Survey; Not evaluated)	2002 (Brown, Brad)	Borrow pit and structural remains	No change from 2010 assessment	E-W
013683	--	Prehistoric	6Z (Found ineligible through survey evaluation)	2008 (McCormick, S.)	Isolate: flake	Could not be relocated	E-W
013814	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K.)	Isolate: can	No change from 2010 assessment	E-W
013963	--	Historic	6Z (Found ineligible through survey evaluation)	2009 (Lawson, N., C. Calicher, R. Harmon, E. Peters, and R. Rolston)	Isolate: can and steel bucket	No change from 2010 assessment	E-W
014700	8266	Prehistoric	7R (Identified in Survey; Not evaluated)	2009 (Harmon, R., H. Calicher and E. Peters)	Lithic scatter	No change from 2010 assessment	E-W
014701	8267	Prehistoric	7R (Identified in Survey; Not evaluated)	2009 (Ineligible on record)	Quarry or prospect site	No change from 2010 assessment	E-W

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
015544	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Candenas, Glonella)	1934 Survey Marker	No change from 2010 assessment	E-W
017096	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Maier, E. and Lambert, K.)	Trash scatter of cans and glass	No change from 2010 assessment	E-W
017097	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Maier, E. and Lambert, K.)	Trash scatter of cans and glass	No change from 2010 assessment	E-W
017098	--	Historic	7R (Identified in Survey; Not evaluated)	2011 (Maier, E. and Lambert, K.)	Trash scatter of cans and glass	No change from 2010 assessment	E-W
017119	--	Historic	6Z (Found ineligible through survey evaluation)	2011 (Rolston, R., J. McDermott, and K. Lambert)	Isolate: can	Could not be relocated	E-W
017121	--	Historic	6Z (Found ineligible through survey evaluation)	2011 (Rolston, R., J. McDermott, and K. Lambert)	Isolate: can	No change from 2010 assessment	E-W
017305	--	Historic	7R (Identified in Survey; Not evaluated)	2013 (Lucas, T. and C. Higgins)	State Route 14/ Aerospace Highway	No change from 2010 assessment	E-W
018681	10204H	Historic	7R (Identified in Survey; Not evaluated)	2014 (Dice, Michael)	LADWP Owens Gorge 230kV transmission line	No change from 2010 assessment	E-W
002050/003366/000560/017333	2050H	Historic	3CD (Appears eligible for CR as contributor)	2009 (Calicher, H., R. Rolston, N. Lawson)	Union Pacific Railroad and associated spurs	No change from 2010 assessment	E-W North-South (N-S) Option 1

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
013801	7736H	Historic	7R (Identified in Survey; Not evaluated)	2010 (Blotner, N., K. Smolik, S. Clowery)	Trash scatter of metal, glass, butchered bone	No change from 2010 assessment	N-S Option 2
013802	--	Historic	7R (Identified in Survey; Not evaluated)	2010 (Blotner, N., K. Smolik, S. Clowery)	Trash scatter of glass	No change from 2010 assessment	N-S Option 2
013806	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	Could not be relocated	N-S Option 2
013807	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	No change from 2010 assessment	N-S Option 2
013808	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	Could not be relocated	N-S Option 2
013809	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: can	No change from 2010 assessment	N-S Option 2
013810	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K., N. Blotner)	Isolate: bottle base	Could not be relocated	N-S Option 2
013811	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K.)	Isolate: can	Could not be relocated	N-S Option 2
013812	--	Historic	6Z (Found ineligible through survey evaluation)	2010 (Smolik, K.)	Isolate: can	Could not be relocated	N-S Option 2
000807	--	Prehistoric	7R (Identified in Survey; Not evaluated)	1974 (Eggers, A.V.)	Lithic scatter	No change from 2010 assessment	N-S Option 3*
004763	--	Historic	7R (Identified in Survey; Not evaluated)	2001 (Glennon)	Sierra Highway	No change from 2010 assessment	N-S Option 3*

Table 4
Previously Recorded Cultural Resources Within the Project APE

Primary Number (P-15-)	Trinomial (CA-KER-)	Period	NRHP/CRHP Status	Recorded By/Year	Description	Current Condition	APE Component
004764	--	Prehistoric	6Z (Found ineligible through survey evaluation)	1995 (Samuelson, Ann, Bryan Mischke, John Yelding-Slone, and Charlene Gross)	Isolate: lithic core	Could not be relocated	N-S Option 3*
004765	--	Historic	6Z (Found ineligible through survey evaluation)	1995 (Samuelson, Ann, Bryan Mischke, John Yelding-Slone, and Charlene Gross)	Isolate: Glass insulator	No change from 2010 assessment	N-S Option 3*

* Removed from consideration

5.1.1.3 Cultural Resources Survey

Dudek conducted intensive-level pedestrian surveys of 241.2 acres of the APE. Visits to sites recorded during the 2010 field effort exhibited little to no change in existing conditions. Transects were spaced 15 meters (45 feet) apart. Visibility in the APE was excellent, averaging over 90%. Although some seasonal grasses were present and obscured the view slightly, archaeologists generally had excellent visual access to the APE. In many cases, artifacts found were partially buried as a result of natural alluvial and aeolian processes. Shallowly and partially buried surface deposits are anticipated because of the relatively active nature of this alluvial plain. The very dry sediments and frequent high winds indicate the possible, though unlikely, presence of substantial intact, subsurface archaeological resources in the APE. However, intentionally buried deposits (such as refuse dumps) associated with identified historic archaeological sites in the general vicinity may be present.

Of the 313.9-acre APE, 115.2 acres were spot-checked and 198.7 acres were intensively surveyed in February and November, 2017. Visits to sites recorded during the 2010 field effort exhibited little to no change in existing conditions. As a result of these investigations, a total of 49 resources (33 previously-recorded and 16 newly recorded) were identified within the project APE. These resources included 18 isolates, 22 archaeological resources, and 9 built environment resource. It was determined that 7 of these 49 resources would potentially be impacted by the proposed project. All 49 resources identified within the APE are detailed in Table 5.

Table 5
Archaeological Site Management Recommendations

APE Component	Temporary Number	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact
East-West (E-W)	--	003528	Unnamed road	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	003534	Unnamed road	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	003537	Oak Creek Road	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	003549	Los Angeles Aqueduct	Historic	2B (Determined eligible)	No Impact
E-W	--	003929	Los Angeles-Owens River Road	Historic	3D (Appears eligible as contributor)	No Impact
E-W	--	012716	Borrow pit and structural remains	Historic	7R (Identified in Survey; Not evaluated)	impacted
E-W	--	013683	Isolate: flake	Prehistoric	6Z (Found ineligible through survey evaluation)	No Impact
E-W	--	013814	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
E-W	--	013963	Isolate: can and steel bucket	Historic	6Z (Found ineligible through survey evaluation)	No Impact
E-W	--	014700	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	014701	Quarry or prospect site	Prehistoric	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	015544	1934 Survey Marker	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	017096	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	impacted
E-W	--	017097	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	017098	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	017119	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
E-W	--	017121	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact

Table 5
Archaeological Site Management Recommendations

APE Component	Temporary Number	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact
E-W	--	017305	State Route 14/Aerospace Highway	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	--	018681	LADWP Owens Gorge 230kV transmission line	Historic	7R (Identified in Survey; Not evaluated)	No Impact
E-W	SS-I-04	--	Isolate: lithic	Prehistoric	6Z (Found ineligible through survey evaluation)	No Impact
E-W	SS-I-14	--	Isolate: glass	Historic	6Z (Found ineligible through survey evaluation)	No Impact
E-W	SS-S-11	--	Trash scatter of cans	Historic	7R (Identified in Survey; Not evaluated)	impacted
E-W, North-South (N-S) Option 1	--	002050/003366/000560/017333	Union Pacific Railroad and associated spurs	Historic	3CD (Appears eligible for CR as contributor)	No Impact
N-S Option 1	SS-S-10	--	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	Impacted
N-S Option 1	SS-S-23	--	Trash scatter of cans	Historic	7R (Identified in Survey; Not evaluated)	Impacted
N-S Option 1	SS-S-30	--	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	Impacted
N-S Option 2	--	013801	Trash scatter of metal, glass, bone	Historic	7R (Identified in Survey; Not evaluated)	Impacted
N-S Option 2	--	013802	Trash scatter of glass	Historic	7R (Identified in Survey; Not evaluated)	Impacted
N-S Option 2	--	013806	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 2	--	013807	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 2	--	013808	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 2	--	013809	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 2	--	013810	Isolate: bottle base	Historic	6Z (Found ineligible through survey evaluation)	No Impact

Table 5
Archaeological Site Management Recommendations

APE Component	Temporary Number	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact
N-S Option 2	--	013811	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 2	--	013812	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 3*	--	000807	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	--	004763	Sierra Highway	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	--	004764	Isolate: lithic core	Prehistoric	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 3*	--	004765	Isolate: Glass insulator	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 3*	SS-I-15	--	Isolate: Can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 3*	SS-I-16	--	Isolate: Can	Historic	6Z (Found ineligible through survey evaluation)	No Impact
N-S Option 3*	SS-S-31	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-32	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-33	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-34	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-35	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-36	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-37	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact
N-S Option 3*	SS-S-38	--	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	No Impact

* Removed from consideration

Following the inventory, it was determined that seven (7) cultural resources could not be avoided and would be impacted by project implementation. These seven sites included two prehistoric archaeological sites (SS-S-10 and SS-S-30) and six historic period refuse deposits (P-15-012716, P-15-013801, P-15-013802, P-15-013807, P-15-017096, SS-S-11, and SS-S-23). These resources were situated in areas that could not be avoided through reasonable design changes. Prehistoric site evaluations are discussed first, followed by historic period refuse deposits.

5.2 Testing and Evaluation Results

5.2.1 Site SS-S-10

Situated at the southeastern portion of North-South Gen-Tie Route Option 1, site SS-S-10 is a prehistoric lithic scatter. Testing within site SS-S-10 consisted of a surface inventory and conducting subsurface test excavations. The subsurface evaluations at SS-S-10 consisted of the excavation of eight STPs, three CSC units, two SSUs, and one CU. During the surface inventory previously unidentified prehistoric features extend beyond the previously mapped site boundaries.

Site SS-S-10 is situated on a low rise that trends north-south overlooking a west-facing playa shoreline known as Lake Thompson. While seasonal flooding of the lake basin is not uncommon, Lake Thompson was part of a post-Pleistocene lake system fed by desiccating glaciers. As discussed in Chapter 4, hunter-gatherer occupation debris commonly found on the margins of these now dry lakebeds. However, hunter-gatherers of the last 1000 years of prehistory frequented these lake basins during seasonal runoff that fed various seasonally abundant plants and small animals (see Hale et al. 2010).

5.2.1.1 Surface Inventory

A total of 3 prehistoric tool artifacts, 56 flakes, 3 faunal bone fragments and a minimum of 19 prehistoric rock features were identified during the surface inventory. The prehistoric tool artifacts include: one rhyolite flake tool/scraper (A1), one rhyolite flake tool (A2), and one chert retouched flake tool (A3). Of the total 56 flakes collected from the general surface collection, 23 are rhyolite debitage and the remaining 33 flakes are Cryptocrystalline Silicates (CCS) such as variously colored fine grain chert and chalcedonies. While most of the fragments were heavily deteriorated and show little diagnostic elements, the bones most likely represent both small and large vertebrates. Several of the fragments demonstrate artiodactyl (antelope/deer) characteristics.

5.2.1.2 Features

A total of 19 prehistoric features were identified during the surface inventory. All of the 19 features appear to represent fire-treating/heating local rhyolite rock. The individual rock features range in dimension from approximately 2 to 10 square meters (m^2). The features include concentrated clusters of rock as well as "blown-out" from post-depositional processes and activities. The feature shapes tended to be rounded or oval, although the horizontal shape of these burned rock features is not likely significant. Evidence of post-depositional environmental processes, such as wind and soil erosion, was evident. The rhyolite fire-affected rock (FAR) ranged in size from 1 to 2 cm sub-rounded gravels to 15 to 20 cm diameter angular cobbles. While some limited rhyolite flakes and core fragments were noted with the features, the majority of the rhyolite fragments were angular to sub-angular rocks and gravels. Several of the rhyolite features contained debitage of various stages but primarily limited to cortical flakes and early interior flakes.

5.2.1.3 Shovel Test Pits

Eight individual STPs were excavated at SS-S-10. All eight of the STPs exhibited loose to moderately compact well sorted brown sands (Munsell 10YR4/3). The sediments are consistent from the ground surface to approximately 40 cmbs. From 40 cmbs to 60 cmbs the sand became more compact and contains small rounded to sub-sounded gravels.

Of the 8 STPs excavated, Numbers 1, 3, and 7 were negative. STPs 2, 4, 5, 6, and 8 contained cultural materials. A total of 9 artifacts; including 8 flakes and 1 fragment of non-human faunal bone, were recovered from the STP excavations. The materials and artifacts recovered by STP are listed in Table 6, below:

Table 6
Shovel Test Pit Recovery from SS-S-10

Site SS-S-10			
STP	*Level cmbs*	*Artifacts Recovered*	*Count*
2	20 - 40	Chalcedony (CCS) flake	1
		Rhyolite flake	2
4	0 - 20	Rhyolite flake	1
5	0 - 20	Chert (CCS) flake	1
	20 - 40	Chert (CCS) flake	1
6	0 – 20	Faunal bone fragment	1
	20 - 40	Chert (CCS) flake	1
8	0 – 20	Chert (CCS) flake	1
		STP Total:	9

5.2.1.4 Controlled Surface Collections

Three various sized CSC units were conducted. CSC-1 measured 5 m x 5 m and was placed to collect materials from rhyolite rock Feature 1. A total of 220 rhyolite FAR fragments and a total of 72 rhyolite flakes were collected from CSC-1. CSC-2 measured 5 m x 5 m and was placed just east of CSC-1, to collect materials from Feature 2. A total of 184 rhyolite FAR fragments and a total of 5 rhyolite flakes were collected from CSC-2. The final CSC at this site, CSC-3 measured 15 m x 15 m (divided into cells A to I) and was placed to collect materials from Feature 5. A total of 110 rhyolite FAR fragments, 96 rhyolite flakes, 19 CCS flakes, 2 quartz flakes, 1 obsidian flake and 5 faunal bone fragments were recovered from CSC-3.

5.2.1.5 Surface Scrape Units

Two surface scrape units were excavated at this site, in conjunction with 2 of the 3 CSCs. SSU-1 was placed within the central portion of CSC-1. Sediments from the surface to a depth of approximately 0.5 centimeters below surface (cmbs) consisted of loosely compacted unsorted brown sand (Munsell: 10YR 4/3) with roots and krotovina noted. Materials recovered from SSU-1 consist of 7 fragments of rhyolite FAR.

The second surface scrape, SSU-2, was a 2 m x 2 m scrape unit within CSC-3, cell A, to collect data from Feature 5. Sediments encountered consisted of loosely compacted unsorted brown sand (Munsell: 10YR 4/3). Slight discoloration was noted near the FAR along the western edge of the unit. Materials recovered from SSU-2 consist of 83 fragments of rhyolite FAR, 82 rhyolite flakes, 3 CCS flakes, and 2 fragments of non-human, small animal bone.

5.2.1.6 Control Units

One control unit, CU-1, measuring 0.5 m x 1m was excavated within Feature 5. CU-1 was excavated to a terminal depth of 60 cmbs. The sediments consisted of loosely compacted brown sand (Munsell: 10YR 4/3) consistent from the ground surface to approximately 40 cmbs. From 40 to 60 cmbs the sand became more compact and contain small rounded to sub-sounded gravels. Moderate amounts of roots were noted in the upper levels and some minor krotovina disturbances were noted throughout all the levels. The artifact distribution in CU-1 is summarized in Table 7 below:

Table 7
Control Unit 1 Recovery from SS-S-10.

Site SS-S-10			
CU	*Level cmbs*	*Artifacts Recovered*	*Count*
1	0 - 10	Rhyolite FAR	22
		Rhyolite flakes	6
	10 - 20	Rhyolite FAR	5
	20 - 30	Rhyolite flakes	15
		Faunal bone fragments	2
	30 – 40	Rhyolite FAR	2
		Rhyolite flakes	7
		Faunal bone fragments	2
	40 – 50	Rhyolite FAR	2
		Rhyolite flakes	5
		Faunal bone fragments	3
		CU 1 Total:	71

5.2.1.7 Site Results

The surface inventory of the site identified 19 rock features and a light to moderate scatter of prehistoric lithic artifacts and FAR fragments. Surface collections and the 14 various subsurface excavation units produced a total of 1,052 individual artifacts and cultural materials. The 1,052 items collected include 640 rhyolite FAR fragments, 391 flakedstone artifacts (debitage = 385, tools = 5; core = 1), and 21 faunal bone fragments. Out of the 385 total debitage collected, 322 are rhyolite, 60 are various CCS, 1 is obsidian, and 2 are quartz. Rhyolite is the dominant material, with approximately 60 percent of the surface artifact assemblage and over 91 percent of that recovered during testing.

Test excavations at site SS-S-10 indicate prehistoric lithic production from material sourced within the immediate vicinity, specifically the rhyolite butte (Lookout Knob) overlooking the site to the north. Neither groundstone nor ceramic artifacts types were identified.

Sediment profiles recorded from the subsurface excavation demonstrate that the majority of the artifacts and cultural materials were encountered from a shallow context from the ground surface to approximately 40 cmbs. The excavation units demonstrate a low probability that the FAR features have significant depth. The three features excavated (Features 1, 2 and 5) showed little to no trace of a subsurface component. No charcoal or ash staining was identified, likely due to the shifting sands depositional environment.

Evaluation of SS-S-10 focused on the project APE, minimally touching on outlying regions and limited to basic surface recordation and observation. The majority of burned rock features are located to the east of the APE and some of these appear to have the potential for subsurface deposits that may contain charcoal suitable for dating. For this reason, the portion of SS-S-10 outside of the APE to the east is recommended as significant for archaeological values and eligible for CRHR listing under Criterion 4, and for NRHP listing under Criterion D.

Within the APE, no substantial or significant deposits were identified. Implementation of the project within the APE at this site would not have a significant impact on the site's archaeological values. No information was obtained that would contribute value under any of the other significance criteria.

5.2.2 Site SS-S-11

Site SS-S-11 is a historic can scatter along the eastern portion of the East-West Gen-Tie Route alignment, to the north side of Purdy Avenue to the west of Highway 14. Measuring 605 feet (east-west) x 223 feet (north-south), the site is composed of a light scatter of cans and appear to be a discrete single use dumping site. Testing methods at the site were constrained to surface inventory only.

5.2.2.1 Surface Inventory

An inventory of this site resulted in the identification of 88 varied historic cans scattered diffusely within the general confines of the area previously recorded. No features were noted during the inventory and all the artifacts appeared loose or minimally embedded in the surrounding sand sediments. None of the cans were in a depositional context that suggested subsurface deposits.

Of the total 88 cans identified, 19 cans were knife cut or hole punched beverage cans (1915 to 1930; Simonis 1997), 19 cans were rotary and P38 opened sanitary food cans (1904-on; Rock 1987), 15 were hole-in-cap (post-1901; Simonis 1997), knife punched and rotary opened food cans, 6 were large fruit and vegetable cans (post-1910; Clark 1977), and 4 were square meat tins. Also identified at this site were 4 bi-metal pull-tab beer cans (post -1962; Simonis 1997), 2 food pail cans, one oval ham tin, one square cooking oil can and a total of 17 unidentified smashed cans/can fragments.

5.2.2.2 Site Summary

Site SS-S-11 appears to be a mid- to late-Twentieth Century historic trash deposit representing basic food and beverage consumption. There was no evidence of subsurface deposits.

Considering this site's proximity to local roads, it is likely that this scatter is associated with domestic refuse disposal.

5.2.3 Site SS-S-23

Site SS-S-23 is a historic can scatter southeastern portion of North–South Gen-Tie Route Option 1. Measuring 260 feet (northwest-southeast) x 98 feet (northeast-southwest), the site is composed of a light scatter of sanitary and church-key opened beverage cans totaling approximately 20 rotary-opened sanitary food cans, and four church-key opened beverage cans. Testing of site SS-S-23 consisted of a surface inventory and the excavation of one STP.

5.2.3.1 Surface Inventory

The surface inventory resulted in the identification of 18 varied historic cans and 6 historic ceramic fragments scattered diffusely. No features were noted during the inventory and all the artifacts appeared loose or minimally embedded in the surrounding sand sediments. None of the artifacts suggest subsurface deposits.

Artifacts identified include 13 C-ration food cans measuring 2 ¾" x 4 ½", 5 C-ration food cans measuring 4 3/8" x 4", one fragment of historic whiteware ceramic and 5 fragments of a single lead-glazed earthenware ceramic plate.

5.2.3.2 Shovel Test Pit

One STP (STP-1) was excavated. Sediments observed STP encountered homogenous sediments which consisted of loose to moderately compact well sorted brown sands (Munsell: 10YR4/3). No cultural artifacts were recovered from STP1 and it was terminated at a depth of 40 cmbs.

5.2.3.3 Site Summary

All the data collected during the testing of site SS-S-23 suggests that this is a Twentieth Century historic trash deposit representing food consumption. The general can types represent C-ration cans which were in production from 1938 to 1945 (Mason et al 1982). Considering the type of cans identified and this site's proximity to Edward Air Force Base, it is possible that this trash deposit represents mid- to late- Twentieth Century military utilization of the general region surrounding the base. Nothing identified during the testing of this site suggests that any significant subsurface deposit is associated with the surface scatter.

5.2.4 Site SS-S-30

Situated at the southeastern portion of North–South Gen-Tie Route Option 1, site SS-S-30 is a sparse prehistoric lithic scatter measuring 75 meter (northeast-southwest) x 55 meter (northeast-southwest. Testing of site SS-S-30, consisted of a surface inventory and conducting subsurface test excavations. A total of 11 STPs, 2CSC units, 1 SS, 2 CUs, and the collection of one Column Sample. SS-S-30 is situated on the west side of Lookout Knob, on a relatively flat alluvial plain.

5.2.4.1 Surface Inventory

A total of three prehistoric tool artifacts (A1, A2, A3), 71 pieces of debitage, 21 fragments of rhyolite FAR, 4 faunal bone fragments and one prehistoric rock feature was identified during the surface inventory. The prehistoric tool artifacts collected during the inventory include: an indeterminate granitic groundstone fragment (A1), a simple rhyolite flake tool (A2), and, a rhyolite unidirectional core (A3). Of the total 71 flakes collected from the general surface collection 44 flakes are Cryptocrystalline Silicates (CCS) such as variously colored (white to brown) fine grain chert and chalcedonies, 26 are rhyolite, and one is obsidian.

5.2.4.2 Features

One prehistoric feature was identified during the surface inventory. Feature 1, a rhyolite rock/hearth feature, measuring approximately 12 m (N/S) x 8 m (E-W), is very diffuse and scattered but FAR is concentrated in the southern portion of the feature. Feature 1 has an apparent oval shape but the diffuse nature of the FAR toward the northern half of the feature obscures any obvious feature shape. The rhyolite FAR ranged in size from 10 to 15 cm diameter angular cobbles to 1 to 2 cm sub-rounded gravels. While some limited rhyolite flakes were noted on the surface, the majority of the rhyolite fragments of Feature 1 appeared to be angular to sub-angular burned rocks and gravels.

5.2.4.3 Shovel Test Pits

Eleven individual STPs were excavated at SS-S-30. While most of the sediments encountered in the STPs consisted of loosely compacted brown sands (Munsell: 10YR4/3-4/4), STPs excavated along the eastern most portion of the site encountered a deposit of extremely compact, slightly sand clay loam that was not excavated. The clay loam lens was typically encountered at depths of 20 cmbs but ranged in color from a brown (Munsell: 10YR4/3-4/4) to very pale brown (Munsell: 10YR8/3). STPs numbered 5 and 11 encountered this compact clay lens.

Of the total eleven STPs excavated, STP Numbers 1, 4 through 6, and 8 through 10 were negative with no artifacts or materials recovered. STPs 2, 3, 7, and 11 were positive and contained artifacts or FAR. A total of five artifacts, consisting of 4 flakes and one fragment of non-human faunal bone were collected the STP excavations. The materials and artifacts recovered by STP are listed briefly below:

Table 8
Shovel Test Pit Recovery from SS-S-30

Site SS-S-30			
STP	*Level cmbs*	*Artifacts Recovered*	*Count*
2	0 - 20	Rhyolite flakes	3
	20 – 40	Rhyolite FAR	2
11	0 – 20	Chert (CCS) flake	1
		Faunal one fragment	1
		STP Total:	7

5.2.4.4 Controlled Surface Collections

Two CSC units were conducted. CSC-1 was placed to cover the most dense surface lithic artifact scatter identified during the surface inventory, and the second was placed to investigate Feature 1. CSC-1 measured 10 m (N/S) x 15 m (E/W), and was divided into four 5 m x 5 m cells (cells A through D). A total of 129 CCS (chert and chalcedony) flakes, 36 rhyolite flakes, 8 rhyolite FAR fragments, and 5 small animal bone fragments were recovered from CSC-1. This volume of CCS debitage represents the densest part of this site.

The second CSC, CSC-2, measured 5 m x 5 m and was placed to collect materials from the southern portion of Feature 1, the rhyolite FAR feature. A total of 53 rhyolite FAR fragments and 14 rhyolite flakes were collected from CSC-2.

5.2.4.5 Surface Scrape Units

One surface scrape unit, SSU-1, was excavated in conjunction with other control units (CSC-1 cell C). SSU-1 was placed within CSC-1 cell C, to recover materials from the densest scatter of lithic artifacts. Sediments from the surface to a depth of approximately 0.5 cmbs consisted of loosely compacted unsorted dark yellowish brown sand (Munsell: 10YR 4/4) with a light volume of roots and krotovina noted. Artifacts recovered from SSU-1 consist of 26 CCS (chert and chalcedony) flakes, 33 rhyolite flakes, one obsidian flake, and 2 faunal bone fragments. One of the 26 CCS flakes collected in SSU-1 consists of a fine-grain brown chert reduction flake that has the remains of a fossilized Ammonite/Ammonoid embedded into the matrix (Figure 3).

Figure 3 Chert flake with embedded Ammonoid fossil recovered from SSU-1, Site SS-S-30

5.2.4.6 Control Units

Two control units, both measuring 0.5 m x 1m were excavated in an attempt to delineate any subsurface elements of the dense lithic scatter (CU-1), and portions of the rhyolite FAR feature, Feature 1 (CU-2).

The first level of CU-1 was excavated to a terminal depth of 50 cmbs. The sediments were loosely compacted dark yellowish brown sand (Munsell: 10YR 4/4) consistent from the ground surface to approximately 40 cmbs. From approximately 40 cmbs to 60 cmbs the brown sands became slightly more compact and contain small rounded to sub-sounded gravels. Moderate amounts of roots were noted in the upper levels and some minor krotovina disturbances were noted throughout all the levels. The artifact distribution in CU-1 is summarized in below:

Table 9
Control Unit 1 Artifact Recovery from SS-S-30

Site SS-S-30			
CU	*Level cmbs*	*Artifacts Recovered*	*Count*
1	05 - 10	CCS flakes	6
		Faunal bone fragment	1
	20 - 30	CCS flakes	7
		Faunal bone fragment	1
	30 - 40	Rhyolite flakes	4
		Faunal bone fragment	3
	40 - 50	CCS flakes	6
		CU 1 Total:	28

CU-2 was placed to cover the center of the most dense portion of Feature 1, estimated from the field results of the collection of CSC-2. CU-2 was a 0.5 m x 1 m unit excavated in four 10 cm levels, down to a terminal depth of 40 cmbs. The sediments encountered were loosely compacted dark yellowish brown sand (Munsell: 10YR 4/4) consistent from the ground surface to approximately 40 cmbs. Fragments of rhyolite FAR were observed within sediments at depths from 0 to 20 cmbs. Consistent with all the subsurface units excavated, light amounts of roots were noted in the upper levels and some minor krotovina disturbances were noted throughout all the levels. The artifact distribution in CU-2 is summarized in Table 10 below.

Table 10
Control Unit 2 Artifact Recovery from SS-S-30

Site SS-S-30			
CU	*Level cmbs*	*Artifacts Recovered*	*Count*
2	0 - 10	Rhyolite FAR	20
		Rhyolite simple flake tool	1
	10 - 20	Rhyolite FAR	30
	20 - 30	Rhyolite flakes	5
		CU 2 Total:	56

CU-2 was terminated at 40 cmbs due to the diminishing volume data collected and lack of perceptible feature definitions in the unit sidewalls. Before this unit was backfilled, a single 20 cm x 20 cm column sample collection was excavated into the eastern sidewall.

5.2.4.7 Column Sample

One 20 cm x 20 cm column sample was collected from the east sidewall of CU-2, adjacent to the southern wall of the completed unit. The column sample was collected as four 10 cm deep levels, matching the levels excavated in CU-2. Each column sample level was not screened but collected as a complete level. The column sample was not processed as of the date of this report.

5.2.4.8 Site Summary

The surface inventory of the site identified one rock feature and a moderate to moderately-dense scatter of prehistoric lithic artifacts. Surface collections and the 16 different subsurface excavation units produced a total of 458 individual artifacts and cultural materials from site SS-SS-30. Of the total 458 items collected; 339 artifacts are flakedstone artifacts (debitage = 337, tools = 2; core = 1), 102 are rhyolite FAR fragments, one artifact is a granitic indeterminate groundstone fragment and 15 artifacts are faunal bone fragments. Thus, out of the total artifact assemblage, flakedstone artifacts (mainly debitage) makes up 74 percent of the collection, with rhyolite FAR making up 22 percent of the collection. Out of the 337 total debitage collected, 214 are various CCS (various fine grained chert and chalcedonies identified) debitage, 121 pieces of debitage are rhyolite, one is an obsidian flake, and one is quartz debitage. Just over 63 percent of the debitage collected is made up of varied CCS, while approximately 36 percent of the debitage materials consist of rhyolite.

The preliminary results of the test excavations at SS-S-30 suggest the site was used primarily rhyolite lithic production. With the largest volume of materials consisting of CCS materials and rhyolite FAR being secondary in volume, SS-S-30 reflects a simple encampment occupied for the purpose of lithic toolkit replenishment. The presence of one groundstone artifact implies some vegetal processing occurred. Addressing the makeup of debitage materials recovered at this site, while CCS materials are the most numerous, rhyolite debitage was still a significant portion of the debitage collection. Conversely, the amount of rhyolite FAR at this site is relatively light compared to the volume of rhyolite debitage collected (rhyolite FAR makes up 22 percent of the entire collection, while rhyolite debitage makes up 36 percent of the collection of debitage).

Finally, sediment profiles recorded from the subsurface excavation across SS-S-30 demonstrate that the majority of the artifacts and cultural materials were encountered from the surface, just below, or within a shallow context. The single FAR feature, Feature 1, showed little to no trace of discernable feature subsurface and no charcoal or ash staining was identified during the excavation.

Overall, SS-S-30 has a small assemblage that is limited in diversity, with no chronological indicators that would enable placement of this site in time. The patterns recognized at this site are common in the region and better documented at other nearby resources outside of the project limits. For this reason, the site does not have enough information to contribute to regional trends in prehistory and is recommended as not eligible for CRHR listing under Criterion 4 or NRHP listing under Criterion D. No information was obtained that would contribute value under any of the other significance criteria.

5.2.5 Site P-15-012716

This site consists of a historic borrow pit that measures approximately 30 m (N/S) x 15 m (E/W). The sediments that were excavated from the pit appear to have been used to build a berm surrounding the pit. An inventory of this site resulted in the identification of 5 historic artifacts scattered diffusely within the site boundary. All the scattered artifacts identified were loose or minimally embedded in the surrounding sand sediments.

The surface inventory conducted at P-15-012716 identified a total 5 historic cans. Of the total 5 artifacts identified, one was a flat top beverage can (1935-1970s; Martels 1976), one was a sanitary food can (1904-on; Rock 1987), one was a cooking oil can, one artifact was an unidentified crushed can, and the final artifact was a tin enamel plate (postdate the early 1900s; Clark 1977; Rock 1987; Simonis 1997). The previous DPR site form mentions that there were wooden remains of a structure located along the northern portion of the site; however, during the current evaluation the wooden debris was noted to be scattered across the entire site. Additionally, the wooden remains noted on site are the remains of a wooden fence and possible gate. It is evident that the wood debris was not part of a structure.

5.2.5.1 Site Summary

Site P-15-012716 likely represents a Late Twentieth Century mining/industrial borrow pit. No artifacts or other cultural materials identified to suggest any additional utilization. No information was obtained that would warrant a significance finding and the site is recommended as not significant and not eligible for listing in the CRHR or NRHP under any significance criteria.

5.2.6 Site P-15-013801

Site P-15-13802 is an undifferentiated historic period refuse deposit. The evaluation of this site consisted of a surface inventory, one SSU and the excavation of one STP.

5.2.6.1 Surface Inventory

An inventory of this site was conducted resulted in the identification of 15 varied historic cans and one historic trash deposit feature (Feature 1). All artifacts that were outside of the Feature 1 appeared loose or minimally embedded in the surrounding sand sediments; none of the cans were in a depositional context that suggests they were associated subsurface deposits. It appears that all of the cans (mostly bi-metal beverage cans) closest to the existing road and the Gen-Tie Route Option 2 appear to be of a later age than those noted with Feature 1.

The surface inventory conducted at P-15-013801 identified a total 15 historic cans. Of the total 15 cans identified, 7 were beverage cans, 3 sanitary food cans, one was a motor oil can and 4 were unidentified can fragments.

5.2.6.2 Feature

Feature 1, measures 10 m x 10 m and consists of a historic trash dump that has a rounded shape, is relatively concentrated in the approximate center and diffuse near the outer edges. While the majority of the metal cans, glass bottles and jars, ceramic vessel fragments and other miscellaneous item appear to be on or near the surface, some of the artifacts appear well embedded in the surrounding brown sands.

5.2.6.3 Surface Scrape Unit

After the surface inventory was conducted and it was determined that Feature 1 could extend below the current ground surface, the feature was split into quarters and one 5 m x 5 m Surface Scrape Unit was placed in the Northwest quarter of the feature. This SSU-1 was excavated and all materials were screened and inventoried but not collected.

The SSU inventoried a total 446 artifacts with a minimum number of items totaling140 different vessels. A total of 241 glass artifacts, 62 cans and can fragments, 18 ceramics fragments, and 95 other historic items were inventoried during the excavation of this surface scrape. All of the artifacts inventoried are included in Table 11 below.

Table 11
Historic Artifact Inventory from SSU-1, Feature 1, Site P-15-013801.

Artifact Type	Functional Area	Description	Count	MNI*
Bone	Faunal	Burnt and butchered food remains	30	-
Ceramic	Tableware	Ironstone whiteware bowl fragments	10	2
Ceramic	Tableware	Ironstone whiteware plate fragments	6	2
Ceramic	Tableware	Ironstone whiteware coffee cup handle fragment	1	1
Ceramic	Household	Stoneware vessel base fragment	1	1
Glass	Bottles	Brown glass bottle fragments	75	16
Glass	Bottles	Colorless glass bottle fragments	121	45
Glass	Bottle	Aqua-colored glass bottle fragments	6	1
Glass	Mason Jars	Colorless glass Mason Jar fragments	38	10
Glass	Can liner	Milk glass can liner	1	1
Metal	Cans/containers	Small aspirin tin	1	1
Metal	Cans/containers	Solder dot food cans	5	5

Table 11
Historic Artifact Inventory from SSU-1, Feature 1, Site P-15-013801.

Artifact Type	Functional Area	Description	Count	MNI*
Metal	Cans/containers	Sanitary food cans	12	12
Metal	Cans/containers	Sardine/fish tins "Packaged in Norway"	11	11
Metal	Cans/containers	Other meat tins	5	5
Metal	Cans/containers	Unspecified beverage cans	8	8
Metal	Cans/containers	Tobacco tins	11	11
Metal	Cans/containers	Pepper/spice	2	2
Metal	Cans/containers	Key-wound opened food tin keys	7	7
Metal	Unidentified	Unidentified metal fragments	80	-
Metal	Personal	Clothing buttons/hooks/clasps	5	-
Metal	Kitchen	Rotary can opener	1	-
Metal	Building Materials	Machine made wire nails	8	-
Metal	Building Materials	Electrical fuse	1	-
		Total	446	140

* MNI= Minimum Number of Items

5.2.6.4 Shovel Test Pit

One STP measuring .25 m x .50 m was placed within the southwestern corner of SSU-1. STP 1 was excavated down to a depth of 20 cmbs and encountered compact brown sands (Munsell: 10YR4/3). No cultural artifacts were recovered.

5.2.6.5 Site Summary

Site P-15-013801 is a Twentieth Century historic trash deposit representing general domestic consumption. There are no artifacts or other cultural materials identified to suggest that this scatter of cans is anything other than historic subsistence. The general contents of the trash deposit demonstrate typical food, beverage and tobacco consumption, but other items such as nails, electrical fuses, and various ceramic and household items suggest that this refuse represents habitation or minimally temporary domestic residence. No information was obtained that varies from well-documented regional trends in historic domestic consumption and refuse disposal. As such, the site is recommended as not eligible for CRHR or NRHP listing under any of the significance criteria.

5.2.7 Site P-15-013802

Site P-15-013802 is a late Twentieth Century historic trash scatter. During the current evaluation, the entire site was located outside of and away from the existing road and the proposed Gen-Tie Route Option 2 route. The site was photo-documented, however no additional testing was conducted. While this site was not formally evaluated, the artifacts and conditions noted at this site strongly suggest that this scatter represents roadside trash dumped due to convenience more than a specific significant historic deposit representing local habitation.

6 ARCHAEOLOGICAL SIGNIFICANCE EVALUATIONS

Following the inventory, it was determined that seven (7) cultural resources could not be avoided and would be impacted by project implementation. These seven sites included two prehistoric archaeological sites (SS-S-10 and SS-S-30) and five historic period refuse deposits (P-15-012716, P-15-013801, P-15-013802, SS-S-11 and SS-S-23). These resources were situated in areas that could not be avoided through reasonable design changes. Prehistoric site evaluations are discussed first, followed by historic period refuse deposits.

The primary goals of this study were to identify cultural resources that have the potential to be significantly impacted by project implementation, to provide an evaluation of the resources to identify their historical significance, to identify resource-specific impacts, and to recommend mitigation that would reduce impacts to a level below significance.

Evaluation of significance requires the development of an understanding of each identified resource in such a way that its historical significance can be assessed. CEQA and Section 106 of the NHPA requires lead agencies to consider the historical significance of a resource so as to gauge whether it has the potential to be listed on the CRHR or NRHP. Criteria 1–4 of CEQA and criteria A-D of Section 106 are a set of standards for determining whether a particular resource is eligible for listing on the CRHR or NRHP. These criteria were discussed in Chapters 1 and 2.

The following eligibility determinations are based primarily on Criterion 4 of CEQA and Criterion D of Section 106 for archaeological values, since the data generated during the evaluation program can be used to judge whether a particular cultural resource has yielded or may be likely to yield information important in prehistory or history. Data potential is represented by general archaeological characteristics such as assemblage integrity, size, diversity, defined chronology, and the potential for buried deposits. Historic period refuse deposits do not contain any features, structures, or other constituents that could be used identify them through archival research in such a way that information could have been used to evaluate the sites under CEQA criteria 1-3 or Section 106 criteria A-C; instead these historic period refuse deposits could be evaluated only under Criterion 4/D.

Based on the results of the current investigation, all but one of the evaluated archaeological sites are recommended as not significant under CEQA and Section 106 of the NHPA, and as not eligible for listing in the CRHR or the NRHP. The single prehistoric site recommended as eligible for listing is SS-S-10.

Prehistoric site SS-S-10 has several concentrations of archaeological material, but most of these are located outside of the transmission line corridor. The current evaluation focused on areas within the project impact area (APE), with only minimal exploration completed outside of the corridor to better understand the archaeological site. Within the corridor, no significant deposits were identified during archaeological testing. However, outside of the transmission line corridor, several thermal features were identified that have the potential to yield archaeological material important to prehistoric research themes. As such, prehistoric site SS-S-10 is recommended as eligible for listing in the CRHR under Criterion 4, and in the NRHP under Criterion D, for archaeological values. However, this significance recommendation does not apply to archaeological deposits within the APE; no significance-conveying aspects of the site were identified therein.

6.1 Integrity

Integrity is an important factor in the evaluation of archaeological resources. Integrity fundamentally affects associations that are critical for understanding behavioral relationships in site formation and design for prehistoric and historical archaeological sites. For the most part, evaluated prehistoric archaeological sites maintain good integrity, as the distribution of artifacts on the surface was generally good, with some areas more impacted by post depositional disturbance than others. Nearby exposures of rhyolite appear to have been exploited for production of flakedstone tools—the ample volcanic raw material erodes from the local buttes (such as Lookout Knob) with very little soil obscuring their presence. Impacts are generally minimal, consisting of dirt road travel, target shooting, refuse disposal, animal burrowing, and various other minimal modern activities. As these disturbances were constrained to small areas, wide swaths of the region remain relatively untouched. Soil deflation appears to be an old phenomenon here, and is currently most noticeable on nearby playa or small playettes that dot the landscape. Overall, however, cultural resources were demonstrated to be surficial deposits that retain horizontal integrity but lack substantial subsurface deposits.

Notably lacking from the majority of current evaluated sites (or portions thereof) are other forms of cultural deposits such as midden soils. Potential midden deposits are present at a few sites in the area, indicating some habitation did occur, however these are located outside the APE and were not investigated as part of this study. Thermal features were identified at both evaluated prehistoric archaeological sites, but these are consistent with other features in the region that reflect heat-treatment of local raw material to enhance flaking capabilities for production of stone tools. Hale et al. (2010) evaluated several similar features in the Bissell Hills located to the south on Edwards AFB. Thermal features used to heat-treat lithic material characteristically lack charcoal or other materials suitable for radiocarbon determinations.

Overall, the lack of buried deposits at the prehistoric archaeological sites reduces the opportunity for drawing more meaningful or data-laden associations between assemblage constituents, despite relatively strong integrity of surface manifestations. Thus, integrity alone is not a determining factor when deciding historical significance of an archaeological resource.

Turning to historic period resources, these sites consisted of limited refuse deposits common in the area. In terms of structural integrity, most retained enough integrity to discern that they were generated as single dump events, sometimes of mixed-age materials. Indeed, historic refuse was dominated by sanitary cans and glass fragments that were generally consumed in between 1920 and 1960, or of military rations indicative of short term encampments associated with development of the military installation. Considering the generality of information on historic period resources and inability to contribute to research themes, they were all considered not significant and not eligible under CEQA criteria 1-4 or Section 106 criteria A-D.

6.2 Chronology

With strong integrity of archaeological deposits, chronological associations can add much value to archaeological interpretation. For this reason, archaeological sites that yield chronological information are typically deemed to hold higher scientific value. It is not uncommon for topical evaluations of prehistoric sites to conclude that a particular deposit could be considered significant because of the presence of time-sensitive artifacts or the presence of archaeological deposits that carry the promise of producing radiocarbon dates. The rarity of intact, datable archaeological deposits has somewhat inflated the importance of chronological data when evaluating the historical significance of an archaeological site. Such deposits are critical to evaluation efforts.

Unfortunately, no strong chronological information was obtained for prehistoric archaeological sites. Antiquity is implied at SS-S-10 by the predominance of rhyolite as a lithic raw material, and its spatial proximity to an ancient Late Pleistocene/Early Holocene lakeshore (locally known as Lake Thompson). Rhyolite is the dominant lithic raw material used during the Pinto period and locally, the Lake Mojave period (see Basgall and Overly 2004); both of these time periods predate 7,500 B.P. The association of early hunter-gatherer occupation with post-glacial lakeshores is well known in the Mojave and Great Basin. However, seasonal rains are known to temporarily flood old lake basins and it was not uncommon for hunter-gatherers in the last 1,000 years to exploit seasonally abundant vegetation and small animals that appear with the rains (see Hale et al. 2009; Hale et al. 2010). The thermal features from SS-S-10 and SS-S-30 may reflect at least an early Holocene (pre-7,500 B.P.) occupation, but only circumstantial evidence supports such a claim. The lack of chronological control at evaluated prehistoric archaeological sites further reduces their ability to contribute to regional themes and therefore reduce their value under CEQA Criterion 4 or Section 106 Criterion D.

Historic period refuse deposits, on the other hand, are rich in chronological information with many of the artifacts having datable maker's marks or are of a manufacturing style that dates to a specific period. Hole-in-top cans are one such example of a manufacturing method datable to specific periods. Despite the abundance of chronological information for HPRDs, the lack of diversity in these assemblages reveals little about the individuals who disposed of them. Equally mundane dumps can derive from complex homesites or transients. The matter is further complicated when considering homesite cleanup; subsequent home occupants often clean up and dispose of rubbish in locations distant to the home and this patter was exacerbated with the advent of the automobile (see Giambastiani et al. 2006). Without other identifying information, datable historical rubbish provides little more than face-value of the artifacts. Extending artifact manufacture dates to consumption dates and disposal dates is even more problematic. For these reasons, evaluated HPRDs did not have values consistent with significance under CEQA Criterion 4 or Section 106 Criterion D.

6.3 Settlement and Site Deposition

As with any archaeological evaluation, research issues postulated in advance of fieldwork have mixed success in their applicability to the recovered assemblage, particularly in terms of the kinds of data that could be generated and attendant questions that can be addressed. There is no departure from this pattern with current Proposed Project sites that yielded only a few handfuls of artifacts that can be leveraged to speak to major settlement and subsistence questions.

The prehistoric assemblage from evaluated prehistoric sites is dominated by lithic reduction debris (i.e., debitage and cores) with modest amounts of crude flakedstone tools (i.e., chopping/pounding core and flake tools). Locally abundant rhyolite stone is available on the surface of nearby buttes, which acted as incipient or opportunistic lithic raw material quarries. Within the APE, prehistoric stone quarrying is identifiable primarily by the appearance of local rhyolite cobbles quarried from nearby buttes.

Evaluation efforts were flexible, aimed at collecting a representative sample of flaked lithic debris. As it turned out, the amount of flaked lithic debris encountered was low, consisting only of several hundred pieces of debitage, and as a result, generating a large enough sample to speak to research issues was made difficult. The evaluation program resulted in the conclusion that the area was targeted for an unknown period of time by aboriginal occupants who opportunistically took rhyolite from nearby exposures, subject them to heat, split them to assay quality, and sometimes further reduced cobbles and flakes into cobble or flake-based tools, though not to any great degree. The analysis of debitage confirms this assertion, with large amounts of cortical and early interior debitage, and only trace amounts of debitage that could have resulted from tool edge finishing, including late interior, biface thinning, and pressure flakes. Indeed, smaller flakes indicative of tool manufacture or repair were almost all cryptocrystalline silicate, rather than rhyolite.

The stone tool analysis indicates that discernable stone tools include unmodified flakes (simple flake tools) and minimally retouched flakes with essentially no formed flake tools. Cobble based chopping and hammering tools were used to reduce cobbles and small outcrops completing a picture of a lithic toolkit intended for the production of flakes either for immediate local use or for transport of smaller, more suitable raw material blanks to other locations. Expedient lithic tool production and use is a common pattern in the Mojave, and is a technique available to hunter-gatherers that balances access costs to high-quality raw materials with the efficiency of using lower-quality local raw materials (Basgall and Overly 2004; Hale et al. 2009).

In context of immediately local archaeological studies, the current prehistoric site evaluations did not result in the identification of any new archaeological patterns, but confirmed an existing understanding of local lithic reduction. That more variety is seen in adjacent areas is probably due to more regular aboriginal occupation of those areas.

Lithic quarrying evidenced at SS-S-10 and SS-S-30 contributes little more than confirmation of regional trends better documented at other local sites and in the western Mojave Desert in general. For this reason, there are no significant patterns identified at these sites that could lead to a recommendation of eligibility under CEQA Criterion 4 or Section 106 Criterion D.

6.4 Summary

The thematic considerations explored in this chapter indicate that archaeological sites within the project APE lack significant deposits for various reasons, but primarily due to low data potential; a factor affecting eligibility determinations under CEQA Criterion 4 and Section 106 Criterion D. Prehistoric sites notably lacked chronological control, diversity, and substantive archaeological deposits. Also sparse, historic period refuse deposits could be assigned to a range of manufacture dates but lacked enough variety to contribute to a regional understanding of material goods consumption and refuse disposal in the local area and broader region.

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7 FINDINGS AND RECOMMENDATIONS

A total a total of 49 resources (33 previously-recorded and 16 newly recorded) were identified within the project APE. These resources included 18 isolates, 22 archaeological resources, and 9 built environment resource. It was determined that 7 of these 49 resources would potentially be impacted by the proposed project. By definition, archaeological isolates are not eligible as significant resources under the CRHR or the NRHP and no further work is necessary in regards to these. Table 12 provides an overview of all identified impacts to resources and any associated mitigation measures necessary to reduce impacts.

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
East-West (E-W)	003528	Unnamed road	Historic	7R (Identified in Survey; Not evaluated)	The road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact No mitigation required
E-W	003534	Unnamed road	Historic	7R (Identified in Survey; Not evaluated)	The road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact No mitigation required
E-W	003537	Oak Creek Road	Historic	7R (Identified in Survey; Not evaluated)	Oak Creek Road has not been fully evaluated; however, all activities will be limited to crossing the road during	No impact/adverse effects No mitigation required

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
					construction and maintenance. Provided the road is not altered during these activities there are no impacts.	
E-W	003549	Los Angeles Aqueduct	Historic	2B (Determined eligible)	The Aqueduct was determined eligible listing in the NRHP with concurrence from the state historic preservation office; however, the construction of transmission towers will not impact the resource.	No impact/adverse effects No mitigation required
E-W	003929	Los Angeles-Owens River Road	Historic	3D (Appears eligible as contributor)	Los Angeles-Owens River Road has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
E-W	012716	Borrow pit and structural remains	Historic	7R (Identified in Survey; Not evaluated)	The site may be destroyed through ground disturbance during project implementation.	Impacts are not significant/ no adverse effects No mitigation required
E-W	013683	Isolate: flake	Prehistoric	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	013814	Isolate: can	Historic	6Z (Found ineligible through survey	The isolate is ineligible by definition; therefore	No impact/adverse effects

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
				evaluation)	no impact	No mitigation required
E-W	013963	Isolate: can and steel bucket	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	014700	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	014701	Quarry or prospect site	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	015544	1934 Survey Marker	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	017096	Trash scatter of cans and glass	Historic	6Z (Found ineligible through evaluation)	The site may be destroyed during construction	No significant impacts/no adverse effects No mitigation is required

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
E-W	017097	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	017098	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	017119	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	017121	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	017305	State Route 14/Aerospace Highway	Historic	7R (Identified in Survey; Not evaluated)	State Route 14 has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
E-W	018681	LADWP Owens Gorge 230kV transmission line	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
					avoided.	resource will be required
E-W	SS-I-04	Isolate: lithic	Prehistoric	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W	SS-S-11	Trash scatter of cans	Historic	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
E-W	SS-I-14	Isolate: glass	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
E-W, North-South (N-S) Option 1	002050/ 003366/ 000560/ 017333	Union Pacific Railroad and associated spurs	Historic	3CD (Appears eligible for CR as contributor)	The site has not been fully evaluated; however, the construction of transmission towers will not impact the resource.	No impact/adverse effects No mitigation required
N-S Option 1	SS-S-10	Lithic scatter	Prehistoric	Evaluated as eligible for CRHR listing under Criterion 4 and NRHP listing under Criterion D for archaeological values	Archaeological deposits from the site in the APE are not significant; Significant deposits at the site are located outside of the APE and will not be impacted. The project will disturb sediments within the portions of the site within the APE	No significant impacts/no adverse effects No mitigation is required because significant deposits are located outside of the APE
N-S Option 1	SS-S-23	Trash scatter of cans	Historic	6Z (Found ineligible through evaluation)	The site may be destroyed during construction	No significant impacts/no adverse effects No mitigation is required

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
N-S Option 1	SS-S-30	Lithic scatter	Prehistoric	6Z (Found ineligible through evaluation)	The site may be destroyed during construction	No significant impacts/no adverse effects No mitigation is required
N-S Option 2	013801	Trash scatter of metal, glass, butchered bone	Historic	6Z (Found ineligible through evaluation)	The site may be destroyed during construction	No significant impacts/no adverse effects No mitigation is required
N-S Option 2	013802	Trash scatter of glass	Historic	6Z (Found ineligible through evaluation)	The site may be destroyed during construction	No significant impacts/no adverse effects No mitigation is required
N-S Option 2	013806	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	013807	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	013808	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	013809	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	013810	Isolate: bottle base	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 2	013811	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
N-S Option 2	013812	Isolate: can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3	000807	Lithic scatter	Prehistoric	7R (Identified in Survey; Not evaluated)	The site has not been fully evaluated; however, no impact would occur if the resources were fully avoided.	No impact/adverse effects if avoided. If avoidance is not feasible, complete evaluation of the resource will be required
N-S Option 3	004763	Sierra Highway	Historic	7R (Identified in Survey; Not evaluated)	Sierra Highway has not been fully evaluated; however, all activities will be limited to crossing the road during construction and maintenance. Provided the road is not altered during these activities there are no impacts.	No impact/adverse effects No mitigation required
N-S Option 3	004764	Isolate: lithic core	Prehistoric	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3	004765	Isolate: Glass insulator	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3*	SS-I-15	Isolate: Can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3*	SS-I-16	Isolate: Can	Historic	6Z (Found ineligible through survey evaluation)	The isolate is ineligible by definition; therefore no impact	No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-31	Trash scatter of cans and	Historic	7R (Identified in Survey; Not	Trash scatter of cans and glass	Option removed from consideration

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
		glass		evaluated)		No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-32	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	Trash scatter of cans and glass	Option removed from consideration No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-33	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	Trash scatter of cans and glass	Option removed from consideration No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-34	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	Trash scatter of cans and glass	Option removed from consideration No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-35	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	Trash scatter of cans and glass	Option removed from consideration No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-36	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	Trash scatter of cans and glass	Option removed from consideration No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-37	Trash scatter of cans and	Historic	7R (Identified in Survey; Not	Trash scatter of cans and glass	Option removed from consideration

Table 12
Archaeological Site Management Recommendations

APE Component	Primary Number (P-15-)	Site Type	Time Range	Significance/ Eligibility Status	Impact	Recommendation/ Mitigation Measures
		glass		evaluated)		No impact/adverse effects No mitigation required
N-S Option 3*	SS-S-38	Trash scatter of cans and glass	Historic	7R (Identified in Survey; Not evaluated)	Trash scatter of cans and glass	Option removed from consideration No impact/adverse effects No mitigation required

7.1 Impact Analysis and Project Effects

Of the 31 archaeological or built environment resources that were identified within the APE, one (P-15-003549/CA-KER-3549H: Los Angeles Aqueduct) has been determined eligible for listing in the CRHR/NRHP and three (SS-S-10: prehistoric site; P-15-003929/CA-KER-3929H: LA-Owens River Road and P-15-002050/P-15-003366/P-15-000560/CA-KER-2050H: Union Pacific Railroad) appear eligible for the CRHR and NRHP through survey evaluation (see Table 12).

Implementation of any project option, however, would not result in significant impacts or adverse effects any of these CRHR or NRHP listed or eligible cultural resources. The gen-tie line would span the historic built environment resources, with towers placed systematically to ensure avoidance. At prehistoric site SS-S-10, no significant archaeological deposits were identified within the transmission line APE; all significant components of this site are located well outside of the limits of project disturbance. As a result, the construction of a gen-tie would not degrade the character-defining qualities of the significant resources or materially alter their physical components.

Isolated finds by definition; however, are not sites and therefore not eligible for inclusion in the CRHR or NRHP. As a result, no impacts will occur to the 16 isolated finds (14 previously recorded and 2 newly recorded).

7.1.1 Unavoidable Impacts/Effects

Implementation of the proposed project will result in unavoidable impacts to seven (7) archaeological resources: prehistoric sites SS-S-10 and SS-S-30, and historic period refuse deposits (P-15-012716, P-15-013801, P-15-013802, P-15-013807, P-15-017096, SS-S-11, and SS-S-23). Each of these impacted sites was evaluated for significance and eligibility for listing in the CRHR and NRHP. SS-S-10 is recommended eligible under CEQA Criterion 4 and Section 106 Criterion D for archaeological deposits that hold scientific value. However, the significance-conveying deposits at SS-S-10 are located outside of the project APE and will not be impacted. Impacted portions of SS-S-10 do not contain significant deposits and therefore, there will be no significant impacts or adverse effects to SS-S-10.

The remaining six evaluated sites (SS-S-30, P-15-012716, P-15-013801, P-15-013802, P-15-013807, P-15-017096, SS-S-11, and SS-S-23) are recommended as not significant and not eligible for CRHR or NRHP listing under any significance criteria. Therefore, implementation of the project will not have a significant impact or adverse effect on these sites.

No other cultural resources will be impacted by implementation of the project and will be avoided in place. If changes to project design occur and avoidance is not feasible for any or all of the unevaluated resources, further work will need to be completed to determine the significance of the newly identified impacted resources and the significance of impacts.

7.1.2 Significant Impacts/ Adverse Effects

Implementation of the project will not have a significant impact or adverse effect on any of the cultural resources identified within the APE. Impacts to seven archaeological sites within the APE are not significant and do not constitute an adverse effect.

Avoidance of impacts is feasible for all other identified cultural resources within the APE. Should project implementation be unable to avoid these resources, the project would have the potential to significantly impact the resources under CEQA, and have the potential for an adverse effect under Section 106 of the NHPA. Under that scenario, newly identified impacts to unevaluated resources would require significance evaluation to determine the impacted resource's potential eligibility under CEQA and Section 106, prior to determining the significance of those impacts and proposing mitigation. Likewise, newly identified impacts to the significance-conveying elements of resources identified as eligible for CRHR or NRHP listing would require resource-specific mitigation.

7.1.3 Further Considerations

North–South Gen-Tie Route Options 1 and 3 traverse a depositional environment where the likelihood of encountering significant subsurface deposits is relatively higher than in neighboring areas. Therefore, there is a moderate potential for encountering significant buried archaeological deposits during earth-moving activities for project implementation. Such inadvertent discoveries would result in a significant impact under CEQA or adverse effect under Section 106 of the NHPA if such resources were found to be significant due to damage incurred during the discovery and evaluation process.

Furthermore, there is always the potential to discovery human remains and grave goods during project implementation. Such discoveries would also be considered a significant impact under CEQA and an adverse effect under Section 106 of the NHPA.

7.2 Management Recommendations

Three resources that are eligible for or listed in the CRHR and NRHP are within the APE (P-15-003549/CA-KER-3549H/Los Angeles Aqueduct, P-15-003929/CA-KER-3929H/LA-Owens River Road, and P-15-002050/P-15-003366/P-15-000560/CA-KER-2050H/Union Pacific Railroad). The gen-tie line would span across these resources, with towers placed systematically to ensure avoidance. As a result, implementation of any project option would not result in significant impacts or adverse effects to any of these resources. No further work is warranted on these resources.

Prehistoric site SS-S-10 is recommended eligible for its scientific research value under CEQA Criterion 4 and Section 106 Criterion D. However, none of the significance-conveying deposits identified at this site are located within the project APE. Therefore, implementation of the project will not have a significant impact or adverse effect on SS-S-10. Should avoidance of the significant deposits at SS-S-10 become infeasible, impacts will be considered significant and mitigation in the form of archaeological data recovery is recommended.

The project avoids all other cultural resources identified in the APE. In the event that the project design changes and avoidance becomes infeasible, formal significance evaluation is recommended to determine the significance of newly impacted resources, and to determine appropriate mitigation for those found to be significant under CEQA or Section 106. .

Cultural resources monitoring is recommended during earth-moving activities associated with project implementation within 500 feet of known cultural resources, and on an occasional (spot check) basis to ensure that inadvertent discoveries are properly treated. A cultural resources monitoring plan should be developed in conjunction with the project proponent and lead agencies to guide monitoring activities and delineate the locations and intensity of monitoring.

In accordance with Section 7050.5 of the California Health and Safety Code, if human remains are found, the County coroner shall be immediately notified of the discovery. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the County coroner has determined, within two working days of notification of the discovery, the appropriate treatment and disposition of the human remains. If the County coroner determines that the remains are, or are believed to be, Native American, he or she shall notify the NAHC in Sacramento within 24 hours. In accordance with California Public Resources Code, Section 5097.98, the NAHC must immediately notify those persons it believes to be the most likely descendant from the deceased Native American. The most likely descendant shall complete their inspection within 48 hours of being granted access to the site. The designated Native American representative would then determine, in consultation with the property owner, the disposition of the human remains.

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CONFIDENTIAL
APPENDIX A
Resource Location Maps

Redacted from Public Version

CONFIDENTIAL APPENDIX B

Department of Parks and Recreation Series 523 Forms

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APPENDIX C
Records Search Results

Redacted from Public Version

B9. Geology and Soils Report

Los Angeles County

25050 Avenue Kearny, Suite 110A
Santa Clarita, California 91355
T: 661.255.5790 F: 661.255.5242

July 20, 2012
J.N. 247-12

Mr. Bruce R. Grove, Jr.
RBF CONSULTING
4540 Duckhorn Drive, Suite 202
Sacramento, California 95834

Subject: Preliminary Geologic Hazards and Soils Report, Proposed Solar Power Site, *Oro Verde Project*, Edwards Air Force Base, Kern County, California

Dear Mr. Grove:

The following preliminary geologic hazards and soils report presents our findings and opinions with respect to a proposed solar power site (*Oro Verde Project*), located at the northwest corner of Edwards Air Force Base south of the Mojave and northeast of Rosamond, Kern County, California. The proposed project consists of the construction of an up to 450 megawatt solar photovoltaic facility. A 230 kilovolt transmission line with an associated fiber optic communication line is proposed to connect the facility to the existing Southern California Edison's Windhub Substation, approximately 13.5 miles to the northwest.

The purpose of this study is to identify potential geologic hazards and soil conditions that may affect the property and proposed development and to provide discussion related to the general feasibility and environmental impacts of the proposed project in accordance with the California Environment Quality Act (CEQA) and the National Environmental Policy Act (NEPA). This preliminary geologic hazards and soil report is based on our review of published geologic reports and maps, geologic reconnaissance of the site area (access to the site/Edwards Air Force Base was not available during our study), and our previous experience with other projects in this area.

LOCATION AND SITE DESCRIPTION

The proposed solar power site consists of approximately 6,000 acres within the Mojave Desert approximately 6 miles south of Mojave and approximately 4 miles north of Rosamond, Kern County, California (see Figure 1). The site comprises Sections 13, 14, 23, 24 and portions of Sections 15, 22 and 27 of Township T.10 N. and Range R.12W., SBBM and Sections 17, 18, 19 and portions of 15, 16 and 20 of Township T.10 N. and Range R.11W., SBBM. The site is bounded on the north by Trotter Avenue and on the west by Lone Butte Road, where fences exist along the air force base boundary. Several existing unimproved roads provide access to the area within the air force base.

The site is located near the western edge of the Mojave Desert. The topography of the site is gently sloping to the east. Based on information shown on the published U.S, Geological Survey (USGS) topographic map for the area, elevations range from approximately 2,550 feet above mean sea level along the western edge of the site, to approximately 2,450 feet above mean sea level at the northeast corner. The property is currently undeveloped and typical Mojave Desert vegetation, such as creosote, shadscale and Joshua trees, covers the site. The surrounding land is primarily undeveloped desert land, although low density residential development is located outside of the base to the north and west.

FINDINGS

Regional Geology

The proposed solar power site is located within the Mojave Desert geomorphic province. The Mojave Desert geomorphic province is a broad interior region of isolated mountain ranges separated by desert plains and basins. The western Mojave Desert is a wedge-shaped structural block bounded on the north by the Garlock fault and along the southwest by the San Andreas fault. North of the Garlock fault are the Sierra Nevada and Tehachapi Mountains. Southwest of the San Andreas fault are the Transverse Ranges and coastal basins.

Typical lithographic units within the western Mojave Desert consist of pre-Tertiary crystalline rocks, Tertiary sedimentary and volcanic rocks, and Quaternary sediments and volcanics. The pre-Tertiary crystalline bedrock is predominantly of plutonic origin with limited exposures of metamorphic rock. The Tertiary sedimentary rocks are largely terrestrial deposits and include sandstone, shales, conglomerates, and volcanics that were deposited within intermontane basins that typically were of limited areal extent. The Quaternary sediments vary from coarse-grained fanglomerates to fine-grained playa deposits that were derived from the adjacent mountains and hills.

Geomorphology

The site is situated within a relatively flat alluvial plain where the drainage is towards the east. Only minor drainage channels are located within the project area (Meyers and Bowers, 2000). The alluvial plain is surrounded by low hills, including the Rosamond Hills to the south and the Bissell Hills to the east. Several isolated hills are located to the west and north of the site, including Soledad Mountain, Sanborn Hill, Brown Butte and De Stego Hill (see Figure 1).

Local Geology

Quaternary alluvium underlies the site (see Figures 2 and 3), although an isolated outcrop of granitic rock (quartz monzonite) is exposed on a knoll near the western edge of the site (see Figure 3). Granitic rock exposures, or shallow granitic rock, may also be present along the eastern edge of the site, near the Bissell Hills.

Based on observations from the edge of the site, the alluvium consists of silty sand, although finer grained soils may exist in the central, relatively flat portions of the site. Variable carbonate cementation is also likely to be present. The U.S. Department of Agriculture, National Resource Conservation Service (NRCS), has designated the soils on the site as DeStazo complex- 0 to 5 percent slopes, (northern edge of the site); Cajon loamy sand – 0 to 2 percent slopes (most of the southern portion of the site; and Leuhman complex – 0 to 2 percent slopes (west-central part of the site). A small area of the Helendale-Cajon complex – 2 to 5 percent slopes is mapped near the southwest corner of the site. The general characteristics of these soil types are summarized below, based on information from the National Resources Conservation Service.

Table 1
Soil Characteristics and Location in Project Area

Soil Name (Symbol)	Drainage Characteristics	Shrink-Swell Behavior	General Project Location
DeStazo Complex 0 - 5% slopes	Well drained, negligible to medium runoff	Low to Moderate	Northern portion
Cajon loamy sand 0 - 2% slopes	Well drained, Negligible to low runoff	Low	Southern portion
Leuhman Complex 0 - 2% slopes	Moderately well drained, Low runoff	Moderate*	West-central portion
Helendale-Cajon Complex 2 - 5% slopes	Well drained, Low runoff	Low*	Southwestern corner

Source: NRCS (2012), Valverde and Hill (1981)
Notes: * not described by Valverde and Hill (1981): shrink swell behavior based on soil description only

Faults-Geologic Structure

No known active or potentially active faults exist on the site. A buried northeast trending fault is shown to traverse into the northwest corner of the site (see Figure 3). This fault is based on the projected faulted contact between granitic rocks and volcanic rocks approximately 3 miles to the southwest in the Rosamond Hills (see Figure 2).

Groundwater

The site is situated in the Gloster Subbasin of the Antelope Valley Groundwater Basin (see Figure 4). The Gloster Subbasin is separated from larger portions of the Antelope Valley Groundwater Basin by bedrock highs, including the Rosamond and Bissell Hills south and east of the site. These bedrock barriers contribute to a more shallow depth to groundwater compared to deeper levels in the Antelope Valley south of the site. A well with a Department of Water Resources (DWR) record (Well No. 10N12W22J001S), is located in the western portion of the site (see Figure 1). This well had a depth to water of approximately 49 feet below the surface in 2010. The shallowest record from this well was 33 feet in 1956. Several additional wells nearby the site are also shown on Figure 1.

GEOLOGIC HAZARDS

The following section discusses various potential geologic hazards with respect to the proposed solar power site. The issues addressed include risks associated with active faults, strong seismic ground shaking, seismic-related ground failure such as liquefaction, landslides, subsidence, and flooding.

Fault Rupture

The site is not located within a currently delineated State of California Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2007). In addition, no known active or potentially active faults have been identified on the site. Therefore, the potential for active fault rupture is considered to be very low. The corridor between the project site and the Windhub Substation located northwest of the site, through which the connecting transmission line and a communication line is proposed, is also free from known active or potentially active faults.

According to State of California fault definitions (Bryant and Hart, 2007), an "active" fault has had displacement within the Holocene epoch or last 11,000 years. A "potentially active" fault is a fault that does not have evidence of movement within the last 11,000 years, but has moved within Quaternary period, the last 2.6 million years. "Potentially active" faults are not placed within Alquist-Priolo

Earthquake Fault Zones, but are considered when placing such critical structures as dams and nuclear power plants, etc.

Seismic Shaking

The site is located within an active tectonic area with several significant faults capable of producing strong earthquakes (see Figure 5). The closest known active fault is the northeast trending Garlock fault, located approximately 11 miles northwest of the site. Other important regional faults include the San Andreas, located approximately 22 miles southwest of the site, and the White Wolf fault, located approximately 32 miles to the west. The west Mojave Desert area contains several northwest trending right lateral strike-slip faults that could also affect the site area. These faults are discussed further below.

Garlock Fault

The Garlock fault extends eastward from its point of intersection with the San Andreas fault, near Lebec, for a distance of approximately 150 miles. The fault is located approximately 11 miles northeast of the project site. The Garlock fault zone is a prominent geologic feature in southern California, and marks the northern boundary of the Mojave Block, as well as the southern ends of the Sierra Nevada and the valleys of the westernmost Basin and Range province. While no earthquake has produced surface rupture on the Garlock fault in historic times, there have been a few sizable quakes recorded along the Garlock fault zone. The most recent was a magnitude 5.7 near the town of Mojave on July 11, 1992. It was believed to have been triggered by the Landers earthquake, just two weeks earlier. At least one section of the fault has shown movement in recent years. This is an active fault capable of damaging the area.

San Andreas Fault

The San Andreas Fault is located approximately 22 miles southwest of the project site. The fault is the most prominent fault in the State of California and is approximately 650 miles in length, reaching from the Mendocino Escarpment on the north to the Imperial Valley to the south. Along this extent, the San Andreas is considered to be the boundary between the North American Plate and the Pacific Plate. The last great earthquake on this segment was the 1857 Fort Tejon earthquake, which is believed to have caused a rupture extending 200 miles or more. Geologists consider this fault as having the potential to generate an earthquake of magnitude of approximately 8.0 on the Richter scale. This is an active fault capable of strong earthquake in the region.

Mojave Desert Northwest Trending Faults

Northwest trending right lateral strike-slip faults are fairly common in the western Mojave Desert. A group of relatively small northwest trending faults is located 9 miles southwest of the site, including the Tyler Horse, Willow Springs and Cottonwood faults. These faults are considered potentially active. However, given their size, they may not produce earthquakes as large as a group of more prominent northwest-trending right lateral faults located east of the site (see Figure 5). These include the Lockhart fault (23 miles northeast of the site), the Mirage Valley fault (18 miles to the southeast), the Leuhman-Kramer Hills fault (18 miles to the east) and the Blake Ranch fault (21 miles to the southeast). These faults may be capable of generating earthquakes similar to the 1999 Hector Mine and the 1992 Landers earthquakes.

White Wolf Fault

The White Wolf fault is a southeast dipping, left-lateral, oblique, reverse fault with a length of approximately 45 miles. This fault is located approximately 32 miles west of the site. The fault traverses the southeastern end of the San Joaquin Valley, from Wheeler Ridge to northeast of Caliente. On July 21, 1952, the White Wolf fault ruptured, producing an earthquake of magnitude 7.5 and subsequently an extensive sequence of aftershocks. Although surface rupture formed along only 17 miles of the surface trace of this fault, rupture probably occurred along most of its length. The magnitude 7.5 of 1952 on the White Wolf Fault has been the only event in historic time.

The faults discussed above, as well as other regional faults, contribute to the potential ground shaking at the subject site. Based on probabilistic analysis from the California Geological Survey, peak ground acceleration at the site is estimated to be approximately 0.31g (based on 10% probability of being exceeded in 50 years). This probability analysis takes into account the earthquake histories; slip rates, and potential earthquake magnitudes of significant regional faults. The proposed project will be constructed in conformance with the California Building Standards Code (CBC) in order to minimize seismic impacts.

Table 2
Significant Historical Earthquakes

Historical Earthquake	Approximate Epicentral Distance from Project Site (mi)	Moment Magnitude (Mw)
Hector Mine (Oct. 16, 1999)	105	7.1
Northridge (January 17, 1994)	55	6.7
Landers (June 28, 1992)	107	7.6
Big Bear (June 28, 1992)	89	6.7
San Fernando (Feb. 9, 1971)	41	6.4
Kern County (July 21, 1952)	52	7.7
Lone Pine (March 26, 1872)	119	7.8
Fort Tejon (January 9, 1857)	98	7.9
Wrightwood (Dec. 8, 1812)	48	7.0

Secondary Effects of Seismic Activity

Secondary effects of seismic activity normally considered as possible hazards to a site include liquefaction, lateral spreading, several types of ground failure, and earthquake-induced flooding. These potential hazards are discussed further below.

Liquefaction and Lateral Spreading

Loosely compacted/deposited granular soils located below the water table can fail through the process of liquefaction during strong earthquake-induced ground shaking. When solid particles in a saturated soil consolidate into a tighter package as a result of vibration due to an earthquake, the non-compressible pore water between the particles will be squeezed out. If the soil has a high permeability, a sufficient amount of water will drain out of the pores. However, the permeability is relatively low, then the water will not be able to drain away quickly enough and positive excess pore water pressures will build up. When excess pore water pressures build up, they reduce the effective stresses acting on the soil and, in turn, reduce the shear strength of the soil. If the pore water pressure rises to a level such that the shear strength of the soil becomes relatively negligible, then liquefaction is said to have occurred. Factors known to influence liquefaction potential include soil type and depth, grain size, relative density, ground-water level, degree of saturation, and both intensity and duration of ground shaking.

Historically shallow groundwater (less than 50 feet deep) is present at the site. As a result, there is a potential for liquefaction at the site. The potential for liquefaction should be evaluated as a part of a detailed geotechnical investigation.

Lateral spreading is associated with liquefaction where extensional ground cracking and settlement occur as a result of lateral migration of subsurface liquefiable material. Lateral spreading typically occurs adjacent to free faced, such as slopes and drainage channels. Based on the flat topography of the site, the potential for lateral spreading is unlikely.

Seismically Induced Ground Failure and Landslides

Various general types of ground failures, which might occur as a consequence of severe ground shaking at the site, include landsliding, ground subsidence, and ground lurching. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, subsoils and groundwater conditions, in addition to other factors. Based on the site conditions and gently sloping topography, the above secondary effects of seismic activity are considered unlikely at the site.

Seismically Induced Flooding

Seismically induced flooding that might be considered a potential hazard to a site normally includes flooding due to tsunami or seiche (i.e., a wave-like oscillation of the surface of water in an enclosed basin that may be initiated by a strong earthquake) or failure of a major reservoir or retention structure upstream of the site. No major reservoir is located near, or upstream of the site so the potential for seiche or inundation is considered negligible. Because of the inland location of the site, flooding due to a tsunami is also considered non-existent at the site.

Landslides and Slope Instability

No landslide is expected to exist on the site. Based on the relatively flat to gently sloping topography over most of the site, the potential for slope instability is considered non-existent.

Areal Subsidence

The site is not located in an area with potential for ground subsidence due to withdrawal of fluids.

Expansive Soils

Expansive soils generally result from specific clay minerals that expand in volume when saturated and shrink in volume when dry. Based on the sandy alluvium at the site, the potential for expansive soil at the site is considered to be low. However, based on NRCS soil description, soils in the west-central portion of the site may contain some clay and may have a higher potential for expansion.

Flooding and Erosion

No major drainage channels are located on the site. Sheet flooding and local erosion can be expected to occur at the site. The potential for flooding exists within the minor drainage courses within the site. A study by Meyer and Bowers (2000) of Edwards Air Force Base identified a limited area of potential channel flooding in the western part of the project site.

The sandy alluvial soils on the site are subject to erosion, by water and wind, as described by the NRCS (2012). However, the generally well drained nature of the soils may limit the potential for runoff from undisturbed onsite soils. A detailed evaluation of soil erosion potential will be required during design phase geotechnical investigations

CONCLUSIONS AND RECOMMENDATIONS

Based on our preliminary assessment of the potential geologic hazards and soil conditions, the Oro Verde Solar Project is underlain primarily by alluvial soils that do not appear to present significant geologic/geotechnical issues relative to the feasibility of the proposed project. Further studies, however, are necessary to accurately define some impacts at to design appropriate mitigation. The following summarizes the primary geologic and geotechnical issues that could affect the site as well as possible mitigation, if required.

Fault Rupture

No known active or potentially active faults have been identified on the site. The potential for active fault rupture is considered to be very low. No mitigation required.

Seismic Shaking
The site is situated in an active seismic area. The nearest and most significant fault in the area is the Garlock Fault, located approximately 11 miles northwest of the site. Moderate seismic shaking is anticipated, which is estimated to be approximately 0.31 g (based on 10% probability of being exceeded in 50 years). A more detailed study will be required at the design stage of the project to analyze the potential seismicity according to the current Kern County Building Code. Based on that study, appropriate recommendations will be incorporated into the final project plans.

Liquefaction - Seismic Ground Deformation
Based on the presence of historic groundwater less than 50 feet deep, there is a potential for liquefaction to occur on the site. Site investigation, including subsurface exploration, is necessary to define the actual liquefaction potential at the site. Based on the flat topography of the site, other potential seismically induced ground deformation is considered to be low.

Landslides
Based on the relatively flat to gently sloping topography over most of the site, the potential for slope instability is considered negligible. No mitigation is necessary.

Geotechnical Issues
Geotechnical issues, such as loose upper soils, expansive soils and erodible soils, that affect the site can be successfully mitigated with site specific investigations and their implementation during project construction. Such investigation would include subsurface exploration, laboratory testing and geotechnical analysis. In addition, civil engineering/hydrologic studies are required to account for the potential flooding issues that occur on the site.

REPORT LIMITATIONS

This report is based solely on the results of our reconnaissance of the site area (not the site itself), and our review of the referenced reports and literature. The conclusions and recommendations contained in this report are presented on that basis.

This report has been prepared consistent with the level of care being provided by other professionals providing similar services at the same locale and in the same time period. This report provides our professional opinions and, as such, they are not to be considered a guaranty or warranty.

This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

We sincerely appreciate this opportunity to be of service. Please do not hesitate to call the undersigned if you have any questions regarding this report.

Respectfully submitted,

PETRA GEOTECHNICAL, INC.

Daniel C. Schneidereit	Siamak Jafroudi, PhD
Associate Geologist	Senior Principal Engineer
CEG 1621	GE 2024

DCS/SJ/kg

Attachments: References
Figure 1 – Location Map
Figure 2 – Geologic Location Map
Figure 3 – Geologic Map
Figure 4 – Antelope Valley Groundwater Basin
Figure 5 – Regional Fault Map

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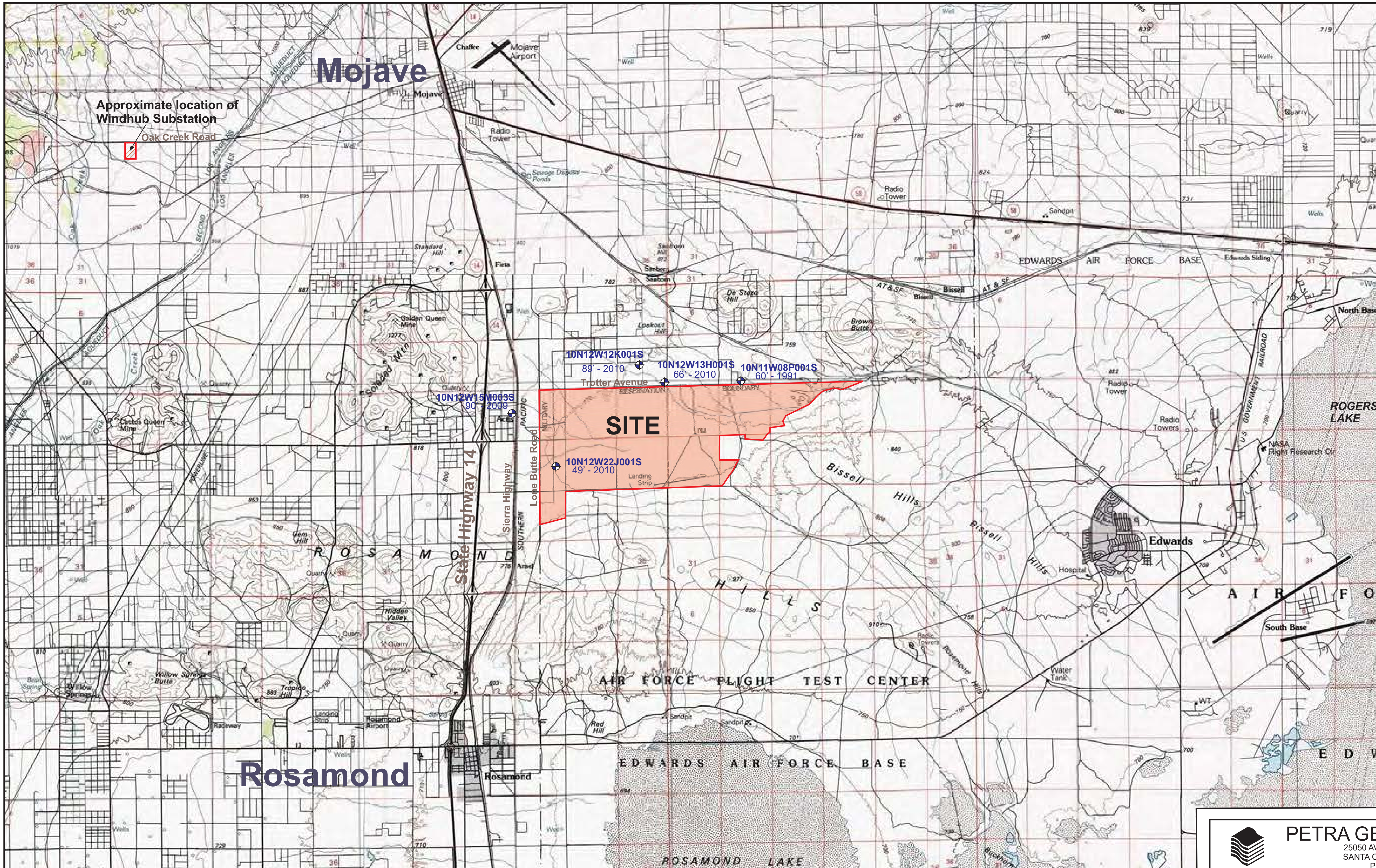


10N12W22J001S
49' - 2010

Well with available DWR record, indicating depth to groundwater and year of record

Approximately 1 Mile

N

Base map: USGS Lancaster, Victorville, Cuddyback Lake and Tehachapi, California 30X60 minute quadrangles

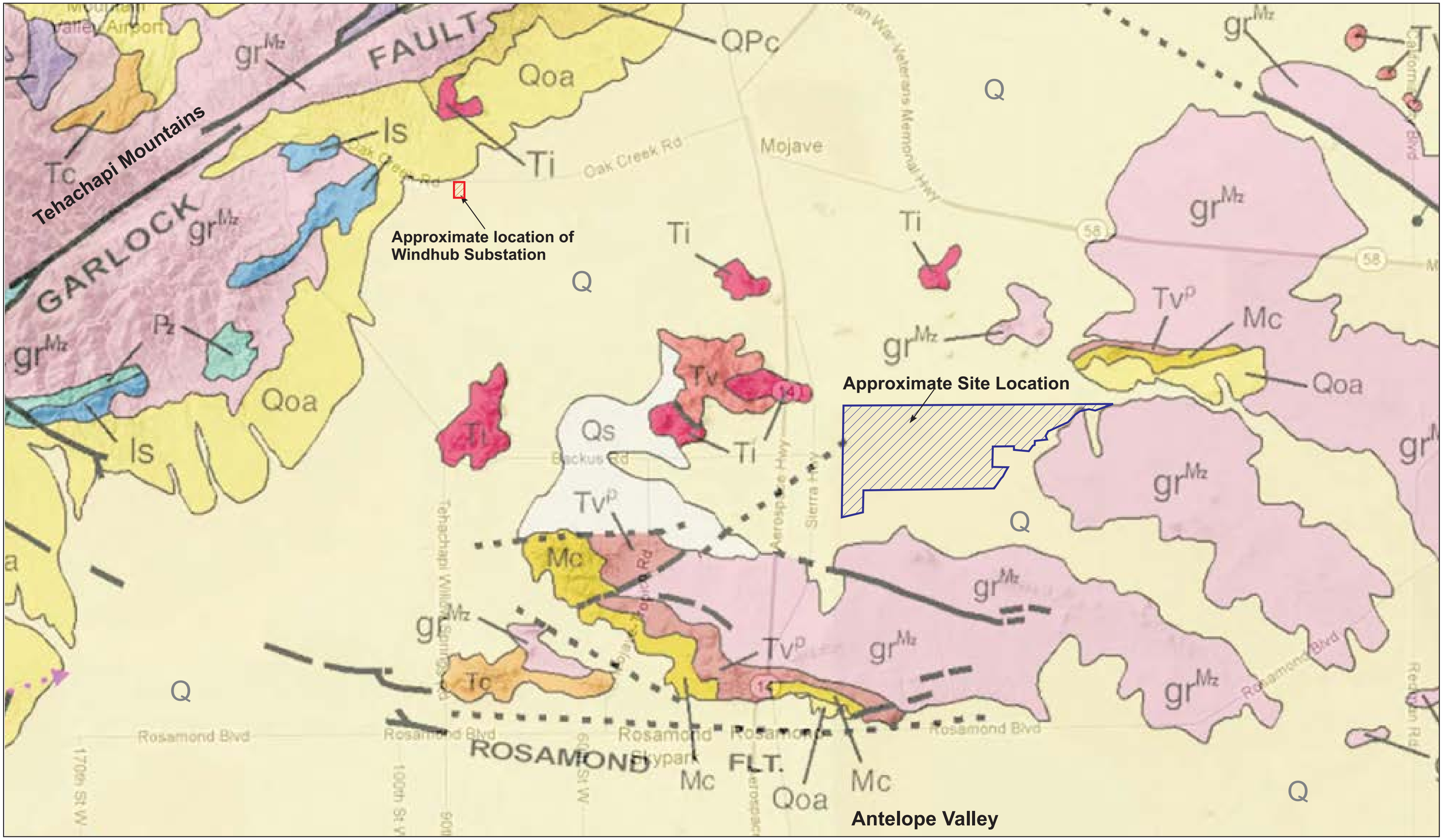
PETRA GEOTECHNICAL, INC.
25050 AVENUE KEARNY, SUITE 110A
SANTA CLARITA, CALIFORNIA 91355
PHONE: (661) 255-5790

COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

LOCATION MAP

ORO VERDE SOLAR PROJECT
KERN COUNTY, CALIFORNIA

DATE: July 2012	J.N.: 247-12	Figure 1
DWG BY: DCS	SCALE: 1" = ~2 miles	



Source: Gutierrez and others, 2010

Q	Quaternary sand
Qs	Quaternary alluvium
Qoa	Quaternary older alluvium
Mc	Miocene sedimentary rocks
Tv	Tertiary volcanic rocks
Ti	Tertiary intrusive rocks
Tc	Tertiary sedimentary rocks
gr^{Mz}	Mesozoic granitic rocks
ls	Paleozoic limestone
Pz	Paleozoic rocks, undifferentiated

LEGEND

Geologic contact

Fault
(Dashed where approximately located or infered; Dotted where concealed)

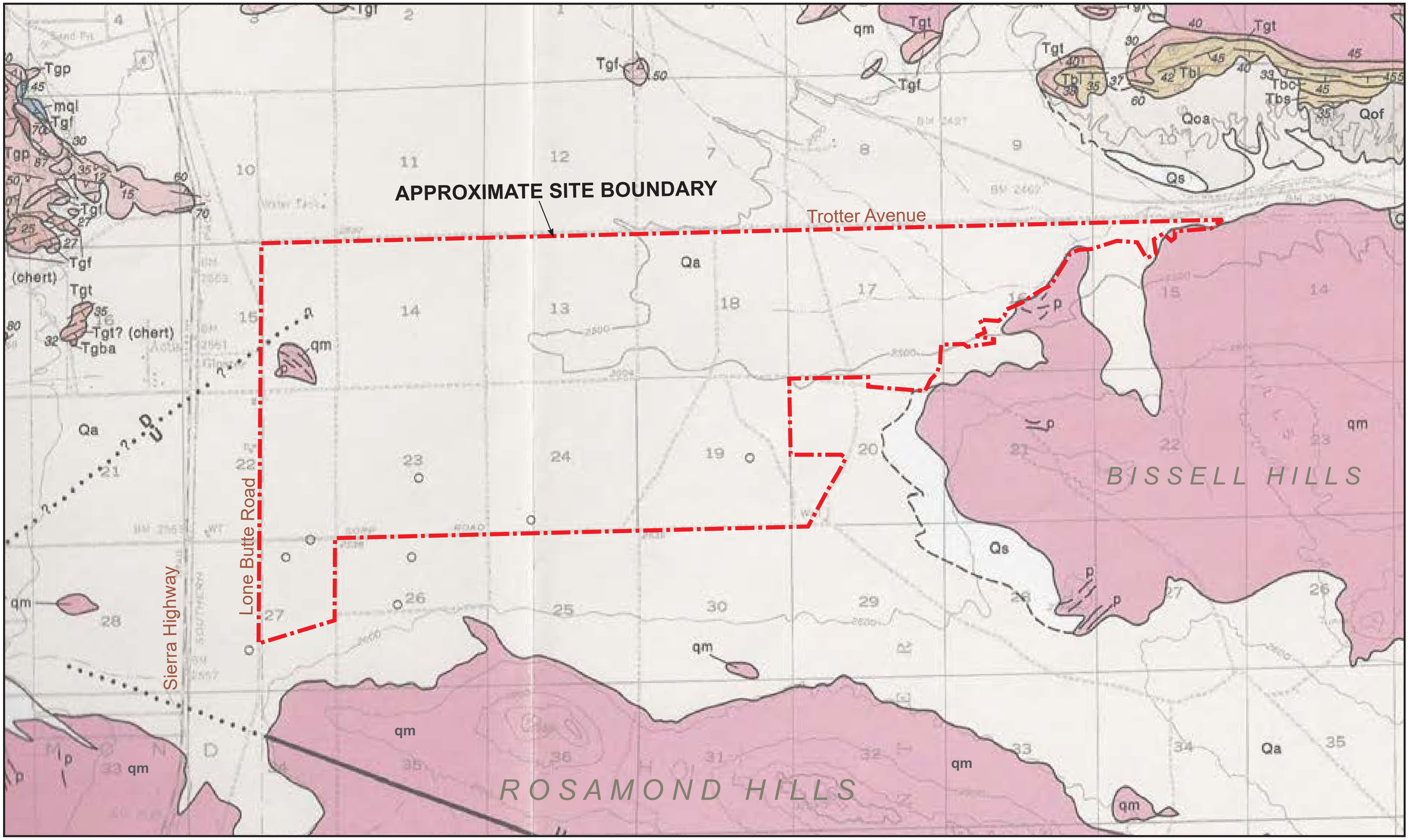
N

PETRA GEOTECHNICAL, INC.
25050 AVENUE KEARNY, SUITE 110A
SANTA CLARITA, CALIFORNIA 91355
PHONE: (661) 255-5790
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

GEOLOGIC LOCATION MAP

ORO VISTA SOLAR PROJECT
KERN COUNTY, CALIFORNIA

DATE: July 2012	J.N.: 247-12	Figure 2
DWG BY: DCS	SCALE: 1" = ~3 miles	



Source: Dibblee, 2008

EXPLANATION

Qs Quaternary windblown sand
Qa Quaternary alluvium
Qoa Quaternary older alluvium (Pleistocene)
Qof Quaternary fanglomerate (Pleistocene)

Tbs, Tbc, Tbl Tertiary Bissell Hills Formation; sedimentary rocks, including sandstone, claystone, calcareous and siliceous siltstone
Tgt, Tgf, Tgba Tertiary Gem Hill Formation; volcanic rock , including tuff, felsite and basalt
qm Mesozoic granitic rock (quartz monzonite)
mql Mesozoic? metavolcanic rocks (metaquartz latite)

Geologic contact
(Dashed where approximately located, gradational or inferred)

?
Fault
(Dotted where concealed, querried where uncertain)

45
Bedding attitude

15
Foliation attitude

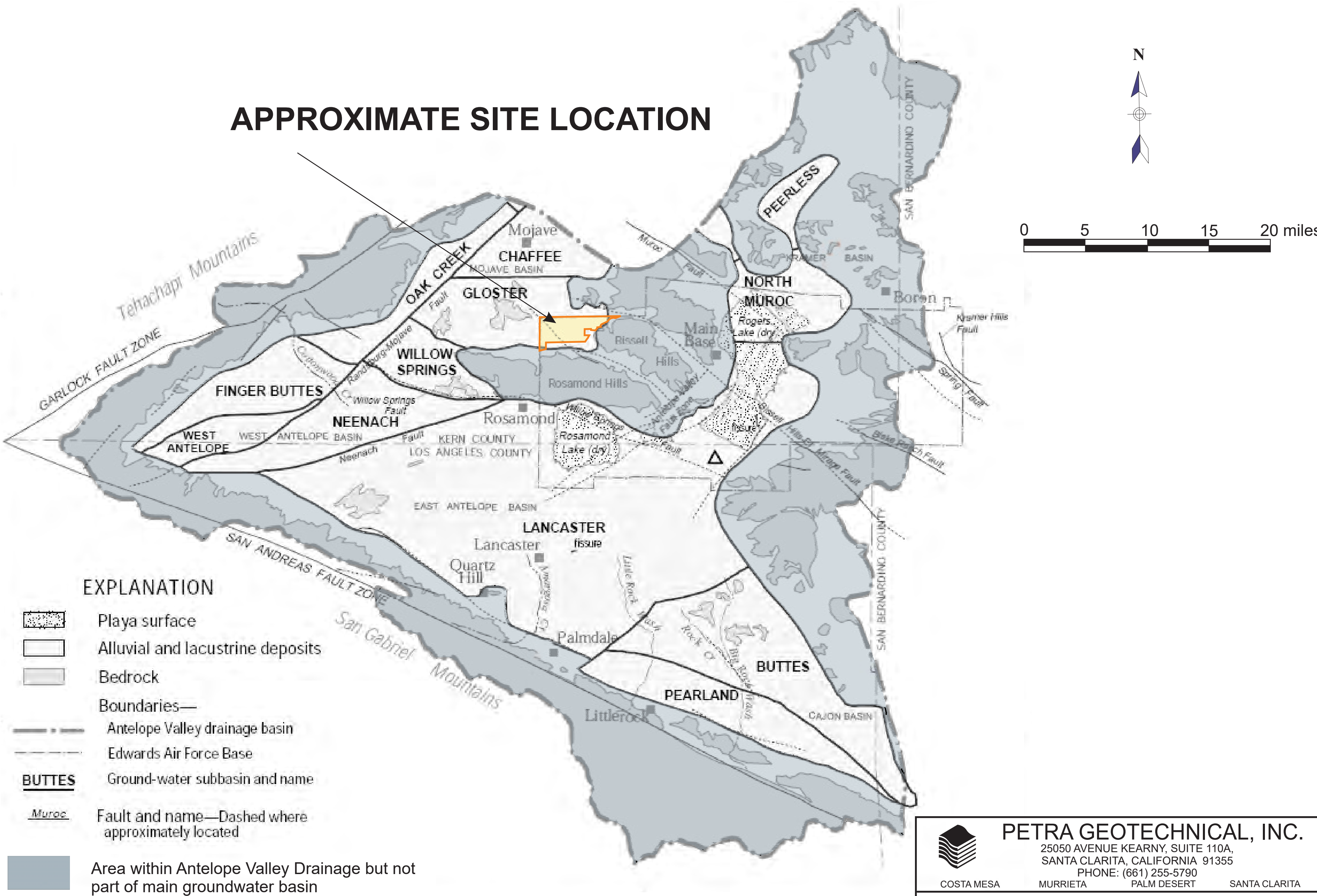
N

PETRA GEOTECHNICAL, INC.
25050 AVENUE KEARNY, SUITE 110A
SANTA CLARITA, CALIFORNIA 91355
PHONE: (661) 255-5790
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

GEOLOGIC MAP

ORO VISTA SOLAR PROJECT
KERN COUNTY, CALIFORNIA

DATE: July 2012	J.N.: 247-12	Figure 3
DWG BY: DCS	SCALE: 1" = 1 mile	



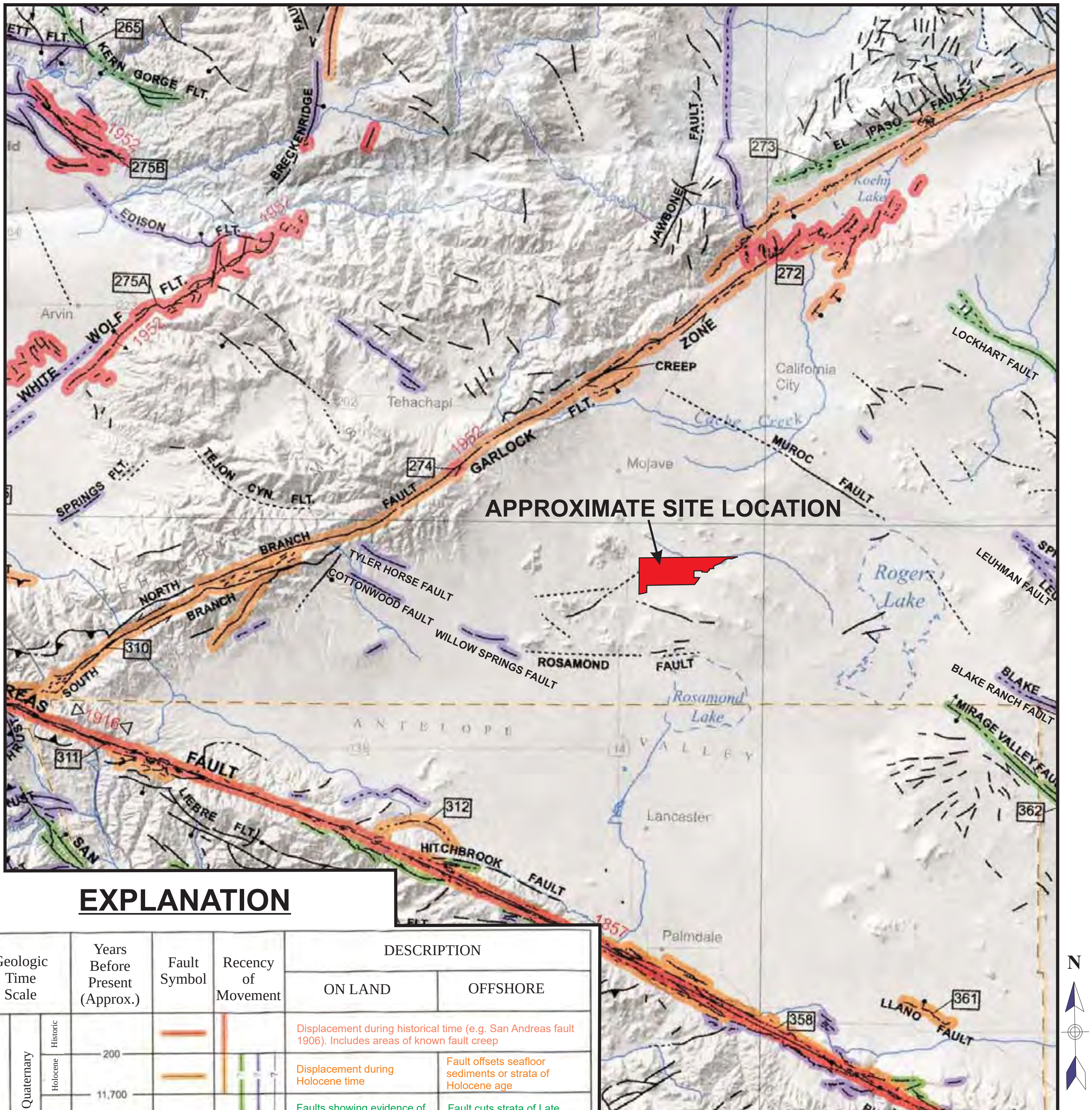
Source: modified from Sneed and Galloway, 2000

PETRA GEOTECHNICAL, INC.
25050 AVENUE KEARNY, SUITE 110A,
SANTA CLARITA, CALIFORNIA 91355
PHONE: (661) 255-5790
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

ANTELOPE VALLEY GROUNDWATER BASIN

ORO VISTA SOLAR PROJECT
KERN COUNTY, CALIFORNIA

DATE: July 2012	J.N.: 247-12	**Figure 4**
DWG BY: DCS	SCALE: 1" = ~10 miles	



Source: Jennings and Bryant, 2010

EXPLANATION

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic	200			Displacement during historical time (e.g. San Andreas fault 1906). Includes areas of known fault creep	
Quaternary	Late Quaternary	Holocene	11,700			Displacement during Holocene time	Fault offsets seafloor sediments or strata of Holocene age
Quaternary	Late Quaternary	Pleistocene	700,000			Faults showing evidence of displacement during late Quaternary time	Fault cuts strata of Late Pleistocene age
Quaternary	Early Quaternary	Pleistocene	1,600,000*			Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years*; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age	Fault cuts strata of Quaternary age
Pre-Quaternary			4.5 billion (Age of Earth)			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not	Fault cuts strata of Pliocene or older age

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion

PETRA GEOTECHNICAL, INC.
25050 AVENUE KEARNY, SUITE 110A
SANTA CLARITA, CALIFORNIA 91355
PHONE: (661) 255-5790
COSTA MESA MURRIETA PALM DESERT SANTA CLARITA

REGIONAL FAULT MAP

ORO VERDE SOLAR PROJECT
KERN COUNTY, CALIFORNIA

DATE: July 2012	J.N.: 247-12	Figure 5
DWG BY: DCS	SCALE: 1" = ~10 miles	

B10. 2018 Hazards Assessment

DUDEK

MAIN OFFICE
605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760.942.5147 T 800.450.1818 F 760.632.0164

MEMORANDUM

To:	Megan Enright, Bio
From:	Glenna McMahon, Keith Blackmon, Hydrogeology/HazWaste
Subject:	Hazards Assessment for Oro Verde Solar Project EIR
Date:	March 14, 2018
Attachment(s):	Table 1 Figure 1 A – ERIS Database Report

This Hazards Assessment was conducted for the Environmental Impact Report (EIR) for the Solar Photovoltaic Enhanced Use Lease Project (project area) at Edwards Air Force Base (AFB) in Kern County, California. The intent of the project area is to lease approximately 4,000 acres of non-excess land at Edwards AFB and develop it for use as a solar facility.

The objective of the Hazards Assessment is to determine if any of the project area is listed in a regulatory database for hazardous materials/waste issues and/or if there have been any impacts to project area as a result of current or past hazardous materials storage or use on/at a facility or use adjacent to a facility that could impact the project area.

To identify potential hazardous materials impacts, Dudek contracted Environmental Risk Information Services (ERIS) to conduct a search of regulatory records within the project area. ERIS searched records from federal, state, local, and tribal entities as specified in the American Society for Testing and Materials (ASTM) Standard E1527-13, Section 8.1.8 Sources of Standard Source Information. For this database search, a buffer of 1/8 mile was added around the project area boundary and a 100-foot buffer was added around the gen-tie in order to capture potential impacts to the project area from adjacent sites.

The primary databases considered for this assessment, along with a brief description of each, are as follows:

- LUST: Leaking underground storage tank incident reports. Source: California State Water Resources Control Board (SWRCB).

- ENVIROSTOR: California Department of Toxic Substances Control (DTSC) list of sites with known contamination or sites for which there may be reason to investigate further. Source: DTSC.
- ERNS: Oil and hazardous substances spill reports. Source: National Response Center.
- CHMIRS: Reported hazardous material incidents, spills, and releases. Source: California Office of Emergency Services.
- LDS: Land disposal sites listing. Source: SWRCB.
- VCP: Sites with confirmed or unconfirmed releases that are considered low threat level where cleanup is overseen by the DTSC. Source: DTSC.
- LUR: Sites cleaned up under the Site Mitigation and Brownfields Reuse Program (SMBRP). Source: DTSC.
- CLEANUP SITES: Sites listed as cleanup sites in the state of California. Source: SWRCB.
- CERCLIS: Potential or confirmed hazardous waste sites that may be listed on the National Priorities List.
- RESPONSE: Confirmed release sites where the DTSC is involved in remediation. Source: DTSC.

Other databases searched by ERIS (per the ASTM standard) either did not indicate a release of hazardous materials or did not include any results within the search area. In addition, the SWRCB GeoTracker website (SWRCB 2018) and DTSC EnviroStor website (DTSC 2018) were reviewed to verify information included in the ERIS report.

REGULATORY RECORDS

Dudek identified a total of 15 sites/listings within or near the project area as having releases or potential releases of hazardous materials or contaminants. Some of the sites are listed in several of the databases searched. Table 1 provides a summary of the 15 sites of concern. Information includes site name, address, site status and status date, contaminants of concern, and regulatory database listings.

Of the 15 sites identified as sites of concern, 10 are listed as closed, non-operating, certified, or no status listed. The status of these listings indicates that they no longer pose an environmental risk or do not require further action by the lead regulatory agency. These listings include the following types of sites: gas stations, landfills, and various other manufacturing sites. Sites with known releases, such as gas stations, landfills, and other similar sites, could have residual impacts remaining in the soil. The regulatory status of these sites is shown in yellow on Table 1 and Figure 1.

Of the 15 sites identified as sites of concern, three are listed as inactive or referred to another agency. These types of sites may have deferred investigation, be operated by uncooperative parties, have been referred to another regulatory agency, or do not provide any information on the type of release. It is unlikely that these are high-risk sites, as they have either been closed by the other agency, have documentation stating that the site has been cleaned, or have no information indicating current adverse conditions. However, because there is limited information, the extent of impacts is unknown. The regulatory status of these sites are shown in orange on Table 1 and on Figure 1.

Of the 15 sites identified as sites of concern, two are listed as open or active. The regulatory status of these two open/active sites are shown in red in Table 1. These sites of concern are depicted on Figure 1. A brief summary of the impacts at each of these sites is provided below.

Mobile Smelting is located at United Street and Reed Avenue (#8 on Table 1 and Figure 1). The site was formerly used for metals recovery from 1962 to 1992. Operations at the site included smelting, incineration and burning of materials to salvage metals, such as aluminum, copper and lead. This process has impacted the soil by direct and windborne deposition. The chemicals of concern are lead, copper, zinc, and dioxins. In 2014, approximately 20,000 cubic yards of contaminated soils were excavated and consolidated; a cap was installed over the contaminated soil. As contaminants are still present, the land has been restricted to industrial or commercial use only.

Courtaulds Aerospace is located at United Street and Reed Avenue (#9 on Table 1 and Figure 1). The site is approximately 156 acres of vacant land located east of the Mobile Smelting site. The site was impacted by dioxin, copper, lead and zinc from windborne deposition from operations at the Mobile Smelting site. In 2014, a removal action workplan was created to consolidate and cap the contaminated soil; it has not been reported as being implemented.

In addition to the 15 sites of concern, Edwards Air Force Base (base) is listed in the regulatory database search on the National Priorities List. The base is an EPA Superfund site. The base comprises approximately 301,000 acres in San Bernardino, Kern and Los Angeles Counties. Soil and groundwater on portions of the base are impacted by volatile organic compounds, fuels, metals and other chemicals. Part of the project area is located on the western portion of the base. Based on the information reviewed on the EPA Superfund website (EPA 2018) the project area is not located within the areas of impacts.

REFERENCES

DTSC (Department of Toxic Substances Control). 2018. EnviroStor [online data management system]. Accessed February 27 and 28, 2018. http://www.envirostor.dtsc.ca.gov/public/.

EPA (Environmental Protection Agency). 2018. Edwards Air Force Base, Edwards AFB, CA https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0902725. Accessed March 12, 2018.

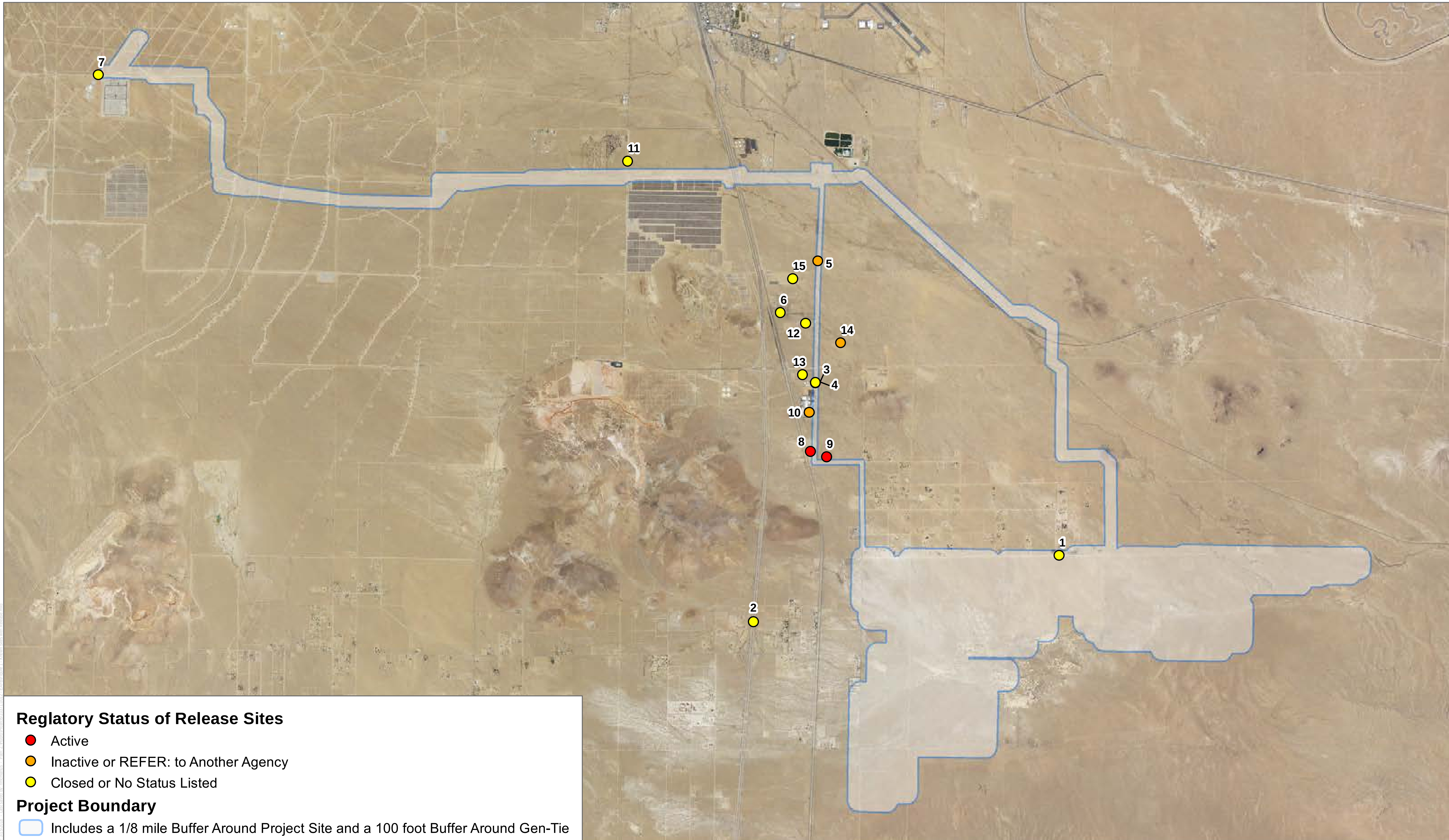
SWRCB (State Water Resources Control Board). 2018. GeoTracker [online database]. http://geotracker.waterboards.ca.gov/. Accessed February 27 and 28, 2018.

Table 1. Summary of Sites Listed in Regulatory Databases on/adjacent to Program Area

Number on Figure 1	Site Name	Site Address	City	Regulatory Status[1]	Status Date	Impacted Media	Constituents of Concern	Regulatory Database Listings[2] (primary databases)	Notes
1	ARCO # 5953	2520 E AVENUIE S	Palmdale	Closed	7/28/1999	Not Reported	Gasoline, other fuel oxygenates	LUST	Leak of gasoline in August 1997.
2	CHP Bishop	NB 14 JNO Backus Rd	Mojave	No Status Listed	-	Soil	Diesel	CHMIRS	In November 2015, approximately 200 gallons of diesel was released to the soil due to an overturned tractor trailer.
3	COMMODITY RESOURCE & ENVIRONMENTAL	11847 UNITED ST	Mojave	Non-Operating	-	Not Reported	Not Reported	ENVIROSTOR, HWP	Same address as the below site.
4	COMMODITY REFINING EXCHANGE	11847 UNITED ST	Mojave	Certified	6/27/2003	Soil	Baghouse waste, Lead, Waste potentially containing dioxins	HWSS CLEANUP, HIST CORTESE, ENVIROSTOR, LUR, RESPONSE, CERCLIS	Former operations included recovery of copper and lead from circuit boards and insulated wire. Waste dioxin ash was produced during incineration of these materials and were deposited throughout the site. In 1990, a polymer coating was applied on the property. Areas of contamination were capped in 2003.
5	COLUMBIAN CHEMICAL COMPANY	12701 UNITED STREET	Mojave	REFER: RWQCB	6/23/1994	Not Reported	Contaminated soil, hydrocarbon	ENVIROSTOR	Lead agency transferred from DTSC to RWQCB. Same address as the below site.
6	MOJAVE PLANT NO 55	12701 UNITED STREET	Mojave	Closed	4/7/2014	Soil	PAH	CLEANUP SITES, LDS, CERCLIS	The site was operated as a carbon black plant in 1969 to 1989. Industrial wastewater was disposed into three clay-lined evaporation ponds. SVOCs and PAHs were later found in the ponds. The ponds were capped in 2005. Soil samples collected in 2012 from the three ponds were non-detect for PAHs and it was determined that groundwater was not impacted.
7	ALTA WIND II LLC	8560 OAK CREEK RD	Mojave	No Status Listed	-	Soil	Mineral Oil and Unknown PCB content	CERS HAZ, CHMIRS, KERN CUPA, DELISTED COUNTY, FINDS/FRS, HAZNET	In March 2015, approximately 210 gallons of mineral oil was released to soil due to a failed pad mounted transformer.
8	MOBILE SMELTING	UNITED STREET AND REED AVENUE	Mojave	Active	6/29/1998	Soil	Dioxin, Lead, Zinc, Cadmium and Copper	HIST CORTESE, ENVIROSTOR, RESPONSE, CERCLIS	Formerly used for metals recovery from 1962 to 1992. Operations included smelting, incineration and open burning of materials for salvaging select metals. Onsite soils are impacted by direct and windborne deposition. A large area in the southeast portion of the site is impacted.
9	COURTAULDS AEROSPACE	UNITED STREET AND REED AVENUE/11601 United Street	Mojave	Active	7/20/2009	Soil	Dioxin, Lead, Zinc and Copper	ENVIROSTOR, VCP	Impacts from Mobile Smelting operation to the west.
10	PRODUCTS RESEARCH & CHEMICAL CORP	11601 UNITED STREET	Mojave	"Backlog"	6/8/1995	Not Reported	solvents, waste potentially containing	HIST CORTESE, ENVIROSTOR, RESPONSE, CERCLIS	Not on the NPL. Spill of potentially hazardous materials. Line fracture caused vapor cloud resulting in persons needing medical attention. Permitted hazardous waste generator.
11	WESTERN GROWTH PROPERTIES	14501 HOLT ST	Mojave	Closed	1/4/2000	Under Investigation	Diesel	LUST	Leak of diesel in July 1999.
12	UNITED METAL RECOVERY	12433 UNITED STREET	Mojave	Certified / Operation & Maintenance	6/1/1995	Soil	Copper, Lead, Zinc and Waste potentially containing dioxins	HWSS CLEANUP, HIST CORTESE, ENVIROSTOR, LUR, RESPONSE	The Site was a copper recovery operation. Dioxins, furans, copper, lead and zinc have been found in the onsite soils and ash piles. In March 1990 the DTSC sprayed suppressant polymer coating on contaminated soil onsite. In November 1998 a remedial action plan was implemented, which entailed excavation and consolidation of the contaminated soils and ash piles into a pit. A concrete cap was placed over the consolidated soil pit. Annual inspection of the cap is being performed by the DTSC.
13	SILVER QUEEN JUNKYARD	BACK LOT AT 11847 UNITED STREET	Mojave	Certified / Operation & Maintenance	6/30/2006	Soil	Copper, Lead, Zinc and Dioxins	HWSS CLEANUP, HIST CORTESE, ENVIROSTOR, LUR, RESPONSE	The site operated as metal recovery operation between late 1960's to mid-1970's. Lead, copper, zinc and dioxin have been found in the onsite soils and ash piles. The contaminated soils and ash piles were consolidated and capped near the southwest corner of the site.
14	PRIMARY GOLD COMPANY	1/2 MI N OF SILVER QUEEN RD	Mojave	Inactive-needs evaluation	12/28/1990	Not Reported	Not Reported	ENVIROSTOR	A complaint was reported in 1990 that various wastes were abandoned by renter. A letter dated 3/18/1997 from BLM stated that all waste has been removed from the site.
15	PURDY COMPANY	12901 UNITED ROAD	Mojave	Certified / Operation & Maintenance	2/28/1997	Surface soils	Lead and waste potentially containing dioxins	HWSS CLEANUP, ENVIROSTOR, LUR, RESPONSE	The site operated as a salvaging metals from railcars between 1960 and late 1965. Heavy metals, dioxin and furans were released onsite during burning operations. In July 1990 a polymer coating was applied to affected soil to prevent contaminated soils to become airborne. Majority of the contaminated soil was consolidated and capped. Some of the contaminated soil was disposed of offsite.

Notes: 1 Sites are plotted on figures in Hazards section of EIR using colors shown here.

2 Regulatory database listing information from Environmental Risk Information Services (ERIS) report, February 2018. See ERIS report for acronym definitions.



SOURCE: NAIP/California_2016_60cm

DUDEK

0 2,500 5,000 Feet

FIGURE 1

Known Sites with Releases

Oro Verde Solar Project - Hazards Memo

APPENDIX J1

Noise Assessment Technical Report

NOISE ASSESSMENT TECHNICAL REPORT
for the
Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

Prepared for:

Edwards AFB Solar, LLC
11512 El Camino Real, Suite 370
San Diego, California 920130
Contact: Simon Day

Prepared by:

DUDEK

OCTOBER 2017

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FIGURES

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TABLES

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Meaning
ADT	average daily trips
ANSI	American National Standards Institute
BNSF	Burlington North Santa Fe
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	community noise equivalent level
CVEF	Commercial Vehicle Enforcement Facility
dB	decibel
DOT	Department of Transportation
HVAC	heating-ventilation-air-conditioning
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
Hz	hertz
I-	Interstate
Ldn	day-night sound level
Leq	equivalent sound level
Lmax	maximum sound level
Lmin	minimum sound level
Lxx	percentile-exceeded sound levels
mph	miles per hour
NAC	noise abatement criteria
NSLU	noise-sensitive land use
PPV	peak-particle velocity
Ranch	Tejon Ranch
Ranchwide Agreement	Tejon Ranch Conservation and Land Use Agreement
RMS	root mean square
SR-	State Route
TNM	transportation noise model
TRCC	Tejon Ranch Commerce Center
UPRR	Union Pacific Railroad
VdB	vibration decibels

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1 INTRODUCTION

1.1 Project Description Overview

A Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) is being prepared by the U.S. Air Force (USAF or Air Force) and the County of Kern, California (County) to evaluate, at a project level, the impacts of the Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project (formerly known as Oro Verde Solar Project). A Request for Qualifications (RFQ) was issued on February 3, 2017, by the Air Force for solar development through the EUL program. Edwards AFB Solar, LLC has been selected by the Air Force as the Highest Rate Offeror (HRO). Edwards AFB Solar, LLC will construct, operate, and maintain a utility-scale solar photovoltaic (PV) energy-generating facility on the Edwards AFB property. Edwards AFB Solar, LLC will file an application with the County for a franchise agreement and/or Conditional Use Permit (CUP) for routing a generation tie (gen-tie) transmission line from the proposed solar facility to the privately owned Westwind Substation in the first phase of the project and to Southern California Edison (SCE) Windhub Substation in subsequent phases. For purposes of this report, the project is referred to as the Gen-Tie Routes for Edwards AFB Solar EUL Project or proposed project.

An acoustic assessment report has been prepared for the solar facility (RBF Consulting, Inc. 2013) and a previously identified gen-tie route. However, since this document was prepared, the gen-tie route has changed, and there are now three gen-tie route options that need to be evaluated for noise impacts under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). The purpose of this noise assessment technical report is to evaluate these three gen-tie route options and to: (1) document ambient noise levels and identify noise-sensitive receptors in proximity to the gen-tie route options; (2) analyze the potential for noise impacts to occur as a result of construction and operation of the gen-tie; (3) describe the significance of the potential impacts; and (4) identify recommended mitigation measures for consideration by the U.S. Air Force (USAF or Air Force), Lead Agency under NEPA, and Kern County, the Lead Agency under CEQA.

1.2 Proposed Gen-Tie Line Corridor

A 230 kV gen-tie would connect the Edwards AFB solar generation site with the existing and privately owned electrical substation, the Westwind Substation, in the first phase of the project, and to the SCE Windhub Substation in subsequent phases of the project (Figures 1-1 and 1-2). The proposed gen-tie may be a shared facility with other solar projects in the future. In general, the gen-tie route can be broken down in to two categories based on the direction of the corridor—a north–south connection and an east-west connection. There are three options for the north–south gen-tie connection and the project would include only one of these three north-south route options. There are two options for the east–west gen-tie connection and the proposed project would include only one of these two east–west route options (Figure 1-2). The three options for the north–south gen-tie routes are described first and the two options for the east–west gen-tie routes are described second.

North-South Gen-Tie Routes

From the proposed solar generation site to the approximate intersection of Purdy Avenue and United Street, there are two gen-tie route options and from the proposed solar generation site to the intersection of Holt Street and Purdy Avenue, there is a third gen-tie route option. These north–south route options include the following: (1) North–South Gen-Tie Route Option 1: an approximately 5.6-mile-long gen-tie route on the east that generally runs from the AFB solar generation site north adjacent to 20th Street, west adjacent to East Reed Avenue, north adjacent to 15th Street, then generally follows the north side of the Burlington Northern Santa Fe (BNSF) Railway and finally runs west to the intersection of Purdy Avenue and the BNSF; (2) North–South Gen-tie Route Option 2: an approximately 4.5-mile-long gen-tie route that generally runs from the northwestern edge of the AFB solar generation site north on Lone Butte Road, west on West Reed Avenue, and north on United Street where it intersects with Purdy Avenue; (3) North–South Gen-tie Route Option 3: an approximately 6-mile-long gen-tie route that generally runs from the northwestern edge of the AFB solar generation site directly west to Sierra Highway and runs along Sierra Highway to the intersection with Silver Queen Road; the gen-tie route runs directly west along Silver Queen Road for 1.8 miles and heads north of Gold Town Road, which turns into Holt Street, where the route intersects with Purdy Avenue.

Figure 1-2 shows the approximate location of each the north–south gen-tie route options; the North–South Gen-Tie Route Option 1 is shown in yellow, the North–South Gen-Tie Route Option 2 is shown in blue; and the North–South Gen-Tie Route Option 3 is shown in red.

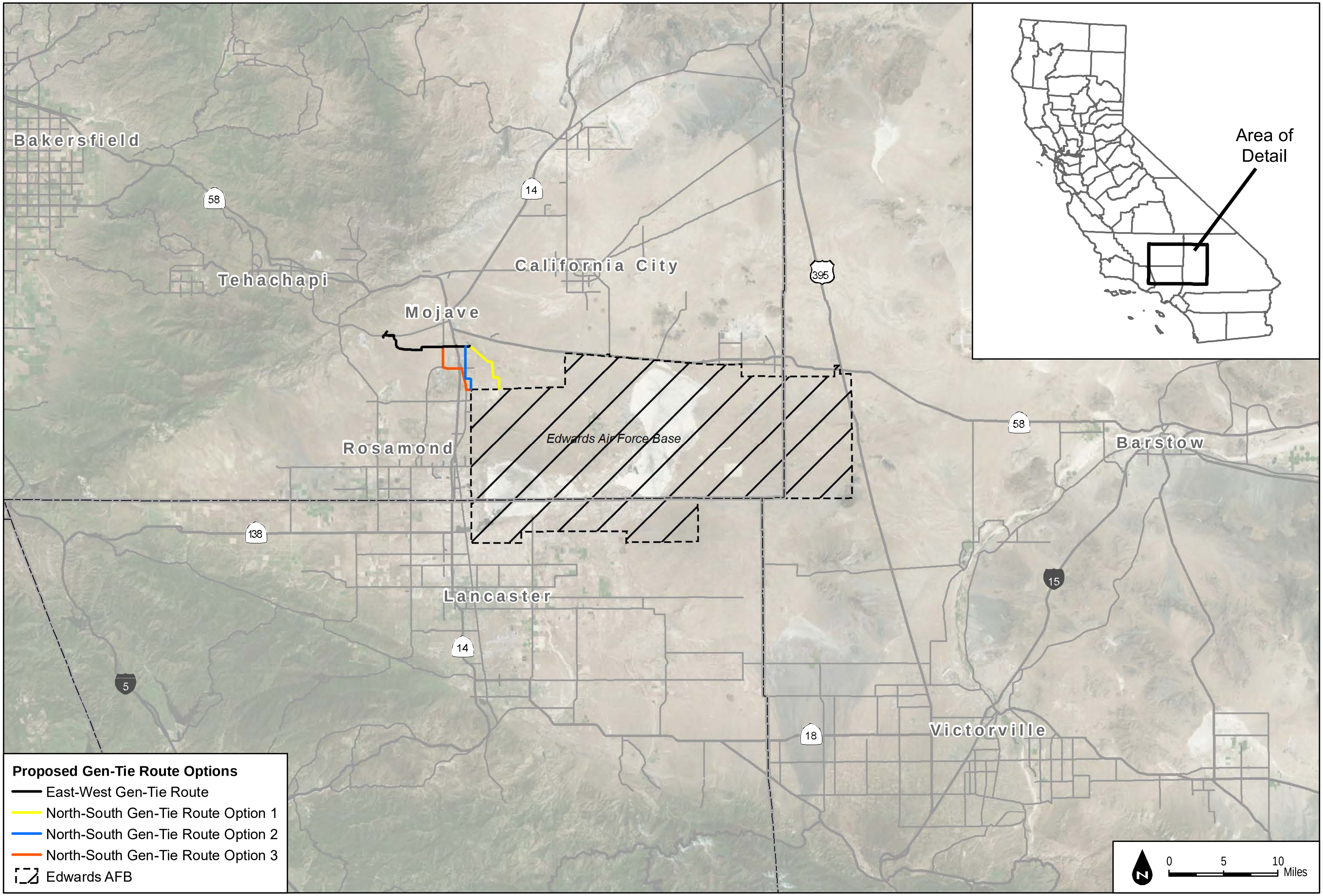

Figure 1-1: REGIONAL LOCATION

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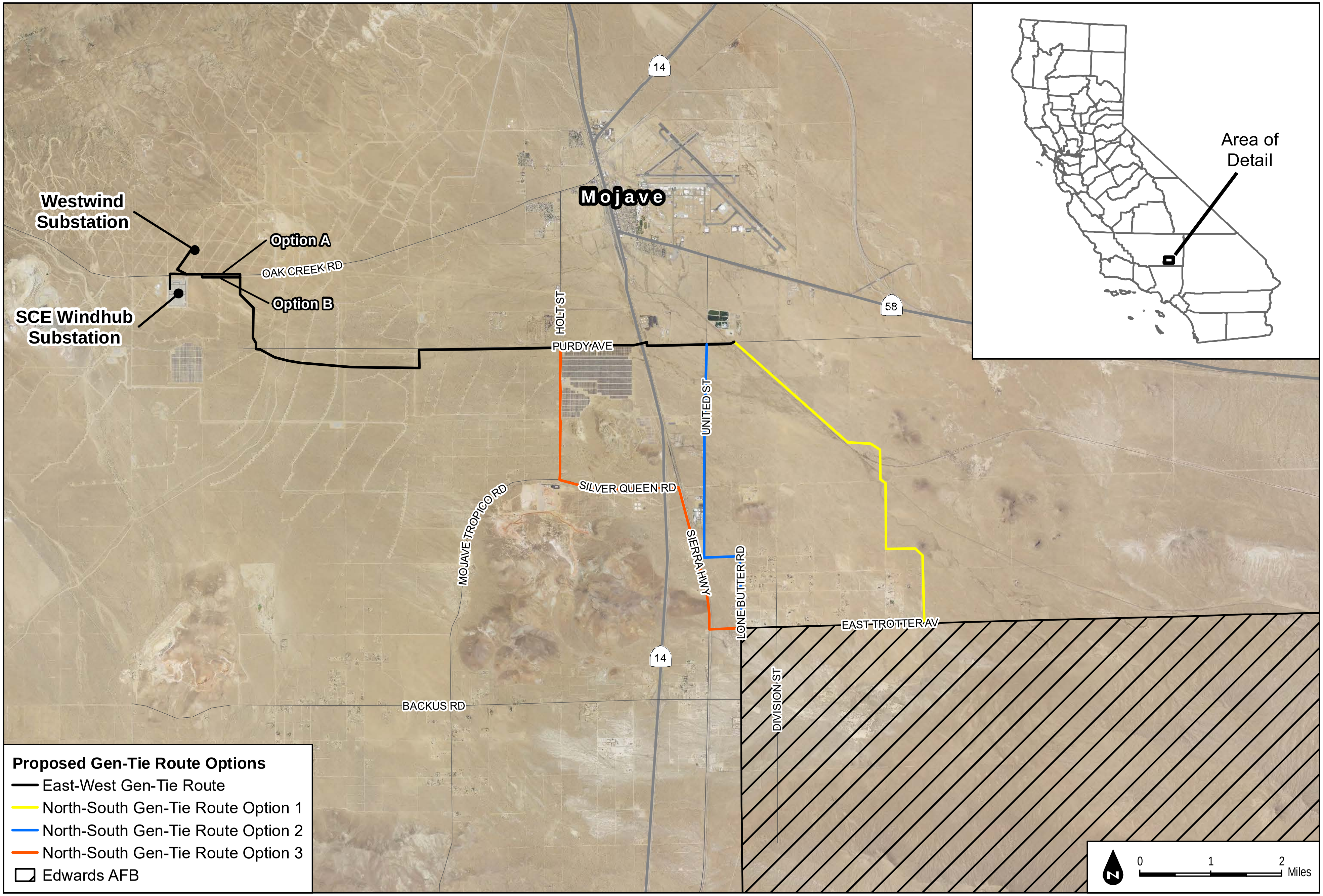

Figure 1-2: GEN-TIE ROUTE OPTIONS

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East-West Gen-Tie Routes

Figure 1-2 shows the approximate location of the east–west gen-tie route in black and includes two route options, Options A and B, along Oak Creek Road; the proposed project would include only one of these options for the east-west gen-tie route. More specifically, from the intersection of the North–South Gen-Tie Option 1 and Purdy Avenue, the east–west gen-tie is approximately 9.8 miles in length and would run west along Purdy Avenue for approximately 5.5 miles and then would run south of Purdy Avenue, but north of Decatur Avenue for approximately 2.9 miles and then turn north back to Purdy Avenue. From Purdy Avenue, the east–west gen-tine line would run north and northwest for approximately 1.3 miles to Oak Creek Road. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option A would run north of Oak Creek Road and Option B would run south of Oak Creek Road. From these two options, the east–west gen-tie route would run 0.4 mile before jogging northwest for 0.4 mile and connecting to the Westwind Substation or Windhub Substation.

Table 1 provides a brief description of the three north-south route options and the two east-west route options.

Table 1
Proposed Gen-Tie Route Options

Direction from Solar Generation Site to Substations	Option	Description
North-South	1	5.6-mile-long gen-tie route; runs from the AFB solar generation site north to the intersection of Purdy Avenue and the BNSF.
	2	4.5-mile-long gen-tie route; runs from the northwestern edge of the AFB solar generation site to the intersection of United Street and Purdy Avenue.
	3	6-mile-long gen-tie route; runs from the northwestern edge of the AFB solar generation site to the intersection of Holt Street and Purdy Avenue.
East-West	1-A	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option A would run north of Oak Creek Road.
	1-B	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 mile there are two options for the east–west gen-tie route—Option B would run south of Oak Creek Road

Gen-Tie Construction Description

Site preparation would include clearing existing vegetation in the proposed pole locations, including their ground lines; trenching locations; access roads; and stringing areas. Vegetation in all of these areas, except for the access roads, would be reseeded with a seed stock comprising local, native species. Vegetation in the temporary staging and laydown areas would be trampled but not cleared; these areas would be reseeded as well. Selective vegetation clearing or cutting may also be necessary to provide for line clearance (height).

To install the gen-tie poles, their foundations would be installed a minimum of 28 days prior to erection of the poles. Pole installation would then occur sequentially along the route to the extent practical. After the poles are installed, stringing of the lines onto the poles would be conducted as described below.

Installation of underground fiber optic line would require a narrow trench that would primarily be installed in access roads serving the gen-tie facilities. . In addition, small underground vaults or junction boxes would need to be installed, every 5,000 feet, along the fiber optic route.

Structures for the gen-tie line and conductor support hardware would be assembled at each pole location to minimize damage during transport. Construction of the gen-tie line would require an approximate area of 50 feet by 50 feet at each pole location, for use as temporary laydown or staging areas for equipment, poles, and hardware.

In addition to temporary staging and laydown areas described above, additional areas of disturbance would be required in certain locations along the gen-tie route in order to string the lines. Specifically, an approximate 100 foot by 300 foot area would be disturbed along the route, where there are large angles in the alignment, at all dead-end structures, and at other strategically located locations, in order to accommodate equipment required for wire pulling and tensioning in these areas.

Because it is anticipated that the gen-tie line will primarily follow existing roads, main access to the gen-tie route would be via these roads. To avoid elevation conflicts with crossing the Los Angeles Department of Water and Power (LADWP) high voltage lines, a short segment of the gen-tie may be installed underground at this crossing point. However, new temporary unpaved access roads would need to be installed to access the laydown areas for each pole. These access roads would be between 15 feet to 20 feet wide. They would also be used to access the poles for future maintenance activities.

1.3 Noise Background and Terminology

Fundamentals of Environmental Noise

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting, called "A" weighting, is typically used for quieter noise levels, which de-emphasizes the low-frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the "noise level" and is referenced in units of dBA.

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (Caltrans 1998). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable (EPA 1974). The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual's noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources such as traffic volume and changes in atmospheric conditions.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during night-time hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed "community noise equivalent level" (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence. A complete definition of CNEL is provided below.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (Leq), the minimum and maximum sound levels (Lmin and Lmax), percentile-exceeded sound levels (Lxx), the day-night sound level (Ldn), and the CNEL. Below are brief definitions of these measurements and other terminology used in this report.

- *Decibel (dB)* is a unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *A-weighted decibel* (dBA) is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- *Equivalent sound level* (Leq) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the L_{dn} and CNEL scales.
- *Maximum sound level* (Lmax) is the maximum sound level measured during the measurement period.
- *Minimum sound level* (Lmin) is the minimum sound level measured during the measurement period.
- *Percentile-exceeded sound level* (Lxx) is the sound level exceeded X% of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- *Day-Night Average Sound Level (Ldn)* The County of Kern describes community noise levels in terms of the Ldn (as well as CNEL [see below]). The Ldn is a 24-hour average A-weighted sound level with a 10 dB penalty added to the nighttime hours from 10:00 p.m. to 7:00 a.m. The 10 dB penalty is applied to account for increased noise sensitivity during the nighttime hours.
- *Community Noise Equivalent Level (CNEL)* is the average equivalent A-weighted sound level during a 24-hour day. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the sound levels in the evening and 10 dB to the sound levels at night.

Exterior Noise Distance Attenuation

Noise sources are classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time; and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0

dBA for each doubling of distance from the source to the receptor at acoustically "hard" sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically "soft" sites. Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers. For the purpose of a sound attenuation discussion, a "hard" or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically "soft" or absorptive site is characteristic of unpaved loose soil or vegetated ground.

With respect to examples of this distance-attenuation relationship for exterior noise, a 60 dBA noise level measured at 50 feet from a transformer within a paved substation site would diminish to 54 dBA at 100 feet from the source, and to 48 dBA at 200 feet from the source. This scenario is addressed by the point source attenuation for a hard site (6 dBA with each doubling of the distance). For the scenario where soft side conditions exist between the point source and receptor, represented by a corridor of vegetation or open ground along the substation perimeter, an attenuation rate of 7.5 dBA per doubling of distance would apply; the transformer noise measured as a 60 dBA noise level at 50 feet would diminish to 52.5 dBA at 100 feet from the source and to 45 dBA at 200 feet from the source, where soft ground with or without vegetation exists between the sound source and the receptor location.

Structural Noise Attenuation

Sound levels can also be attenuated by man-made or natural barriers. Solid walls, berms, or elevation differences typically reduce noise levels in the range of approximately 5 to 15 dBA (Caltrans 1998). Structures can also provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 to 30 dBA with open and closed windows, respectively, as shown in Table 2.

Table 2
Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows[1]
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Offices/Hotels	17	25
Theaters	17	25

Note:
[1] As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.
Source: Transportation Research Board, National Research Council, 2000.

Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. The response of humans to vibration is very complex. However, it is generally accepted that human response is best approximated by the vibration velocity level associated with the vibration occurrence.

Heavy equipment operation, including stationary equipment that produces substantial oscillation or construction equipment that causes percussive action against the ground surface, may be perceived by building occupants as perceptible vibration. It is also common for groundborne vibration to cause windows, pictures on walls, or items on shelves to rattle. Although the perceived vibration from such equipment operation can be intrusive to building occupants, the vibration is seldom of sufficient magnitude to cause even minor cosmetic damage to buildings.

When evaluating human response, groundborne vibration is usually expressed in terms of root mean square (RMS) vibration velocity. RMS is defined as the average of the squared amplitude of the vibration signal. As for sound, it is common to express vibration amplitudes in terms of decibels defined as:

$$L_v = 20\log\left(\frac{v_{rms}}{v_{ref}}\right)$$

where Vrms is the RMS vibration velocity amplitude in inches/second and Vref is the decibel reference of $1x10^{-6}$ inches/second.

To avoid confusion with sound decibels, the abbreviation VdB is used for vibration decibels. The vibration threshold of perception for most people is around 65 VdB. Vibration levels in the 70 to 75 VdB range are often noticeable but generally deemed acceptable, and levels in excess of 80 VdB are often considered unacceptable (FTA 2006).

Health Effects of Noise

Noise is known to have a number of different adverse effects on humans. Based upon these recognized adverse effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on effects of noise on people such as hearing loss (not generally associated with community noise), communication interference, sleep interference, physiological responses, and annoyance.

1.4 Noise Regulation and Management

1.4.1 Federal

Department of Defense (DOD)

Edwards Air Force Base Air Installation Compatible Use Zones

The Department of Defense requires military aviation facilities to prepare an Air Installation Compatible Use Zones (AICUZ) study. The principle purpose of the AICUZ study is to protect community safety and health, promote appropriate development in the vicinity of military airfields, and protect taxpayer's investment in national defense. The currently adopted AICUZ for EAFB indicates areas affected by current noise and safety impacts are confined within the boundaries of the installation.

Federal Aviation Administration Standards

Enforced by the Federal Aviation Administration (FAA), Code of Federal Regulations (CFR) Title 14, Part 150, prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving those programs. Title 14 also identifies those land uses that are normally compatible with various levels of exposure to noise by individuals. The FAA has determined that interior sound levels up to 45 dBA Ldn (or CNEL) are acceptable within residential buildings. The FAA also considers residential land uses to be compatible with exterior noise levels at or less than 65 dBA Ldn (or CNEL).

Federal Highway Administration Standards

CFR Title 23, Part 772, sets procedures for the abatement of highway traffic noise and construction noise. Title 23 is implemented by the federal Department of Transportation (DOT) Federal Highway Administration (FHWA). The purpose of this regulation is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria (NAC), and to establish requirements for information to be given to local officials for use in the planning and design of highways. All highway projects that are developed in conformance with this regulation shall be deemed to be in conformance with the DOT-FHWA Noise Standards. Title 23 establishes an NAC of 67 dBA $L_{eq(h)}$ applicable to federal highway projects for evaluating impacts to land uses including residences, recreational uses, hotels, hospitals, and libraries (23 CFR Chapter 1, Part 772, Section 772.19). Additionally, FHWA requires that individual states establish an allowable noise level increase (at or above which the increase is deemed to be "substantial" and abatement should be considered) for Type 1[1] highway projects. Currently, the definition of a "substantial increase" ranges from 5 to 15 dB, depending upon the state.

Federal Transit Administration and Federal Railroad Administration Standards

Although the Federal Transit Administration (FTA) standards are intended for federally funded mass-transit projects, the impact assessment procedures and criteria included in the FTA Transit Noise and Vibration Impact Assessment Manual (May 2006) are routinely used for projects proposed by local jurisdictions. The FTA and Federal Railroad Administration (FRA) have published guidelines for assessing the impacts of groundborne vibration associated with rail projects, which have been applied by other jurisdictions to other types of projects. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 inches/second peak-particle velocity (PPV).

Federal Occupational Safety and Health Act

Under the Occupational Safety and Health Act of 1970 (OSHA) (29 U.S.C. §651 et seq.), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) adopted regulations (29 CFR §1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list limits on noise exposure levels as a function of the amount of time during which the worker is exposed. The regulations further specify requirements for a hearing conservation program (§1910.95(c)), a monitoring program (§1910.95(d)), an audiometric testing program (§1910.95(g)), and hearing protection (§1910.95(i)).

1.4.2 State

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological,

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[1] A Type I project as defined in 23 CFR 772, is a federal or federal-aid project for:

1. The construction of a highway on a new location;
2. The physical alteration of an existing highway where there is either: a. Substantial horizontal alteration; b. Substantial vertical alteration;
3. The addition of a through-traffic lane(s).
4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane;
5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange;
6. Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane;
7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Environmental Quality Act (CEQA)

CEQA requires that all environmental effects of a project be analyzed, including environmental noise. Under CEQA, a project has a potentially significant impact if the project exposes people to noise levels in excess of standards established in the local general plan or noise ordinance. Additionally, under CEQA, a project has a potentially significant impact if the project creates a substantial increase in the ambient noise levels in the project vicinity above levels existing without the project. If a project has a significant impact, mitigation measures must be prescribed.

1.4.3 Kern County

Kern County General Plan – Noise Element

The following goal and policies from the County General Plan, Noise Element are applicable to the proposed project.

Goals

Goal 1. Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.

Policies

Policy 1. Review discretionary industrial, commercial, or other noise generating land use projects for compatibility with nearby noise-sensitive land uses.

Policy 4. Utilize good land use planning principles to reduce conflicts related to noise emissions.

Policy 5. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels:

a) 65 dB Ldn or less in outdoor activity areas.

b) 45 dB Ldn or less within living spaces or other noise sensitive interior spaces.

Policy 7. Employ the best available methods of noise control.

Implementation Measures

Implementation Measure A. Utilize zoning regulations to assist in achieving noise compatible land use patterns.

Implementation Measure C. Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policies outlined in this element.

Implementation Measure F. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB Ldn and interior noise levels in excess of 45 dB Ldn.

Implementation Measure G. At the time of any discretionary approval, such as a request for a General Plan Amendment, zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

a) Be the responsibility of the applicant.

b) Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

c) Be subject to the review and approval of the Kern County Planning Department and the Environmental Health Services Department. All recommendations therein shall be complied with prior to final approval of the project.

Implementation Measure I. Noise analyses shall include recommended mitigation, if required, and shall:

a) Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

b) Include estimated noise levels for existing and projected future (10 – 20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

c) Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.

d) Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided.

Implementation Measure J. Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

Kern County includes working landscapes that have background noise levels from on site as well as off site (e.g., highway) uses, and also have periodic construction-related or seasonal noise levels. These ambient noise levels vary by location and over time, but are considered part of the County's setting for California Environmental Quality Act (CEQA) purposes. The County's General Plan Noise Element establishes the applicable CEQA significance threshold for noise impacts, and there is no actual or implied "zero decibel" or "any audible noise increase" that is appropriate or applicable to the study area.

Kern County General Plan – Energy Element

The Kern County General Plan also requires the analysis of noise impacts relating to energy development that has the potential to impact sensitive land uses.

Policy 10. The County should require acoustical analysis for energy project proposals that might impact sensitive and highly-sensitive uses in accordance with the Noise Element of the General Plan.

Kern County Zoning Ordinance

Section 19.04.252 of the Kern County Zoning Ordinance defines *exterior noise level* as "the noise level near the exterior of a structure usually within fifty (50) feet of the structure."

Section 19.80.030.S (1) restricts noise generated by commercial or industrial uses within 500 feet of a residential use or residential zone district. The commercial or industrial use shall not generate noise that exceeds an average 65 dB L_{eq} between the hours of 7:00 a.m. and 10:00 p.m. and shall not generate noise that exceeds 65 dB, or which would result in an increase of 5 dB or more from ambient sound levels, whichever is greater, between the hours of 10:00 p.m. and 7:00 a.m. Commercial or industrial facilities that are located in the M-3 zone district are exempt from these noise-generation restrictions.

Kern County Noise Ordinance

Section 8.36.020 of the Kern County Municipal Code (Noise Ordinance) establishes construction noise control standards that would apply to any project construction activity. Construction activity noise restrictions are as follows.

> 8.36.020 - Prohibited sounds.
>
> It is unlawful for any person to do, or cause to be done, any of the following acts within the unincorporated areas of the county:
>
> H. To create noise from construction, between the hours of nine (9:00) p.m. and six (6:00) a.m. on weekdays and nine (9:00) p.m. and eight (8:00) a.m. on weekends, which is audible to a person with average hearing faculties or capacity at a distance of one hundred fifty (150) feet from the construction site, if the construction site is within one thousand (1,000) feet of an occupied residential dwelling except as provided below:
>
> 1. The development services agency director or his designated representative may for good cause exempt some construction work for a limited time.
> 2. Emergency work is exempt from this section.

2 ENVIRONMENTAL SETTING

2.1 Sensitive Receptors

NSLUs are land uses that may be subject to stress and/or interference from excessive noise. The Noise Element of the Kern County General Plan (County of Kern 2004) identifies residences, schools, hospitals, parks, churches, and other similar land uses to be NSLU. Industrial and commercial land uses are generally not considered sensitive to noise, with the exception of commercial lodging facilities. Land uses especially sensitive to vibration include concert halls, hospitals, libraries, vibration sensitive research operations, residential areas, schools, and offices.

Noise sensitive land uses located in the vicinity of the proposed gen-tie alignments are primarily rural residences. Tables 3 to 6 provide a summary of the rural residences located in proximity to each of the potential gen-tie alignments, including the separation distance between the residences and the given gen-tie alignment.

Table 3
East-West Gen-Tie NSLUs

Arizona Avenue	14 homes 1440 to 2600 ft. north of alignment
Winchester Road	Approximately 100 homes 1195 feet north of alignment

Table 4
North-South Option 1 Gen-Tie NSLUs

20th Street	3 homes 925, 950, 1725 ft. west of alignment
15th Street	11 homes 2,100 to 2,425 feet west of alignment
East Trotter Avenue	2 homes 185 and 525 feet west of alignment

Table 5
North-South Option 2 Gen-Tie NSLUs

Reed Avenue	4 homes 50 to 510 feet east of alignment
La Cita	1 home 1.325 feet east of alignment
Lone Butte	2 homes – 175 and 225 feet east of alignment 2 homes – 850 feet east of alignment 3 homes – 50, 175, 200 feet east of alignment 3 homes – 80, 90, 200 feet east of alignment 1 home – 140 feet southwest of alignment

Table 6
North-South Option 3 Gen-Tie NSLUs

Holt Street	3 homes 75, 80, and 110 ft. east of alignment
Mohawk Street	2 homes 450 and 650 feet southwest of alignment
Silver Queen Road	2 homes 135 and 650 feet south of alignment
Sierra Highway	4 homes – 85 feet west of alignment 4 homes – 150 to 325 feet west of alignment 1 home – 750 feet west of alignment
Lone Butte	4 homes 150 to 510 feet east of alignment

As illustrated in Tables 3–6, the closest homes to the alignments are from 50 to 75 feet away, and these occur along the Option 2 and 3 North-South Alignments. The closest home to the Option 1 North-South Alignment is at a distance of 185 feet, and the closest homes to the East-West alignment are 1,195 feet away.

2.2 Proximate Vibration-Sensitive Land Uses

Land uses in which groundborne vibration could potentially interfere with operations or equipment, such as research, manufacturing, hospitals, and university research operations (FTA 2006) are considered "vibration-sensitive." The degree of sensitivity depends on the specific equipment that would be affected by the groundborne vibration. Excessive levels of groundborne vibration of either a regular or an intermittent nature can result in annoyance to residential uses. There are no known vibration-sensitive land uses within 10 miles of the study area.

2.3 Existing Noise Levels

Existing (pre-project) noise conditions present in the study area were inventoried by Dudek in June 2017. Two types of sound-level measurements were taken: two 24-hour measurements were performed in the general vicinity of the north-south gen-tie alignments, at locations removed from existing roadways; three short-term (varying from 6 to 15 minutes) measurements were performed along the east-west gen-tie alignment, including one measurement adjacent to SR14 which included manual traffic counts.

Sound-level measurements were performed using a total of four different integrating sound-level meters: A Larson Davis Model 800 American National Standards Institute (ANSI) Type I, a Larson Davis Model 720 ANSI Type II, and two SoftdB Piccolo Models ANSI Type II. ANSI Type I and Type II sound-level meters both have sufficient accuracy to be used for environmental noise evaluation. The sound-level meters were calibrated before and after each series of measurements using a Larson Davis Model CAL150 calibrator.

A total of two long-term measurements (24-hour duration) were taken in the general vicinity of the North-South Gen-Tie Option 1 and Option 2 alignments. Table 7 summarizes the minimum (L_{min}) and maximum (L_{max}) sound levels recorded for each monitor location during the 24-hour measurement, as well as the calculated 24-hour weighted average noise level (L_{dn}). The sound monitor location description, dates of the measurement, and sound sources affecting the monitoring location are also provided in Table 7 for each monitor location. The long-term monitoring locations (denoted LT#) are illustrated on Figure 1-3.

Table 7
Ambient Sound Level Measurements (dBA)

Site	Location	Noise Sources	Dates	L_{dn}	L_{max}	L_{min}
LT1	West of North-South Gen-Tie Option 1	Distant vehicular traffic on SR-58	6/14- 6/15/17	64	64	38
LT1	West of North-South Gen-Tie Option 2	Distant vehicular traffic on SR-14	6/14- 6/15/17	63	61	38

The results of the ambient noise survey from long-term measurements reflect noise levels that range between 63 and 64 dBA L_{dn} (or CNEL) in the general vicinity of the Option 1 and Option 2 north-south gen-tie alignments. The primary noise source contributing to the ambient noise environment was traffic, despite the selection of noise monitor locations distant from principal roadways. SR14 and SR58 are major roadways and contributors to the ambient noise environment in the vicinity of the study area. As described previously, NSLU should not be exposed to noise levels exceeding 65 dBA L_{dn} (or CNEL); the ambient noise levels recorded at each of the long-term monitor locations would fall within acceptable levels for NSLU as specified in the Kern County General Plan.

One important source of noise generation in the project study area are wind turbines. The east-west gen-tie alignment passes through a sizable wind farm. Also, the east-west alignment would cross SR14, and the southern portions of north-south Option 2 and Option 3 are in close proximity to SR-14. Short-term noise measurements were conducted within the wind farm along the east-west alignment, and adjacent to north-south Option 3. A short-term noise measurement with manual traffic counts was completed adjacent to SR14 along the east-west gen-tie alignment. These measurements are useful in characterizing ambient noise levels associated with the wind turbines and along the major roadway within the study area. The results of these short-term noise measurements are presented in Table 8. The short-term roadway noise measurement locations (denoted ST#) are illustrated on Figure 1-3.

Table 8
Short-Term Ambient Noise Level Measurements (Existing) (dBA)

ST #	Measure-ment Date	Measurement Time Period	L_{eq}	L_{max}	L_{min}	Remarks
1	6/14/2017	3:25 – 3:35	34	51	31	Purdy Road @ Holt Street, several turbines
2	6/14/2017	3:45 – 4:00	52	58	51	Purdy Road @ 54th Street, many turbines
3	6/14/2017	4:30 – 4:36	75	82	59	SR-14 @ 50 feet from edge of pavement, 202 cars, 18 heavy trucks, 7 medium trucks

The highest recorded average noise level (75 dBA L_{eq}) was associated with traffic on SR-14 at a distance of approximately 50 feet from the edge of pavement. Based on an outdoor attenuation rate of 4.5 dBA with a doubling of distance from a roadway soft site conditions), noise levels would diminish to 65 dBA L_{eq} at approximately 230 feet from the edge of pavement. The measurements conducted within various areas of the existing wind farm had average noise levels ranging from 34 to 52 dBA L_{eq}. With the exception of areas within 230 feet of SR-14, current average noise levels in the study area would generally not exceed acceptable levels for NSLU.

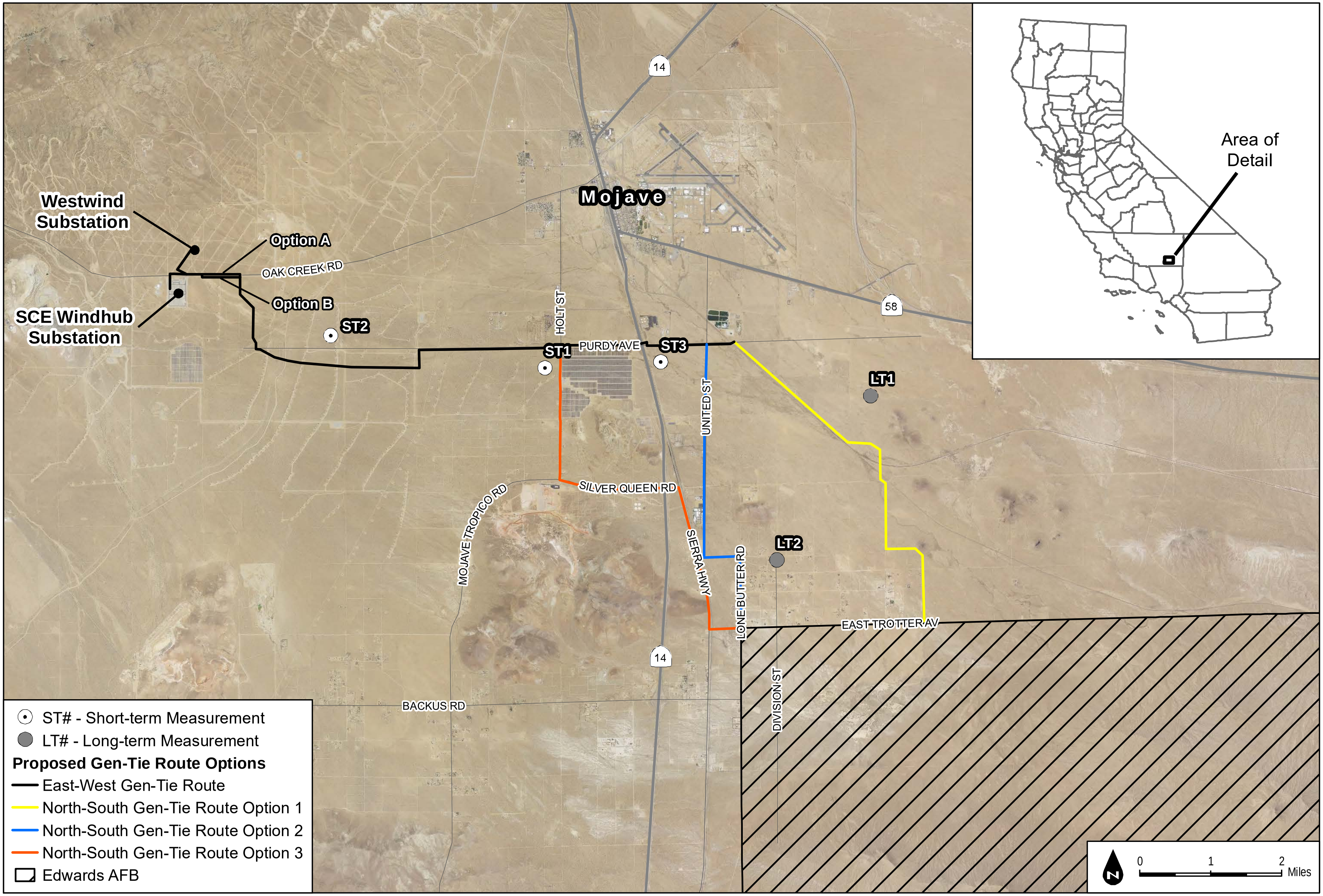

Figure 1-3: NOISE MEASUREMENT LOCATIONS

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3 SIGNIFICANCE CRITERIA

Based on the criteria identified in Appendix G of the CEQA Guidelines, the proposed project would have a significant impact on noise if it would result in:

1. The exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
2. The exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

3.1 County of Kern Noise Significance Criteria

Section 3.2 of the Noise Element of the Kern County General Plan (County of Kern 2004) defines noise-sensitive areas to include:

- Residential areas
- Schools
- Convalescent and acute care hospitals
- Parks and recreational areas
- Churches.

The above types of occupancies or development are also commonly referred to as NSLUs.

Based on Policy 1 of the Noise Element of the Kern County General Plan (County of Kern 2004), impacts relating to operational noise are considered significant when proposed project-related commercial or industrial noise would result in exposure of NSLUs to noise levels exceeding 65 dBA Ldn (or CNEL).

For transportation-related noise, impacts are considered significant if proposed project-generated traffic exposes existing or potential NSLU to sound levels in excess of 65 dBA Ldn (or CNEL). In areas where the ambient noise exceeds 65 dBA Ldn (or CNEL), a 3 dBA Ldn (or CNEL) or greater increase due to the proposed project is considered significant.

With respect to noise generation during construction, Section 8.36.020 of the Kern County Municipal Code (Noise Ordinance) establishes construction noise control standards that would apply to any proposed project construction activity. Generally, noise-generating construction activities are restricted to the period between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends. Construction noise outside these allowable periods would be considered significant if it is audible to a person at a distance of 150 feet of the construction activity, if the construction site is within 1,000 feet of an occupied residential dwelling.

Impacts related to excessive groundborne vibration would be significant if the proposed project results in the exposure of persons to or generation of excessive groundborne vibration equal to or in excess of 0.2 in/sec PPV. Construction activities within 200 feet and pile driving within 600 feet would be potentially disruptive to vibration-sensitive operations (Caltrans 2004).

4 IMPACTS AND MITIGATION

4.1 Project Operational Noise Generation

Operation of the gen-tie transmission lines would have little potential for the generation of substantial noise. However, transmission lines are subject to a phenomena called "Corona discharge noise". Corona discharge results from the partial breakdown of the electrical insulating properties of the air surrounding electricity conductors. When the intensity of the electric field at the surface of the conductor exceeds the insulating strength of the surrounding air, a corona discharge occurs at the conductor surface, representing a small dissipation of heat and energy. Some of the energy may dissipate in the form of small local pressure changes that result in audible noise, or in radio or television interference. Audible noise generated by corona discharge is characterized as a hissing or crackling sound that may be accompanied by a hum.

Slight irregularities or water droplets on the conductor and/or insulator surface accentuate the electric field strength near the conductor surface, making corona discharge and the associated audible noise more likely. Therefore, audible noise from transmission lines is generally a foul weather (wet conductor) phenomenon. Based on precipitation data from the Western Regional Climate Center, the Mojave region receives approximately 6.7 inches of precipitation a year, with daily highs of less than 0.10 inch per day (WRCC 2017). Because the number of days and amount of precipitation per year would be minimal, corona events would be rare and intermittent.

Nonetheless, in order to dismiss the potential significance of corona noise, research was conducted to determine the sound level associated with this phenomenon. Veneklasen Associates conducted noise measurements of a 500 kV double-circuit transmission line. Since corona noise is relative to the capacity of the transmission line, the noise levels from a 500 kV line would be greater than for the project's 230 kV transmission line. Veneklasen conducted noise measurements on a 15-minute average for a 500 kV double-circuit transmission line near Serrano Substation in Anaheim Hills, when humidity was greater than 80 percent and temperatures were in the range of 60 degrees F (conditions contributing to high corona noise). Directly under the transmission line tower, the measured level of corona noise, when ideal conditions existed for this phenomenon to occur, were 46 dBA (Veneklasen Associates, Inc. 2004). Beyond 100 feet of the T/L, the corona noise level drops at a rate of approximately 4 dB for each doubling of the distance. At a distance of 50 feet from the transmission line (the closest residence) the corona discharge noise level would be approximately 44 dBA roughly equivalent to the existing ambient noise levels in the project area. Consequently, corona noise would not have the potential to create an operational noise level of 65 dBA CNEL, or to increase ambient noise levels greater than 5 dBA above ambient.

The Project would install polymer (silicon rubber) insulators on any new gen-tie transmission line connections. This material is hydrophobic (repels water) and minimizes the accumulation of surface contaminants such as soot and dirt, which in turn reduces the potential for corona noise to be generated at the insulators. With consideration of these standard practices, noise from coronal discharge would not represent a substantial increase in noise levels in the project vicinity.

4.1.1 Mitigation – Project Noise Generation

The proposed gen-tie transmission line operation would not be anticipated to generate noise levels which exceed Kern County Standards nor which would cause a substantial increase in ambient noise levels compared to existing conditions. Therefore mitigation would not be required.

Residual Significance After Mitigation

Potential impacts associated with operational noise would remain less than significant, with no need for mitigations to be implemented.

4.2 Construction Noise

Construction of the gen-tie transmission lines would generate noise that could expose nearby receptors to elevated noise levels that may disrupt communication and routine activities. The magnitude of the impact would depend on the type of construction activity, equipment, duration of the construction phase, distance between the noise source and receiver, and intervening structures.

Noise from construction equipment generally exhibits point source acoustical characteristics. A point source sound is attenuated (is reduced) at a rate of 6 decibels per doubling of distance from the source for “hard site” conditions and at 7.5 decibels per doubling of distance for “soft site” conditions. The gen-tie alignments are located in areas typically exhibiting soft site conditions, including dirt roads and open areas with native vegetation. These rules apply to the propagation of sound waves with no obstacles between source and receivers, such as topography (ridges or berms) or structures. The range of maximum noise levels for various types of construction equipment is depicted in Table 9. Typical operating cycles may involve two minutes of full power, followed by three or four minutes at lower levels.

Table 9
Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dB) - 50 feet from Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pneumatic Tool	85
Pump	76
Roller	74
Saw	76
Scraper	89
Truck	88

Source: FTA 2006

4.2.1 Construction Activity

Construction of the gen-tie transmission line would involve clearing and grubbing of the existing vegetation at the pole locations; grading necessary for construction of dirt access roads, where necessary, and transmission pole foundations; and stringing of the transmission cable. Clearing of vegetation at a proposed pole location, and the construction of a foundation for the pole, would require approximately 2-3 construction days, with the erection of the pole requiring approximately one day. Access road construction to selected pole locations would require 1-2 days, as distance from existing roads would be very limited. Finally, stringing of the transmission line for any given gen-tie segment would likely occur in a single day. Compiled together, the construction activity for the gen-tie development would account for between approximately 4-6 days associated with any given pole location. Depending upon the average pole separation distance, any given residence might fall within 1,000 feet of active construction for only 4-6 days out of the total gen-tie construction period.

Construction activities would occur during the County's allowable hours of operation. The noise levels generated by construction equipment would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed and the condition of the equipment. The average sound level of the construction activity also depends upon the amount of time that the equipment operates and the intensity of the construction during the time period.

Construction equipment would likely include graders, scrapers, backhoes, loaders, cranes, dozers, water trucks, portable generators and air-compressors, and miscellaneous trucks. The maximum noise level ranges for various pieces of construction equipment at a distance of 50 feet are depicted in Table 9. The average noise levels at 50 feet for typical equipment would range up to 89 dB for the type of equipment normally used for this type of project. The hourly average noise levels would vary, but construction noise levels of up to approximately 75–80 dB at 50 feet are typical for the anticipated construction activities.

As illustrated in Tables 3–6, there are several homes at 50 feet from segments of some of the alignments. However, there are no homes closer than 50 feet, and many of the existing homes are at much greater distances from the potential gen-tie alignments. With average construction noise levels during grading and other typical construction activities in the range of 75-80 dBA L_{eq} (hourly) at 50 feet from the construction activity, even the closest residences would not be exposed to extreme construction noise.

Although the adjacent residences could be exposed to high construction noise levels which could result in annoyance, the exposure would be short-term, would occur during the less sensitive daytime period, and would cease upon proposed project construction completion. It is anticipated that construction activities associated with build-out of the proposed project would take place between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends, which is the limit specified in the Kern County noise ordinance. However, construction activities could take place outside these time periods for portions of the proposed project where technical requirements dictate (such as completion of transmission line stringing). As a result, a significant construction noise impact could potentially occur.

4.2.2 Mitigation - Construction Noise

Implementation of the following mitigation measure would reduce temporary noise impacts from construction activities.

Noise-1 **Construction Activity Limits**. Construction activity occurring within 1000 feet of occupied residential or other NSLU shall be restricted to the hours between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends.

Residual Significance After Mitigation

Implementation of the above measure would reduce potential impacts associated with construction noise to a less than significant level.

4.3 Cumulative Construction Noise Impacts

Construction noise impacts are localized in nature because they are limited to the construction site where construction equipment is operating. As discussed above, sound levels from typical construction equipment range from 60 dBA to 90 dBA L_{eq} at 50 feet from the source (FHWA 2006). Construction noise decreases approximately 6 dBA (urban area, hard-surface conditions) to 7.5 dBA (undeveloped area with loose dirt or vegetated ground cover) with every doubling of distance. Therefore, construction noise would be reduced to less than 60 dBA approximately 0.25 miles from the construction site, assuming worst case construction noise of 90 dBA L_{eq}, hard site conditions, and no intervening topography or structures. Additionally, construction noise is temporary and would cease at completion of the cumulative project. Only construction projects occurring simultaneously within 0.25 mile of each other could result in a significant cumulative temporary noise impact. The project gen-tie alignments are separated from more populated portions of the region via distance and open spaces with soft soil and or native vegetation, which provides a noise buffer between on-site construction activities and off-site future construction projects. Therefore, construction of the gen-tie transmission lines would not be located in close proximity to another construction project(s) and would not contribute to a significant cumulative temporary ambient noise impact.

4.4 Groundborne Vibration

4.4.1 Impacts

The main concern associated with groundborne vibration is annoyance, however, vibration-sensitive instruments and operations, such as those found in hospitals and laboratories, can be disrupted at much lower levels. In extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. No vibration-sensitive land uses are proposed as part of the proposed project; however, excessive levels of groundborne vibration may be an annoyance to residences. Some common sources of groundborne vibration are trains, and construction activities such as blasting, pile-driving and heavy earth-moving equipment. The primary source of groundborne vibration occurring as part of the proposed project is construction activity.

According to Caltrans, the highest measured vibration level during highway construction was 2.88 in/sec PPV at 10 feet from a pavement breaker. Other typical construction activities and equipment, such as 8 and D-9 Caterpillars, earthmovers, and trucks have not exceeded 0.10 in/sec PPV at 10 feet. Vibration sensitive instruments and operations may require special consideration during construction. Vibration criteria for sensitive equipment and operations are not defined and are often case specific. As a guide, major construction activity within 200 feet and pile driving within 600 feet may be potentially disruptive to sensitive operations (Caltrans 2002). No pile driving is anticipated to be necessary. There are no known vibration-sensitive land uses (i.e., research, manufacturing, or medical facilities using vibration-sensitive devices) within 10 miles of the study area.

Gen-tie transmission line construction would have the potential to expose existing residences to groundborne vibration, because construction activities would take place within 200 feet of some residences. With respect to any given existing residence in the study area, construction activity close enough to cause any perceptible ground borne vibration would likely occur approximately 4-6 days, out of the total construction duration for the gen-tie alignment. Also, ground vibrations from construction activities do not often reach the levels that can damage structures or affect activities that are not vibration-sensitive, although the vibrations may be felt by nearby persons in close proximity and result in annoyance (FTA 2006). In addition, the construction activity that would occur in close proximity to occupied residences would not include pile driving, and would therefore not result in a significant impact from groundborne vibration.

4.4.2 Mitigation Measures

The proposed project would not result in a significant groundborne vibration impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required, because impacts would be less than significant without mitigation.

4.5 Cumulative Vibration Impacts

As described above, major construction activity within 200 feet may be potentially disruptive to sensitive operations (Caltrans 2002). In order to result in a cumulative vibration impact, major construction activities would have to be located within 200 feet of another project. Due to the localized nature of vibration impacts and the fact that all construction would not occur at the same time or at the same location, cumulative development in the surrounding Kern County would not result in the exposure of people to or the generation of excessive groundborne vibration and/or noise levels. Therefore, a cumulative groundborne vibration impact would not occur.

5 REFERENCES

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B12. Noise Measurements

DUDEK

MAIN OFFICE
605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760.942.5147 T 800.450.1818 F 760.632.0164

MEMORANDUM

To:	Megan Enright, Dudek
From:	Jonathan Leech, Dudek
Subject:	Edwards Air Force Base Solar Project Update to Ambient Noise Measurements
Date:	February 16, 2018
Attachment(s):	Noise Measurement Location Figure Acoustical Terms and Definitions Noise Measurement Field Data

Noise measurements to characterize the ambient noise environment in the vicinity of a proposed solar energy development on Edwards Air Force Base (EAFB) were performed in 2013 by RBF consultants. In order to determine if the documented ambient noise levels from the 2013 assessment would remain valid in the current year, Terra Gen retained Dudek to conduct noise measurements again at the same locations used in the original assessment.

The attached figure illustrates the location of the two noise measurement sites (NM-1 and NM-2), which duplicate those chosen by RBF for the 2013 ambient noise measurements. NM-1 is located at the northeastern corner of the intersection of Trotter Avenue and Fetters Street, adjacent to several residences. NM-2 is located on the west side of Lone Butte Avenue, approximately ½ mile north of Sopp Road, adjacent to several commercial businesses (open storage yards).

A Dudek acoustician performed the updated set of noise measurements at NM-1 and NM-2 on February 13, 2018. Meteorological conditions were clear skies, cool temperatures, with medium wind speeds (5 to10 miles per hour), and low humidity. Noise monitoring equipment used for the ambient noise survey consisted of a SoftdB Piccolo integrating sound level meter with pre-polarized microphone. The monitoring equipment complies with applicable requirements of the American National Standards Institute (ANSI) for a Type 2 (general purpose) sound level meter.

A summary comparison of the sound level measurement results for the 2013 and 2018 measurement events is presented in Table 1, below. The field noise measurements results for the Dudek 2018 measurement event are included in an Attachment (Noise Measurement Field Data).

TABLE 1

Noise Measurement Results

(2013 Versus 2018)

Site ID	Location	L_{EQ}	L_{MIN}	L_{MAX}	Date	Time
NM-1	Near a single-family home on the northeastern corner of the Fetters Street/Trotter Avenue intersection (near the northwestern boundary of the project site).	48.5	24.8	68.2	10/17/13	11:36 AM
		58.9	43.1	75.6	2/13/18	12:34 PM
NM-2	Near a single-family home located along Lone Butte Road, west of the project site.	55.0	24.9	80.5	10/17/13	12:05 PM
		62.3	40.3	84.7	2/13/18	12:10 PM

As indicate above in Table 1, the measured sound levels at both NM-1 and NM-2 were greater in 2018 than in 2013. The increase in measured sound levels is evidently the result of more intensive commercial activities occurring in the immediate vicinity of the measurement sites.

For NM-1, audible noise contributions were noted from the storage yard two parcels to the east, also on the north side of Trotter Avenue. Pick-up truck loading, small equipment operation, and the use of a portable generator were occurring during the measurement. The minimum noise level recorded during the measurement was 18 dBA higher than in 2013, indicating a consistent noise source is now present in this vicinity. The activities at the nearby commercial property are assumed to be routine, and therefore the higher ambient noise level recorded in 2018 is considered to be representative for this vicinity.

For NM-2, audible noise contributions were noted from the property immediately adjacent to the measurement site, as well as from the storage yards to the north and south of the measurement site. Small equipment operation, movement of materials in the yards, and power tool use occurred within the commercial properties in the immediate vicinity of the measurement site. The minimum noise level recorded during the measurement was 15 dBA higher than in 2013, indicating probably more intensive operations activities at these businesses. The maximum noise level recorded between 2013 and 2018 was similar, with the average noise level (L_{EQ}) increasing a moderate amount (7 dBA) in 2018. Assuming the activities at the adjacent commercial properties were normal during the measurement, the higher ambient noise level recorded in 2018 is considered to be representative for this vicinity.

Acoustical Terms and Definitions

GLOSSARY

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level (dBA)	The sound pressure level in decibels as measured on a sound-level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Community Noise Equivalent Level (CNEL)	CNEL is the A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10 p.m. to 7 a.m.) and a 5 dB adjustment added to the sound levels occurring during the evening hours (7 p.m. to 10 p.m.).
Decibel (dB)	A unit for measuring sound pressure level, equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Equivalent Sound Level (L_{eq})	The sound level corresponding to a steady-state sound level and containing the same total energy as a time varying signal over a given sample period. L_{eq} is designed to average all of the loud and quiet sound levels occurring over a specific time period.

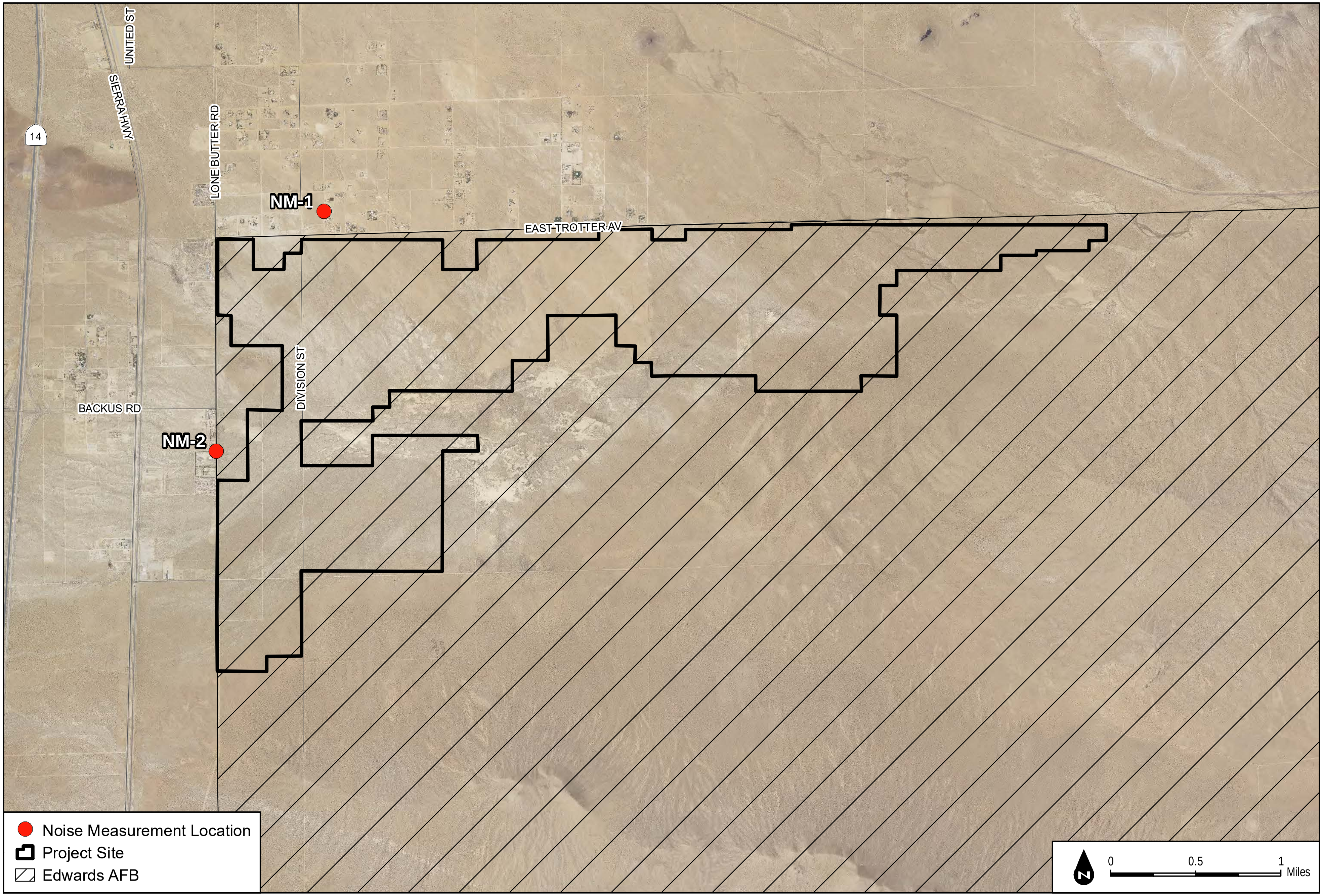
Noise Measurement Field Data

LOCATION NM-1

	Slow Response		dBA weighting		2.0 dB resolution stats		
Date hh:mm:ss	LeqPeriod	Leq	Lmax	Lmin	L10%	L50%	L90%
2/13/2018 12:34	15.0 min	58.9	75.6	43.1	61	53	45

LOCATION NM-2

	Slow Response		dBA weighting		2.0 dB resolution stats		
Date hh:mm:ss	LeqPeriod	Leq	Lmax	Lmin	L10%	L50%	L90%
2/13/2018 12:10	15.0 min	62.3	84.7	40.3	57	49	43



NOISE MEASUREMENT LOCATIONS

B13 Noise Report 2013

ACOUSTICAL ASSESSMENT
for the
Oro Verde Solar Project

County of Kern, State of California

Consultant:

RBF CONSULTING
14725 Alton Parkway
Irvine, California 92618
Contact: Mr. Eddie Torres, INCE,
Director of Technical Studies
949.855.3612

December 3, 2013

JN 131259

This document is designed for double-sided printing to conserve natural resources.

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DEFINITIONS OF COMMONLY USED TERMS IN NOISE CONTROL

The definitions that follow are in general agreement with those contained in publications of various professional organizations, including the American National Standards Institute (ANSI); the American Society for Testing and Materials (ASTM); the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE); the International Organization for Standardization (ISO); and the International Electrotechnical Commission (IEC).

TERMINOLOGY

acoustic; acoustical: *Acoustic* is usually used when the term being qualified designates something that has the properties, dimensions, or physical characteristics associated with sound waves (e.g., acoustic power); *acoustical* is usually used when the term which it modifies does not explicitly designate something that has the properties, dimensions, or physical characteristics of sound (e.g., acoustical material).

ambient noise: The all-encompassing noise associated with a given environment at a specified time, usually being a composite of sound from many sources arriving from many directions, near and far; no particular sound is dominant.

attenuation: The decrease in level of sound, usually from absorption, divergence, scattering, or the cancellation of the sound waves.

average sound level (L_{eq}): The level of a steady sound which, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Unit: decibel.

A-weighted sound level (L_A): The sound level measured with a sound-level meter using A-weighting. *Unit*: decibel (dBA).

background noise: The total noise from all sources other than a particular sound that is of interest (e.g., other than the noise being measured or other than the speech or music being listened to).

decibel (dB): A unit of level which denotes the ratio between two quantities that are proportional to power; the number of decibels correspond to the logarithm (to the base 10) of this ratio. [In many sound fields, the sound pressure ratios are not proportional to the corresponding power ratios, but it is common practice to extend the use of the decibel to such cases. One decibel equals one-tenth of a *bel*.]

equivalent continuous sound level (average sound level) (L_{eq}): The level of a steady sound which, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound. *Unit*: decibel (dBA).

frequency (f): Of a periodic function, the number of times that a quantity repeats itself in one second, i.e., the number of cycles per second. *Unit*: hertz (Hz).

noise: Any disagreeable or undesired sound, i.e., unwanted sound.

noise level: Same as sound level. Usually used to describe the sound level of an unwanted sound.

noise reduction (NR): The difference in sound pressure level between any two points along a path of sound propagation.

sound: (1) A change in air pressure that is capable of being detected by the human ear.
(2) The hearing sensation excited by a change in air pressure.

sound level: Ten times the logarithm to the base 10 of the square of the ratio of the frequency-weighted (and time-averaged) sound pressure to the reference sound pressure of 20 micropascals. The frequency-weightings and time-weighting employed should be specified; if they are not specified, it is understood that A-frequency-weighting is used and that an averaging time of 0.125 seconds is used. *Unit*: decibel (dBA).

EXECUTIVE SUMMARY

The purpose of this Acoustical Assessment is to evaluate potential short- and long-term noise impacts resulting from implementation of the proposed Oro Verde Solar Project (Project or proposed Project).

The Oro Verde Solar Project (the "Project"), proposed by FRV EAFB Solar Holdings, LLC, involves construction and operation of an up to 400 megawatt alternating current (MW-AC) solar photovoltaic (PV) energy-generating facility (the "Solar Facility") and an associated 230 kilovolt (kV) generation interconnection transmission line with up to two circuits and associated fiber optic communications (the "Gen-tie Line"). The proposed Solar Facility would be located on Edwards Air Force Base (EAFB), approximately 6 miles northeast of the town of Rosamond and 6 miles south of Mojave, in southeastern Kern County, California. The proposed Gen-tie Line would run approximately 13.5-miles northwest from the Solar Facility to Southern California Edison's (SCE) Windhub Substation located to the northwest of the Solar Facility and the community of Rosamond and to the south of Oak Creek Road. The Project is located on land that is subject to the jurisdiction the Department of Defense (DOD) and Kern County; therefore, DOD and Kern County will direct preparation of a joint Environmental Impact Statement (EIS) and an Environmental Impact Report (EIR), referred to as an EIS/EIR. The Air Force is representing DOD as the lead agency responsible for complying with the National Environmental Policy Act (NEPA). Kern County will be the lead agency responsible for complying with the California Environmental Quality Act (CEQA).

Temporary Impacts. Based upon the results of the analysis, short-term construction impacts associated with Project implementation would result in a less than significant impact. Mitigation Measure NOI-1 would be required to would be required to ensure best management practices are incorporated when construction activities occur within 1,000 feet of a sensitive receptor and to ensure compliance with the County Noise Ordinance (Chapter 8.36, *Noise Control*, Section 8.36.020, *Prohibited Sounds*). Construction equipment noise would be reduced to a less than significant level.

Long-Term Impacts. The analysis has concluded that Project implementation would result in less than significant long-term impacts pertaining to operational noise levels. No mitigation measures are required for long-term operations.

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1.0 INTRODUCTION

The Oro Verde Solar Project (the "Project"), proposed by FRV EAFB Solar Holdings, LLC, involves construction and operation of an up to 400 megawatt alternating current (MW-AC) solar photovoltaic (PV) energy-generating facility (the "Solar Facility") and an associated 230 kilovolt (kV) generation interconnection transmission line with up to two circuits and associated fiber optic communications (the "Gen-tie Line"). The proposed Solar Facility would be located on Edwards Air Force Base (EAFB), approximately 6 miles northeast of the town of Rosamond and 6 miles south of Mojave, in southeastern Kern County, California; refer to Figure 1, *Regional Vicinity*. The proposed Gen-tie Line would run approximately 13.5-miles northwest from the Solar Facility to Southern California Edison's (SCE) Windhub Substation located to the northwest of the Solar Facility and the town of Rosamond and to the south of Oak Creek Road. The Project is located on land that is subject to the jurisdiction the Department of Defense (DOD) and Kern County; therefore, DOD and Kern County will direct preparation of a joint Environmental Impact Statement (EIS) and an Environmental Impact Report (EIR), referred to as an EIS/EIR. The Air Force is representing DOD as the lead agency responsible for complying with the National Environmental Policy Act (NEPA). Kern County will be the lead agency responsible for complying with the California Environmental Quality Act (CEQA).

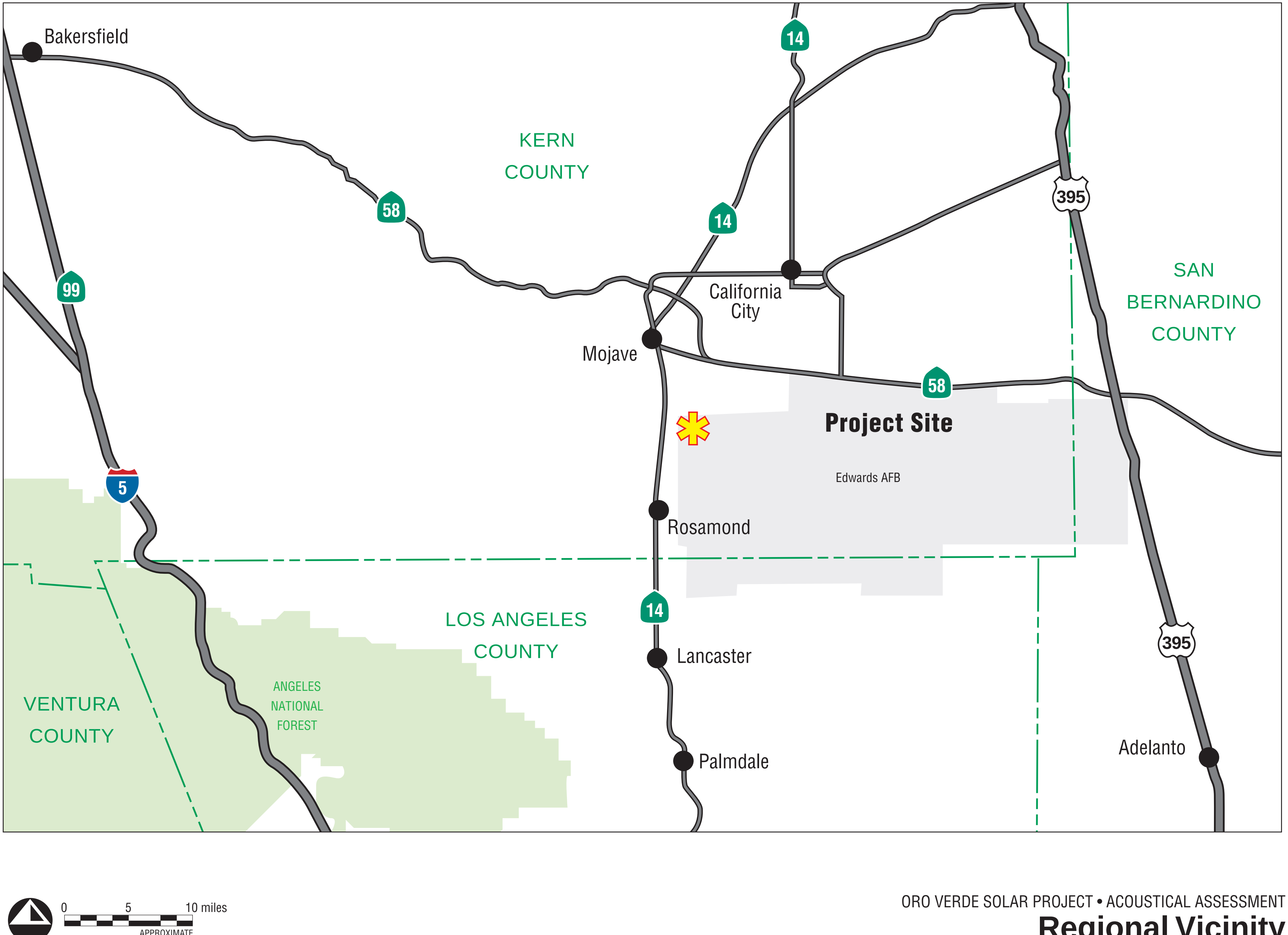
EAFB consists of approximately 308,000 acres of largely undeveloped or semi-improved land used predominantly for aircraft test ranges and maintained and unmaintained landing sites (i.e., dry lake beds). An approximately 6,000 acre area located in the northwest corner of EAFB, approximately 5 miles north of Rosamond Dry Lake and 10 miles west of Rogers Dry Lake, located south of Trotter Avenue and east of Lone Butte Road, has been identified as the potential location for the Solar Facility (herein referred to as the "Solar Facility Study Area" or SFSA); refer to Figure 2, *Site Vicinity*. The final proposed footprint of the Solar Facility within the SFSA has not yet been defined; however it is anticipated that the proposed footprint will not comprise more than 4,000 acres.

The proposed 230 kV Gen-tie Line would run across publicly and privately-owned property in unincorporated Kern County. The main constraint on the alignment of the Gen-tie Line would be securing access easements from relevant public and private entities along the various alignment options.

PROJECT OBJECTIVES

Executive Order S-14-08 established Renewable Portfolio Standard (RPS) targets for California that "all retail sellers of electricity shall serve 33 percent of their load with renewable energy by 2020." State government agencies have been directed to take all appropriate actions to implement this target in all regulatory proceedings, including siting, permitting, and procurement for renewable energy power plants and transmission lines. The RPS has created a competitive market for contracts to sell renewable energy, with success determined on the basis of "least cost, best fit" criteria.

FRV EAFB Solar Holdings, LLC, was formed for the sole purpose of developing and constructing the Project and selling its electricity and associated environmental attributes to an electric utility purchaser under a long-term contract to meet California RPS goals. The specific objectives for the Project include the following:

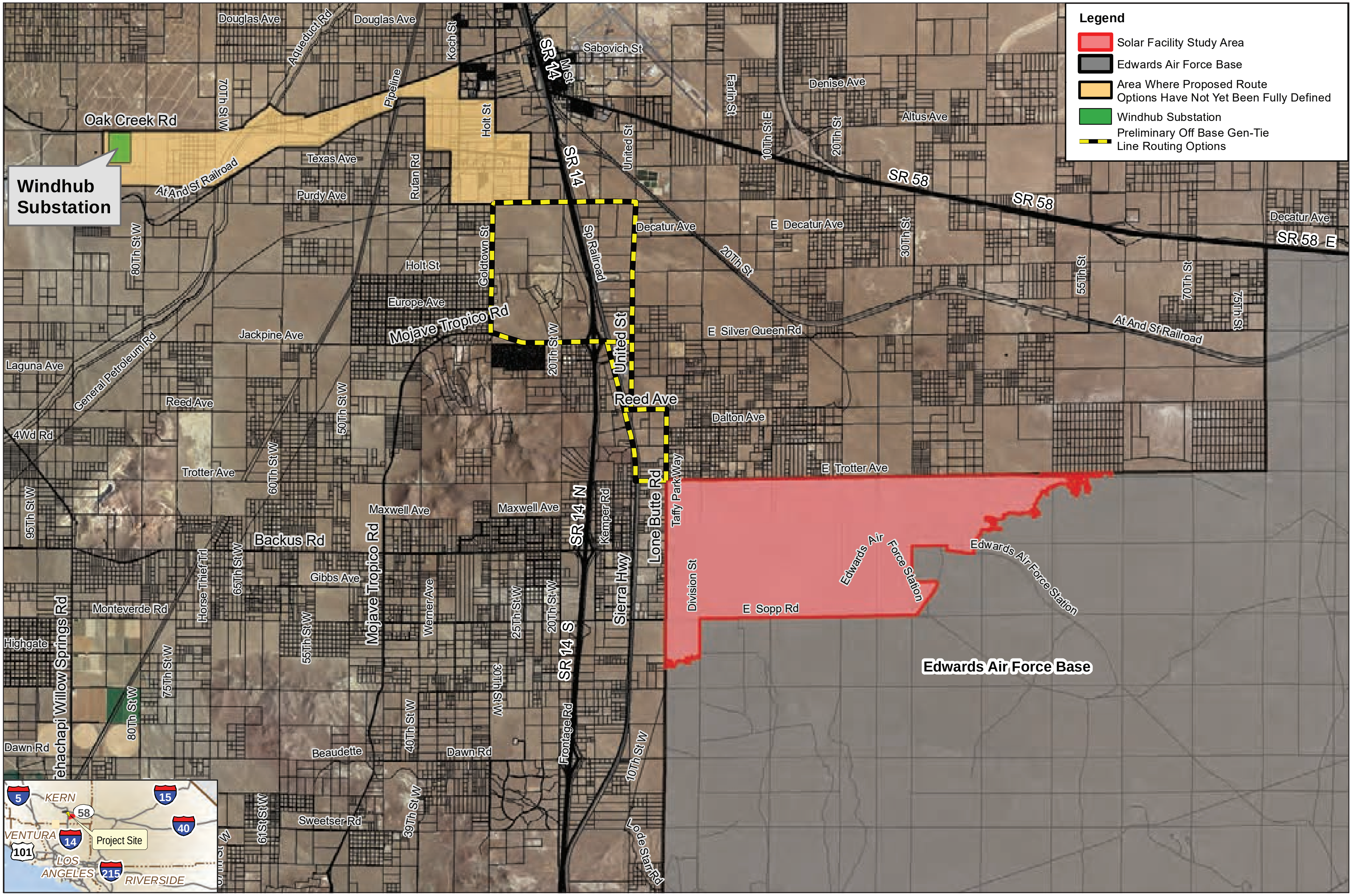


ORO VERDE SOLAR PROJECT • ACOUSTICAL ASSESSMENT

Regional Vicinity

JN 131259-19705 MAS

Figure 1



Source: [1] ESRI StreetMap USA (2006). [2] I-cubed Nationwide Prime - Aerials Express (2009-04-15 image date, 0.3m resolution).

ORO VERDE SOLAR PROJECT • ACOUSTICAL ASSESSMENT

Site Vicinity

JN 131259-19705 MAS

Figure 2

- Establish a solar PV power-generating facility that is of a sufficient size and configuration to clean electricity in order to assist the State of California in achieving the RPS for 2020 by providing a significant new source of renewable energy.
- Offset carbon dioxide and other emissions that would have resulted from providing an equivalent amount of electricity from fossil fuel-fired electric generators.
- Produce and transmit electricity at a competitive cost.
- Develop an economically feasible project for which commercial financing is available.
- Locate the facility in a low impact area of Kern County, not near sensitive receptors nor located on prime farmland or Williamson Act land, and within proximity to an available connection to the existing electrical transmission infrastructure.
- Minimize environmental effects by:
    - Using existing electrical distribution facilities, rights-of-way, roads, and other existing infrastructure where practicable;
    - Minimizing impacts to threatened species and/or endangered species;
    - Minimizing water use; and
    - Reducing greenhouse gas emissions.
- Use technology that is available, proven, efficient, and easily maintained, recyclable, and environmentally sound.

1.1 PROJECT DESCRIPTION

To construct and operate the Solar Facility on EAFB, the applicant is requesting execution of an Enhanced Use Lease with DOD, acting through the Secretary of the Air Force. The applicant is also requesting approval of a Franchise Agreement with Kern County to utilize County franchise rights for routing the Gen-tie Line from the Solar Facility to Windhub Substation. In addition, several road reservations for future public arterial (major highway) and collector (secondary highway) routes, established per the Circulation Element of the Kern County General Plan (KCGP) and Mojave Specific Plan (MSP), exist along the Gen-tie Line Route Options. The applicant is requesting amendments to the KCGP and MSP to remove the road reservations in select locations along the Gen-tie Line route, once finalized.

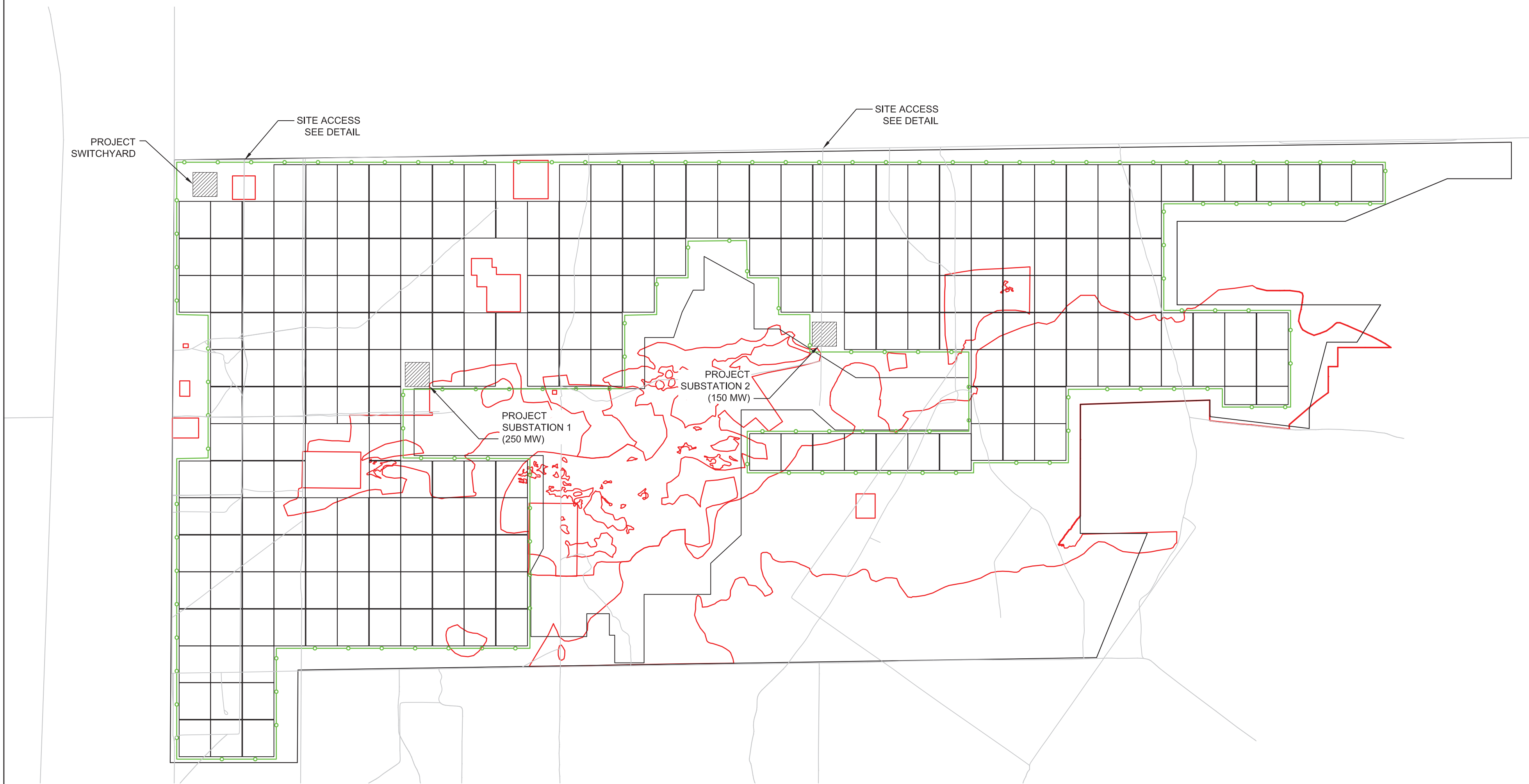
PROJECT COMPONENTS OVERVIEW

The Project would consist of two major components: the Solar Facility and the associated Gen-tie Line as described in more detail below.

SOLAR FACILITY

The Solar Facility would consist of solar arrays arranged in a grid pattern to convert solar energy directly to electrical power to supply the electrical grid; refer to Figure 3, *Site Plan*. The Solar Facility would consist of the following subcomponents, as described in more detail below:

- PV arrays;
- Up to three on-base substations;
- One project switchyard;
- Several meteorological stations and associated equipment;
- One microwave tower and receiver tower (if required);



TOTAL SYSTEM DESCRIPTION	
SYSTEM SIZE (AC)	400,000 KW
SYSTEM SIZE (DC)	517,000 KW
MODULE TYPE	MEMC 330W
INVERTER	TBD
RACKING SYSTEM	SINGLE AXIS TRACKING

LEGEND

PERMETER FENCE

EXISTING ROADS

SITE CONSTRAINTS

Source: SunEdison, 9/16/13.

not to scale

ORO VERDE SOLAR PROJECT • ACOUSTICAL ASSESSMENT

Site Plan

JN 131259-19705 MAS

Figure 3

- SCE upgrades required to interconnect the project;
- Up to 40,000 square feet of permanent services and warehouse buildings placed throughout the site;
- Associated roads, fencing, and drainage facilities; and
- Generators for emergency back-up power.

PV ARRAYS

An array consists of multiple PV panels. PV panels convert sunlight directly into electrical power to supply the electrical grid, consuming no fossil fuels and emitting no pollutants during operations. PV panels are mounted on metal pipe or "H" beam foundations that are approximately four to six inches in diameter or dimension. The panels can be installed either using a single axis tracking system, whereby the panels are controlled to move with the sun, or on a fixed tilt system, whereby the panels are fixed in position at a particular angle. The mounting configuration for the Project has not yet been determined. For either configuration, most of the pipe pile foundations would be driven to depths of 10- to 15-feet deep. When piles cannot be driven to the required depth, an alternate spread footing detail would be required; these footings are approximately 6 feet wide by 6 feet long and 2 feet deep. The PV panels, at their highest point, would not exceed 12 feet above the ground surface and at their lowest point, could be approximately 30 inches above the ground surface.

POWER CONVERSION

The direct current (DC) power generated by the PV panels is delivered along an underground trench system located between each row of PV panels, approximately three feet deep and up to five feet wide (including the trench and disturbed area). The DC power for each array would be routed to a 12-foot wide, 30-foot long, and 12-foot tall metal clad electrical enclosure mounted on concrete foundation pads where an inverter and transformer would be located. The inverters within the electrical enclosures convert the DC power to alternating current (AC) power and the medium voltage transformers step up the voltage to collection level voltage (34.5 kV). All electrical equipment would be either outdoor rated or mounted within the electrical enclosures designed specifically for outdoor installation. The equipment poses no electrical shock risk and is safe for humans and wildlife to touch.

The multiple transformers would then be connected in parallel, to deliver AC power along other underground trenches, approximately four feet deep and up to five feet wide, (including the trench and disturbed area), to up to three on-site substations. These trenches would also contain fiber optic cable.

The final size of each subarray will be determined during final design. A 2 MW subarray, including the PV panels and associated electrical enclosure, occupies approximately 9.76 acres for a fixed tilt configuration and 15.00 acres for a tracker configuration.

ON-BASE SUBSTATIONS

The Solar Facility would include up to three on-base substations. Each substation would step up the generation voltage from 34.5 kV to 230 kV for off-base transmission to SCE's Windhub Substation. Each substation would contain an approximately 20-foot wide, 30-foot long, 10-foot high control building with an attached battery room, and standard substation equipment. Each on-base substation would not exceed 65,340 square feet, or 1.5 acres, in size.

Substation equipment would generally be between 15 and 35 feet tall, with the exception of the transmission tower which would be a maximum of 60 feet in height and a lightning protection mast, which would not exceed 75 feet in height (transmission tower plus 15 feet).

Grounding of the substations would be accomplished by ground grids designed to meet the requirements of Institute of Electrical and Electronics Engineers (IEEE) 80, "IEEE Guide for Safety in AC Substation Grounding." Final ground grid design would be based on site-specific information such as available fault current and local soil resistivity. Typical ground grids consist of direct buried copper conductors with eight-foot long copper-clad ground rods arranged in a grid pattern to approximately three feet outside of the substation area.

Overhead lines would then run from each substation to the project switchyard described below using approximate 60-foot steel monopoles. The number of poles that would be required within the Solar Facility will be determined after the Solar Facility layout is determined.

PROJECT SWITCHYARD

The Solar Facility switchyard is where the voltage from the up to three Solar Facility phases would be combined before being routed via the 230 kV Gen-tie Line to SCE's Windhub Substation. The switchyard contains standard switching, metering, and voltage protection equipment. The switchyard would not exceed 104,286 square feet, or 2.4 acres, in size (which includes a ground grid approximately three feet outside of the substation area. The Project Switchyard requires dead end structures which would not exceed 80 feet in height and lightning protection masts which would not exceed 95 feet in height.

MICROWAVE TOWER

The Solar Facility may also include a microwave tower for utility communications (if deemed necessary), which will be sited to achieve line-of-sight to Windhub Substation and would not exceed 150 feet in height. A reciprocal receiver at Windhub Substation may also be required.

SERVICE BUILDINGS AND WAREHOUSES

The Solar Facility would include up to 40,000 square feet of permanent services and warehouse buildings placed throughout the site. Such buildings would not exceed 14 feet in height. Each Service Building would contain offices, a breakroom and restroom, and would house the overall plant control system (PCS), where operation of the Solar Facility would be monitored and controlled using a Supervisory Control and Data Acquisition (SCADA) system. The Warehouses would contain a restroom and shower, and would be used to conduct various maintenance activities on the Solar Facility equipment. These buildings would include paved parking lots and septic systems.

METEOROLOGICAL EQUIPMENT

The Solar Facility would include multiple Solar Meteorological Station (SMS) located within the Solar Facility. Each SMS includes two solar energy (irradiance) meters, as well as an air temperature and a wind meter. The equipment would be mounted on tripods (at a maximum of 15 feet in height), that would require no permanent foundation. Power for the SMS would be provided by the plant's essential power system or a dedicated PV panel with a small battery. The SMS would be located inside the solar array field or adjacent to a services building; data would be communicated directly to the PCS. The SMS would be used for electrical generation predictions and for coordination with the California Independent Systems Operator (CAISO).

ROADS

Access to the Solar Facility would be from Trotter Avenue, which is currently an unpaved roadway east of Lone Butte Road. A permanent 25-foot paved access road would be established into the Solar Facility and would lead to each Service Building. In addition, the Solar Facility would contain an internal, permanent unpaved roadway system that would include 25-foot wide perimeter roads surrounding the facility, as well as a network of 25-foot roads between subarrays. These roads would provide access for operations and maintenance activities and would consist of existing on-site materials that would be compacted, or a blend of existing and imported materials (e.g., gravel).

FENCING

To ensure the safety of the public and the facility, the Solar Facility would be secured with six-foot high chain-link fencing topped with three strands of barbed wire for a total height of seven feet. The chain-link fencing may be “wildlife permeable” for certain species (e.g., desert tortoise), where an approximately 2 foot opening would be left at the bottom of the fence at regular intervals along its length, to allow the passage of certain wildlife through the Solar Facility. The opening would be sized to prevent theft of PV panels and would contain a slack line within the opening to deter people from using the opening to access the site. Access to the Solar Facility would be controlled and gates would be installed to provide the required access to the site. The site would also have a closed circuit TV that would be monitored from a remote location.

DRAINAGE FACILITIES

The drainage facilities have yet to be designed; however, they may include an onsite storm water collection system and an on-site retention basin(s).

GEN-TIE AND RELATED TELECOMMUNICATIONS LINE

Power would be carried from the Solar Facility to the Windhub Substation via a 230 kV Gen-tie Line with one or two circuits and related fiber optic communications lines. The Gen-tie Line would be installed on one set of steel monopoles (e.g., single pole) (with a dull-galvanized finish) for the majority of the route; however, where the Gen-tie Line reaches Oak Creek Road, two parallel sets of monopoles for the remainder of the route until reaching Windhub Substation are included in this project description to be environmentally reviewed. This second set of poles will not be constructed or utilized by the Project, and is to be studied for use by other entities as part of the Kern County Energy Corridor for use by other entities.

The Gen-tie Line would travel overhead for the majority of the route, but would be installed underground in certain sections where necessary due to physical or commercial constraints. Up to two fiber optic communication cables would run parallel with the Gen-tie Line. If two cables are required, one would be installed overhead and the other installed underground, in order to ensure diverse communications paths exist between the Solar Facility and Windhub Substation.

Foundation sizes for the Gen-tie poles would be approximately six to 12 feet in diameter, 20 to 40 feet deep, and would be augured wherever feasible. The Gen-tie poles would be set in poured concrete foundations within the holes.

Where there is one set of poles, the approximate width of disturbance associated with construction and maintenance of the Gen-tie Line would be 100 feet. Where the Gen-tie Line route passes through the Kern County Energy Corridor, the Gen-tie Line disturbance width would be approximately half the width of the 200 foot disturbance width anticipated as a result of the full Kern County Energy Corridor Buildout. These widths of disturbance include 50 feet of disturbance associated with ground lines extending out from the poles. The Gen-tie Line may also share rights of way with existing public and private transmission lines where technically and commercially feasible.

It is estimated that approximately 140 poles would be installed for the Gen-tie Line. All poles would be designed to be avian-safe in accordance with the *Suggested Practices for Avian Protection on Power Lines: the State of the Art in 2006* (Avian Power Line Interaction Committee [APLIC] 2006).

SCE UPGRADES REQUIRED IN ORDER TO INTERCONNECT THE PROJECT

Upgrades required to interconnect the Oro Verde Solar project to the transmission grid include installation of new transmission equipment, including circuit breakers, switches, bus supports, breaker management relays, insulator/hardware assemblies, telecommunications equipment, and spans of conductors between the last developer-owned structure and the Windhub Substation switchyard. SCE would also install additional systems, meters, and transmitters at Windhub substation.

In addition, SCE would need to add relays and satellite synchronized clocks at Antelope, Vincent, Whirlwind, and Windhub substations, and light-wave, channel and related terminal equipment at the Antelope, Vincent, Whirlwind, and Windhub Substations, and at the Alhambra communications site. SCE would also upgrade wave traps at Lugo substation and Vincent substation, and upgrade circuit breakers at Vincent and Lugo substations.

1.2 CONSTRUCTION

It is anticipated that construction of the Project would take approximately two years, beginning in the third quarter of 2014 and ending in the third quarter of 2016.

The construction worker population would consist of laborers, electricians, supervisory personnel, support personnel, and construction management personnel. The Project is anticipated to be constructed as quickly as at a rate of 0.015 MW per month per laborer, maximum. Construction work would generally occur during daylight hours, Monday through Friday. Non-daylight work hours may be necessary to make up schedule deficiencies, or to complete critical construction activities including activities that cannot be completed during daylight. For instance, during hot weather, it may be necessary to start work earlier to avoid pouring concrete during high ambient temperatures.

It is anticipated that up to 1000 acre-feet per year of water (as a worst-case scenario) would be required during the two year construction to support concrete manufacturing, dust control, and sanitary use. To the extent available, tertiary treated water would be used for non-potable uses from the Rosamond Community Services District or Antelope Valley East Kern Water Agency (AVEK), or would be trucked to the site.

Temporary power for Project construction is expected to be provided by mobile diesel-driven generator sets and/or by temporary electrical service from the local power provider. The diesel generators would be registered with the California Air Resources Board's (CARB) Portable Equipment Registration Program (PERP). Additionally, when diesel-driven generators are used, appropriate noise abatement procedures will be implemented to reduce noise-related impacts to residents adjacent the locations of said power equipment.

More details regarding the construction process for the Solar Facility and Gen-tie Line are provided below, as well as a discussion of construction Best Management Practices (BMPs) that would be implemented.

SOLAR FACILITY

SITE PREPARATION

Site preparation would begin by clearing existing vegetation, to the extent necessary, and grading the areas proposed for the main permanent access road to the project site, and the permanent unpaved internal road system. Vegetation clearing and removal operations would be undertaken using mowers, skip loaders, chippers, and dump trucks. Areas proposed for the Service Buildings and Warehouses and their associated parking lots, as well as the proposed switchyard location and on-site substation locations, would also be cleared and graded. These areas would be disked and rolled and compacted to 90 percent; due to the flat topography, the amount of grading to construct these structures is anticipated to be minimal. It is currently unknown if any overexcavation and compaction of these areas would be required, pending a detailed geotechnical investigation. Initial site preparation activities would also include installation of fencing along the Solar Facility boundary or repair to existing fencing, where applicable.

Because of the flat topography at the Solar Facility site, it is anticipated that minimal grading would be required to prepare the site for PV modules. The PV module piles also allow for installation on uneven ground, reducing the need for grading. To the extent possible, existing topsoil will be left in place. However, it is anticipated that vegetation would need to be removed for safety and as a result of trenching and other construction activities. As discussed above, structures and arrays will be sited to avoid or minimize biological and cultural impacts and it is anticipated that areas of avoidance will be left undisturbed as possible.

TEMPORARY STAGING AND LAYDOWN AREAS, TEMPORARY BUILDINGS, AND CONCRETE BATCH PLANT

Equipment and material staging areas would be established during the site preparation phase. Multiple temporary staging and laydown areas would be located throughout the Solar Facility to support final assembly and installation. The staging areas would be approximately one-acre each and the laydown areas would be approximately two acres each. It is currently undetermined how many staging and laydown areas would be required, pending the final proposed site layout of the Solar Facility. Areas proposed for structures and roads would be used as staging and laydown areas to the maximum extent feasible to minimize disturbance to native vegetation.

Temporary assembly buildings and construction trailers, not exceeding a total of 40,000 square feet, would be installed on-site to assemble the PV subarrays and for other construction activities will likely be located near to the warehouse and services buildings. A temporary concrete batch plant would also be utilized during construction activities. The concrete batch plant would be used to supply concrete for the pole foundations for the Gen-tie Line.

GEN-TIE AND RELATED TELECOMMUNICATION LINE

SITE PREPARATION

Site preparation would include clearing existing vegetation in the proposed pole locations, including their ground lines; trenching locations; access roads; areas for guard structures; and stringing areas. Vegetation in all of these areas, except for the access roads, would be reseeded with a seed stock comprising local, native species. Vegetation in the temporary staging and laydown areas would be trampled but not cleared; these areas would be reseeded as well. Selective vegetation clearing may also be necessary to provide for line clearance.

To install the Gen-tie poles, their foundations would be installed a minimum of 28 days prior to erection of the poles. Pole installation would then occur sequentially along the route to the extent practical. After the poles are installed, stringing of the lines onto the poles would be conducted as described below.

Installation of underground fiber optic line would require a trench that would disturb an approximate 20-foot wide corridor underneath the Gen-tie Line. In addition, 3-foot by 4-foot surface-mounted splice cabinets would need to be installed aboveground, every 5,000 feet, along the fiber optic route.

For certain sections of the Gen-tie route, the Gen-tie Line would be installed underground with the fiber optic cables. In this situation, the Gen-tie Line would be installed in a trench that would be approximately four to five feet wide which result in a maximum disturbance of a 40 foot wide corridor. At approximately every 2,000 feet, the lines would enter below-grade, pre-cast concrete vaults that would be approximately 10 feet wide, 20 feet long, and 10 feet tall. Access to the vaults would be via round, steel manhole covers installed at existing grade. Installation of the vaults would require an excavation of approximately 20 feet wide and 40 feet long. An approximate 40 foot wide by 200 foot long area would be needed to install each vault and to stage equipment and materials for the vault installation. A total of approximately 2,800 cubic yards of soil would be excavated per linear mile that the Gen-tie Line is installed underground.

TEMPORARY STAGING AND LAYDOWN AREAS

Structures for the Gen-tie Line and conductor support hardware would be assembled at each pole location to minimize damage during transport. Construction of the Gen-tie Line would require an approximate area of 100 feet by 250 feet at each pole location, for use as temporary laydown or staging areas for equipment, poles, and hardware.

STRINGING AREAS

In addition to temporary staging and laydown areas described above, additional areas of disturbance would be required in certain locations along the Gen-tie route in order to string the lines. Specifically, an approximate 100 foot by 400 foot area would be disturbed along the route, where there are large angles in the alignment, at all dead-end structures, and at other strategically located locations, in order to accommodate equipment required for wire pulling and tensioning in these areas.

GUARD STRUCTURES

During construction of the Gen-tie Line across existing roads or structures, temporary guard structures would need to be installed on either side of the crossing to maintain vertical clearance during construction. Each guard structure would disturb an approximate 100-foot by 100-foot (10,000 square foot area).

ROADS

Because it is anticipated that the Gen-tie Line will primarily follow existing roads, main access to the Gen-tie route would be via these roads. However, new temporary unpaved access roads would need to be installed to access the laydown areas for each pole and where the Gen-tie Line is installed underground. These access roads would be between 15 feet to 20 feet wide. They would also be used to access the poles for future maintenance activities.

1.3 OPERATION AND MAINTENANCE

Once placed into service, the Solar Facility would operate during daylight hours when there is sufficient sunlight for operation of the solar field.

Project maintenance that would be performed on the site would consist of equipment inspection and replacement in accordance with manufacturer recommendations. Maintenance activities would occur primarily during daylight hours. Maintenance activities would also include washing the PV panels, as described in more detail below.

No heavy equipment would be used during normal operation and maintenance of the Solar Facility. Operation and maintenance vehicles would include trucks (pickups, flatbeds, dump trucks), forklifts, and loaders for routine and unscheduled maintenance, and water trucks for solar panel washing. Large heavy-haul transport equipment may be brought to the site infrequently for equipment repair or replacement.

Approximately 12 to 24 personnel would be required for operation, maintenance, and security at the Solar Facility. Much operation and security would be conducted from an off-site location, and maintenance crews would be dispatched to the Solar Facility (as needed) during operation, with a minimal amount of equipment stored on-site in equipment enclosures.
Other operational details are summarized as follows:

ELECTRICAL SUPPLY

The Solar Facility would require power for the electrical enclosures, substation equipment, tracker motors, Service Buildings, Warehouses, and for plant lighting and security. Power for these solar facility auxiliaries would be provided by the Solar Facility's electrical generation or supplied by the local power provider. Substation protection equipment would be supplied by DC power provided by each substation control building's battery room. There may also be emergency generators located on site as a back-up source, however such emergency generators may only be needed during construction and could perhaps be removed during operations.

LIGHTING

The lighting system for the Solar Facility would provide operation and maintenance personnel with illumination for both normal and emergency conditions. Lighting would be designed to provide the minimum illumination needed to achieve safety and security objectives. Lighting would be directed downward and shielded to focus illumination on the desired areas only and to minimize light trespass in accordance with applicable County requirements. Lighting would be provided at the electrical enclosures, on site buildings, and the main access road entrance. Lighting will be limited so that light spillover on the adjacent properties would be minimal. If lighting at individual solar panels or other equipment is needed for night maintenance, portable lighting would be used.

WATER USE

Water for operation of the Solar Facility would consist primarily of water consumed by panel washing processes and small quantities used for dust mitigation. To the extent available, tertiary treated water would be used for non-potable uses from the Rosamond Community Services District or AVEK.

It is assumed that two gallons of water would be used to wash each panel, and that under a worst-case scenario, each panel would need to be washed three times a year. Assuming that 310 watt panels would be used, approximately 1,451,613 panels would be installed for the Project. This would amount to approximately 27 acre-feet of water use per year, to wash the panels three times per year. Operational decisions regarding panel washing will be made based upon real-time conditions and there may be years where no washing is required.

Landscaping portions of the project with species native to the area may be required. Assuming that a 10-foot wide area along Trotter Avenue and Lone Butte Road would be landscaped with drought tolerant vegetation (for a total of 10.96 acres), water use for landscaping for the proposed project is estimated to be 5.5 acre-feet per year.

An additional quantity of water will be needed annually to supply water to those buildings with sinks and toilets. Using the 2010 California Green Building Standards Code, based on 24 personnel using restrooms and sinks three times a day, less than 0.5 acre-foot of water is anticipated for worker-related operational use (sinks, toilets, and kitchen faucets). This assumes a 1.6 gallon per minute (gpm) flush rate and metering faucets for wash fountains.

Therefore, the total estimated water use during operation of the project is 33 acre-feet per year.

WASTEWATER GENERATION

Wastewater generated would include sanitary waste handled via on-site septic, storm water runoff, and panel washdown water. Sanitary waste would be handled via on-site septic systems for the Services Buildings and Warehouses. Storm water runoff would be collected via an on-site drainage system that has not been designed yet, as described above. Finally, panel washdown water would be discharged to grade.

FIRE PROTECTION

The Project would comply with all Kern County Fire Code requirements. The PV panels and ancillary equipment represent a negligible increase in fire potential. For the off-site Gen-tie Line, clearances for vegetation would be implemented in accordance with California Public Utility Code (CPUC) General Order 95 (Rules for Overhead Electric Line Construction).

SOLID WASTE MANAGEMENT

Operation of the Solar Facility would produce a small amount of non-hazardous solid waste. This would include refuse generated by workers and small office operations such as rags, scrap metal, packing materials from deliveries, and empty containers. Solid waste would be recycled to the maximum extent possible.

HAZARDOUS MATERIALS USE AND MANAGEMENT

Limited quantities of hazardous materials would be used and stored for operation and maintenance activities. These materials would include oils, lubricants, paints, solvents, degreasers and other cleaners, and transformer mineral oil. Transformer mineral oil would be stored at the on-site substations; all other hazardous materials would be stored in the Warehouses.

Approximately 205,000 gallons of mineral oil would be stored at the Solar Facility. Each of the two generation step-up transformers at the on-site substations would contain approximately 15,000 gallons of dielectric fluid (mineral oil) which would be located on a concrete pad surrounded by a six-inch earthen, fiberglass, or concrete containment berm/curb. The containment area would be lined with an impermeable membrane covered with gravel, and would drain to an underground storage tank. Each medium-voltage transformer would also carry approximately 500 gallons of mineral oil (e.g., each for the estimated 350 medium-voltage transformers that would be required). The Project substations would have a comprehensive spill prevention, control, and countermeasure (SPCC) plan in accordance with state and federal regulations. Any storm water or fluid drained to the tank would be inspected for a sheen prior to disposal. If a sheen is observed, the tank contents would be removed by vacuum truck to an appropriate disposal site. If no sheen or contaminants are detected, the storm water would be drained on-site.

Any hazardous materials would be stored in appropriate storage locations and containers. Flammable materials, such as paints and solvents, would be stored in non-flammable material storage cabinets with built-in containment sumps. A Hazardous Material Management Program (HMMP) would be developed for Project operations in compliance with the Hazardous Materials Management Plan for EAFB and the Kern County Fire Department prior to turnover of the site from construction to operations.

1.4 DECOMMISSIONING

The Project owner intends to sell the renewable energy produced by the Project for the term of the 50-year Enhanced Use Lease with the USAF. Upon completion of the Lease, the owner may extend the Enhanced Use Lease with the USAF or decommission and remove the system and its components. The solar panels would be dismantled and removed from the site by truck and footings removed to a depth of three feet.

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2.0 DESCRIPTION OF NOISE METRICS

2.1 STANDARD UNIT OF MEASUREMENT

Sound is described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is dB. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by differentiating among frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is perceived to be twice as loud and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud).

Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time;
- The influence of periodic individual loud events; and
- The community response to changes in the community noise environment.

Table 1, *Noise Descriptors*, provides a listing of methods to measure sound over a period of time.

2.2 HEALTH EFFECTS OF NOISE

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise generally increases with the environmental sound level. However, many factors also influence people's response to noise. The factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence people's response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses would range from "not annoyed" to "highly annoyed."

When the noise level of an activity rises above 70 dBA, the chance of receiving a complaint is possible, and as the noise level rises, dissatisfaction among the public steadily increases. However, an individual's reaction to a particular noise depends on many factors, such as the source of the sound, its loudness relative to the background noise, and the time of day. The reaction to noise can also be highly subjective; the perceived effect of a particular noise can vary widely among individuals in a community.

Table 1
Noise Descriptors

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measured sound to a reference pressure (20 micropascals).
A-Weighted Decibel (dBA)	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
Equivalent Sound Level (L_{eq})	The sound level containing the same total energy as a time varying signal over a given time period. The L_{eq} is the value that expresses the time averaged total energy of a fluctuating sound level.
Maximum Sound Level (L_{max})	The highest individual sound level (dBA) occurring over a given time period.
Minimum Sound Level (L_{min})	The lowest individual sound level (dBA) occurring over a given time period.
Community Noise Equivalent Level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments are +5 dBA for the evening, 7:00 PM to 10:00 PM, and +10 dBA for the night, 10:00 PM to 7:00 AM.
Day/Night Average (L_{dn})	The L_{dn} is a measure of the 24-hour average noise level at a given location. It was adopted by the U.S. Environmental Protection Agency for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the L_{eq}. The L_{dn} is calculated by averaging the L_{eq}'s for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 PM to 7:00 AM) by 10 dBA to account for the increased sensitivity of people to noises that occur at night.
Exceedance Level (L_n)	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% (L_{01}, L_{10}, L_{50}, L_{90}, respectively) of the time during the measurement period.
Source: Cyril M. Harris, *Handbook of Noise Control*, 1979.	

The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on the community can be organized into six broad categories:

- Noise-Induced Hearing Loss;
- Interference with Communication;
- Effects of Noise on Sleep;
- Effects on Performance and Behavior;
- Extra-Auditory Health Effects; and
- Annoyance.

Although it often causes discomfort and sometimes pain, noise-induced hearing loss usually takes years to develop. Noise-induced hearing loss can impair the quality of life through a reduction in the ability to hear important sounds and to communicate with family and friends. Hearing loss is one of the most obvious and easily quantified effects of excessive exposure to noise. While the loss may be temporary at first, it could become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly caused by the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, substantial damage can be caused by non-occupational sources.

According to the United States Public Health Service, nearly ten million of the estimated 21 million Americans with hearing impairments owe their losses to noise exposure. Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. It can also disrupt effective communication between teachers and pupils in schools, and can cause fatigue and vocal strain in those who need to communicate in spite of the noise.

Interference with communication has proved to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern, or level of sleep. It can produce short-term adverse effects on mood changes and job performance, with the possibility of more serious effects on health if it continues over long periods. Noise can cause adverse effects on task performance and behavior at work, and non-occupational and social settings. These effects are the subject of some controversy, since the presence and degree of effects depends on a variety of intervening variables. Most research in this area has focused mainly on occupational settings, where noise levels must be sufficiently high and the task sufficiently complex for effects on performance to occur.

Recent research indicates that more moderate noise levels can produce disruptive after-effects, commonly manifested as a reduced tolerance for frustration, increased anxiety, decreased incidence of “helping” behavior, and increased incidence of “hostile” behavior. Noise has been implicated in the development or exacerbation of a variety of health problems, ranging from hypertension to psychosis. As with other categories, quantifying these effects is difficult due to the amount of variables that need to be considered in each situation. As a biological stressor, noise can influence the entire physiological system. Most effects seem to be transitory, but with continued exposure some effects have been shown to be chronic in laboratory animals.

Annoyance can be viewed as the expression of negative feelings resulting from interference with activities, as well as the disruption of one’s peace of mind and the enjoyment of one’s environment. Field evaluations of community annoyance are useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above. In a study conducted by the United States Department of Transportation, the effects of annoyance to the community were quantified. In areas where noise levels were consistently above 60 dBA CNEL, approximately nine percent of the community is highly annoyed. When levels exceed 65 dBA CNEL, that percentage rises to 15 percent. Although evidence for the various effects of noise have differing levels of certainty, it is clear that noise can affect human health. Most of the effects are, to a varying degree, stress related.

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3.0 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Land uses deemed sensitive by the State of California (State) include schools, hospitals, rest homes, and long-term care and mental care facilities. Many jurisdictions also consider residential uses particularly noise-sensitive because families and individuals expect to use time in the home for rest and relaxation, and noise can interfere with those activities. Some jurisdictions may also identify other noise-sensitive uses such as churches, libraries, and parks. Land uses that are relatively insensitive to noise include office, commercial, and retail developments. There is a range of insensitive noise receptors that include uses that generate significant noise levels and that typically have a low level of human occupancy.

3.1 FEDERAL

Under the Occupational Safety and Health Act of 1970 (OSHA) (29 U.S.C. §651 et seq.), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) adopted regulations (29 CFR §1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list limits on noise exposure levels as a function of the amount of time during which the worker is exposed. The regulations further specify requirements for a hearing conservation program (§1910.95(c)), a monitoring program (§1910.95(d)), an audiometric testing program (§1910.95(g)), and hearing protection (§1910.95(i)). No federal laws govern community noise.

3.2 STATE

The California Environmental Quality Act (CEQA) was enacted in 1970 and requires that all known environmental effects of a project be analyzed, including environmental noise impacts. Under CEQA, a project has a potentially significant impact if the project exposes people to noise levels in excess of standards established in the local general plan or noise ordinance. Additionally, under CEQA, a project has a potentially significant impact if the project creates a substantial increase in the ambient noise levels in the project vicinity above levels existing without the project. If a project has a potentially significant impact, mitigation measures must be considered. If mitigation measures to reduce the impact to less than significant are not feasible due to economic, social, environmental, legal, or other conditions, the most feasible mitigation measures must be considered.

3.3 LOCAL

KERN COUNTY GENERAL PLAN

NOISE ELEMENT

The Kern County General Plan Noise Element is a mandatory element as required by California Government Code Section 65302(f). The state requires that local jurisdictions prepare statements of policy indicating their intentions regarding noise and noise sources, establish desired maximum noise levels according to land use categories, set standards for noise emission from transportation and fixed-point sources, and prepare implementation measures to control noise. Noise Elements are prepared in accordance with Guidelines for the Preparation and Content of Noise Elements of the General Plan, published by the California Office of Noise Control in 1976.

The major purpose of the Noise Element is to establish reasonable standards for maximum desired noise levels in Kern County, and to develop an implementation program which could effectively mitigate potential noise problems. The implementation measures have been designed so that they will not subject residential or other sensitive noise land uses to exterior noise levels in excess of 65 dBA Ldn, and interior noise levels in excess of 45 dBA Ldn.

The following goal and policies from the County General Plan are applicable to the proposed project.

Goals

- **Goal 1.** Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.

  #### *Policies*

  - **Policy 1.** Review discretionary industrial, commercial, or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses.
  - **Policy 2.** Require noise level criteria applied to all categories of land uses to be consistent with the recommendations of the California Division of Occupational Safety and Health (DOSH).
  - **Policy 3.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.
  - **Policy 4**. Utilize good land use planning principles to reduce conflicts related to noise emissions.
  - **Policy 5**. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels:
    a. 65 dB L_{dn} or less in outdoor activity areas.
    b. 45 dB L_{dn} or less within living spaces or other noise sensitive interior spaces.
  - **Policy 6.** Ensure that new development in the vicinity of airports will be compatible with existing and projected airport noise levels as set forth in the ALUCP.
  - **Policy 7.** Employ the best available methods of noise control.

    #### *Implementation Measures*

- **Implementation Measure A.** Utilize zoning regulations to assist in achieving noise-compatible land use patterns.
- **Implementation Measure C.** Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policies outlined in this element.

- **Implementation Measure F.** Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB Ldn and interior noise levels in excess of 45 dB Ldn.

- **Implementation Measure G.** At the time of any discretionary approval, such as a request for a General Plan Amendment, zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

  a) Be the responsibility of the applicant.
  b) Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.
  c) Be subject to the review and approval of the Kern County Planning Department and the Environmental Health Services Department. All recommendations therein shall be complied with prior to final approval of the project.

- **Implementation Measure I.** Noise analyses shall include recommended mitigation, if required, and shall:

  a) Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.
  b) Include estimated noise levels for existing and projected future (10 – 20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.
  c) Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.
  d) Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided.

- **Implementation Measure J.** Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

ENERGY ELEMENT

The Kern County General Plan also requires the analysis of noise impacts relating to energy projects that might impact sensitive land uses.

Policies

- **Policy 10.** The County should require acoustical analysis for energy project proposals that might impact sensitive and highly-sensitive uses in accordance with the Noise Element of the General Plan.

KERN COUNTY NOISE ORDINANCE

Noise issues are also addressed in Chapter 8.36 of the Kern County Municipal Code. These include acceptable hours of construction and limitations on construction related noise impacts on adjacent sensitive receptors. Noise producing construction activities that are audible to a person with average hearing ability at a distance of 150 feet from the construction site, or within 1,000 feet of an occupied residential dwelling are prohibited between the hours of 9:00 p.m. to 6:00 a.m. on weekdays, and 9:00 p.m. to 8:00 a.m. on weekends. However the following exceptions are permitted:

1) The resource management director or his designated representative may for good cause exempt some construction work for a limited time.
2) Emergency work is exempt from this section.

MOJAVE SPECIFIC PLAN

The Mojave Specific Plan guides development within and surrounding the Mojave community and works in tandem with the Kern County General Plan and Zoning Ordinance. Noise compatibility standards of the Kern County General Plan Noise Element apply within the Specific Plan area. The Mojave Specific Plan area could potentially be affected by the Project. Chapter 8, Noise Element, establishes policies to protect residents in the planning area from the harmful effects of excessive exposure to noise. The objectives and policies focus on minimizing the effects of transportation-related noise.

Noise in Mojave originates from four primary sources: roadways, railroads, aircraft, and airport and research and development facilities. Secondary noise sources include industrial operations in and around Mojave Airport and operation of the Mojave-Rosamond Landfill. The following element goals guide future decisions pertaining to noise impacts within the Specific Plan area:

- Evaluate transportation-related noise.
- Evaluate noise during land use planning efforts.

The following goal and policies from the Mojave Specific Plan are applicable to the proposed project.

- **Objective 8.1:** Minimize the effects of transportation-related noise.

  Policies

  - **Policy 8.1.1.** Reduce transportation-related noise impacts on sensitive land uses (as defined in the Kern County Noise Element) through the use of noise control measures.
  - **Policy 8.1.2.** Incorporate sound-reduction designs in development projects impacted by transportation-related noise.
  - **Policy 8.1.3.** Identify potential impacts from transportation noise during the planning stages of the development process.

- **Policy 8.1.4.** Support efforts by Caltrans, Union Pacific, BNSF, and other transportation providers to provide acoustical protection for noise-sensitive uses.
- **Policy 8.1.5.** Work with property owners to ensure repair of deteriorating noise walls.
- **Policy 8.1.6.** Coordinate with the Kern County Sheriff's Department and California Highway Patrol to ensure enforcement of California Vehicle Code noise regulations pertaining to the operation of all vehicles on public roads.
- **Policy 8.1.7.** Continue to participate in joint development review with the FAA and the Mojave Airport to ensure a compatible relationship between future land uses, Airport operations, and the policies of the Airport Land Use Compatibility Plan.

Implementation Measures

- **Implementation Measure G-4 (Vehicular Noise).** Implement the following measures to reduce the impacts of vehicle-related noise on development in adjacent areas.
  a. New construction shall include sound walls as recommended by required acoustic studies.
  b. New development shall be required to identify and mitigate for vehicular noise impacts as a condition of approval for construction of new noise-sensitive land uses.
  c. Request that other agencies construct noise barriers as part of future highway, roadway, and rail projects to mitigate significant impacts beyond County jurisdiction.
  d. Landscaping or other project design measures are required in all new public and private projects to address potentially significant aesthetic impacts associated with noise barriers.
  e. Regulate traffic flow and coordinate with the California Highway Patrol to enforce speed limits.
  f. Incorporate noise impact considerations, particularly the relationship of parking ingress/egress, loading, and refuse collection areas to surrounding residential and other noise-sensitive uses.

- **Objective 8.2:** Minimize the effects of noise through proper land use planning

Policies

- **Policy 8.2.1.** The land use compatibility standards and policies of the Kern County General Plan Noise Element are hereby incorporated by reference.
- **Policy 8.2.2.** The land use compatibility standards and policies of the Kern County Airport Land Use Compatibility Plan are hereby incorporated by reference.
- **Policy 8.2.3.** Ensure consistency of development proposals with the Kern County Airport Land Use Compatibility Plan and Mojave Specific Plan to reduce potential for noise conflicts.
- **Policy 8.2.4**. Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in this element.

- **Policy 8.2.6.** Industrial uses adjacent to residences shall minimize potential noise and health hazards. Buffers may be required and shall be reviewed during the Precise Development review process and may be imposed when necessary to maintain noise standards. Landscaping, picnic areas, parking, offices, warehousing, or other more compatible uses may be incorporated within identified buffer zones.
- **Policy 8.2.7**. Noise attenuation measures as defined by the Kern County Noise Element, Development Standards, and any pertinent noise studies (such as setbacks, clustering, berming, and sound walls) shall serve as a guide for future planning and development decisions.
- **Policy 8.2.8.** Evaluate ways to mitigate existing noise impacts on existing residential and other sensitive land use developments, and explore financial alternatives.
- **Policy 8.2.9.** Amendments to the plan proposing sensitive uses adjacent to noise contours about 65 CNEL shall require preparation of a site-specific noise study including proposed mitigation.

Implementation Measures

- **Implementation Measure G-2 (Noise Attenuation Measures)**. Noise attenuation measures (such as setbacks, clustering berming, and sound walls) shall be required as conditions of project approval prior to or as part of construction in areas subject to excessive noise. Examples of cases that may require attenuation measure include:

  a. Commercial and residential development where noise levels exceed adopted standards in the Kern County Noise Element.
  b. Residential and other sensitive uses with direct exposure to highway activities and/or railroad noise.
  c. Between residential land uses and commercial or industrial land uses.

SOLEDAD MOUNTAIN-ELEPHANT BUTTE SPECIFIC PLAN

This Specific Plan does not contain any recommendations, analysis, or implementation measures that are directly applicable to the noise analysis of the project.

ACTIS INTERIM RURAL COMMUNITY PLAN MAP

The Actis Interim Rural Community Plan Map area could potentially be affected by the Project. The Community Plan Map is in effect until formal Specific Plans can be adopted for the community. Therefore, no formal text plans have yet been adopted and the goals and policies of the Kern County General Plan shall be the governing tool for any development.

KERN COUNTY AIRPORT LAND USE COMPATIBILITY PLANNING BACKGROUND

The purpose of the Kern County Airport Land Use Compatibility Plan is to establish procedures and criteria by which the County of Kern and the affected incorporated cities can address compatibility issues when making planning decisions regarding airports and the land uses around them.

The Department of Defense requires military aviation facilities to prepare an Air Installation Compatible Use Zones (AICUZ) study. The principle purpose of the AICUZ study is to protect community safety and health, promote appropriate development in the vicinity of military airfields, and protect taxpayer's investment in national defense. Presently, base personnel are updating the present AICUZ study to reflect the ongoing changes at the installation. The AICUZ will indicate the location of safety zones and noise impacts associated with the flying mission. Because of the vast size of EAFB areas affected by the current impacts are confined within the boundaries of the installation.

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4.0 ENVIRONMENTAL SETTING

4.1 SENSITIVE RECEPTORS

Noise- and vibration-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound or vibration could adversely affect the designated land uses. Typically, sensitive receptors on noise-sensitive lands include residences, hospitals, places of worship, libraries and schools, nature and wildlife preservers, and parks. Several land uses are especially sensitive to vibration, including concert halls, hospitals, libraries, vibration sensitive research operations, residential areas, schools, and offices.

Noise sensitive land uses located in the vicinity of the proposed Project are primarily rural residences located immediately north of the project site along East Trotter Avenue (approximately 100 feet to the north) and west of the site along Lone Butte Road (approximately 2,800 feet to the west). It should be noted there are two alternative routes for the Gen-tie line, therefore, the distance to sensitive receptors varies with the closest residences being approximately 100 feet from the route.

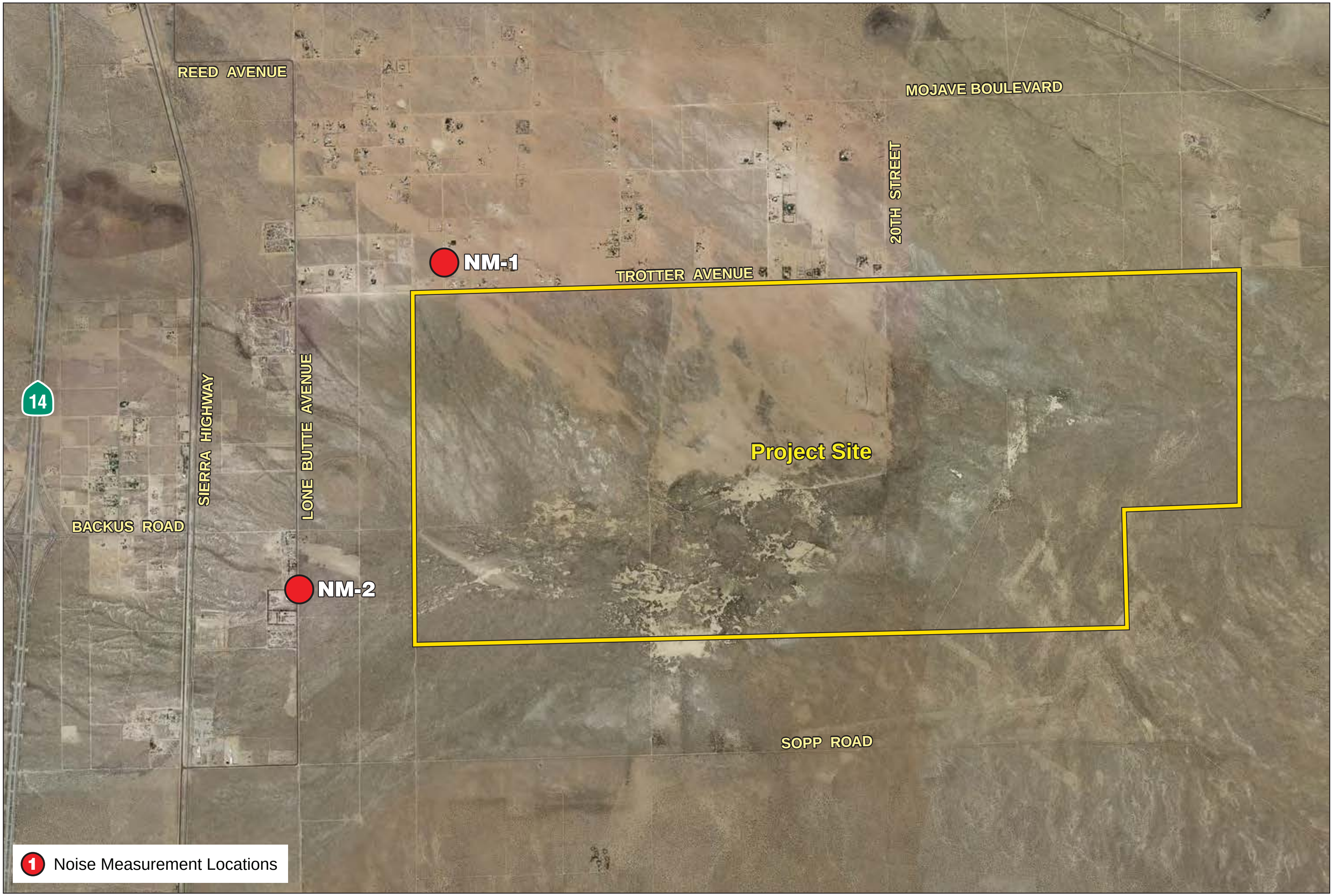
4.2 EXISTING CONDITIONS

In order to quantify existing ambient noise levels in the project area, RBF Consulting conducted a noise measurement on October 17, 2013; refer to Table 2, *Noise Measurements*. The noise measurement site was representative of typical existing noise exposure within and immediately adjacent to the project site; refer to Figure 4, *Noise Measurement Locations*. Each measurement was conducted for a duration of 15 minutes.

Table 2
Noise Measurements

Site No.	Location	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Peak (dBA)	Time
1	Near a single-family home on the northeastern corner of the Fetters Street/Trotter Avenue intersection (near the northwestern boundary of the project site).	48.5	24.8	68.2	91.5	11:36 AM
2	Near a single-family home located along Lone Butte Road, west of the project site.	55.0	24.9	80.5	98.4	12:05 PM
dBA = A-weighted decibel; L_{eq} = equivalent sound level; L_{max} = maximum sound level; L_{min} = minimum sound level						
Source: RBF Consulting, October 17, 2013.						

Meteorological conditions were clear skies, cool temperatures, with light wind speeds (0 to 5 miles per hour), and low humidity. Noise monitoring equipment used for the ambient noise survey consisted of a Brüel & Kjær Hand-held Analyzer Type 2250 equipped with a Type 4189 pre-polarized microphone. The monitoring equipment complies with applicable requirements of the American National Standards Institute (ANSI) for Type I (precision) sound level meters. The results of the field measurements are included in Appendix A, *Noise Measurement Data*.



not to scale

ORO VERDE SOLAR PROJECT • ACOUSTICAL ASSESSMENT

Noise Measurement Locations

JN 131259-19705 MAS

Figure 4

5.0 SIGNIFICANCE CRITERIA

CEQA CRITERIA

Appendix G of the *State CEQA Guidelines* contains analysis guidelines related to the assessment of noise impacts. These guidelines have been utilized as thresholds of significance for this analysis. As stated in Appendix G, a project would create a significant environmental impact if it would:

- Expose persons to, or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies (refer to Section 6.1);
- Expose persons to or generate excessive ground borne vibration or ground borne noise levels (refer to Section 6.1);
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project (refer to Section 6.2);
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project (refer to Section 6.2);
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels (refer to Section 6.3); and
- For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels (refer to Section 6.3).

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6.0 ACOUSTICAL ANALYSIS

6.1 SHORT-TERM NOISE SOURCES

CONSTRUCTION NOISE IMPACTS

Project construction would include site preparation, PV system grading and installation, construction of the generation tie-line, testing, and site cleanup work. It is anticipated that construction of the Project would take approximately two years, beginning in the third quarter of 2014 and ending in the third quarter of 2016.

Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the Project site. Therefore, the noise levels vary as construction progresses. Table 3, *Construction Equipment Noise Levels*, indicates the noise levels of the anticipated construction equipment based on a distance of 50 feet between the equipment and noise receptor. A reasonable worst case assumption is that three pieces of equipment would operate simultaneously and continuously within a focused area. This worst case scenario would be the result of composite construction noise is derived by adding the individual equipment noise levels logarithmically, which would result in a maximum level of 93 dBA.

Table 3
Construction Equipment Noise Levels

Equipment List	Equivalent Federal Transit Administration Classification	Typical Sound Pressure Level (dBA) at 50 feet from source
Vibratory post driver	Pneumatic tool	85
Corner-mount pole hole auger/pressure digger[1]	Pneumatic tool[1]	84[1]
Crawler tractors/dozer	Dozer	85
Dump, concrete, and tender trucks	Truck	88
Excavators	Backhoe	80
Forklifts/aerial lifts/booms	Crane, mobile	83
Generator/compressor	Air compressor/generator	81
Graders	Grader	85
Rollers/compactors	Roller	74
Scrapers	Scraper	89
Tractors/loaders/backhoes	Loader	85
Vibratory plate (handheld)	Compactor	82
Highway tractor	Scarifier	83
Flatbed truck	Truck	88
Water truck	Truck	88

Notes:
1. NextLight, *Lost Hills Solar Draft Environmental Impact Report*, July 2010.

Source: Federal Transit Administration, 2006.

Installation of solar panel arrays would involve metal pipe or "H" beam foundations that are approximately four to six inches in diameter or dimension using percussive or vibration equipment in a manner similar to installing freeway guardrails. The mounting configuration for the Project has not yet been determined; however, most of the pipe pile foundations would be driven to depths of 10- to 15-feet deep. When piles cannot be driven to the required depth, an alternate spread footing detail would be required.

PV facility installation would also include earthwork, grading, and erosion control, as well as construction of the plant substations and erection of the PV modules, supports, and associated electrical equipment.

Some earthwork, including grading, fill, compaction, and erosion control cultivation would be required to accommodate the placement of the PV arrays, concrete for foundations, access roads, and drainage features. Construction of the PV arrays would include installation of support beams, module rail assemblies, PV modules, inverters, transformers, and buried and overhead electrical cables. Site preparation would begin by clearing existing vegetation, to the extent necessary, and grading the areas proposed for the main permanent access road to the project site, and the permanent unpaved internal road system. Because of the flat topography at the Solar Facility site, it is anticipated that minimal grading would be required to prepare the site for PV modules. The PV module piles also allow for installation on uneven ground, reducing the need for grading. To the extent possible, existing topsoil will be left in place. However, it is anticipated that vegetation would need to be removed for safety and as a result of trenching and other construction activities.

Power would be carried from the Solar Facility to Windhub Substation via a 230 kV Gen-tie Line with one or two circuits and related fiber optic communications lines. The Gen-tie Line would travel overhead for the majority of the route, but would be installed underground in certain sections where necessary due to physical or commercial constraints. Up to two fiber optic communication cables would run parallel with the Gen-tie Line. Foundation sizes for the Gen-tie poles would be approximately six to 12 feet in diameter, 20 to 40 feet deep, and would be augured wherever feasible. The Gen-tie poles would be set in poured concrete foundations within the holes. It is estimated that approximately 140 poles would be installed for the Gen-tie Line. The equipment that would be used for construction of the tie-line includes backhoes, tractors, forklifts, flatbed trucks, and concrete trucks.

The distance to the existing sensitive receptors for the Project site are measured from the exterior Project boundary only and not from individual construction projects/areas within the interior of the Project site. There are no existing structures located on areas of the site where development is proposed. The nearest residences are approximately 100 to the north and 2,800 feet to the west. The nearest sensitive uses along the Gen-tie line are approximately 100 feet away.

Little to no grading would be required for these areas. Construction equipment used for construction of the Gen-tie line would include includes backhoes, tractors, forklifts, flatbed trucks, and concrete trucks. The predominant noise source associated with construction of the tie-line would generate from the corner-mount pole auger/pressure digger used to excavate pole holes for embedded poles or poured concrete piers. This equipment is expected to generate an average noise exposure level of 84 dBA at a distance of 50 feet.[1] It should be noted, however, that the noise level during the construction of the gen-tie line would not occur during the other construction phases. Construction of the gen-tie line would

[1] NextLight, *Lost Hills Solar Draft Environmental Impact Report*, July 2010.

progress in a linear fashion, and would not be located in proximity to any one receptor for extended periods of time. Additionally, construction within 1,000 feet of an occupied residential dwelling are prohibited between the hours of 9:00 p.m. to 6:00 a.m. on weekdays, and 9:00 p.m. to 8:00 a.m. on weekends pursuant to the Kern County Noise Ordinance (Chapter 8.36 of the Kern County Municipal Code). Mitigation Measure NOI-1 would be required when construction activities occur within 1,000 feet of a sensitive receptor to ensure that construction activities comply with the County Noise Ordinance and that construction equipment noise is reduced to a less than significant level. Over the anticipated two year construction period, the construction work would occur across the 4,000 acres of the Project site and not continually at the project boundary closest to the sensitive uses.

Construction work would generally be done during daylight hours, Monday through Friday. Non-daylight work hours may be necessary to make up schedule deficiencies, or to complete critical construction activities, including activities that cannot be completed during daylight. For instance, during hot weather, it may be necessary to start work earlier to avoid pouring concrete during high ambient temperatures. Construction activities would be conducted consistent with Kern County Ordinance Title 8, Health and Safety, Chapter 8.36, Noise Control, Section 8.36.020, *Prohibited Sounds*, regarding hours of construction.

It should be noted that the other specific plans that the Project and Gen-tie line traverse (e.g., the Mojave Specific Plan, the Soledad Mountain-Elephant Butte Specific Plan, the Actis Interim Rural Community Plan, etc.) defer to the Kern County noise standards and do not have separate noise requirements. Adherence to the Kern County *General Plan* goals and policies, the Kern County *Municipal Code*, would minimize any impacts from construction noise and would ensure that impacts are less than significant.

Construction Truck Traffic

Truck noise levels depend on vehicle speed, load, terrain, and other factors. The effects of construction-related truck traffic would depend on the level of background noise already occurring at a particular receptor site. It is anticipated that construction truck traffic would access the Project site utilizing Sierra Highway, Division Street, and Trotter Avenue. The closest sensitive receptors to these roadways are approximately 100 feet from the roadway centerline of Trotter Avenue. However, once the Project site is reached, the trucks would utilize internal roadways that would be further away from the existing receptors. Haul truck volumes associated with the proposed project would vary from day to day, with the highest volumes generally occurring during the earthwork and equipment delivery stages. Haul trucks associated with construction would occur during the allowable hours for construction specified in the Kern Code Noise Ordinance (6:00 a.m. to 9:00 p.m. on weekdays and 8:00 a.m. to 9:00 p.m. on weekends). Therefore, short-term noise increases associated with truck traffic increases on truck routes would be less than significant.

CONSTRUCTION-RELATED VIBRATION IMPACTS

Construction of the proposed Project, including the PV arrays, substation, and generation-tie line would not require blasting; however, impact-post driving or drilling would be utilized for installation of the PV arrays foundations support posts and could cause vibration impacts at close distances. While these construction activities would result in some minor amounts of groundborne vibration, such groundborne noise or vibration would attenuate rapidly from the source and would not be generally perceptible outside of the construction areas.

The FTA has published standard vibration velocities for construction equipment operations. In general, the FTA architectural damage criterion for continuous vibrations (i.e., 0.2 inch/second) appears to be conservative. The types of construction vibration impact include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. The vibration produced by construction equipment, is illustrated in Table 4, *Typical Vibration Levels for Construction Equipment*.

Table 4
Typical Vibration Levels for Construction Equipment

Equipment	Approximate peak particle velocity at 25 feet (inches/second)	Approximate peak particle velocity at 100 feet (inches/second)
Large bulldozer	0.089	0.011
Loaded trucks	0.076	0.010
Small bulldozer	0.003	0.000
Auger/drill rigs	0.089	0.011
Jackhammer	0.035	0.004
Vibratory hammer	0.035	0.004
Vibratory compactor/roller	0.003	0.0004
Pile Driver (impact)	0.644	0.081

Notes:
1. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006. Table 12-2.
2. Calculated using the following formula:

$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

where: PPV (equip) = the peak particle velocity in in/sec of the equipment adjusted for the distance
PPV (ref) = the reference vibration level in in/sec from Table 12-2 of the FTA *Transit Noise and Vibration Impact Assessment Guidelines*
D = the distance from the equipment to the receiver

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Guidelines*, May 2006.

Ground-borne vibration decreases rapidly with distance. As indicated in Table 4, based on the FTA data, vibration velocities from typical heavy construction equipment operations that would be used during project construction range from 0.003 to 0.644 inch-per-second peak particle velocity (PPV) at 25 feet from the source of activity. Vibration levels from post driving would be conservatively approximated by the pile driver category. It should be noted that post drivers for the project would be crawler or truck mounted, which generally result in less impact (i.e., lower vibration levels).

The closest structures to the nearest construction activity area are residential uses, which are approximately 100 feet to from the project site and the Gen-tie line. At 100 feet from the source of activity, vibration velocities range from 0.0004 to 0.081 inch-per-second PPV. Therefore, as each of these values is below the 0.2 inch-per-second PPV significance threshold, no sources of groundborne vibration would be expected to affect receptors outside of the work areas, and there would not be any potential for excessive exposure of persons to or generation of groundborne vibration levels.

6.2 LONG-TERM NOISE SOURCES

OPERATIONAL NOISE IMPACTS

Key elements of the Project operations and maintenance include management of lighting, noise, materials storage and cleanup, safety, and equipment repair. Approximately 12 to 24 personnel would be required for operation, maintenance, and security at the Solar Facility. Much operation and security would be conducted from an off-site location, and maintenance crews would be dispatched to the Solar Facility (as needed) during operation, with a minimal amount of equipment stored on-site in equipment enclosures.

Noise from electrical equipment, such as transformers, is characterized as a discrete low frequency hum. Among this type of equipment, transformers would be expected to contribute the most to the composite noise at the site. The noise from transformers is produced by alternating current flux in the core that causes it to vibrate (an effect also known as magnetostriction). To help reduce the operational noise impacts, the transformers could be enclosed in appropriately sized tilt-up or cinder-block structures thereby reducing or eliminating the low frequency hum affecting the sensitive receptors adjacent the project site.

The National Electrical Manufacturers Association standard sound levels for 1,000 to 1,500-kVA commercial transformers (e.g., liquid filled transformers) at a distance of one foot from the source ranges between 58 to 60 dBA. However, noise levels associated with the operation of transformers and other electrical equipment would only occur during daytime hours at a distance of 100 feet to the closest sensitive receptor. The noise level of transformers at the nearest sensitive receptor would be approximately 20 dBA, which is below the ambient noise level and below the County's maximum exterior noise level for noise sensitive uses.

The Project would employ passive solar power generation through the use of fix-mounted PV solar modules or single axis trackers. Fixed mounted PV modules do not require heat transfer fluids or mechanical equipment, and do not generate noise. The DC power generated by the PV panels is delivered along an underground trench system located between each row of PV panels, approximately three feet deep and up to five feet wide (including the trench and disturbed area). The DC power for each array would be routed to a 12-foot wide, 30-foot long, and 12-foot tall metal clad electrical enclosure mounted on concrete foundation pads where an inverter and transformer would be located. The inverters within the electrical enclosures convert the DC power to AC power and the medium voltage transformers step up the voltage to collection level voltage (34.5 kV). All electrical equipment would be either outdoor rated or mounted within the electrical enclosures designed specifically for outdoor installation as such the noise from these units would not be perceptible to the nearest sensitive uses. Additionally, the electrical equipment would be located within the project interior and would be more than 1,000 feet from the project boundaries. As a result, equipment would not be located adjacent to any sensitive receptors. Any noise generated by the on-site equipment would be further attenuated over this distance.

The Solar Facility would also include up to three on-base substations. Each substation would step up the generation voltage from 34.5 kV to 230 kV for off-base transmission to SCE's Windhub Substation. Each substation would contain an approximately 20-foot wide, 30-foot long, 10-foot high control building with an attached battery room, and standard substation equipment. As with the other electrical equipment, the substations would be enclosed and not produce noise impacts at the nearest sensitive uses.

Noise associated with the Gen-tie Line would be associated with the corona effect, which is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware due to very high electric field strength. Corona generates audible noise during operation of transmission lines and substation equipment. The noise is generally characterized as a crackling, hissing, or humming noise. The amount of corona produced by a Gen-tie line is a function of the voltage of the line, the diameter of the conductor, the elevation of the line above sea level, the condition of the conductor and hardware, and the local weather conditions. High sources of corona noise are generally attributed to large regional electrical distribution lines.

The predicted median level (L_{50}) during foul weather of a similar capacity line (230 kV) was found to be 42 dBA at 62.5 feet from the centerline of the transmission line.[2] The nearest sensitive receptor to the proposed overhead Gen-tie Line is located approximately 100 feet from the centerline of the proposed Gen-tie Line, which is greater than the reference distance of 62.5 feet. Therefore, it is expected that noise from the proposed Gen-tie line would be less than the reference measurement of 42 dBA, which is already below the 65 dBA limit for outdoor noise and the 45 dBA limit for indoor noise. Operation-related noise generated by the Gen-tie line for the project would be barely perceptible and result in a less than significant impact.

Other maintenance activities, such as visual inspections, vegetation mowing, and parts replacement, would be expected to be long-term over the life of the proposed Project. Potential effects from these activities on the existing ambient noise levels may be detectable for a short duration at the site and on local roads (minor increase in traffic), but given the relative location of the site with respect to sensitive receptors, any potential increases in the noise levels on-site are unlikely to be detectable or of concern to the general public. The proposed Project would not interfere with traffic flow function, increase traffic volumes, or result in roadway modifications. Furthermore, the Project would comply with Kern County Code Chapter 8.36, Noise Control, which generally restricts noise impacts on neighboring residential properties to 65 dB L_{dn} for outdoor activity areas and 45 dB L_{dn} for interior living areas. Therefore, there would be no long-term effects on existing ambient noise and vibration levels from operations and maintenance of the proposed Project.

6.3 OTHER CEQA NOISE CONSIDERATIONS

The following discussion relates to topics "e" and "f" of the CEQA Appendix G Checklist; refer to Section 5.0. The proposed Project is not located within an airport land use plan or within two miles of a public airport. The Pontious Airport is a private airstrip located approximately two miles to the west of the Project site. However, the proposed Project involves the installation of a PV facility and would not include on-site employees or residential uses. Additionally, although the site is bounded by Edwards Air Force Base (EAFB), the EAFB runways are located approximately 10 miles east of the Project boundaries. The Project does

[2] Bonneville Dam Administration, prepared by T. Dan Bracken, Inc. *Klondike III/ Biglow Canyon Wind Integration Project*. Appendix C: "Electrical Effects", March 2006.

not propose habitable structures and would only have occasional maintenance staff. The project site is also adjacent to sensitive residential uses. Thus, due to the distance of EAFB, the lack of habitable structures and the nearness of pre-existing sensitive uses, the noise impacts of EAFB on the proposed project site would be minimal. Therefore, implementation of the proposed Project would not result in the exposure of people at the project site to excessive aircraft noise levels.

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7.0 MITIGATION MEASURES

NOI-1: To reduce temporary construction related noise impacts for receptors within 1,000 feet of a construction area, the following shall be implemented by the project operator:

a) The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

b) The construction contractor shall locate the pile driver such that the rear of the machine faces toward the noise sensitive receptors when the vibratory pile driver is being utilized.

c) The construction contractor shall locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

d) The construction contractor shall ensure proper maintenance and working order of equipment and vehicles, and that all construction equipment is equipped with manufacturers approved mufflers and baffles.

e) The construction contractor shall install sound-control devices in all construction and impact equipment, no less effective than those provided on the original equipment.

f) Project construction hours shall comply with the Kern County Noise Ordinance (Municipal Ordinance Code 8.36.020).

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8.0 REFERENCES

8.1 LIST OF PREPARERS

RBF CONSULTING
14725 Alton Parkway
Irvine, California 92618
949/472-3505

Eddie Torres, Director of Technical Services
Achilles Malisos, Manager of Air and Noise Studies
Phillip Masto, Analyst
Debby Hutchinson, Graphic Artist

8.2 DOCUMENTS

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3. Kern County, *Actis Interim Rural Community Plan Maps*.

4. Kern County, *Airport Land Use Compatibility Plan*, March 2011.

5. Kern County, Kern County *General Plan*, Chapter 3 *Noise Element*, June 2004.

6. Kern County, *Mojave Specific Plan*, October 2003.

7. Kern County, The Noise Control Ordinance, Kern County Code, (Section 8.36.020 et seq.), codified through Ordinance No. G-8123, passed February 1, 2011.

8. Kern County, *Soledad Mountain-Elephant Butte & Vicinity Specific Plan*, March 1973.

9. NextLight, *Lost Hills Solar Draft Environmental Impact Report*, July 2010.

10. State of California, Governor's Office of Planning and Research, *General Plan Guidelines,* October 2003.

8.3 WEB SITES/PROGRAMS

Kern County Code,
http://library.municode.com/index.aspx?clientId=16251&stateId=5&stateName=California&customBanner=16251.jpg&imageclass=D&cl=16251.txt

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Appendix A – Noise Measurement Data

Site Number: NM-1			
Recorded By: Phillip Masto			
Job Number: 131259			
Date: 10/17/13			
Time: 11:36 AM			
Location: Near single-family home on the northeastern corner of the Fetters Street/Trotter Avenue intersection (near northwestern boundary of the project site).			
Source of Peak Noise: Dogs barking, crows, aircraft flying overhead, and one car passing by.			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
48.5	24.8	68.2	91.5

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**2548189**	**7/12/2013**	
	Microphone	**Brüel & Kjær**	**4189**	**2543364**	**7/12/2013**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**4265**	**7/12/2013**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**7/12/2013**	

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Sunny, clear
	Note: dBA Offset = 0.02		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	3.4	72.0	30.11

Photo of Measurement Location

2250

Instrument:		2250
Application:		BZ7225 Version 2.0.2
Start Time:		10/17/2013 11:36:42
End Time:		10/17/2013 11:51:42
Elapsed Time:		00:15:00
Bandwidth:		1/3-octave
Max Input Level:		138.81

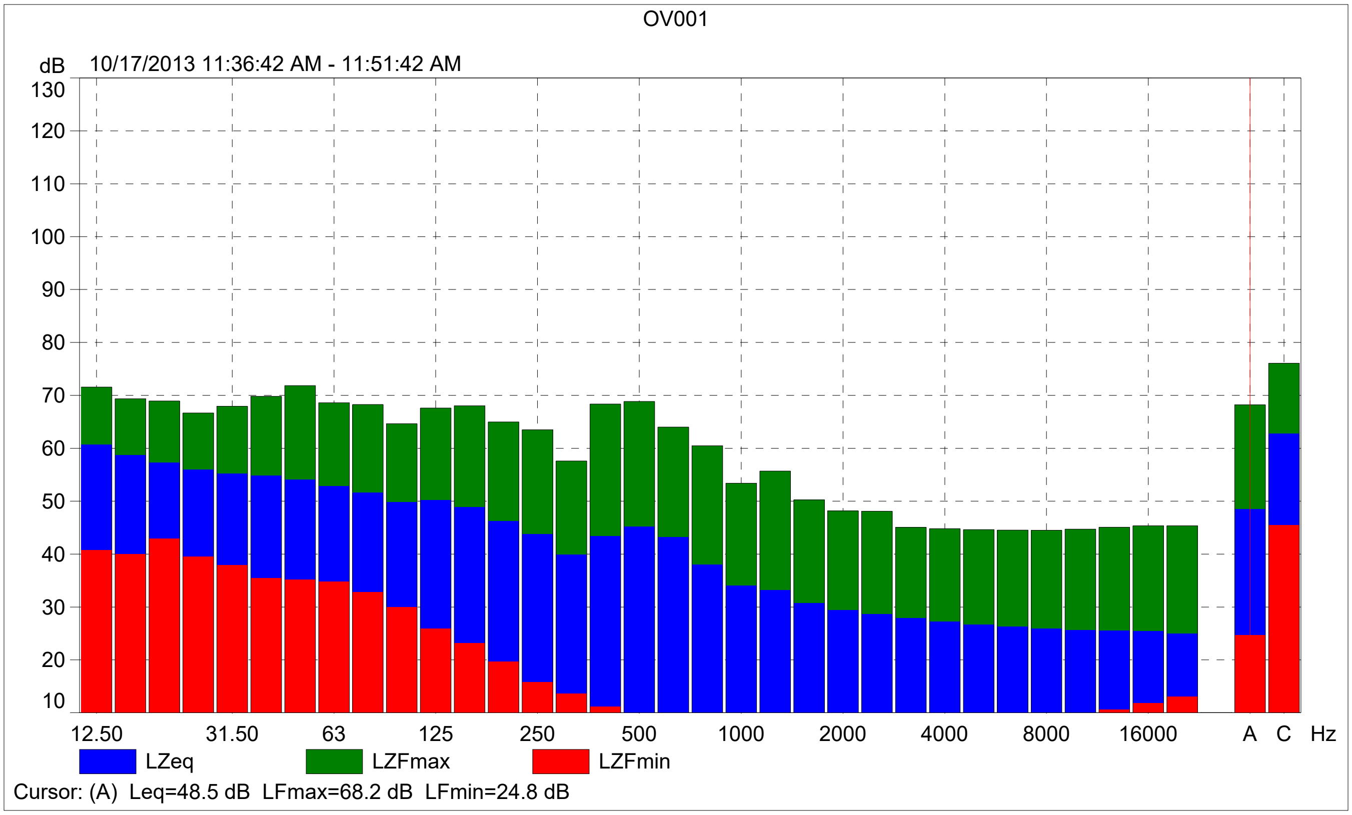
	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

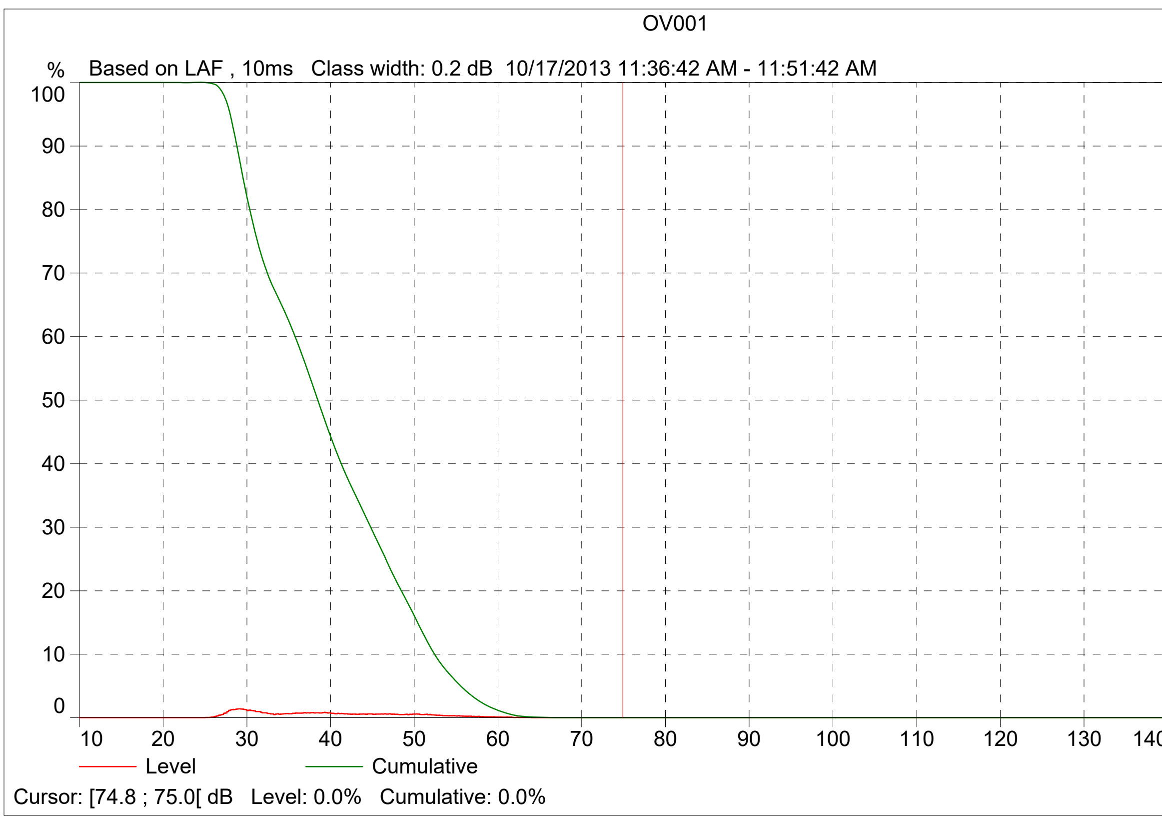
Instrument Serial Number:		2548189
Microphone Serial Number:		2543364
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Diffuse-field

Calibration Time:		10/15/2013 16:31:45
Calibration Type:		External reference
Sensitivity:		63.88 mV/Pa

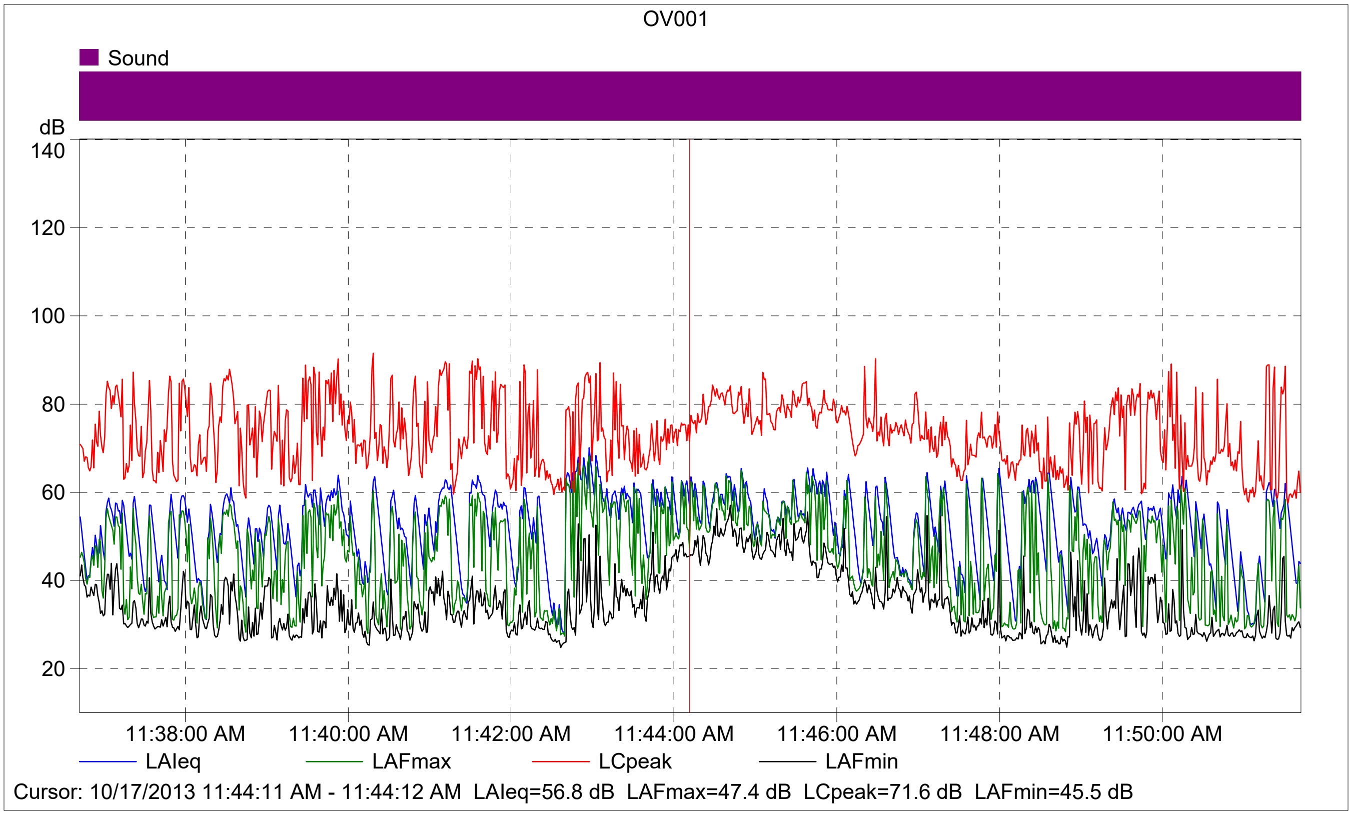
OV001

	Start time	End time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value				0.00	48.5	68.2	24.8
Time	11:36:42 AM	11:51:42 AM	0:15:00				
Date	10/17/2013	10/17/2013					



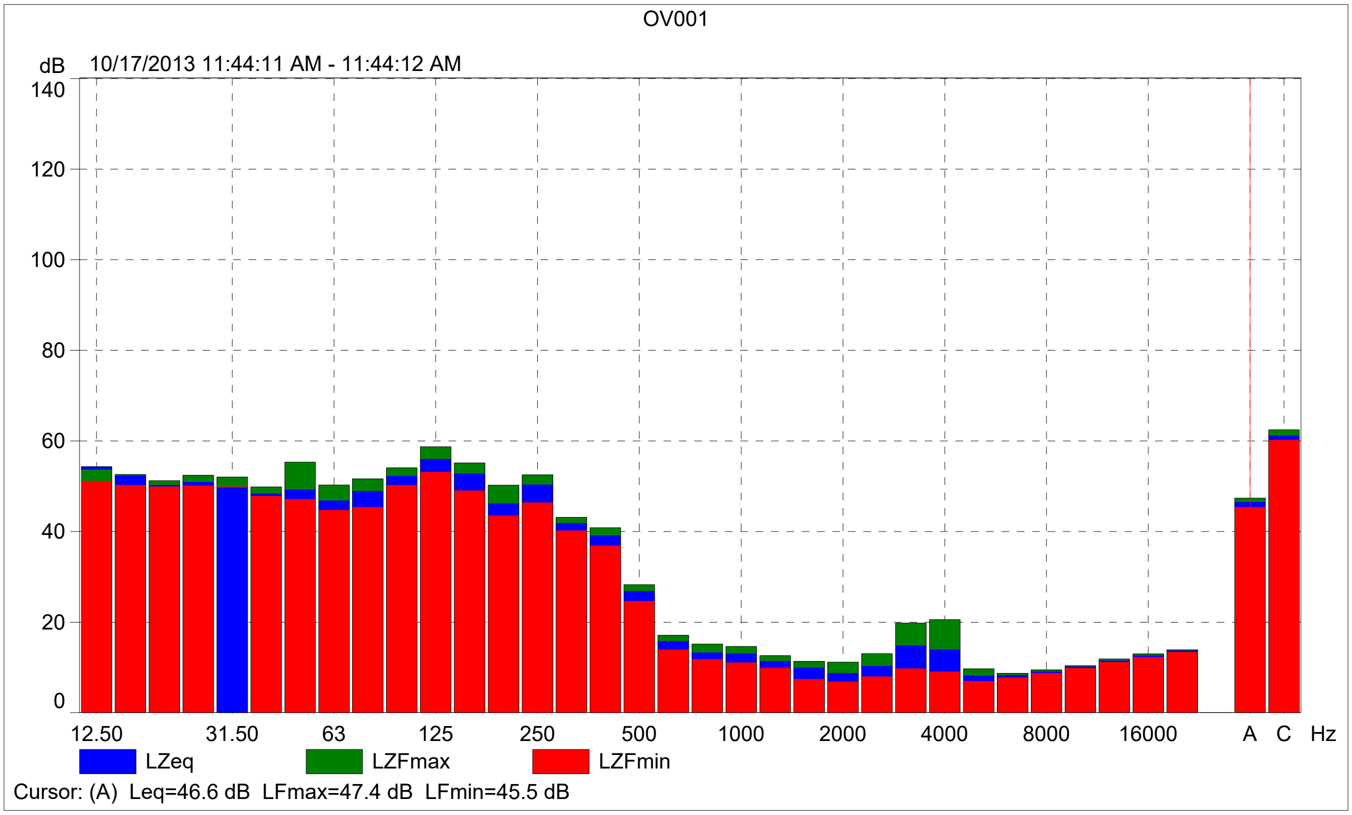


L1	=	60.2 dB
L5	=	55.4 dB
L10	=	52.3 dB
L50	=	38.4 dB
L90	=	28.7 dB
L95	=	27.9 dB
L99	=	26.7 dB



OV001

	Start time	Elapsed time	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			56.8	47.4	45.5
Time	11:44:11 AM	0:00:01			
Date	10/17/2013				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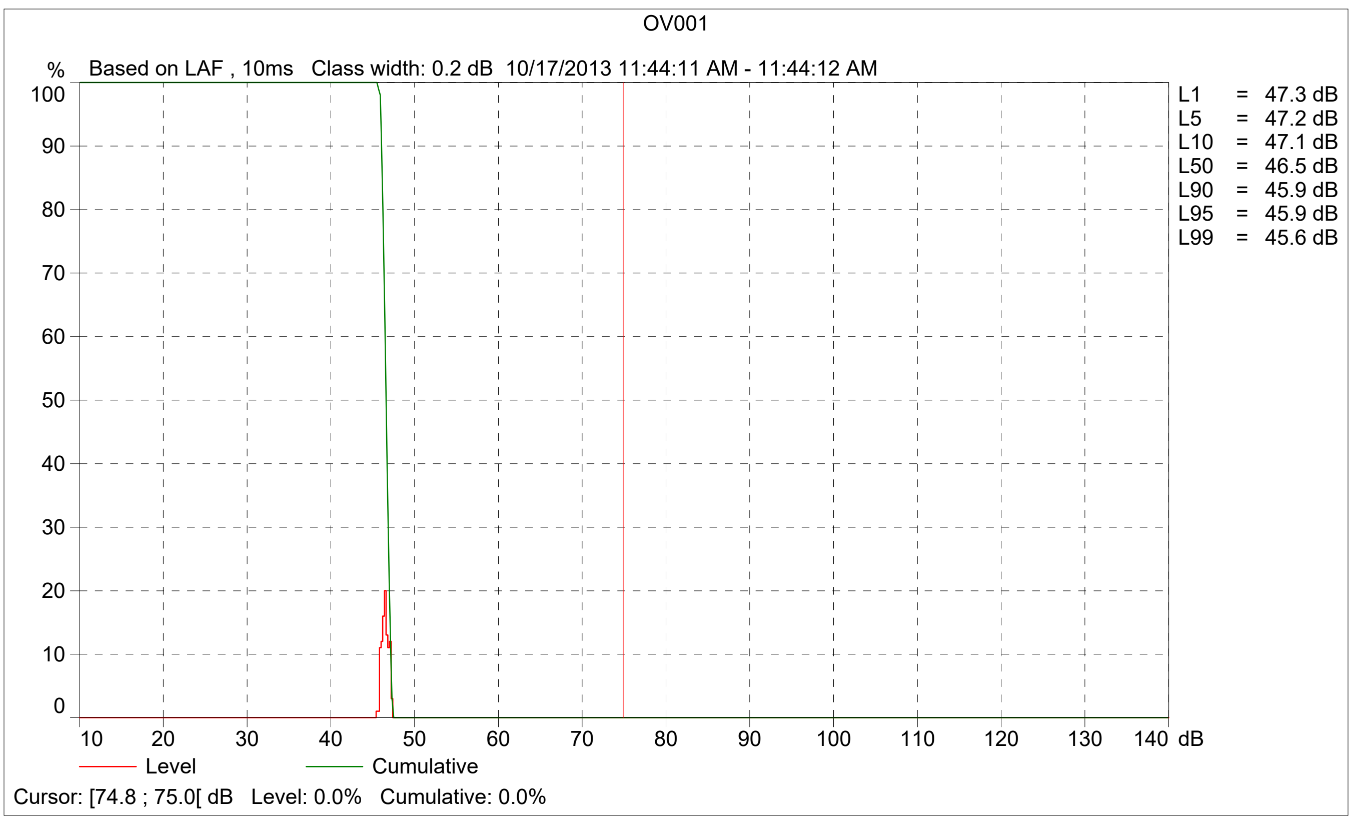
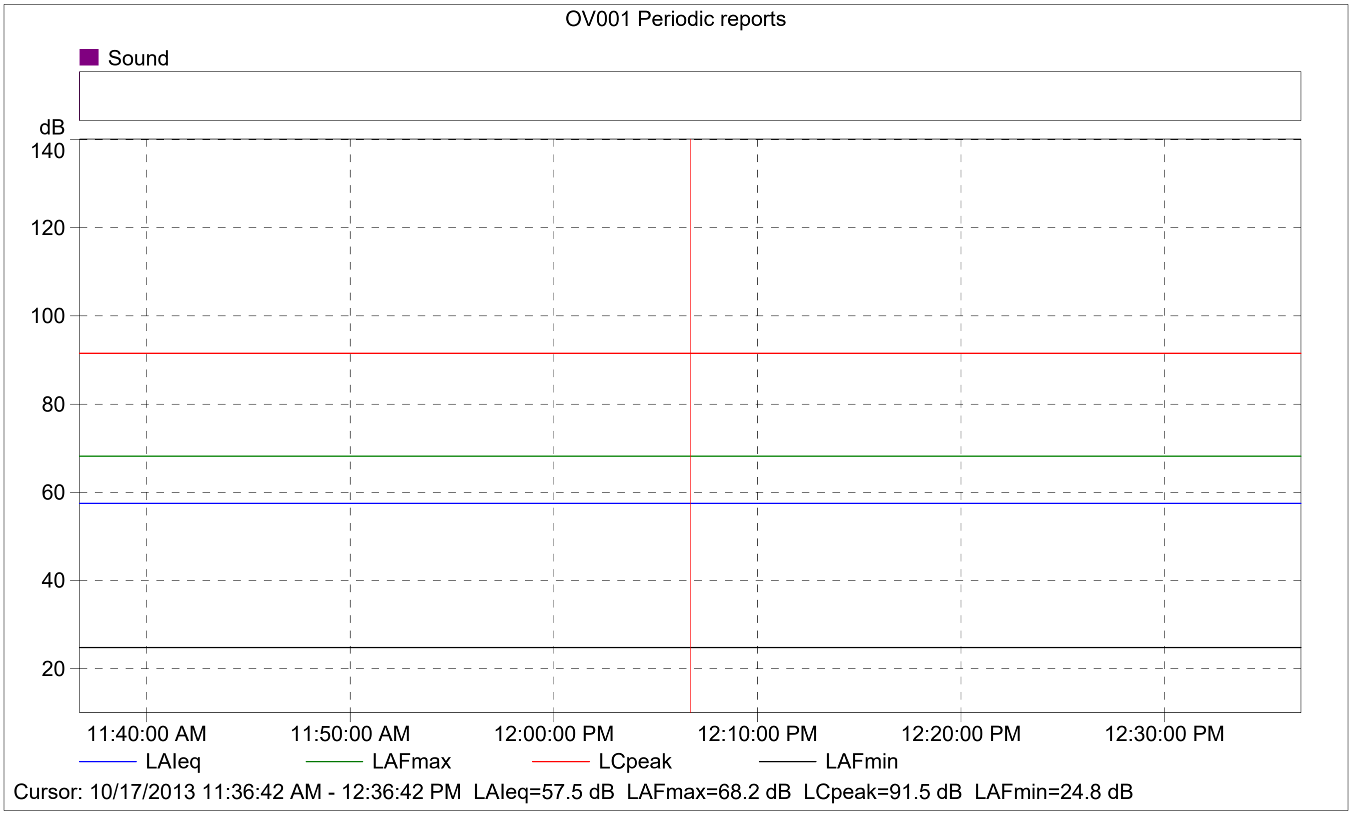
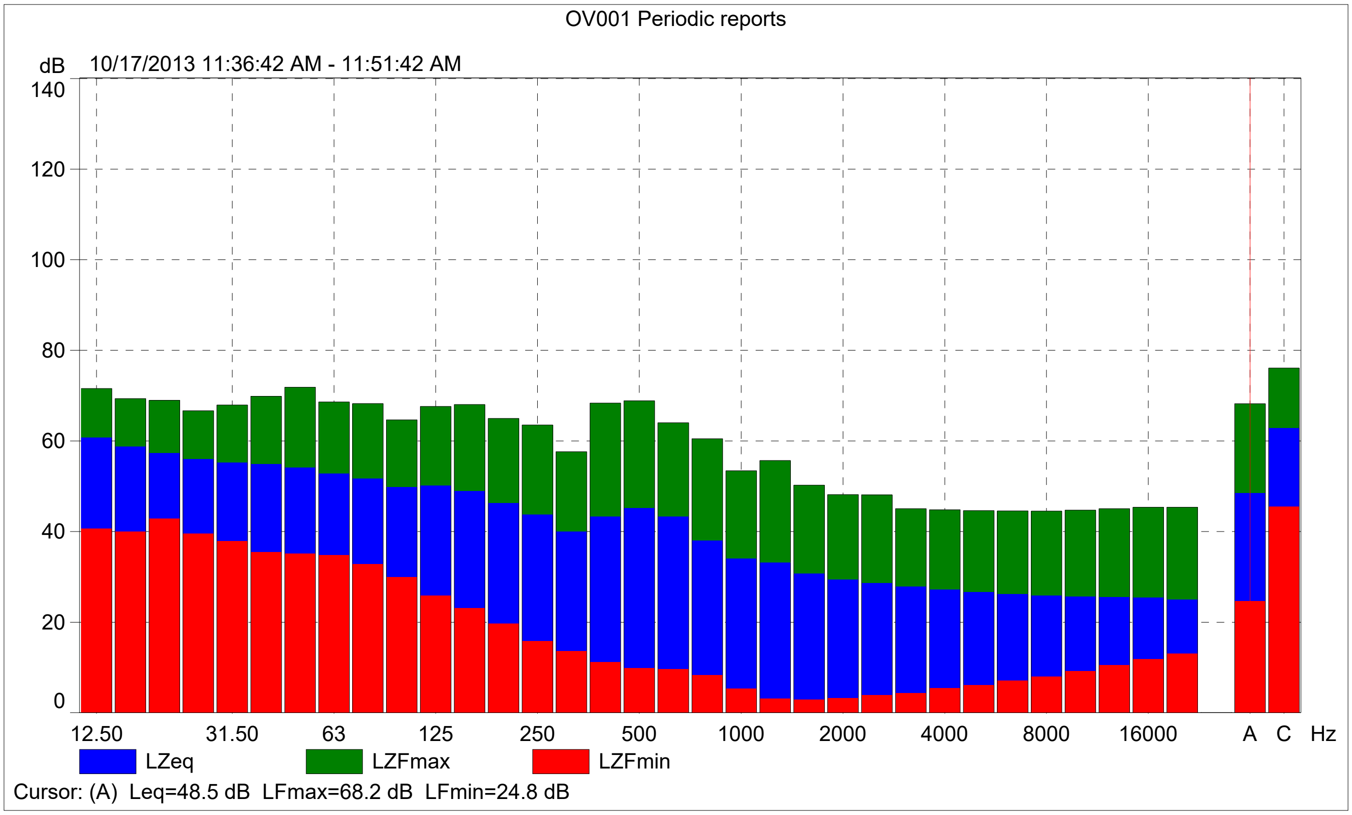
dB 10/17/2013 11:44:11 AM - 11:44:12 AM
140
120
100
80
60
40
20
0
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
LZFmax
LZFmin
Cursor: (A) Leq=46.6 dB LFmax=47.4 dB LFmin=45.5 dB

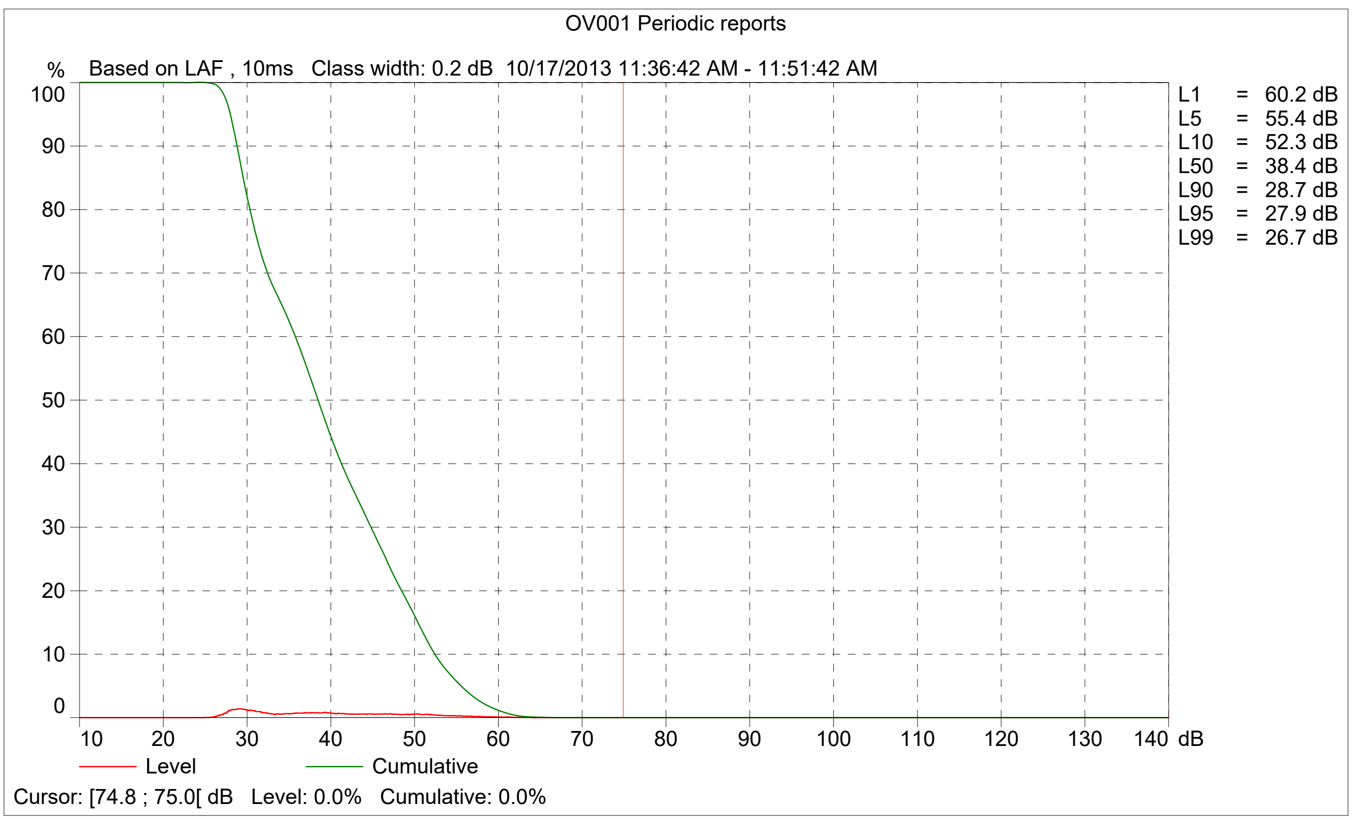

OV001
% Based on LAF , 10ms Class width: 0.2 dB 10/17/2013 11:44:11 AM - 11:44:12 AM
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140 dB
L1 = 47.3 dB
L5 = 47.2 dB
L10 = 47.1 dB
L50 = 46.5 dB
L90 = 45.9 dB
L95 = 45.9 dB
L99 = 45.6 dB
Level
Cumulative
Cursor: [74.8 ; 75.0[dB Level: 0.0% Cumulative: 0.0%

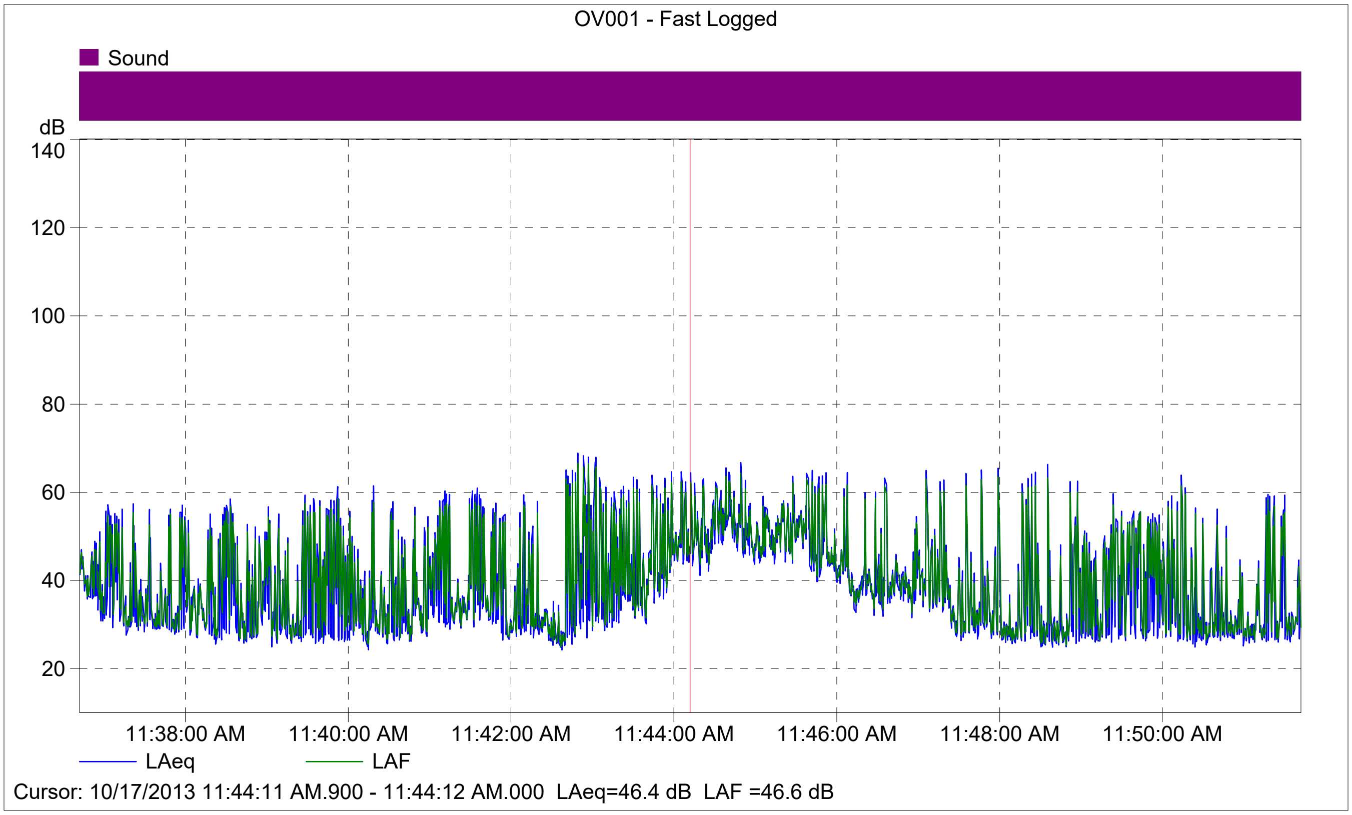


OV001 Periodic reports

	Start time	Elapsed time	Overload [%]	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	57.5	68.2	24.8
Time	11:36:42 AM	0:15:00				
Date	10/17/2013					


OV001 Periodic reports
dB 10/17/2013 11:36:42 AM - 11:51:42 AM
140
120
100
80
60
40
20
0
12.50 31.50 63 125 250 500 1000 2000 4000 8000 16000 A C Hz
LZeq LZFmax LZFmin
Cursor: (A) Leq=48.5 dB LFmax=68.2 dB LFmin=24.8 dB


OV001 Periodic reports
% Based on LAF , 10ms Class width: 0.2 dB 10/17/2013 11:36:42 AM - 11:51:42 AM
100
90
80
70
60
50
40
30
20
10
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 dB
L1 = 60.2 dB
L5 = 55.4 dB
L10 = 52.3 dB
L50 = 38.4 dB
L90 = 28.7 dB
L95 = 27.9 dB
L99 = 26.7 dB
Level Cumulative
Cursor: [74.8 ; 75.0[dB Level: 0.0% Cumulative: 0.0%



OV001 - Fast Logged

	Start time	Elapsed time	LAeq [dB]
Value			46.4
Time	11:44:11 AM.900	0:00:00.100	
Date	10/17/2013		

Site Number: NM-2			
Recorded By: Phillip Masto			
Job Number: 131259			
Date: 10/17/13			
Time: 12:05 PM			
Location: Near single-family home located along Lone Butte Road, west of the project site.			
Source of Peak Noise: Three cars and one truck traveling along Lone Butte Road, airplane flying overhead, dog barking.			
Noise Data			
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
55.0	24.9	80.5	98.4

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**2548189**	**7/12/2013**	
	Microphone	**Brüel & Kjær**	**4189**	**2543364**	**7/12/2013**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**4265**	**7/12/2013**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**7/12/2013**	

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Sunny, clear
	Note: dBA Offset = 0.02		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	4.0	80.7	30.11

Photo of Measurement Location

2250

Instrument:		2250
Application:		BZ7225 Version 2.0.2
Start Time:		10/17/2013 12:05:50
End Time:		10/17/2013 12:20:50
Elapsed Time:		00:15:00
Bandwidth:		1/3-octave
Max Input Level:		138.81

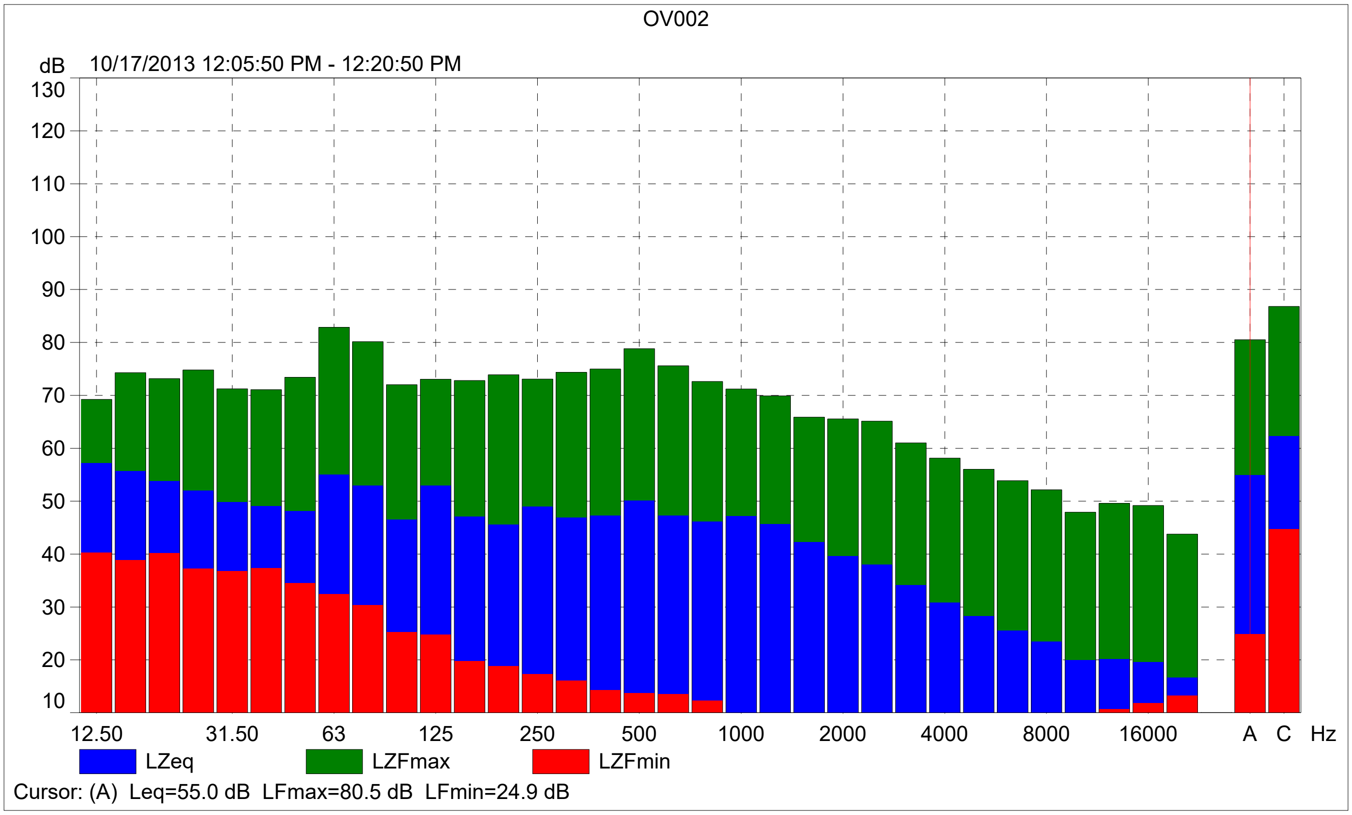
	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

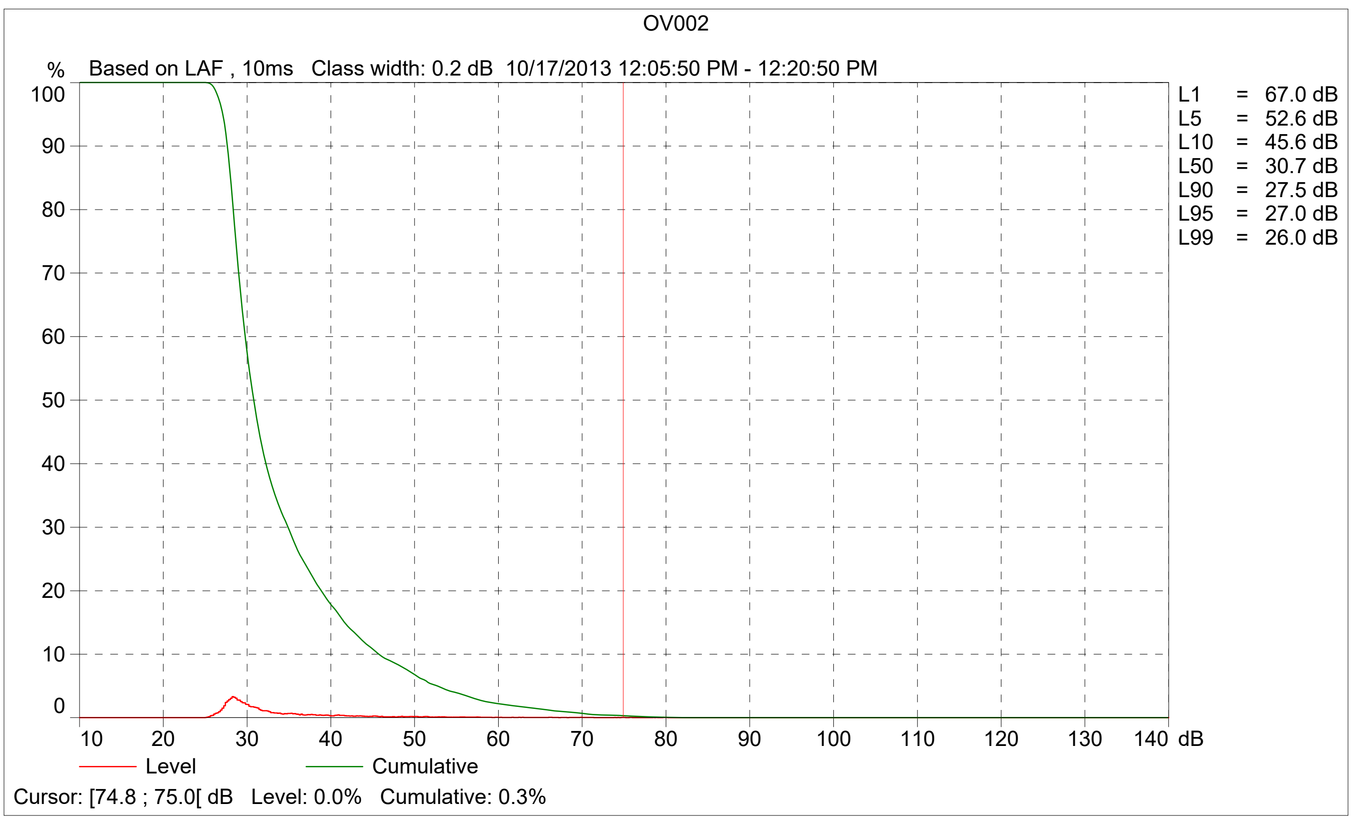
Instrument Serial Number:		2548189
Microphone Serial Number:		2543364
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Diffuse-field

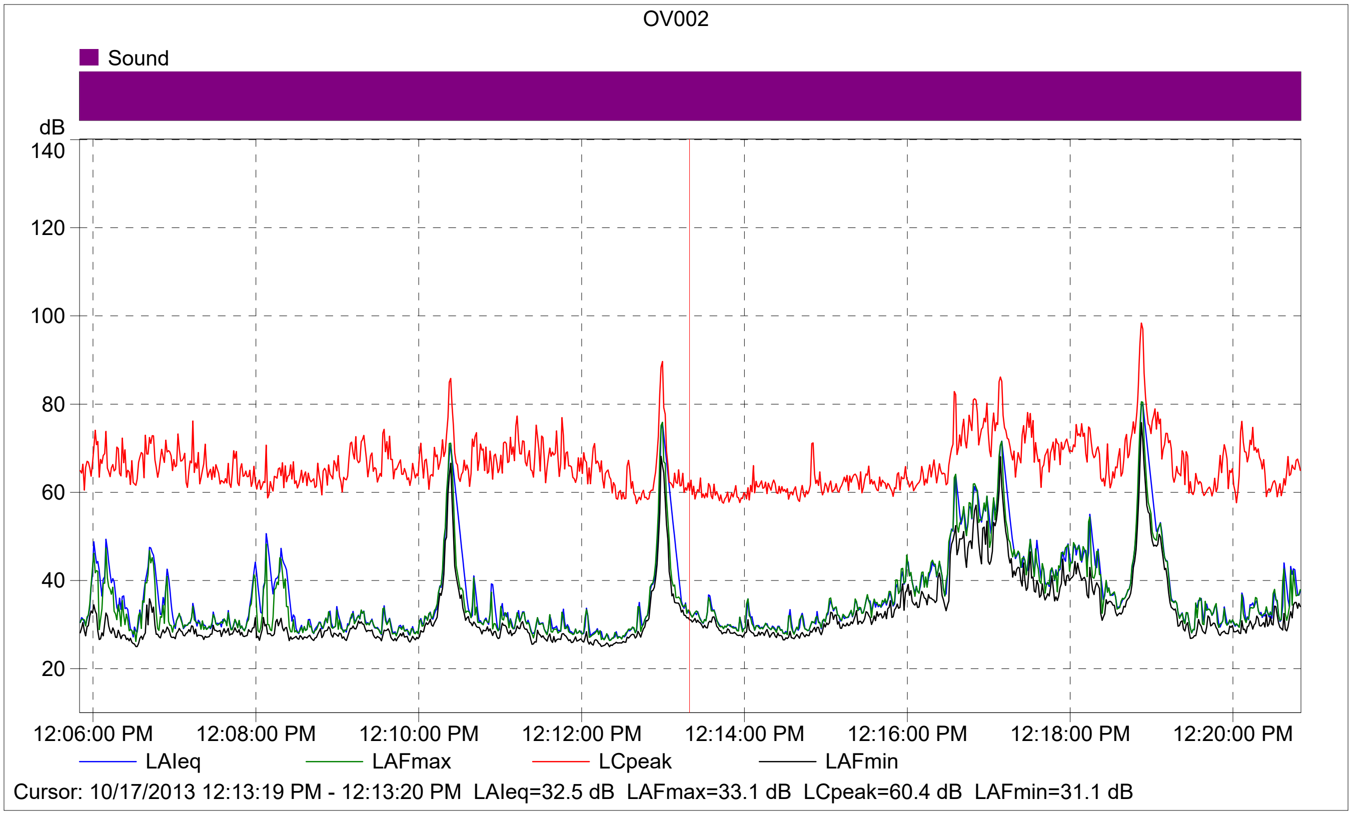
Calibration Time:		10/15/2013 16:31:45
Calibration Type:		External reference
Sensitivity:		63.88 mV/Pa

OV002

	Start time	End time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value				0.00	55.0	80.5	24.9
Time	12:05:50 PM	12:20:50 PM	0:15:00				
Date	10/17/2013	10/17/2013					

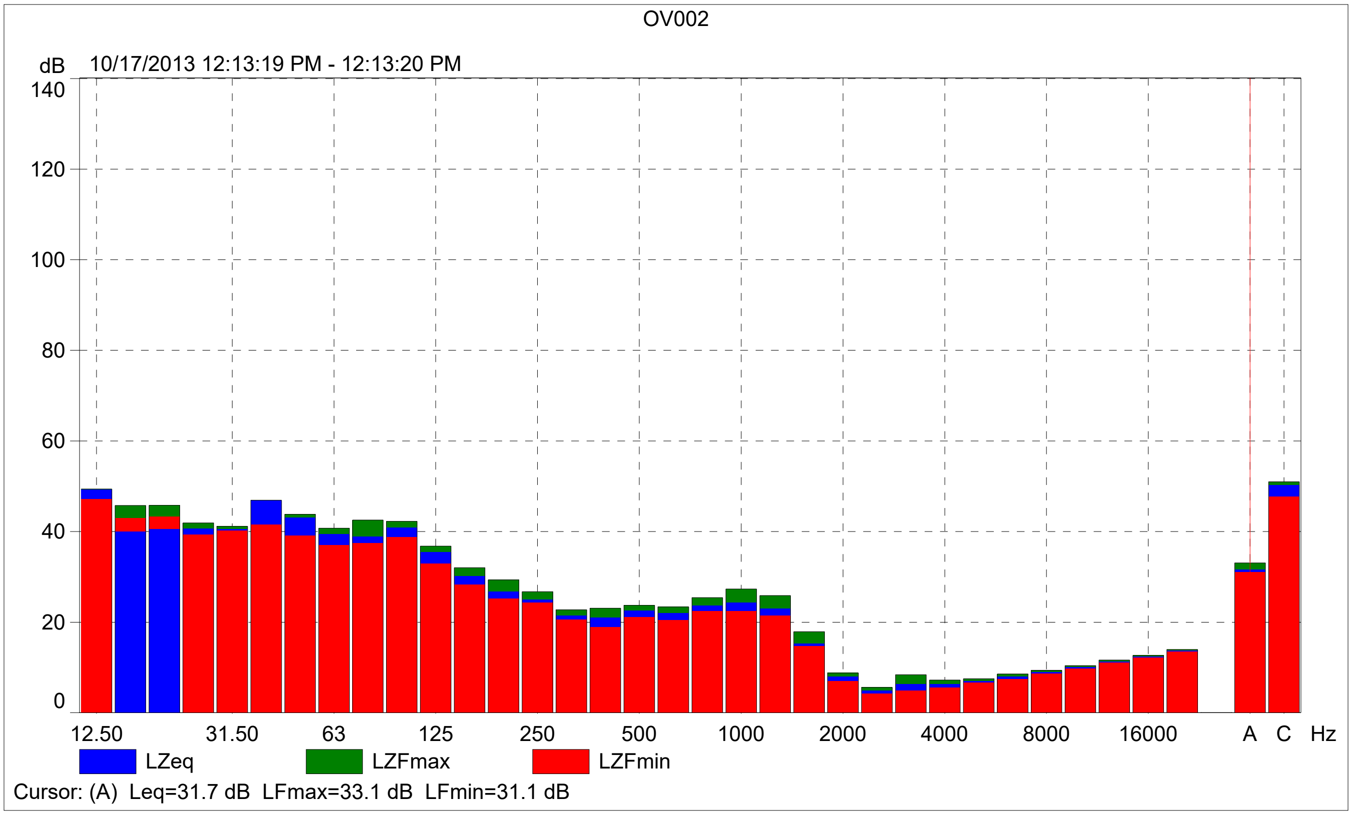

OV002
dB 10/17/2013 12:05:50 PM - 12:20:50 PM
130
120
110
100
90
80
70
60
50
40
30
20
10
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
LZFmax
LZFmin
Cursor: (A) Leq=55.0 dB LFmax=80.5 dB LFmin=24.9 dB

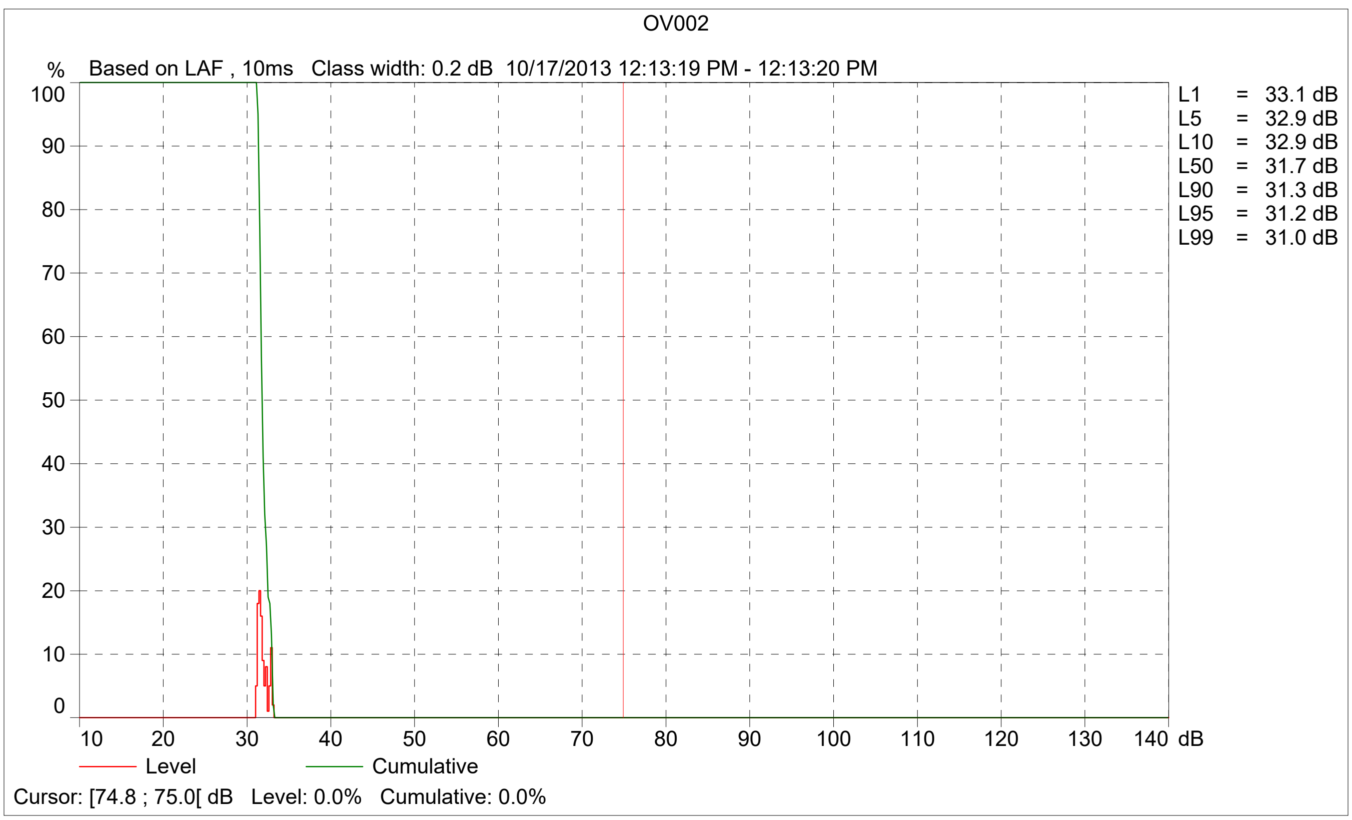

OV002
% Based on LAF , 10ms Class width: 0.2 dB 10/17/2013 12:05:50 PM - 12:20:50 PM
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140 dB
L1 = 67.0 dB
L5 = 52.6 dB
L10 = 45.6 dB
L50 = 30.7 dB
L90 = 27.5 dB
L95 = 27.0 dB
L99 = 26.0 dB
Level
Cumulative
Cursor: [74.8 ; 75.0[dB Level: 0.0% Cumulative: 0.3%



OV002

	Start time	Elapsed time	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			32.5	33.1	31.1
Time	12:13:19 PM	0:00:01			
Date	10/17/2013				


OV002
dB 10/17/2013 12:13:19 PM - 12:13:20 PM
140
120
100
80
60
40
20
0
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
LZFmax
LZFmin
Cursor: (A) Leq=31.7 dB LFmax=33.1 dB LFmin=31.1 dB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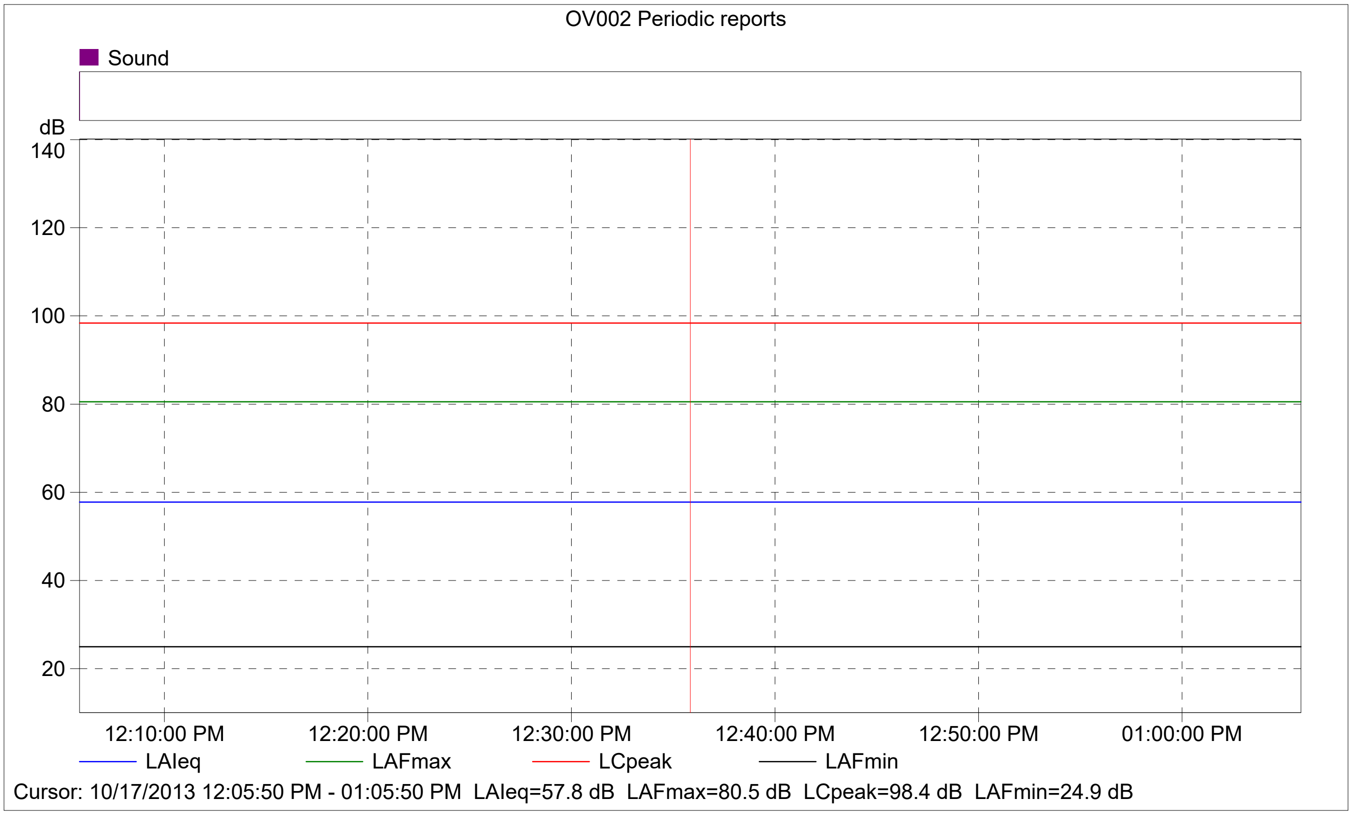
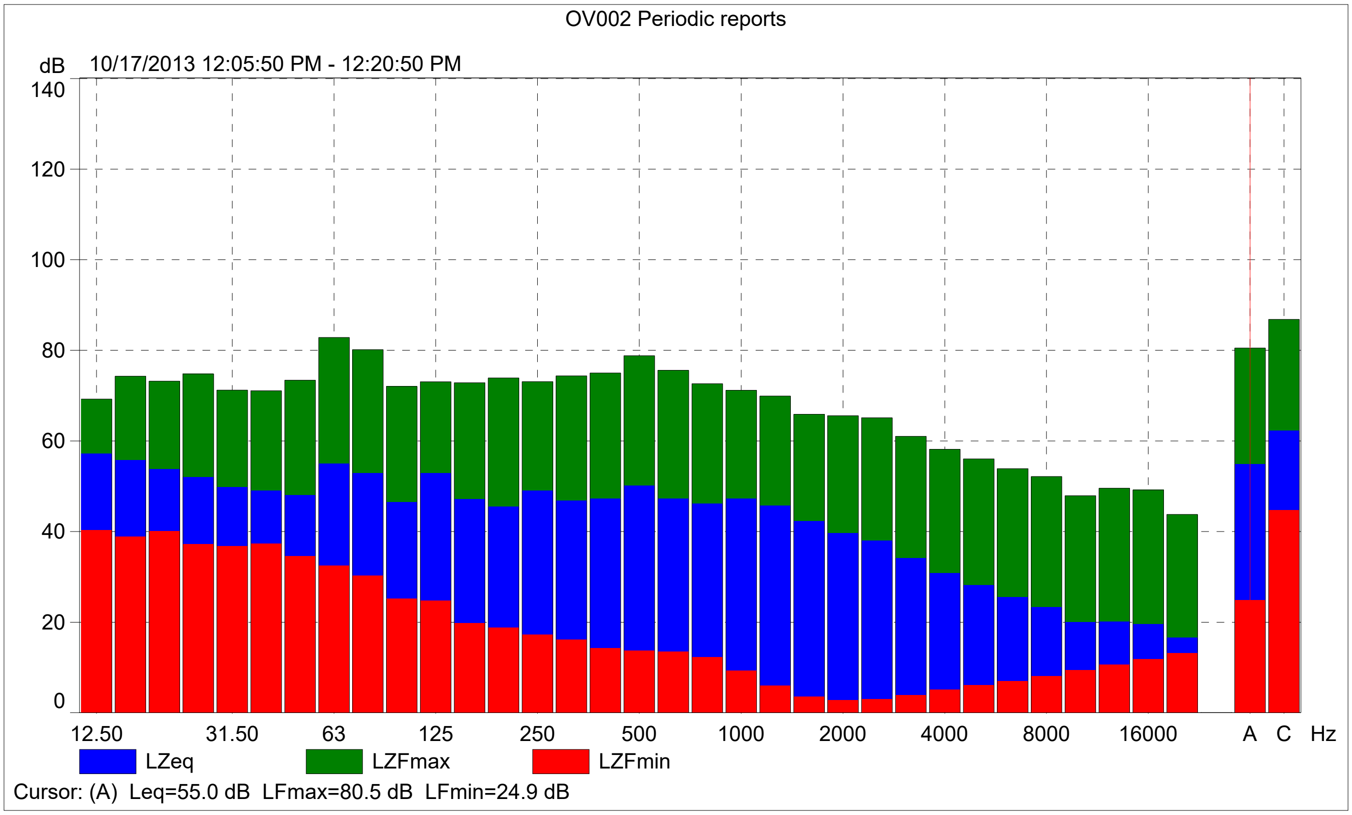
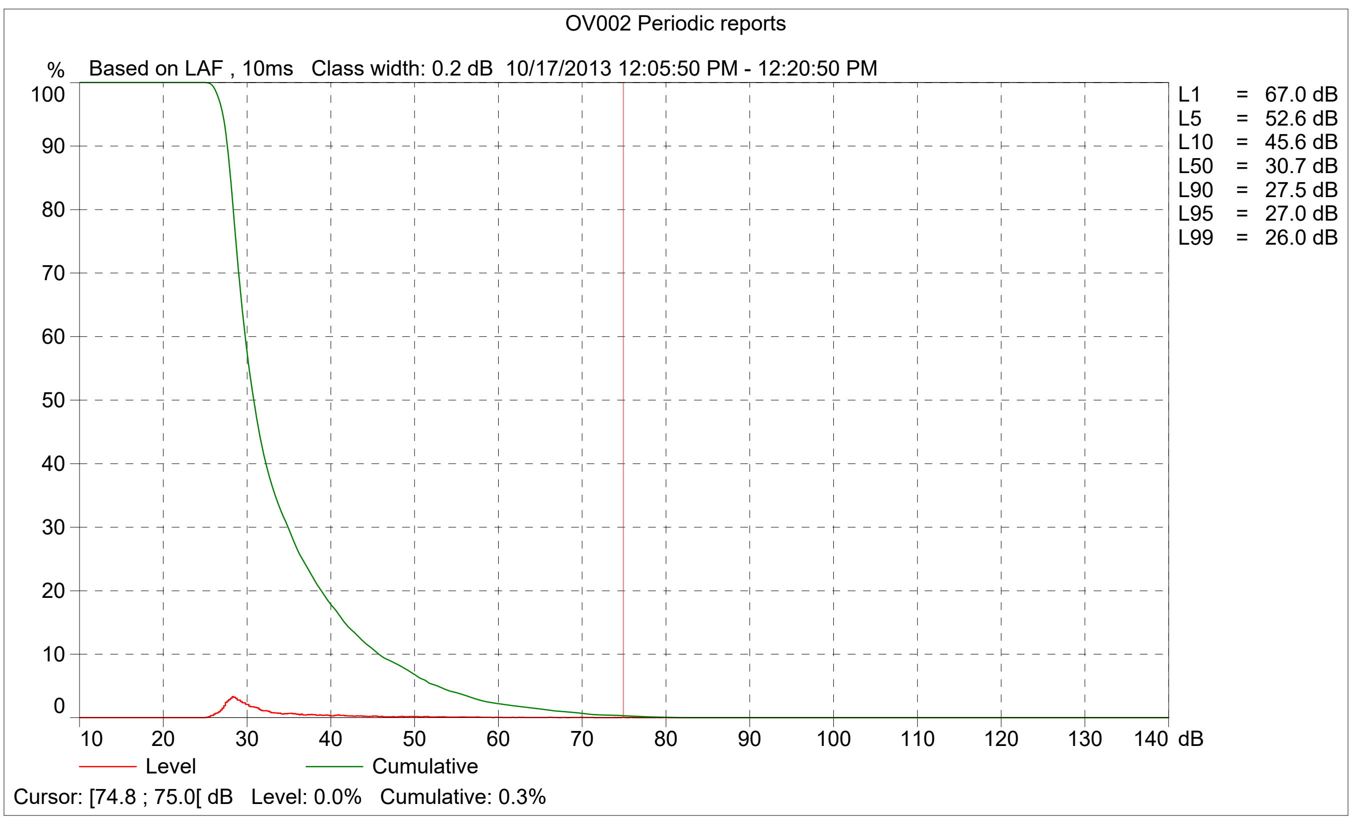
% Based on LAF , 10ms Class width: 0.2 dB 10/17/2013 12:13:19 PM - 12:13:20 PM
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140 dB
L1 = 33.1 dB
L5 = 32.9 dB
L10 = 32.9 dB
L50 = 31.7 dB
L90 = 31.3 dB
L95 = 31.2 dB
L99 = 31.0 dB
Level
Cumulative
Cursor: [74.8 ; 75.0[dB Level: 0.0% Cumulative: 0.0%

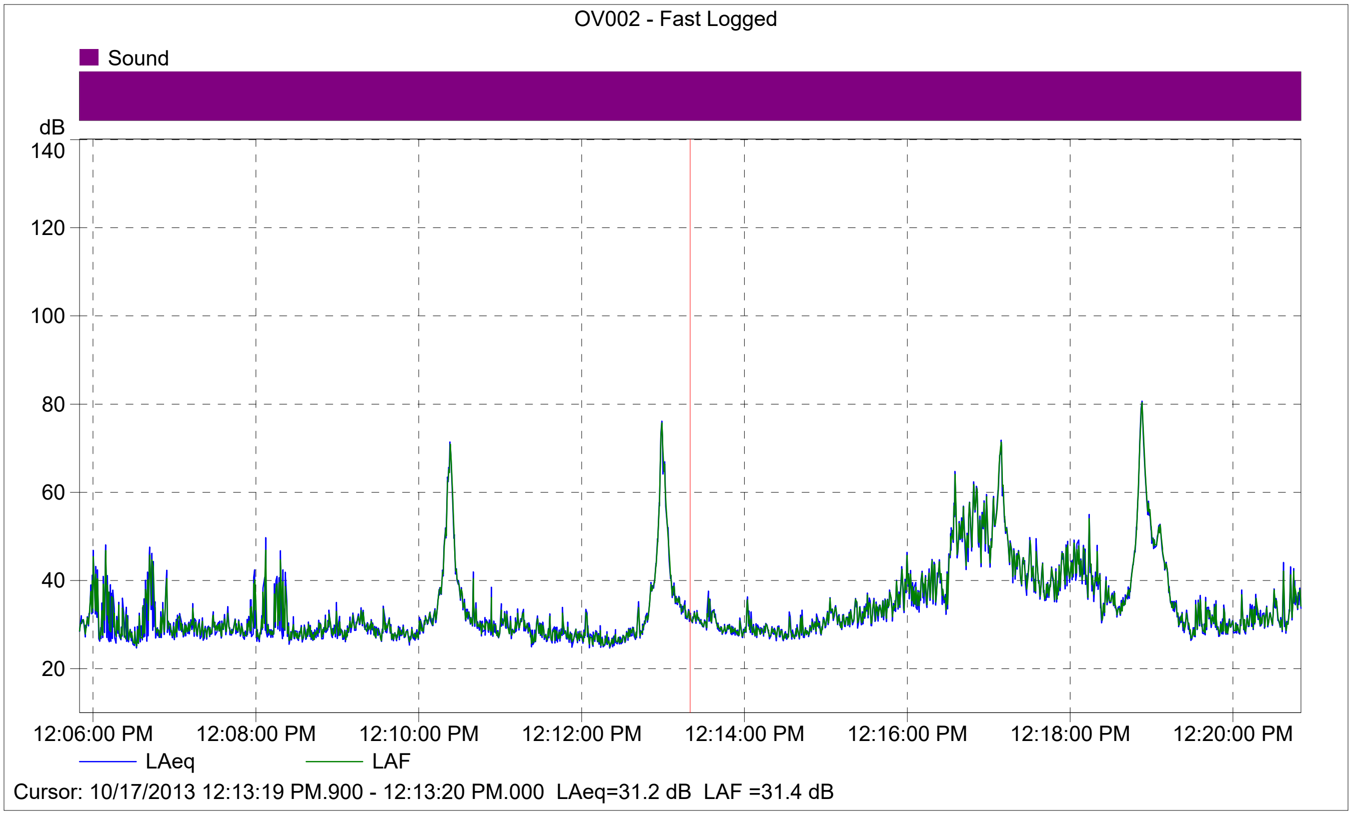


OV002 Periodic reports

	Start time	Elapsed time	Overload [%]	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	57.8	80.5	24.9
Time	12:05:50 PM	0:15:00				
Date	10/17/2013					


OV002 Periodic reports
dB 10/17/2013 12:05:50 PM - 12:20:50 PM
140
120
100
80
60
40
20
0
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
LZFmax
LZFmin
Cursor: (A) Leq=55.0 dB LFmax=80.5 dB LFmin=24.9 dB


OV002 Periodic reports
% Based on LAF , 10ms Class width: 0.2 dB 10/17/2013 12:05:50 PM - 12:20:50 PM
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140 dB
L1 = 67.0 dB
L5 = 52.6 dB
L10 = 45.6 dB
L50 = 30.7 dB
L90 = 27.5 dB
L95 = 27.0 dB
L99 = 26.0 dB
Level
Cumulative
Cursor: [74.8 ; 75.0[dB Level: 0.0% Cumulative: 0.3%



OV002 - Fast Logged

	Start time	Elapsed time	LAeq [dB]
Value			31.2
Time	12:13:19 PM.900	0:00:00.100	
Date	10/17/2013		

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Irvine, California 92618
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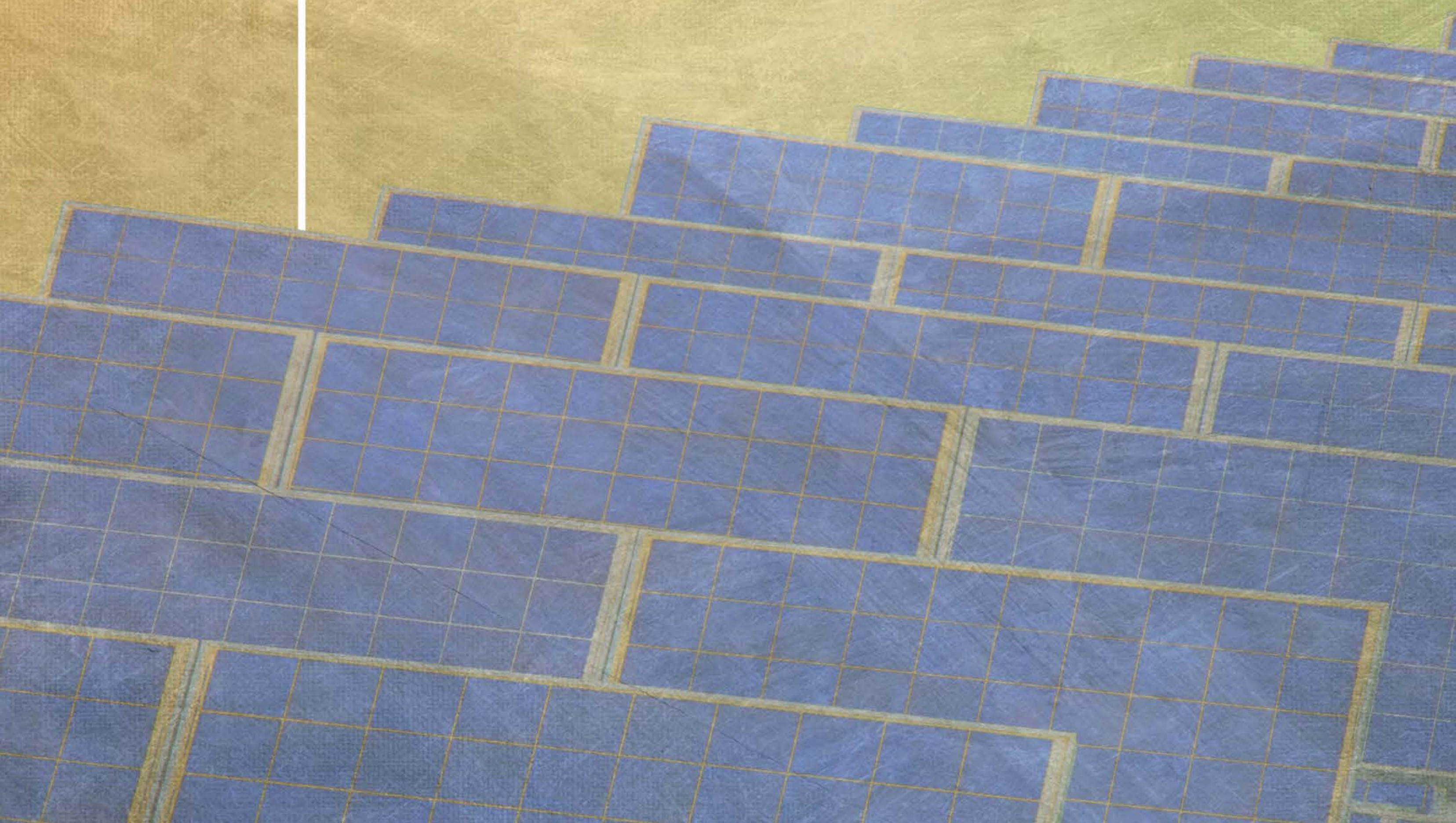


B14. 2013 Traffic Impact Assessment

ORO VERDE SOLAR PROJECT
TRAFFIC IMPACT ANALYSIS

Prepared for

SunEdison

Prepared by

RBF
CONSULTING
A Baker Company

14725 ALTON PARKWAY, IRVINE, CALIFORNIA 92618-2027
CONTACT: BOB MATSON 949.855.5736 bobmatson@rbf.com
CONTACT: GIANCARLO GANDDINI 949.855.7085 giancarlo.ganddini@rbf.com

REGISTERED PROFESSIONAL ENGINEER
GIANCARLO J. GANDDINI
TR 2663
TRAFFIC
STATE OF CALIFORNIA

December 30, 2013

JN 131259

TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

EXECUTIVE SUMMARY

This study analyzes the forecast traffic conditions associated with the proposed Oro Verde Solar Project, which consists of constructing a renewable energy project to produce electric power using solar photovoltaic (PV) modules on a maximum of 4,000-acres of vacant land located on the northwest corner of Edwards Air Force Base in rural Kern County. The proposed project is located approximately six miles northeast of the town of Rosamond, six miles south of Mojave, east of SR-14 and on the south side of Trotter Avenue.

The study intersections are currently operating at an acceptable Level of Service (LOS) according to Kern County and Caltrans performance criteria.

Peak construction-related activity associated with the proposed project is forecast to generate approximately 3,784 daily trips, which include approximately 1,250 a.m. peak hour trips and approximately 1,250 p.m. peak hour trips.

The proposed project (post-construction) is forecast to generate approximately 48 daily trips, which include approximately 24 a.m. peak hour trips and approximately 24 p.m. peak hour trips.

Based on the thresholds of significance, the addition of project construction generated trips is forecast to result in a significant traffic impact at all four study intersections for existing plus project construction conditions.

The following mitigation measures are recommended to address the significant traffic impacts at the study intersections for forecast existing plus project construction conditions:

Mitigation Measure #1 Implement staggered work shifts such that the arrival and departure of all project construction workers does not occur within the same hour. The beginning of the work shifts should be a minimum of one hour apart and split evenly among the workers such that half are scheduled for the first shift and half are scheduled for the second shift.

Mitigation Measure #2 **Sierra Highway/Sopp Road** – The Sierra Highway/Sopp Road intersection shall utilize a trained and qualified traffic flagger for the duration of project construction. The traffic flagger shall be in place for at least one hour at the beginning of each staggered work shift.

Based on the applicable thresholds of significance, the addition of project trips is forecast to result in no significant impact at the study intersections for forecast year 2016 with project (post-construction) conditions.

INTRODUCTION

This study analyzes the forecast traffic conditions associated with the proposed Oro Verde Solar Project, which consists of constructing a renewable energy project to produce electric power using solar photovoltaic (PV) modules on a maximum of 4,000-acres of vacant land located on the northwest corner of Edwards Air Force Base in rural Kern County. The proposed project is located approximately six miles northeast of the town of Rosamond, six miles south of Mojave, east of SR-14 and on the south side of Trotter Avenue.

Exhibit 1 shows the regional vicinity and Exhibit 2 shows the site vicinity of the proposed project.

Resource Documents

This traffic analysis has been prepared based on the following agency documents:

- *Division Nine, Standards For Traffic Engineering, (County of Kern)*;
- *Kern County General Plan Circulation Element (March 13, 2007)*; and
- *Guide for the Preparation of Traffic Impact Studies (Caltrans, December 2002)*.

Study Area

This study evaluates the following four (4) unsignalized intersections in the vicinity of the project site:

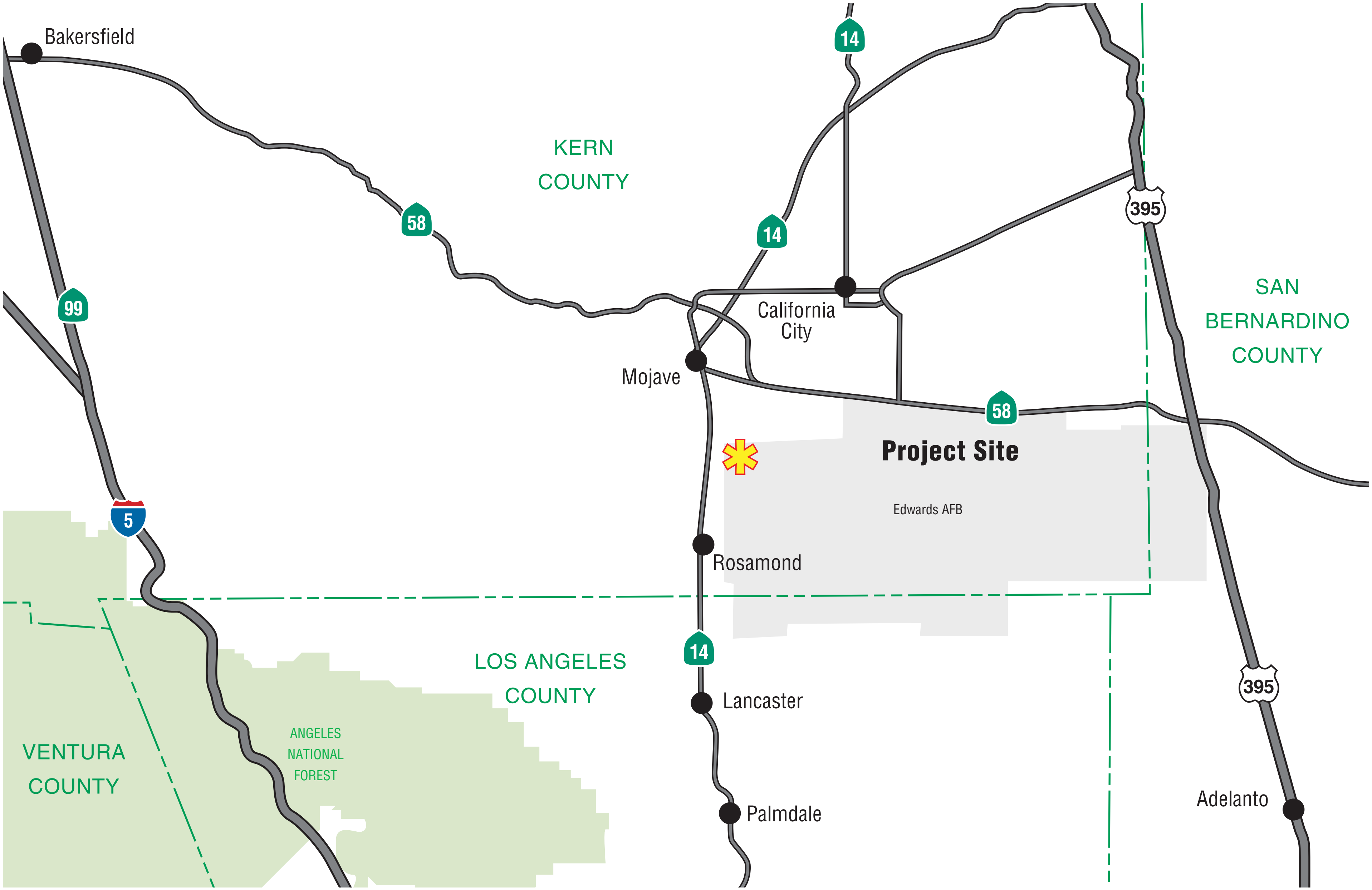
1. SR-14 Southbound Ramps/Backus Road;
2. SR-14 Northbound Ramps/Backus Road;
3. Sierra Highway/Backus Road; and
4. Sierra Highway/Sopp Road.

The study intersections are analyzed for the following study scenarios:

- Existing Conditions;
- Forecast Existing Plus Project Construction Conditions;
- Forecast Opening Year Without Project Conditions; and
- Forecast Opening Year With Project Conditions.

Intersection Analysis Methodology

Level of service (LOS) is commonly used as a qualitative description of intersection operation and is based on the capacity of the intersection and the volume of traffic using the intersection. The County of Kern and Caltrans utilize the Highway Capacity Manual (HCM) intersection analysis methodology to analyze the operation of signalized and unsignalized study intersections. The HCM analysis methodology describes the operation of an intersection using a range of LOS from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding stopped delay experienced per vehicle for unsignalized intersections shown in Table 1.



Not to Scale

RBF A Baker Company

Regional Project Location

Exhibit 1

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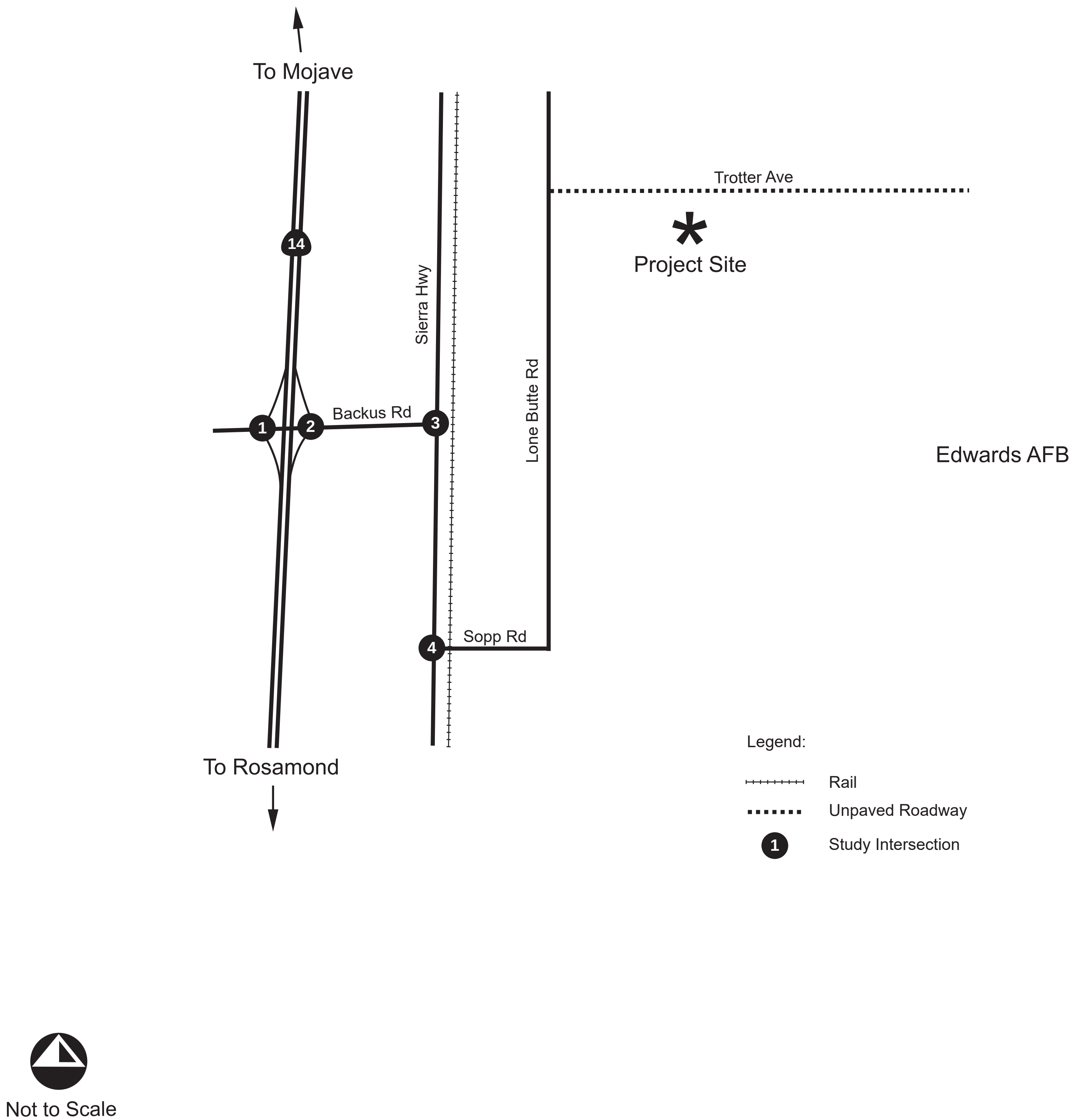
DEC/2013



H:\pdata\131259\Admin\Reports\Traffic\Exhibits DEC/2013

Project Site Vicinity Map

Exhibit 2

Table 1
LOS & Delay Ranges

LOS	Delay (seconds/vehicle)
	Unsignalized Intersections
A	≤ 10.0
B	> 10.0 to ≤ 15.0
C	> 15.0 to ≤ 25.0
D	> 25.0 to ≤ 35.0
E	> 35.0 to ≤ 50.0
F	> 50.0

Source: *2000 Highway Capacity Manual.*

LOS is based on the average stopped delay per vehicle for all movements of signalized intersections and all-way stop-controlled intersections; for one-way or two-way stop-controlled intersections, LOS is based on the worst stop-controlled approach.

Intersection Performance Criteria

As identified in the Kern County General Plan Circulation Element, the County of Kern target for peak hour intersection operation is LOS D or better. As identified in the *Guide for the Preparation of Traffic Impact Studies,* the Caltrans target for peak hour intersection operation is LOS C or better.

Intersection Thresholds of Significance

The Kern County General Plan Circulation Element has established the following traffic threshold of significance:

- A significant project impact occurs and mitigation is required if development causes affected roadways to fall below Level of Service D.

While Caltrans has not established traffic thresholds of significance at intersections, this traffic analysis utilizes the following traffic threshold of significance:

- A significant project impact occurs at a study intersection when the addition of project-generated trips causes the peak hour level of service of the study intersection to change from acceptable operation (LOS A, B, or C) to deficient operation (LOS D, E, or F).

EXISTING CONDITIONS

Existing Conditions Traffic Volumes

To determine the existing traffic operations, a.m. and p.m. peak hour intersection movement volumes were collected in October 2013. The a.m. peak period intersection counts were collected from 7:00 a.m. to 9:00 a.m., and the p.m. peak period intersection counts were collected from 4:00 p.m. to 6:00 p.m. The counts used in this analysis were taken from the highest hour within the peak period counted. Detailed traffic count data is contained in Appendix A.

Existing Conditions Level of Service

Table 2 summarizes existing conditions a.m. peak hour and p.m. peak hour LOS of the study intersections; detailed *HCM* analysis sheets are contained in Appendix B. Exhibit 3 shows existing study intersection controls and geometry.

Table 2
Existing Conditions AM & PM Peak Hour LOS

Study Intersection	AM Peak Hour	PM Peak Hour
	Delay – LOS	Delay – LOS
1. SR-14 SB Ramps / Backus Rd	8.6 – A	8.9 – A
2. SR-14 NB Ramps / Backus Rd	8.7 – A	8.9 – A
3. Sierra Hwy / Backus Rd	8.4 – A	8.4 – A
4. Sierra Hwy / Sopp Rd	8.8 – A	9.0 – A

Notes: SB = Southbound; NB = Northbound; delay shown in seconds per vehicle.
*LOS based on worst stop-controlled movement at unsignalized intersections.

As shown in Table 2, the study intersections are currently operating at an acceptable LOS according to Kern County and Caltrans performance criteria.

PROPOSED PROJECT

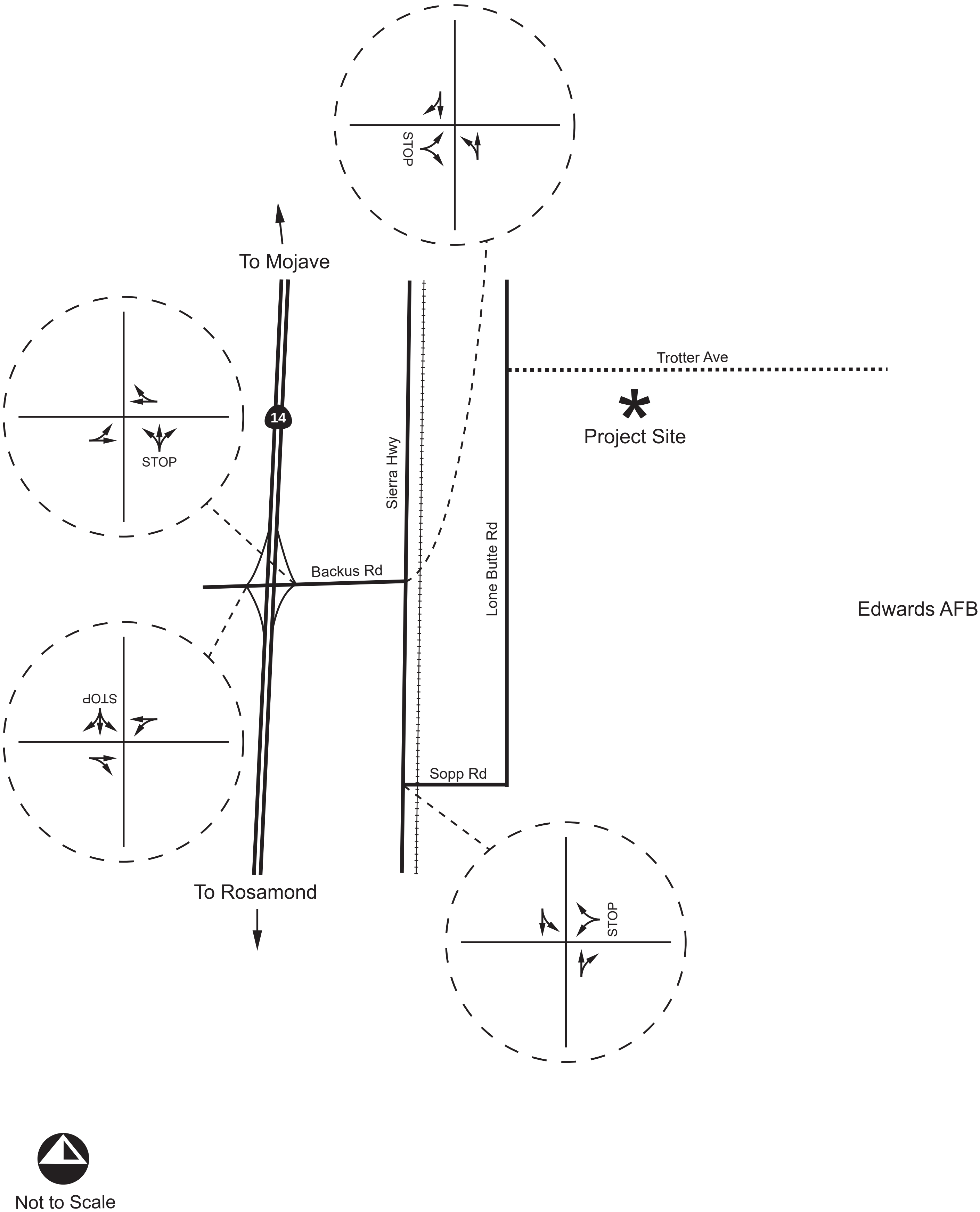
The project applicant is proposing to construct a renewable energy project to produce electric power using solar photovoltaic (PV) modules on a maximum of 4,000-acres of vacant land located on the northwest corner of Edwards Air Force Base in rural Kern County. The proposed project is located approximately six miles northeast of the town of Rosamond, six miles south of Mojave, east of SR-14 and on the south side of Trotter Avenue.

Construction-Related Trip Generation

To determine construction-related forecast trip generation for the proposed project, the project description and construction staging operations were reviewed to identify trips and materials related trips. Construction is anticipated to begin in 2014 and end in 2016. The on-site assembly and construction workforce is expected to reach a peak of approximately 1,250 workers. This analysis conservatively assumes all construction related employees arrive on the site during the a.m. peak hour and depart the site during the p.m. peak hour.

Water usage during construction is estimated at 1,257,692 gallons per day for dust control. Water truck capacity is assumed to be 5,000 gallons thus requiring up to 252 trucks (504 trips) for water delivery daily during construction. System/materials delivery trucks are estimated at 390 trucks (780 trips) per day. It is assumed that system/materials and water trucks trips would occur outside the peak hours.

Construction-related trip generation for the a.m. and p.m. peak hours, as well as daily trips, is summarized in Table 3.



RBF
A Baker Company

Existing Study Intersection Controls and Geometry

H:\pdata\131259\Admin\Reports\Traffic\Exhibits DEC/2013

Exhibit 3

Table 3
Forecast Construction-Related Trip Generation of Proposed Project

Trip Generation Source	AM Peak Hour Trips			PM Peak Hour Trips			Non-Peak Hour Trips	Daily Trips
	In	Out	Total	In	Out	Total		
Onsite Employees	1,250	0	1,250	0	1,250	1,250	0	2,500
System/Materials/Water Delivery[1]	0	0	0	0	0	0	1,284	1,284
Total Trip Generation	**1,250**	**0**	**1,250**	**0**	**1,250**	**1,250**	**1,284**	**3,784**

1 = Non-peak hour trips based on 390 construction-related trucks and 252 water-related trucks; 2 trips/truck equates to 1,284 trips.

As shown in Table 3, peak construction-related activity associated with the proposed project is forecast to generate approximately 3,784 daily trips, which include approximately 1,250 a.m. peak hour trips and approximately 1,250 p.m. peak hour trips. It should be noted, this is a conservative trip generation assumption since it assumes all construction employee trips would occur during the a.m. and p.m. peak periods and no carpooling occurs.

Post-Construction Trip Generation

Upon completion of construction activities, the solar facility will include up to 40,000 square feet of permanent services and warehouse buildings placed throughout the site. Service buildings would house the overall plant control system and warehouses would be used to conduct various maintenance activities on the Solar Facility equipment.

Approximately 12 to 24 personnel would be required for ongoing operation, maintenance, and security at the Solar Facility. Assuming a maximum of 24 employees, the post-construction trip generation conservatively assumes all employees arrive at the site during the a.m. peak hour and depart the site during the p.m. peak hour. Post-construction trip generation for the a.m. and p.m. peak hours, as well as daily trips, is summarized in Table 4.

Table 4
Forecast Post-Construction Trip Generation of Proposed Project

Trip Generation Source	AM Peak Hour Trips			PM Peak Hour Trips			Daily Trips
	In	Out	Total	In	Out	Total	
Onsite Employees	24	0	24	0	24	24	48

As shown in Table 4, the proposed project (post-construction) is forecast to generate approximately 48 daily trips, which include approximately 24 a.m. peak hour trips and approximately 24 p.m. peak hour trips.

Under a worst-case scenario, each solar panel would need to be washed three times per year; however, operational decisions regarding panel washing will be made based upon real-time conditions and there may be years where no panel washing is required. Additional water delivery will be needed once per year to supply water to those buildings with sinks and toilets.

Any required maintenance, including panel washing, will be scheduled to avoid peak energy load periods, and unplanned maintenance will typically be responded to as needed depending on the event. Daily operation of the plant will commence when there is sufficient sunlight to begin operation of the solar field. Project maintenance performed on the site will consist of equipment inspection and replacement, and will occur primarily during daylight hours. As such, any additional trips aside from the employee trips shown in Table 4 would be infrequent and/or occur during off-peak conditions.

Project Trip Distribution and Assignment

Based on review of the proposed project's planned site access, nearby circulation facilities, and proximity to urbanized communities, it is assumed construction workers would commute to/from the project site using SR-14 Freeway at Backus Road, along Sierra Highway to the Sopp Road railroad crossing, and along Lone Butte Road to Trotter Ave. Approximately 85 percent is assumed to/from the south using the SR-14 Freeway and 15 percent is assumed to/from the north using the SR-14 Freeway.

Therefore, approximately 1,063 peak hour construction trips are forecast to travel to/from the south and 188 trips to/from the north.

During post-construction conditions, approximately 20 trips are forecast to travel to/from the south and 4 trips to/from the north.

FORECAST EXISTING PLUS PROJECT CONSTRUCTION CONDITIONS

This section summarizes traffic operations for forecast existing plus project construction conditions. The duration of construction is estimated at two years.

Forecast Existing Plus Project Construction Conditions Traffic Volumes

Forecast existing plus project construction conditions traffic volumes were derived by adding forecast project construction generated trips to existing conditions traffic volumes.

Forecast Existing Plus Project Construction Conditions Level of Service

Table 5 summarizes forecast existing plus project construction conditions a.m. peak hour and p.m. peak hour LOS of the study intersections; detailed *HCM* analysis sheets are contained in Appendix B.

Table 5
Forecast Existing Plus Project
Construction Conditions AM & PM Peak Hour LOS

Study Intersection	Existing Conditions		Forecast Existing Plus Project Construction Conditions		Significant Impact?
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
	Delay – LOS	Delay – LOS	Delay – LOS	Delay – LOS	
1. SR-14 SB Ramps / Backus Rd	8.6 – A	8.9 – A	9.8 – A	999.9 – F	Yes
2. SR-14 NB Ramps / Backus Rd	8.7 – A	8.9 – A	153.4 – F	28.2 – D	Yes
3. Sierra Hwy / Backus Rd	8.4 – A	8.4 – A	103.7 – F	14.9 – B	Yes
4. Sierra Hwy / Sopp Rd	8.8 – A	9.0 – A	999.9 – F	136.6 – F	Yes

Notes: SB = Southbound; NB = Northbound; delay shown in seconds per vehicle.
*LOS based on worst stop-controlled movement at unsignalized intersections.

As shown in Table 5, with the addition of project construction generated trips, the study intersections are forecast to operate at unacceptable LOS according to Kern County and Caltrans performance criteria for forecast existing plus project construction conditions.

As also shown in Table 5, based on the thresholds of significance, the addition of project construction generated trips is forecast to result in a significant traffic impact at all four study intersections for forecast existing plus project construction conditions.

Forecast Existing Plus Project Construction Conditions Recommended Mitigation Measures

The following mitigation measures are recommended to address the forecast significant traffic impacts at the study intersections for forecast existing plus project conditions:

Mitigation Measure #1 Implement staggered work shifts such that the arrival and departure of all project construction workers does not occur within the same hour. The beginning of the work shifts should be a minimum of one hour apart and split evenly among the workers such that half are scheduled for the first shift and half are scheduled for the second shift.

Mitigation Measure #2 **Sierra Highway/Sopp Road** – The Sierra Highway/Sopp Road intersection shall utilize a trained and qualified traffic flagger for the duration of project construction. The traffic flagger shall be in place for at least one hour at the beginning of each staggered work shift.

Table 6 shows the forecast LOS of the significantly impacted study intersections assuming implementation of the recommended mitigation measures for forecast existing plus project construction conditions; detailed LOS analysis sheets are contained in Appendix B.

Table 6
Mitigated Forecast Existing Plus Project Construction Conditions AM & PM Peak Hour LOS

Study Intersection	Existing Conditions		Mitigated Forecast Existing Plus Project Construction Conditions		Significant Impact?
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
	Delay – LOS	Delay – LOS	Delay – LOS	Delay – LOS	
1. SR-14 SB Ramps / Backus Rd	8.6 – A	8.9 – A	9.3 – A	17.7 – C	No
2. SR-14 NB Ramps / Backus Rd	8.7 – A	8.9 – A	13.9 – B	13.7 – B	No
3. Sierra Hwy / Backus Rd	8.4 – A	8.4 – A	13.0 – B	8.7 – A	No
4. Sierra Hwy / Sopp Rd	8.8 – A	9.0 – A	7.8 – A	8.1 – A	No

Notes: SB = Southbound; NB = Northbound; delay shown in seconds per vehicle.
*LOS based on worst stop-controlled movement at unsignalized intersections.

As shown in Table 6, assuming implementation of the recommended mitigation measures, the forecast significant traffic impacts at the study intersections are forecast to be reduced to a level considered less than significant for forecast existing plus project construction conditions.

FORECAST EXISTING PLUS PROJECT (POST-CONSTRUCTION) CONDITIONS

The post-construction project trip generation is significantly less than the construction-related trip generation. Subsequently, the traffic volumes for existing plus project (post-construction) conditions are forecast to be significantly less than existing plus project construction conditions. Therefore, any potential traffic impacts occurring in forecast existing plus project (post-construction) conditions would not exceed those identified in the forecast existing plus project construction analysis.

FORECAST YEAR 2016 WITHOUT PROJECT CONDITIONS

This section summarizes traffic operations for forecast year 2016 without project conditions.

Forecast Year 2016 Without Project Conditions Traffic Volumes

Forecast year 2016 without project traffic volumes were derived by applying an annual growth rate of 3.27 percent per year over a three year period to existing traffic volumes to account for background and cumulative growth. Historical traffic counts maintained by California Department of Transportation indicate the traffic volumes on SR-14 Freeway near the Backus Road interchange grew by approximately 3.27 percent per year between 2002 and 2007. Historical traffic growth over the past ten years was initially reviewed, but determined to decrease presumably due to the economic recession. Therefore, the traffic growth of 3.27 percent per year during pre-recession times applied in this analysis is conservative.

Forecast Year 2016 Without Project Conditions Level of Service

Table 7 summarizes forecast year 2016 without project conditions a.m. peak hour and p.m. peak hour LOS of the study intersections; detailed *HCM* analysis sheets are contained in Appendix B.

Table 7
Forecast Year 2016 Without Project
Conditions AM & PM Peak Hour LOS

Study Intersection	AM Peak Hour	PM Peak Hour
	Delay – LOS	Delay – LOS
1. SR-14 SB Ramps / Backus Rd	8.7 – A	9.0 – A
2. SR-14 NB Ramps / Backus Rd	8.8 – A	9.0 – A
3. Sierra Hwy / Backus Rd	8.4 – A	8.4 – A
4. Sierra Hwy / Sopp Rd	8.9 – A	9.1 – A

Notes: SB = Southbound; NB = Northbound; delay shown in seconds per vehicle.
*LOS based on worst stop-controlled movement at unsignalized intersections.

As shown in Table 7, the study intersections are forecast to continue to operate at an acceptable LOS according to Kern County and Caltrans performance criteria for forecast year 2016 without project conditions.

FORECAST YEAR 2016 WITH PROJECT (POST-CONSTRUCTION) CONDITIONS

This section summarizes traffic operations for forecast year 2016 with project conditions.

Forecast Year 2016 With Project (Post-Construction) Conditions Traffic Volumes

Forecast year 2016 with project (post-construction) traffic volumes were derived by adding forecast post-construction project trips to the year 2016 without project traffic volumes.

Forecast Year 2016 With Project (Post-Construction) Conditions Level of Service

Table 8 summarizes forecast year 2016 with project (post-construction) conditions a.m. peak hour and p.m. peak hour LOS of the study intersections; detailed *HCM* analysis sheets are contained in Appendix B.

Table 8
Forecast Year 2016 With Project
(Post-Construction) Conditions AM & PM Peak Hour LOS

Study Intersection	Forecast Year 2016 Without Project Conditions		Forecast Year 2016 With Project (Post-Construction) Conditions		Significant Impact?
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
	Delay – LOS	Delay – LOS	Delay – LOS	Delay – LOS	
1. SR-14 SB Ramps / Backus Rd	8.7 – A	9.0 – A	8.9 – A	9.1 – A	No
2. SR-14 NB Ramps / Backus Rd	8.8 – A	9.0 – A	8.7 – A	9.2 – A	No
3. Sierra Hwy / Backus Rd	8.4 – A	8.4 – A	8.5 – A	8.4 – A	No
4. Sierra Hwy / Sopp Rd	8.9 – A	9.1 – A	9.2 – A	9.0 – A	No

Notes: SB = Southbound; NB = Northbound; delay shown in seconds per vehicle.
*LOS based on worst stop-controlled movement at unsignalized intersections.

As shown in Table 8, with the addition of project trips, the study intersections are forecast to continue to operate at an acceptable LOS according to Kern County and Caltrans performance criteria for forecast year 2016 with project (post-construction) conditions.

As also shown in Table 8, based on the applicable thresholds of significance, the addition of project trips is forecast to result in no significant impact at the study intersections for forecast year 2016 with project (post-construction) conditions.

TRAFFIC CONTROL PLANNING

Since traffic volumes on many of the roadways are minimal, utilization of Kern County accepted traffic control signs are recommended to identify locations where employees or construction-related vehicles turn off of local roadways to access the project site.

MITIGATION MEASURES

The following mitigation measures are recommended to address the significant traffic impacts at the study intersections for forecast existing plus project construction conditions:

Mitigation Measure #1 Implement staggered work shifts such that the arrival and departure of all project construction workers does not occur within the same hour. The beginning of the work shifts should be a minimum of one hour apart and split evenly among the workers such that half are scheduled for the first shift and half are scheduled for the second shift.

Mitigation Measure #2 **Sierra Highway/Sopp Road** – The Sierra Highway/Sopp Road intersection shall utilize a trained and qualified traffic flagger for the duration of project construction. The traffic flagger shall be in place for at least one hour at the beginning of each staggered work shift.

No significant impacts at the study intersections were identified for forecast year 2016 with project (post-construction) conditions; hence no additional mitigation measures are required after completion of project construction.

CONCLUSIONS

The study intersections are currently operating at an acceptable LOS according to Kern County and Caltrans performance criteria.

Peak construction-related activity associated with the proposed project is forecast to generate approximately 3,784 daily trips, which include approximately 1,250 a.m. peak hour trips and approximately 1,250 p.m. peak hour trips.

The proposed project (post-construction) is forecast to generate approximately 48 daily trips, which include approximately 24 a.m. peak hour trips and approximately 24 p.m. peak hour trips.

Based on the thresholds of significance, the addition of project construction generated trips is forecast to result in a significant traffic impact at all four study intersections for existing plus project construction conditions.

The following mitigation measures are recommended to address the significant traffic impacts at the study intersections for forecast existing plus project construction conditions:

Mitigation Measure #1 Implement staggered work shifts such that the arrival and departure of all project construction workers does not occur within the same hour. The beginning of the work shifts should be a minimum of one hour apart and split evenly among the workers such that half are scheduled for the first shift and half are scheduled for the second shift.

Mitigation Measure #2 **Sierra Highway/Sopp Road** – The Sierra Highway/Sopp Road intersection shall utilize a trained and qualified traffic flagger for the duration of project construction. The traffic flagger shall be in place for at least one hour at the beginning of each staggered work shift.

Based on the applicable thresholds of significance, the addition of project trips is forecast to result in no significant impact at the study intersections for forecast year 2016 with project (post-construction) conditions.

APPENDIX A
Existing Count Data

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

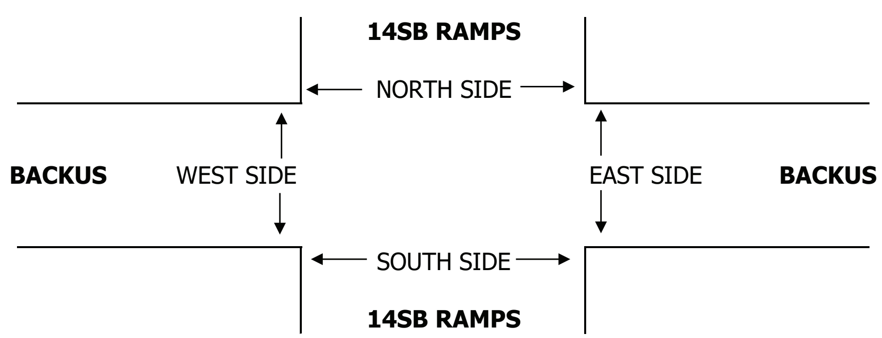
DATE:	LOCATION:	ROSAMOND / MOJAVE	PROJECT #:	SC0248
10/15/13	NORTH & SOUTH:	14SB RAMPS	LOCATION #:	1
TUESDAY	EAST & WEST:	BACKUS	CONTROL:	1-WAY STOP: SB

NOTES:

AM PM MD OTHER OTHER

▲ N ◄ W E ► S ▼

		NORTHBOUND 14SB RAMPS			SOUTHBOUND 14SB RAMPS			EASTBOUND BACKUS			WESTBOUND BACKUS			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	X	X	X	X	X	X	X	X	X	X	X	
AM	7:00 AM				1	0	0		4	8	0	7		20
	7:15 AM				0	0	0		4	19	1	6		30
	7:30 AM				0	0	0		5	21	0	7		33
	7:45 AM				0	0	1		4	11	0	7		23
	8:00 AM				1	0	1		2	7	0	7		18
	8:15 AM				0	0	0		4	9	1	4		18
	8:30 AM				0	1	1		3	14	0	5		24
	8:45 AM				0	1	3		3	7	1	6		21
	VOLUMES	0	0	0	2	2	6	0	29	96	3	49	0	187
	APPROACH %	0%	0%	0%	20%	20%	60%	0%	23%	77%	6%	94%	0%	
	APP/DEPART	0	/	0	10	/	101	125	/	31	52	/	55	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	0	0	0	1	0	1	0	17	59	1	27	0	106
	APPROACH %	0%	0%	0%	50%	0%	50%	0%	22%	78%	4%	96%	0%	
	PEAK HR FACTOR		0.000			0.500			0.731			1.000		0.803
	APP/DEPART	0	/	0	2	/	60	76	/	18	28	/	28	0
PM	4:00 PM				2	0	4		2	5	1	16		30
	4:15 PM				0	0	4		3	12	1	23		43
	4:30 PM				2	0	0		0	4	2	23		31
	4:45 PM				1	0	1		4	6	3	18		33
	5:00 PM				2	0	4		0	6	0	20		32
	5:15 PM				1	1	2		4	4	1	20		33
	5:30 PM				3	0	1		5	9	1	16		35
	5:45 PM				1	0	3		3	7	2	12		28
	VOLUMES	0	0	0	12	1	19	0	21	53	11	148	0	265
	APPROACH %	0%	0%	0%	38%	3%	59%	0%	28%	72%	7%	93%	0%	
	APP/DEPART	0	/	0	32	/	65	74	/	33	159	/	167	0
	BEGIN PEAK HR		4:15 PM											
	VOLUMES	0	0	0	5	0	9	0	7	28	6	84	0	139
	APPROACH %	0%	0%	0%	36%	0%	64%	0%	20%	80%	7%	93%	0%	
	PEAK HR FACTOR		0.000			0.583			0.583			0.900		0.808
	APP/DEPART	0	/	0	14	/	34	35	/	12	90	/	93	0



PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

ROSAMOND / MOJAVE

SC0248

ALL HOURS

14SB RAMPS (north leg)

42	**25**	**3**	**14**	**TOTAL**		**0**
32	19	1	12	**PM**		0
10	6	2	2	**AM**		0

BACKUS (west leg)

TOTAL	**222**	**0**	**50**	**149**	**199**
PM	167	0	21	53	**74**
AM	55	0	29	96	**125**

BACKUS (east leg)

AM	**52**	0	49	3	31
PM	**159**	0	148	11	33
TOTAL	**211**	**0**	**197**	**14**	**64**

14SB RAMPS (south leg)

101	**AM**	0	0	0	**0**
65	**PM**	0	0	0	**0**
166	**TOTAL**	**0**	**0**	**0**	**0**

PEAK HOUR

AM 7:00 AM

PM 4:15 PM

14SB RAMPS (north leg)

16	**10**	**0**	**6**	**TOTAL**		**0**
14	9	0	5	**PM**		0
2	1	0	1	**AM**		0

BACKUS (west leg)

TOTAL	**121**	**0**	**24**	**87**	**111**
PM	93	0	7	28	**35**
AM	28	0	17	59	**76**

BACKUS (east leg)

AM	**28**	0	27	1	18
PM	**90**	0	84	6	12
TOTAL	**118**	**0**	**111**	**7**	**30**

14SB RAMPS (south leg)

60	**AM**	0	0	0	**0**
34	**PM**	0	0	0	**0**
94	**Total**	**0**	**0**	**0**	**0**

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

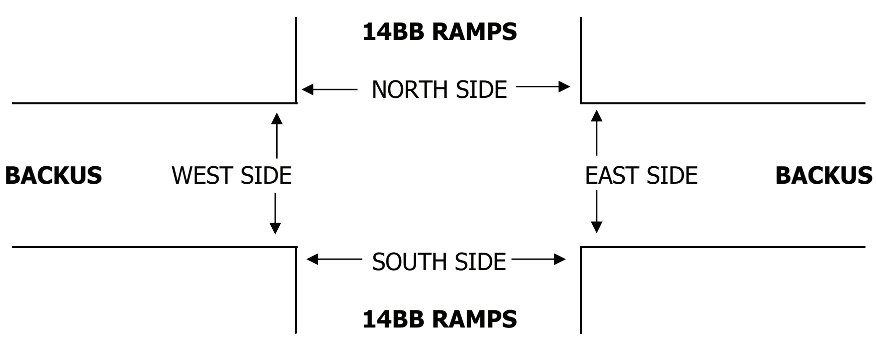
DATE:	LOCATION:	ROSAMOND / MOJAVE	PROJECT #:	SC0248
10/15/13	NORTH & SOUTH:	14BB RAMPS	LOCATION #:	2
TUESDAY	EAST & WEST:	BACKUS	CONTROL:	1-WAY STOP: NB

NOTES:

AM PM MD OTHER OTHER

N ▲ ◄ W E ► S ▼

	NORTHBOUND 14BB RAMPS			SOUTHBOUND 14BB RAMPS			EASTBOUND BACKUS			WESTBOUND BACKUS			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	X	X	X	X	X	X	X	X	X	X	X	X	
AM													
7:00 AM	5	0	0				2	2			2	0	11
7:15 AM	6	0	2				3	1			1	0	13
7:30 AM	5	0	1				1	6			1	0	14
7:45 AM	5	0	0				3	0			3	0	11
8:00 AM	5	0	0				1	2			2	0	10
8:15 AM	3	0	0				2	2			2	0	9
8:30 AM	4	0	1				0	3			1	0	9
8:45 AM	4	0	0				2	1			2	0	9
VOLUMES	37	0	4	0	0	0	14	17	0	0	14	0	86
APPROACH %	90%	0%	10%	0%	0%	0%	45%	55%	0%	0%	100%	0%	
APP/DEPART	41	/	14	0	/	0	31	/	21	14	/	51	0
BEGIN PEAK HR		7:00 AM											
VOLUMES	21	0	3	0	0	0	9	9	0	0	7	0	49
APPROACH %	88%	0%	13%	0%	0%	0%	50%	50%	0%	0%	100%	0%	
PEAK HR FACTOR		0.750			0.000			0.643			0.583		0.875
APP/DEPART	24	/	9	0	/	0	18	/	12	7	/	28	0
PM													
4:00 PM	15	0	0				1	3			3	1	23
4:15 PM	23	0	2				1	3			3	0	32
4:30 PM	18	0	4				1	0			6	0	29
4:45 PM	12	0	2				1	4			7	1	27
5:00 PM	18	0	0				0	2			2	0	22
5:15 PM	19	0	4				3	2			4	1	33
5:30 PM	15	0	1				4	3			2	0	25
5:45 PM	12	0	1				2	2			1	1	19
VOLUMES	132	0	14	0	0	0	13	19	0	0	28	4	210
APPROACH %	90%	0%	10%	0%	0%	0%	41%	59%	0%	0%	88%	13%	
APP/DEPART	146	/	17	0	/	0	32	/	33	32	/	160	0
BEGIN PEAK HR		4:30 PM											
VOLUMES	67	0	10	0	0	0	5	8	0	0	19	2	111
APPROACH %	87%	0%	13%	0%	0%	0%	38%	62%	0%	0%	90%	10%	
PEAK HR FACTOR		0.770			0.000			0.650			0.656		0.841
APP/DEPART	77	/	7	0	/	0	13	/	18	21	/	86	0



PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

ROSAMOND / MOJAVE

SC0248

ALL HOURS

14BB RAMPS (north leg)

TOTAL	0	0	0	0
PM	0	0	0	0
AM	0	0	0	0

TOTAL	31
PM	17
AM	14

BACKUS (west leg)

TOTAL	211
PM	160
AM	51

TOTAL	27	36	0	63
PM	13	19	0	32
AM	14	17	0	31

BACKUS (east leg)

AM	14	0	14	0
PM	32	4	28	0
TOTAL	46	4	42	0

AM	21
PM	33
TOTAL	54

14BB RAMPS (south leg)

AM	0
PM	0
TOTAL	0

AM	37	0	4	41
PM	132	0	14	146
TOTAL	169	0	18	187

PEAK HOUR

AM 7:00 AM

PM 4:30 PM

14BB RAMPS (north leg)

TOTAL	0	0	0	0
PM	0	0	0	0
AM	0	0	0	0

TOTAL	16
PM	7
AM	9

BACKUS (west leg)

TOTAL	114
PM	86
AM	28

TOTAL	14	17	0	31
PM	5	8	0	13
AM	9	9	0	18

BACKUS (east leg)

AM	7	0	7	0
PM	21	2	19	0
TOTAL	28	2	26	0

AM	12
PM	18
TOTAL	30

14BB RAMPS (south leg)

AM	0
PM	0
Total	0

AM	21	0	3	24
PM	67	0	10	77
Total	88	0	13	101

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

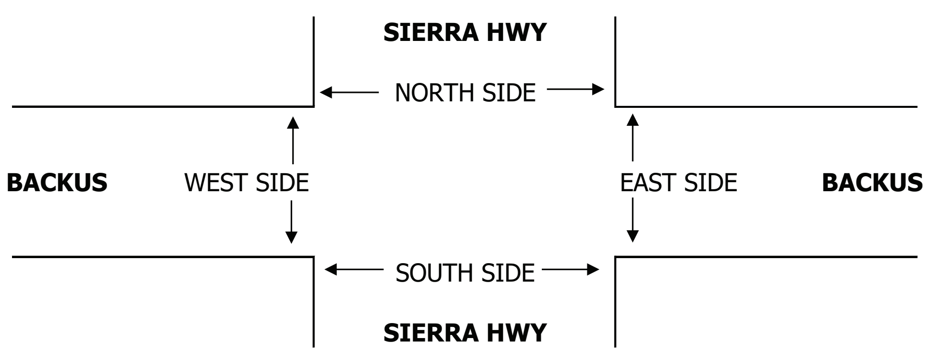
DATE: 10/15/13 TUESDAY	LOCATION:	ROSAMOND / MOJAVE	PROJECT #:	SC0248
	NORTH & SOUTH:	SIERRA HWY	LOCATION #:	3
	EAST & WEST:	BACKUS	CONTROL:	1-WAY STOP: EB

NOTES:

AM
PM
MD
OTHER
OTHER

▲ N
◄ W E ►
S ▼

		NORTHBOUND SIERRA HWY			SOUTHBOUND SIERRA HWY			EASTBOUND BACKUS			WESTBOUND BACKUS			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	X	X	X	X	X	X	X	X	X	X	X	
AM	7:00 AM	3	0			0	0	0		1				4
	7:15 AM	2	3			3	0	0		2				10
	7:30 AM	1	6			0	1	0		6				14
	7:45 AM	3	4			4	0	0		0				11
	8:00 AM	2	3			1	0	0		2				8
	8:15 AM	2	2			4	0	0		4				12
	8:30 AM	0	2			4	0	0		3				9
	8:45 AM	1	4			4	0	0		2				11
	VOLUMES	14	24	0	0	20	1	0	0	20	0	0	0	79
	APPROACH %	37%	63%	0%	0%	95%	5%	0%	0%	100%	0%	0%	0%	
	APP/DEPART	38	/	24	21	/	40	20	/	0	0	/	15	0
	BEGIN PEAK HR		7:30 AM											
	VOLUMES	8	15	0	0	9	1	0	0	12	0	0	0	45
	APPROACH %	35%	65%	0%	0%	90%	10%	0%	0%	100%	0%	0%	0%	
	PEAK HR FACTOR		0.821			0.625			0.500			0.000		0.804
	APP/DEPART	23	/	15	10	/	21	12	/	0	0	/	9	0
PM	4:00 PM	4	2			2	0	0		2				10
	4:15 PM	6	5			3	0	0		1				15
	4:30 PM	4	10			3	0	0		3				20
	4:45 PM	5	4			4	2	0		4				19
	5:00 PM	3	4			6	0	0		3				16
	5:15 PM	3	6			1	1	0		2				13
	5:30 PM	2	1			7	2	0		4				16
	5:45 PM	6	0			4	1	0		4				15
	VOLUMES	33	32	0	0	30	6	0	0	23	0	0	0	124
	APPROACH %	51%	49%	0%	0%	83%	17%	0%	0%	100%	0%	0%	0%	
	APP/DEPART	65	/	32	36	/	53	23	/	0	0	/	39	0
	BEGIN PEAK HR		4:15 PM											
	VOLUMES	18	23	0	0	16	2	0	0	11	0	0	0	70
	APPROACH %	44%	56%	0%	0%	89%	11%	0%	0%	100%	0%	0%	0%	
	PEAK HR FACTOR		0.732			0.750			0.688			0.000		0.875
	APP/DEPART	41	/	23	18	/	27	11	/	0	0	/	20	0



PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

ROSAMOND / MOJAVE

SC0248

ALL HOURS

SIERRA HWY

57	**7**	**50**	**0**	**TOTAL**	**56**
36	6	30	0	**PM**	32
21	1	20	0	**AM**	24

BACKUS

TOTAL	**PM**	**AM**
54	39	15
0	0	0
0	0	0
43	23	20
43	**23**	**20**

BACKUS

AM	**PM**	**TOTAL**
0	**0**	**0**
0	0	**0**
0	0	**0**
0	0	**0**
0	0	**0**

40	**AM**	14	24	0	**38**
53	**PM**	33	32	0	**65**
93	**TOTAL**	**47**	**56**	**0**	**103**

SIERRA HWY

SIERRA HWY

28	**3**	**25**	**0**	**TOTAL**	**38**
18	2	16	0	**PM**	23
10	1	9	0	**AM**	15

BACKUS

TOTAL	**PM**	**AM**
29	20	9
0	0	0
0	0	0
23	11	12
23	**11**	**12**

PEAK HOUR

AM 7:30 AM

PM 4:15 PM

BACKUS

AM	**PM**	**TOTAL**
0	**0**	**0**
0	0	**0**
0	0	**0**
0	0	**0**
0	0	**0**

21	**AM**	8	15	0	**23**
27	**PM**	18	23	0	**41**
48	**Total**	**26**	**38**	**0**	**64**

SIERRA HWY

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

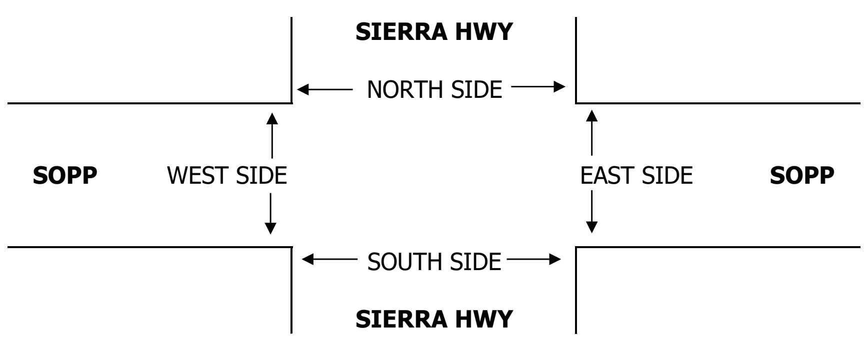
DATE: 10/15/13 TUESDAY	LOCATION:	ROSAMOND / MOJAVE	PROJECT #:	SC0248
	NORTH & SOUTH:	SIERRA HWY	LOCATION #:	4
	EAST & WEST:	SOPP	CONTROL:	1-WAY STOP: WB

NOTES:

AM
PM
MD
OTHER
OTHER

▲ N
◄ W E ►
S ▼

	NORTHBOUND SIERRA HWY			SOUTHBOUND SIERRA HWY			EASTBOUND SOPP			WESTBOUND SOPP			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	X	X	X	X	X	X	X	X	X	X	X	X	
AM													
7:00 AM		2	5	0	1					4		1	13
7:15 AM		4	3	2	3					7		1	20
7:30 AM		8	9	0	7					9		0	33
7:45 AM		4	10	0	4					3		2	23
8:00 AM		5	5	3	1					3		0	17
8:15 AM		3	5	0	9					1		1	19
8:30 AM		2	4	1	7					1		0	15
8:45 AM		5	3	0	5					8		0	21
VOLUMES	0	33	44	6	37	0	0	0	0	36	0	5	161
APPROACH %	0%	43%	57%	14%	86%	0%	0%	0%	0%	88%	0%	12%	
APP/DEPART	77	/	38	43	/	73	0	/	50	41	/	0	0
BEGIN PEAK HR		7:15 AM											
VOLUMES	0	21	27	5	15	0	0	0	0	22	0	3	93
APPROACH %	0%	44%	56%	25%	75%	0%	0%	0%	0%	88%	0%	12%	
PEAK HR FACTOR		0.706			0.714			0.000			0.694		0.705
APP/DEPART	48	/	24	20	/	37	0	/	32	25	/	0	0
PM													
4:00 PM		6	5	1	3					6		2	23
4:15 PM		9	7	0	4					5		1	26
4:30 PM		14	2	1	6					13		0	36
4:45 PM		8	2	1	7					6		1	25
5:00 PM		7	6	0	8					7		0	28
5:15 PM		8	4	1	2					6		1	22
5:30 PM		6	1	1	10					9		0	27
5:45 PM		4	3	0	8					5		0	20
VOLUMES	0	62	30	5	48	0	0	0	0	57	0	5	207
APPROACH %	0%	67%	33%	9%	91%	0%	0%	0%	0%	92%	0%	8%	
APP/DEPART	92	/	67	53	/	105	0	/	35	62	/	0	0
BEGIN PEAK HR		4:15 PM											
VOLUMES	0	38	17	2	25	0	0	0	0	31	0	2	115
APPROACH %	0%	69%	31%	7%	93%	0%	0%	0%	0%	94%	0%	6%	
PEAK HR FACTOR		0.859			0.844			0.000			0.635		0.799
APP/DEPART	55	/	40	27	/	56	0	/	19	33	/	0	0



PACIFIC TRAFFIC DATA SERVICES

TURNING MOVEMENT COUNTS

ROSAMOND / MOJAVE

SC0248

ALL HOURS

SIERRA HWY (north)

	Total				Departing
TOTAL	96	0	85	11	105
PM	53	0	48	5	67
AM	43	0	37	6	38

SOPP (east)

	Total				Departing
AM	41	5	0	36	50
PM	62	5	0	57	35
TOTAL	103	10	0	93	85

SOPP (west)

	Departing				Total
TOTAL	0	0	0	0	0
PM	0	0	0	0	0
AM	0	0	0	0	0

SIERRA HWY (south)

	Departing				Total
AM	73	0	33	44	77
PM	105	0	62	30	92
TOTAL	178	0	95	74	169

PEAK HOUR

AM 7:15 AM

PM 4:15 PM

SIERRA HWY (north)

	Total				Departing
TOTAL	47	0	40	7	64
PM	27	0	25	2	40
AM	20	0	15	5	24

SOPP (east)

	Total				Departing
AM	25	3	0	22	32
PM	33	2	0	31	19
TOTAL	58	5	0	53	51

SOPP (west)

	Departing				Total
TOTAL	0	0	0	0	0
PM	0	0	0	0	0
AM	0	0	0	0	0

SIERRA HWY (south)

	Departing				Total
AM	37	0	21	27	48
PM	56	0	38	17	55
Total	93	0	59	44	103

APPENDIX B
LOS Analysis Sheets

Existing Conditions

```
--------------------------------------------------------------------------------
                              Oro Verde Project
                             Existing Conditions
                                AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      0.2       Worst Case Level Of Service: A[  8.6]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0    1    0     1    0   17    59    1   27     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0    0     0    1    0     1    0   17    59    1   27     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0    0     0    1    0     1    0   17    59    1   27     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    0    0     0    1    0     1    0   17    59    1   27     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    76  105    27  xxxx xxxx xxxxx    76 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   933  789  1054  xxxx xxxx xxxxx  1536 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   932  788  1054  xxxx xxxx xxxxx  1536 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
LOS by Move:    *    *     *    *    *     *    *    *     *    A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  990 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.6 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
Shared LOS:     *    *     *    *    A     *    *    *     *    A    *     *
ApproachDel:     xxxxxx              8.6             xxxxxx           xxxxxx
ApproachLOS:        *                 A                 *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



```
--------------------------------------------------------------------------------
                              Oro Verde Project
                             Existing Conditions
                                AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      5.6       Worst Case Level Of Service: A[  8.7]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      21    0     3    0    0     0    9    9     0    0    7     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   21    0     3    0    0     0    9    9     0    0    7     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:    21    0     3    0    0     0    9    9     0    0    7     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:   21    0     3    0    0     0    9    9     0    0    7     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   34   34     9  xxxx xxxx xxxxx     7 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  984  863  1079  xxxx xxxx xxxxx  1627 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    980  858  1079  xxxx xxxx xxxxx  1627 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.02 0.00  0.00  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *    *    *     *    A    *     *    *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  991 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  8.7 xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *    *    *     *    A    *     *    *    *     *
ApproachDel:      8.7            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:       A                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
-------------------------------------------------------------------------------
                              Oro Verde Project
                             Existing Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      3.5       Worst Case Level Of Service: A[  8.4]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        8   15     0     0    9     1     0    0    12     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     8   15     0     0    9     1     0    0    12     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      8   15     0     0    9     1     0    0    12     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     8   15     0     0    9     1     0    0    12     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   10 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    10  xxxx xxxx xxxxx
Potent Cap.: 1623 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1078  xxxx xxxx xxxxx
Move Cap.:   1623 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1078  xxxx xxxx xxxxx
Volume/Cap:  0.00 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del:  7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     A     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:      xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:         *                *                 A                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



```
-------------------------------------------------------------------------------
                              Oro Verde Project
                             Existing Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
********************************************************************************
Average Delay (sec/veh):      2.8       Worst Case Level Of Service: A[  8.8]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:        0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0   21    27     5   15     0     0    0     0    22    0     3
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0   21    27     5   15     0     0    0     0    22    0     3
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0   21    27     5   15     0     0    0     0    22    0     3
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0   21    27     5   15     0     0    0     0    22    0     3
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    48 xxxx xxxxx  xxxx xxxx xxxxx    60   60    35
Potent Cap.: xxxx xxxx xxxxx  1572 xxxx xxxxx  xxxx xxxx xxxxx   952  835  1044
Move Cap.:   xxxx xxxx xxxxx  1572 xxxx xxxxx  xxxx xxxx xxxxx   950  833  1044
Volume/Cap:  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx  0.02 0.00  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     A    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  960 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  8.8 xxxxx
Shared LOS:     *    *     *     A    *     *     *    *     *     *    A     *
ApproachDel:      xxxxxx           xxxxxx           xxxxxx              8.8
ApproachLOS:         *                *                *                 A
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
--------------------------------------------------------------------------------
                                Oro Verde Project
                               Existing Conditions
                                  PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
              2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      1.2       Worst Case Level Of Service: A[  8.9]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     5    0     9     0    7    28     6   84     0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0     5    0     9     0    7    28     6   84     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0    0     0     5    0     9     0    7    28     6   84     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     5    0     9     0    7    28     6   84     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   117  131    84  xxxx xxxx xxxxx    35 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   884  763   981  xxxx xxxx xxxxx  1589 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   881  760   981  xxxx xxxx xxxxx  1589 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.01 0.00  0.01  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  943 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.9 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     *    *     *     A    *     *
ApproachDel:     xxxxxx              8.9            xxxxxx           xxxxxx
ApproachLOS:        *                 A                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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--------------------------------------------------------------------------------
                                Oro Verde Project
                               Existing Conditions
                                  PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
              2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      6.5       Worst Case Level Of Service: A[  8.9]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       67    0    10     0    0     0     5    8     0     0   19     2
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    67    0    10     0    0     0     5    8     0     0   19     2
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     67    0    10     0    0     0     5    8     0     0   19     2
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    67    0    10     0    0     0     5    8     0     0   19     2
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   38   39     8  xxxx xxxx xxxxx    21 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  979  857  1080  xxxx xxxx xxxxx  1608 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    977  854  1080  xxxx xxxx xxxxx  1608 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.07 0.00  0.01  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  989 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.3 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  8.9 xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *     *    *     *     A    *     *     *    *     *
ApproachDel:       8.9            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        A                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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--------------------------------------------------------------------------------
                               Oro Verde Project
                              Existing Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      3.2       Worst Case Level Of Service: A[  8.4]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      18   23    0     0   16    2     0    0   11     0    0    0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   18   23    0     0   16    2     0    0   11     0    0    0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    18   23    0     0   16    2     0    0   11     0    0    0
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
FinalVolume:   18   23    0     0   16    2     0    0   11     0    0    0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   18 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    17  xxxx xxxx xxxxx
Potent Cap.: 1612 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1068  xxxx xxxx xxxxx
Move Cap.:   1612 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1068  xxxx xxxx xxxxx
Volume/Cap:  0.01 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del:  7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     A     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:        *                *                 A               *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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--------------------------------------------------------------------------------
                               Oro Verde Project
                              Existing Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
********************************************************************************
Average Delay (sec/veh):      2.7       Worst Case Level Of Service: A[  9.0]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   38   17     2   25    0     0    0    0    31    0    2
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0   38   17     2   25    0     0    0    0    31    0    2
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0   38   17     2   25    0     0    0    0    31    0    2
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
FinalVolume:    0   38   17     2   25    0     0    0    0    31    0    2
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    55 xxxx xxxxx  xxxx xxxx xxxxx    76   76    47
Potent Cap.: xxxx xxxx xxxxx  1563 xxxx xxxxx  xxxx xxxx xxxxx   933  819  1029
Move Cap.:   xxxx xxxx xxxxx  1563 xxxx xxxxx  xxxx xxxx xxxxx   932  818  1029
Volume/Cap:  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx  0.03 0.00  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     A    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  937 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.0 xxxxx
Shared LOS:     *    *     *     A    *     *     *    *     *     *    A     *
ApproachDel:     xxxxxx           xxxxxx           xxxxxx              9.0
ApproachLOS:        *                *                *                 A
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Forecast Existing Plus
Project Construction Conditions

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---------------------------------------------------------------------------------
                              Oro Verde Project
            Forecast Existing With Project Construction Conditions
                                 AM Peak Hour
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
*********************************************************************************
Average Delay (sec/veh):      6.4       Worst Case Level Of Service: A[  9.8]
*********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0    1    0     1    0   17    59    1   27     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0    0     0    1    0     1    0   17    59    1   27     0
Added Vol:      0    0     0  188    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0    0     0  189    0     1    0   17    59    1   27     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0    0     0  189    0     1    0   17    59    1   27     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    0    0     0  189    0     1    0   17    59    1   27     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    76  105    27  xxxx xxxx xxxxx    76 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   933  789  1054  xxxx xxxx xxxxx  1536 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   932  788  1054  xxxx xxxx xxxxx  1536 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.20 0.00  0.00  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  933 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.8 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  9.8 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     *    *     *     A    *     *
ApproachDel:    xxxxxx               9.8             xxxxxx           xxxxxx
ApproachLOS:       *                  A                 *                *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
*********************************************************************************
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---------------------------------------------------------------------------------
                              Oro Verde Project
            Forecast Existing With Project Construction Conditions
                                 AM Peak Hour
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
*********************************************************************************
Average Delay (sec/veh):    128.3       Worst Case Level Of Service: F[153.4]
*********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      21    0     3    0    0     0    9    9     0    0    7     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   21    0     3    0    0     0    9    9     0    0    7     0
Added Vol:      0    0  1063    0    0     0    0  188     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   21    0  1066    0    0     0    9  197     0    0    7     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:    21    0  1066    0    0     0    9  197     0    0    7     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:   21    0  1066    0    0     0    9  197     0    0    7     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  222  222   197  xxxx xxxx xxxxx     7 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  771  680   849  xxxx xxxx xxxxx  1627 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    767  676   849  xxxx xxxx xxxxx  1627 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.03 0.00  1.26  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  848 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx 40.1 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  153 xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    F     *     *    *     *     A    *     *     *    *     *
ApproachDel:     153.4           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        F               *                *                *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
*********************************************************************************
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----------------------------------------------------------------------------------
                              Oro Verde Project
            Forecast Existing With Project Construction Conditions
                                AM Peak Hour
----------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
**********************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
**********************************************************************************
Average Delay (sec/veh):    101.1       Worst Case Level Of Service: F[103.7]
**********************************************************************************
Approach:       North Bound       South Bound        East Bound        West Bound
Movement:      L  -  T  -  R     L  -  T  -  R     L  -  T  -  R     L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled      Uncontrolled        Stop Sign         Stop Sign
Rights:            Include           Include           Include           Include
Lanes:         0  1  0  0  0     0  0  0  1  0     0  0  0  0  1     0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        8   15     0     0    9     1     0    0    12     0    0     0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     8   15     0     0    9     1     0    0    12     0    0     0
Added Vol:       0    0     0     0    0     0     0    0  1250     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     8   15     0     0    9     1     0    0  1262     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      8   15     0     0    9     1     0    0  1262     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     8   15     0     0    9     1     0    0  1262     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    10 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    10  xxxx xxxx xxxxx
Potent Cap.:  1623 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1078  xxxx xxxx xxxxx
Move Cap.:    1623 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1078  xxxx xxxx xxxxx
Volume/Cap:   0.00 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  1.17  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  36.1  xxxx xxxx xxxxx
Control Del:   7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 103.7 xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     F     *    *     *
Movement:      LT - LTR - RT     LT - LTR - RT     LT - LTR - RT     LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:   7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx             103.7            xxxxxx
ApproachLOS:         *                 *                 F                 *
**********************************************************************************
Note: Queue reported is the number of cars per lane.
**********************************************************************************
```



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----------------------------------------------------------------------------------
                              Oro Verde Project
            Forecast Existing With Project Construction Conditions
                                AM Peak Hour
----------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
**********************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
**********************************************************************************
Average Delay (sec/veh): OVERFLOW       Worst Case Level Of Service: F[xxxxx]
**********************************************************************************
Approach:       North Bound       South Bound        East Bound        West Bound
Movement:      L  -  T  -  R     L  -  T  -  R     L  -  T  -  R     L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled      Uncontrolled        Stop Sign         Stop Sign
Rights:            Include           Include           Include           Include
Lanes:         0  0  0  1  0     0  1  0  0  0     0  0  0  0  0     0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0   21    27     5   15     0     0    0     0    22    0     3
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0   21    27     5   15     0     0    0     0    22    0     3
Added Vol:       0    0     0  1250    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0   21    27  1255   15     0     0    0     0    22    0     3
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0   21    27  1255   15     0     0    0     0    22    0     3
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0   21    27  1255   15     0     0    0     0    22    0     3
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    48 xxxx xxxxx  xxxx xxxx xxxxx  2560 2560    35
Potent Cap.: xxxx xxxx xxxxx  1572 xxxx xxxxx  xxxx xxxx xxxxx    29   27  1044
Move Cap.:   xxxx xxxx xxxxx  1572 xxxx xxxxx  xxxx xxxx xxxxx     0    0  1044
Volume/Cap:  xxxx xxxx  xxxx  0.80 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   9.6 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx  15.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     *    *     *     C    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT     LT - LTR - RT     LT - LTR - RT     LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx    0 xxxxx
SharedQueue:xxxxx xxxx xxxxx   9.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx  15.6 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     C    *     *     *    *     *     *    *     *
ApproachDel:      xxxxxx            xxxxxx            xxxxxx            xxxxxx
ApproachLOS:         *                 *                 *                 F
**********************************************************************************
Note: Queue reported is the number of cars per lane.
**********************************************************************************
```

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--------------------------------------------------------------------------------
                          Oro Verde Project
         Forecast Existing With Project Construction Conditions
                             PM Peak Hour
--------------------------------------------------------------------------------
                  Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh): OVERFLOW       Worst Case Level Of Service: F[xxxxx]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     5    0     9     0    7    28     6   84     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     5    0     9     0    7    28     6   84     0
Added Vol:      0    0     0     0    0     0     0    0     0  1063    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     5    0     9     0    7    28  1069   84     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0    0     0     5    0     9     0    7    28  1069   84     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     5    0     9     0    7    28  1069   84     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  2243 2257    84  xxxx xxxx xxxxx    35 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx    47   42   981  xxxx xxxx xxxxx  1589 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx     0    0   981  xxxx xxxx xxxxx  1589 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx  0.67 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   5.7 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx  11.8 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     B    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx    0 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.7 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx  11.8 xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     B    *     *
ApproachDel:    xxxxxx           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        *                F                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



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--------------------------------------------------------------------------------
                          Oro Verde Project
         Forecast Existing With Project Construction Conditions
                             PM Peak Hour
--------------------------------------------------------------------------------
                  Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      1.6       Worst Case Level Of Service: D[ 28.2]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      67    0    10     0    0     0     5    8     0     0   19     2
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   67    0    10     0    0     0     5    8     0     0   19     2
Added Vol:      0    0     0     0    0     0     0    0     0     0 1063   188
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   67    0    10     0    0     0     5    8     0     0 1082   190
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    67    0    10     0    0     0     5    8     0     0 1082   190
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   67    0    10     0    0     0     5    8     0     0 1082   190
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1195 1290     8  xxxx xxxx xxxxx  1272 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  208  165  1080  xxxx xxxx xxxxx   553 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    206  163  1080  xxxx xxxx xxxxx   553 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.32 0.00  0.01  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx  11.6 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     B    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  231 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  1.4 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx 28.2 xxxxx xxxxx xxxx xxxxx  11.6 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    D     *     *    *     *     B    *     *     *    *     *
ApproachDel:      28.2           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        D                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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---------------------------------------------------------------------------
                          Oro Verde Project
          Forecast Existing With Project Construction Conditions
                            PM Peak Hour
---------------------------------------------------------------------------
                    Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
***************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
***************************************************************************
Average Delay (sec/veh):     14.3       Worst Case Level Of Service: B[ 14.9]
***************************************************************************
Approach:     North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:       0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     18   23     0     0   16     2     0    0    11     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  18   23     0     0   16     2     0    0    11     0    0     0
Added Vol:  1250    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:   0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut: 1268   23     0     0   16     2     0    0    11     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:  1268   23     0     0   16     2     0    0    11     0    0     0
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume: 1268   23     0     0   16     2     0    0    11     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   18 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    17  xxxx xxxx xxxxx
Potent Cap.: 1612 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1068  xxxx xxxx xxxxx
Move Cap.:   1612 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1068  xxxx xxxx xxxxx
Volume/Cap:  0.79 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    9.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del: 14.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     A     *    *     *
Movement:    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  9.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel: 14.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     B    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:        *                *                 A               *
***************************************************************************
Note: Queue reported is the number of cars per lane.
***************************************************************************
```



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---------------------------------------------------------------------------
                          Oro Verde Project
          Forecast Existing With Project Construction Conditions
                            PM Peak Hour
---------------------------------------------------------------------------
                    Level Of Service Computation Report
         2000 HCM Unsignalized Method (Future Volume Alternative)
***************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
***************************************************************************
Average Delay (sec/veh):    128.4       Worst Case Level Of Service: F[136.6]
***************************************************************************
Approach:     North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:       0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      0   38    17     2   25     0     0    0     0    31    0     2
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   0   38    17     2   25     0     0    0     0    31    0     2
Added Vol:     0    0     0     0    0     0     0    0     0     0    0  1250
PasserByVol:   0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   0   38    17     2   25     0     0    0     0    31    0  1252
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    0   38    17     2   25     0     0    0     0    31    0  1252
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   0   38    17     2   25     0     0    0     0    31    0  1252
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    55 xxxx xxxxx  xxxx xxxx xxxxx    76   76    47
Potent Cap.: xxxx xxxx xxxxx  1563 xxxx xxxxx  xxxx xxxx xxxxx   933  819  1029
Move Cap.:   xxxx xxxx xxxxx  1563 xxxx xxxxx  xxxx xxxx xxxxx   932  818  1029
Volume/Cap:  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx  0.03 0.00  1.22
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     A    *     *     *    *     *     *    *     *
Movement:    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx 1026 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 43.3 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  137 xxxxx
Shared LOS:     *    *     *     A    *     *     *    *     *     *    F     *
ApproachDel:     xxxxxx           xxxxxx           xxxxxx            136.6
ApproachLOS:        *                *                *                F
***************************************************************************
Note: Queue reported is the number of cars per lane.
***************************************************************************
```

Mitigated Forecast Existing Plus Project Construction Conditions

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--------------------------------------------------------------------------------
                              Oro Verde Project
       Mitigated Forecast Existing With Project Construction Conditions
                                AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      4.5       Worst Case Level Of Service: A[  9.3]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     1    0     1     0   17    59     1   27     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     1    0     1     0   17    59     1   27     0
Added Vol:      0    0     0    94    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0    95    0     1     0   17    59     1   27     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0    0     0    95    0     1     0   17    59     1   27     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0    95    0     1     0   17    59     1   27     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    76  105    27  xxxx xxxx xxxxx    76 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   933  789  1054  xxxx xxxx xxxxx  1536 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   932  788  1054  xxxx xxxx xxxxx  1536 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.10 0.00  0.00  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  933 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.3 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  9.3 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     *    *     *     A    *     *
ApproachDel:      xxxxxx              9.3            xxxxxx           xxxxxx
ApproachLOS:        *                 A                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



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--------------------------------------------------------------------------------
                              Oro Verde Project
       Mitigated Forecast Existing With Project Construction Conditions
                                AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):     11.5       Worst Case Level Of Service: B[ 13.9]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      21    0     3     0    0     0     9    9     0     0    7     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   21    0     3     0    0     0     9    9     0     0    7     0
Added Vol:      0    0   531     0    0     0     0   94     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   21    0   534     0    0     0     9  103     0     0    7     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    21    0   534     0    0     0     9  103     0     0    7     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   21    0   534     0    0     0     9  103     0     0    7     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  128  128   103  xxxx xxxx xxxxx     7 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  871  766   957  xxxx xxxx xxxxx  1627 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    868  762   957  xxxx xxxx xxxxx  1627 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.02 0.00  0.56  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  954 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  3.9 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx 13.9 xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    B     *     *    *     *     A    *     *     *    *     *
ApproachDel:       13.9            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        B                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

Oro Verde Project
Mitigated Forecast Existing With Project Construction Conditions
AM Peak Hour

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)

Average Delay (sec/veh): 12.5 Worst Case Level Of Service: B[13.0]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 1 0 0 0			0 0 0 1 0			0 0 0 0 1			0 0 0 0 0		
Volume Module:												
Base Vol:	8	15	0	0	9	1	0	0	12	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	8	15	0	0	9	1	0	0	12	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	625	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	8	15	0	0	9	1	0	0	637	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	8	15	0	0	9	1	0	0	637	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	8	15	0	0	9	1	0	0	637	0	0	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	6.2	xxxxx	xxxx	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	3.3	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	10	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	10	xxxx	xxxx	xxxxx
Potent Cap.:	1623	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	1078	xxxx	xxxx	xxxxx
Move Cap.:	1623	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	1078	xxxx	xxxx	xxxxx
Volume/Cap:	0.00	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.59	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	4.0	xxxx	xxxx	xxxxx
Control Del:	7.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	13.0	xxxxx	xxxx	xxxxx
LOS by Move:	A	*	*	*	*	*	*	*	B	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	7.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	A	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			13.0			xxxxxx		
ApproachLOS:	*			*			B			*		

Note: Queue reported is the number of cars per lane.

Oro Verde Project
Mitigated Forecast Existing With Project Construction Conditions
AM Peak Hour

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.442
Loss Time (sec):	10	Average Delay (sec/veh):	7.8
Optimal Cycle:	33	Level Of Service:	A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Split Phase			Split Phase		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	0 0 0 1 0			0 1 0 0 0			0 0 0 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	0	21	27	5	15	0	0	0	0	22	0	3
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	21	27	5	15	0	0	0	0	22	0	3
Added Vol:	0	0	0	625	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	21	27	630	15	0	0	0	0	22	0	3
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	21	27	630	15	0	0	0	0	22	0	3
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	21	27	630	15	0	0	0	0	22	0	3
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	21	27	630	15	0	0	0	0	22	0	3
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	1.00	0.92	0.92	0.95	0.95	1.00	1.00	1.00	1.00	0.94	1.00	0.94
Lanes:	0.00	0.44	0.56	0.98	0.02	0.00	0.00	0.00	0.00	0.88	0.00	0.12
Final Sat.:	0	768	988	1769	42	0	0	0	0	1576	0	215
Capacity Analysis Module:												
Vol/Sat:	0.00	0.03	0.03	0.36	0.36	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Crit Moves:		****		****						****		
Green/Cycle:	0.00	0.06	0.06	0.81	0.87	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Volume/Cap:	0.00	0.44	0.44	0.44	0.41	0.00	0.00	0.00	0.00	0.44	0.00	0.44
Delay/Veh:	0.0	48.1	48.1	3.1	1.5	0.0	0.0	0.0	0.0	53.0	0.0	53.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	48.1	48.1	3.1	1.5	0.0	0.0	0.0	0.0	53.0	0.0	53.0
LOS by Move:	A	D	D	A	A	A	A	A	A	D	A	D
HCM2kAvgQ:	0	2	2	6	4	0	0	0	0	1	0	1

Note: Queue reported is the number of cars per lane.

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---------------------------------------------------------------------------------
                              Oro Verde Project
       Mitigated Forecast Existing With Project Construction Conditions
                                PM Peak Hour
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
*********************************************************************************
Average Delay (sec/veh):      7.1       Worst Case Level Of Service: C[ 17.7]
*********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     5    0     9     0    7    28     6   84     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     5    0     9     0    7    28     6   84     0
Added Vol:      0    0     0     0    0     0     0    0     0   531    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     5    0     9     0    7    28   537   84     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0    0     0     5    0     9     0    7    28   537   84     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     5    0     9     0    7    28   537   84     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  1179 1193    84  xxxx xxxx xxxxx    35 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   212  188   981  xxxx xxxx xxxxx  1589 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   132   98   981  xxxx xxxx xxxxx  1589 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.04 0.00  0.01  xxxx xxxx  xxxx  0.34 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   1.5 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   8.4 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  298 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx   1.5 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx 17.7 xxxxx xxxxx xxxx xxxxx   8.4 xxxx xxxxx
Shared LOS:     *    *     *     *    C     *     *    *     *     A    *     *
ApproachDel:     xxxxxx            17.7            xxxxxx           xxxxxx
ApproachLOS:        *                C                *                *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
*********************************************************************************
```



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---------------------------------------------------------------------------------
                              Oro Verde Project
       Mitigated Forecast Existing With Project Construction Conditions
                                PM Peak Hour
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
*********************************************************************************
Average Delay (sec/veh):      1.5       Worst Case Level Of Service: B[ 13.7]
*********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      67    0    10     0    0     0     5    8     0     0   19     2
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   67    0    10     0    0     0     5    8     0     0   19     2
Added Vol:      0    0     0     0    0     0     0    0     0     0  531    94
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   67    0    10     0    0     0     5    8     0     0  550    96
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    67    0    10     0    0     0     5    8     0     0  550    96
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   67    0    10     0    0     0     5    8     0     0  550    96
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  616  664     8  xxxx xxxx xxxxx   646 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  457  384  1080  xxxx xxxx xxxxx   949 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    455  382  1080  xxxx xxxx xxxxx   949 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.15 0.00  0.01  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   8.8 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  492 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.6 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx 13.7 xxxxx xxxxx xxxx xxxxx   8.8 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    B     *     *    *     *     A    *     *     *    *     *
ApproachDel:      13.7            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        B                *                *                *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
*********************************************************************************
```

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--------------------------------------------------------------------------------
                              Oro Verde Project
       Mitigated Forecast Existing With Project Construction Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      8.2       Worst Case Level Of Service: A[  8.7]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      18   23     0     0   16     2     0    0    11     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   18   23     0     0   16     2     0    0    11     0    0     0
Added Vol:    625    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  643   23     0     0   16     2     0    0    11     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   643   23     0     0   16     2     0    0    11     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:  643   23     0     0   16     2     0    0    11     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   18 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    17  xxxx xxxx xxxxx
Potent Cap.: 1612 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1068  xxxx xxxx xxxxx
Move Cap.:   1612 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1068  xxxx xxxx xxxxx
Volume/Cap:  0.40 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    2.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del:  8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     A     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  2.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  8.7 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:        *                *                 A               *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



```
--------------------------------------------------------------------------------
                              Oro Verde Project
       Mitigated Forecast Existing With Project Construction Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Operations Method (Future Volume Alternative)
********************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
********************************************************************************
Cycle (sec):          100                Critical Vol./Cap.(X):         0.492
Loss Time (sec):       10                Average Delay (sec/veh):         8.1
Optimal Cycle:         36                Level Of Service:                  A
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Protected        Protected       Split Phase      Split Phase
Rights:           Include          Include          Include          Include
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
Lanes:        0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   38    17     2   25     0     0    0     0    31    0     2
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0   38    17     2   25     0     0    0     0    31    0     2
Added Vol:      0    0     0     0    0     0     0    0     0     0    0   625
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0   38    17     2   25     0     0    0     0    31    0   627
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0   38    17     2   25     0     0    0     0    31    0   627
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0   38    17     2   25     0     0    0     0    31    0   627
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0   38    17     2   25     0     0    0     0    31    0   627
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1900 1900  1900  1900 1900  1900  1900 1900  1900  1900 1900  1900
Adjustment:  1.00 0.96  0.96  1.00 1.00  1.00  1.00 1.00  1.00  0.87 1.00  0.87
Lanes:       0.00 0.69  0.31  0.07 0.93  0.00  0.00 0.00  0.00  0.05 0.00  0.95
Final Sat.:     0 1258   563   140 1752     0     0    0     0    78    0  1574
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.03  0.03  0.01 0.01  0.00  0.00 0.00  0.00  0.40 0.00  0.40
Crit Moves:       ****        ****                               ****
Green/Cycle: 0.00 0.06  0.06  0.03 0.09  0.00  0.00 0.00  0.00  0.81 0.00  0.81
Volume/Cap:  0.00 0.49  0.49  0.49 0.16  0.00  0.00 0.00  0.00  0.49 0.00  0.49
Delay/Veh:    0.0 48.8  48.8  54.6 42.4   0.0   0.0  0.0   0.0   3.3  0.0   3.3
User DelAdj: 1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:   0.0 48.8  48.8  54.6 42.4   0.0   0.0  0.0   0.0   3.3  0.0   3.3
LOS by Move:    A    D     D     D    D     A     A    A     A     A    A     A
HCM2kAvgQ:      0    2     2     2    1     0     0    0     0     7    0     7
********************************************************************************
Note: Queue reported is the number of cars per lane.
```

Year 2016 Without Project Conditions

```
--------------------------------------------------------------------------------
                              Oro Verde Project
                    Opening Year Without Project Conditions
                                 AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
               2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      0.2       Worst Case Level Of Service: A[  8.7]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0    1    0     1    0   17    59    1   27     0
Growth Adj:   1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17
Initial Bse:     0    0     0    1    0     1    0   20    69    1   32     0
User Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:      0    0     0    1    0     1    0   20    69    1   32     0
Reduct Vol:      0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:     0    0     0    1    0     1    0   20    69    1   32     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    89  123    32  xxxx xxxx xxxxx    89 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   917  771  1048  xxxx xxxx xxxxx  1519 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   916  770  1048  xxxx xxxx xxxxx  1519 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.4 xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  978 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.7 xxxxx xxxxx xxxx xxxxx   7.4 xxxx xxxxx
Shared LOS:     *    *     *     *    A     *     *    *     *     A    *     *
ApproachDel:     xxxxxx              8.7            xxxxxx           xxxxxx
ApproachLOS:        *                 A                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



```
--------------------------------------------------------------------------------
                              Oro Verde Project
                    Opening Year Without Project Conditions
                                 AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
               2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      5.6       Worst Case Level Of Service: A[  8.8]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:         Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:            Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       21    0     3    0    0     0    9    9     0    0    7     0
Growth Adj:   1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17
Initial Bse:    25    0     4    0    0     0   11   11     0    0    8     0
User Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     25    0     4    0    0     0   11   11     0    0    8     0
Reduct Vol:      0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    25    0     4    0    0     0   11   11     0    0    8     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   40   40    11  xxxx xxxx xxxxx     8 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  977  856  1076  xxxx xxxx xxxxx  1625 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    972  850  1076  xxxx xxxx xxxxx  1625 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.03 0.00  0.00  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  984 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  8.8 xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *     *    *     *     A    *     *     *    *     *
ApproachDel:       8.8            xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        A                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
-------------------------------------------------------------------------------
                              Oro Verde Project
                 Opening Year Without Project Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
*******************************************************************************
Average Delay (sec/veh):      3.5       Worst Case Level Of Service: A[  8.4]
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        8   15     0     0    9     1     0    0    12     0    0     0
Growth Adj:  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:     9   18     0     0   11     1     0    0    14     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      9   18     0     0   11     1     0    0    14     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     9   18     0     0   11     1     0    0    14     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   12 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    11  xxxx xxxx xxxxx
Potent Cap.: 1620 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1076  xxxx xxxx xxxxx
Move Cap.:   1620 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1076  xxxx xxxx xxxxx
Volume/Cap:  0.01 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del:  7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     A     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:          *                *                A                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```



```
-------------------------------------------------------------------------------
                              Oro Verde Project
                 Opening Year Without Project Conditions
                                AM Peak Hour
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
*******************************************************************************
Average Delay (sec/veh):      2.8       Worst Case Level Of Service: A[  8.9]
*******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0   21    27     5   15     0     0    0     0    22    0     3
Growth Adj:  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:     0   25    32     6   18     0     0    0     0    26    0     4
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0   25    32     6   18     0     0    0     0    26    0     4
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0   25    32     6   18     0     0    0     0    26    0     4
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    56 xxxx xxxxx  xxxx xxxx xxxxx    70   70    41
Potent Cap.: xxxx xxxx xxxxx  1561 xxxx xxxxx  xxxx xxxx xxxxx   940  824  1036
Move Cap.:   xxxx xxxx xxxxx  1561 xxxx xxxxx  xxxx xxxx xxxxx   937  821  1036
Volume/Cap:  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx  0.03 0.00  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     A    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  948 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  8.9 xxxxx
Shared LOS:     *    *     *     A    *     *     *    *     *     *    A     *
ApproachDel:     xxxxxx           xxxxxx           xxxxxx              8.9
ApproachLOS:          *                *                *                A
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

```
--------------------------------------------------------------------------------
                               Oro Verde Project
                   Opening Year Without Project Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      1.2       Worst Case Level Of Service: A[  9.0]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     5    0     9     0    7    28     6   84     0
Growth Adj:   1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:     0    0     0     6    0    11     0    8    33     7   99     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0    0     0     6    0    11     0    8    33     7   99     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     6    0    11     0    8    33     7   99     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   137  154    99  xxxx xxxx xxxxx    41 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   861  742   963  xxxx xxxx xxxxx  1581 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   858  738   963  xxxx xxxx xxxxx  1581 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.01 0.00  0.01  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  922 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  9.0 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
Shared LOS:      *    *     *     *    A     *     *    *     *     A    *     *
ApproachDel:      xxxxxx              9.0            xxxxxx           xxxxxx
ApproachLOS:         *                 A                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



```
--------------------------------------------------------------------------------
                               Oro Verde Project
                   Opening Year Without Project Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
           2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      6.6       Worst Case Level Of Service: A[  9.0]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       67    0    10     0    0     0     5    8     0     0   19     2
Growth Adj:   1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:    79    0    12     0    0     0     6    9     0     0   22     2
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     79    0    12     0    0     0     6    9     0     0   22     2
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    79    0    12     0    0     0     6    9     0     0   22     2
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    45   46     9  xxxx xxxx xxxxx    25 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:   971  850  1078  xxxx xxxx xxxxx  1603 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:     968  847  1078  xxxx xxxx xxxxx  1603 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:   0.08 0.00  0.01  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  981 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.3 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  9.0 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    A     *     *    *     *     A    *     *     *    *     *
ApproachDel:        9.0           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:         A                *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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--------------------------------------------------------------------------------
                              Oro Verde Project
                   Opening Year Without Project Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      3.2       Worst Case Level Of Service: A[  8.4]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      18   23     0     0   16     2     0    0    11     0    0     0
Growth Adj:  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:   21   27     0     0   19     2     0    0    13     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    21   27     0     0   19     2     0    0    13     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   21   27     0     0   19     2     0    0    13     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   21 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    20  xxxx xxxx xxxxx
Potent Cap.: 1608 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1064  xxxx xxxx xxxxx
Move Cap.:   1608 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1064  xxxx xxxx xxxxx
Volume/Cap:  0.01 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del:  7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     A     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:          *                *                A                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



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--------------------------------------------------------------------------------
                              Oro Verde Project
                   Opening Year Without Project Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
             2000 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
********************************************************************************
Average Delay (sec/veh):      2.7       Worst Case Level Of Service: A[  9.1]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0   38    17     2   25     0     0    0     0    31    0     2
Growth Adj:  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:    0   45    20     2   29     0     0    0     0    36    0     2
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0   45    20     2   29     0     0    0     0    36    0     2
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0   45    20     2   29     0     0    0     0    36    0     2
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    65 xxxx xxxxx  xxxx xxxx xxxxx    89   89    55
Potent Cap.: xxxx xxxx xxxxx  1550 xxxx xxxxx  xxxx xxxx xxxxx   917  805  1018
Move Cap.:   xxxx xxxx xxxxx  1550 xxxx xxxxx  xxxx xxxx xxxxx   916  804  1018
Volume/Cap:  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx  0.04 0.00  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     A    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  921 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.1 xxxxx
Shared LOS:     *    *     *     A    *     *     *    *     *     *    A     *
ApproachDel:     xxxxxx           xxxxxx           xxxxxx              9.1
ApproachLOS:          *                *                *                A
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

Year 2016 With Project
(Post-Construction) Conditions

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--------------------------------------------------------------------------------
                              Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                 AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      0.5       Worst Case Level Of Service: A[  8.9]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0    1    0     1    0   17    59    1   27     0
Growth Adj:   1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17
Initial Bse:     0    0     0    1    0     1    0   20    69    1   32     0
Added Vol:       0    0     0    4    0     0    0    0     0    0    0     0
PasserByVol:     0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:     0    0     0    5    0     1    0   20    69    1   32     0
User Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:      0    0     0    5    0     1    0   20    69    1   32     0
Reduct Vol:      0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:     0    0     0    5    0     1    0   20    69    1   32     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    89  123    32  xxxx xxxx xxxxx    89 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   917  771  1048  xxxx xxxx xxxxx  1519 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   916  770  1048  xxxx xxxx xxxxx  1519 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.01 0.00  0.00  xxxx xxxx  xxxx  0.00 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.4 xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  938 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.0 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  8.9 xxxxx xxxxx xxxx xxxxx   7.4 xxxx xxxxx
Shared LOS:      *    *     *     *    A     *     *    *     *     A    *     *
ApproachDel:       xxxxxx               8.9             xxxxxx           xxxxxx
ApproachLOS:          *                  A                 *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



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--------------------------------------------------------------------------------
                              Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                 AM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      6.1       Worst Case Level Of Service: A[  8.7]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       21    0     3    0    0     0    9    9     0    0    7     0
Growth Adj:   1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17
Initial Bse:    25    0     4    0    0     0   11   11     0    0    8     0
Added Vol:       0    0    20    0    0     0    0    4     0    0    0     0
PasserByVol:     0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    25    0    24    0    0     0   11   15     0    0    8     0
User Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     25    0    24    0    0     0   11   15     0    0    8     0
Reduct Vol:      0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    25    0    24    0    0     0   11   15     0    0    8     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   44   44    15  xxxx xxxx xxxxx     8 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  972  852  1071  xxxx xxxx xxxxx  1625 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    967  846  1071  xxxx xxxx xxxxx  1625 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.03 0.00  0.02  xxxx xxxx  xxxx  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     A    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx 1015 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.1 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  8.7 xxxxx xxxxx xxxx xxxxx   7.2 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    A     *     *    *     *     A    *     *     *    *     *
ApproachDel:        8.7             xxxxxx           xxxxxx           xxxxxx
ApproachLOS:         A                 *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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------------------------------------------------------------------------------------
                               Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                 AM Peak Hour
------------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
************************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
************************************************************************************
Average Delay (sec/veh):      5.1       Worst Case Level Of Service: A[  8.5]
************************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        8   15     0     0    9     1     0    0    12     0    0     0
Growth Adj:   1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:     9   18     0     0   11     1     0    0    14     0    0     0
Added Vol:       0    0     0     0    0     0     0    0    24     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     9   18     0     0   11     1     0    0    38     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      9   18     0     0   11     1     0    0    38     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     9   18     0     0   11     1     0    0    38     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   12 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    11  xxxx xxxx xxxxx
Potent Cap.: 1620 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1076  xxxx xxxx xxxxx
Move Cap.:   1620 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1076  xxxx xxxx xxxxx
Volume/Cap:  0.01 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.04  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.1  xxxx xxxx xxxxx
Control Del:  7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.5 xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     A     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  7.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx            xxxxxx              8.5            xxxxxx
ApproachLOS:        *                 *                 A                *
************************************************************************************
Note: Queue reported is the number of cars per lane.
************************************************************************************
```



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------------------------------------------------------------------------------------
                               Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                 AM Peak Hour
------------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
************************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
************************************************************************************
Average Delay (sec/veh):      3.7       Worst Case Level Of Service: A[  9.2]
************************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0   21    27     5   15     0     0    0     0    22    0     3
Growth Adj:   1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:     0   25    32     6   18     0     0    0     0    26    0     4
Added Vol:       0    0     0    24    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0   25    32    30   18     0     0    0     0    26    0     4
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0   25    32    30   18     0     0    0     0    26    0     4
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0   25    32    30   18     0     0    0     0    26    0     4
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    56 xxxx xxxxx  xxxx xxxx xxxxx   118  118    41
Potent Cap.: xxxx xxxx xxxxx  1561 xxxx xxxxx  xxxx xxxx xxxxx   883  776  1036
Move Cap.:   xxxx xxxx xxxxx  1561 xxxx xxxxx  xxxx xxxx xxxxx   870  761  1036
Volume/Cap:  xxxx xxxx  xxxx  0.02 xxxx  xxxx  xxxx xxxx  xxxx  0.03 0.00  0.00
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     A    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  887 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.1 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.2 xxxxx
Shared LOS:     *    *     *     A    *     *     *    *     *     *    A     *
ApproachDel:     xxxxxx            xxxxxx            xxxxxx              9.2
ApproachLOS:        *                 *                 *                A
************************************************************************************
Note: Queue reported is the number of cars per lane.
************************************************************************************
```

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--------------------------------------------------------------------------------
                              Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                PM Peak Hour
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 SR-14 SB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      1.9       Worst Case Level Of Service: A[  9.1]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0    5    0     9    0    7    28    6   84     0
Growth Adj:  1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17
Initial Bse:    0    0     0    6    0    11    0    8    33    7   99     0
Added Vol:      0    0     0    0    0     0    0    0     0   20    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0    0     0    6    0    11    0    8    33   27   99     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0    0     0    6    0    11    0    8    33   27   99     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:    0    0     0    6    0    11    0    8    33   27   99     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx   177  194    99  xxxx xxxx xxxxx    41 xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   817  705   963  xxxx xxxx xxxxx  1581 xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   806  693   963  xxxx xxxx xxxxx  1581 xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.01 0.00  0.01  xxxx xxxx  xxxx  0.02 xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.1 xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
LOS by Move:    *    *     *    *    *     *    *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  900 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx xxxxx xxxx xxxxx   0.1 xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx  9.1 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx
Shared LOS:     *    *     *    *    A     *    *    *     *     A    *     *
ApproachDel:     xxxxxx              9.1            xxxxxx           xxxxxx
ApproachLOS:        *                 A                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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--------------------------------------------------------------------------------
                              Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                PM Peak Hour
--------------------------------------------------------------------------------
                       Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #2 SR-14 NB Ramps (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      5.6       Worst Case Level Of Service: A[  9.2]
********************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  1! 0  0    0  0  0  0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      67    0    10    0    0     0    5    8     0    0   19     2
Growth Adj:  1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17 1.17 1.17  1.17
Initial Bse:   79    0    12    0    0     0    6    9     0    0   22     2
Added Vol:      0    0     0    0    0     0    0    0     0    0   20     4
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   79    0    12    0    0     0    6    9     0    0   42     6
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:    79    0    12    0    0     0    6    9     0    0   42     6
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
FinalVolume:   79    0    12    0    0     0    6    9     0    0   42     6
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  6.4  6.5   6.2 xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:  3.5  4.0   3.3 xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:   67   70     9  xxxx xxxx xxxxx    49 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.:  944  825  1078  xxxx xxxx xxxxx  1571 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:    941  821  1078  xxxx xxxx xxxxx  1571 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  0.08 0.00  0.01  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *    *    *     *     A    *     *    *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx  957 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx  0.3 xxxxx xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx  9.2 xxxxx xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    A     *    *    *     *     A    *     *    *    *     *
ApproachDel:        9.2          xxxxxx           xxxxxx           xxxxxx
ApproachLOS:         A              *                *                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

```
--------------------------------------------------------------------------------
                              Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #3 Sierra Hwy (NS) at Backus Rd (EW)
********************************************************************************
Average Delay (sec/veh):      4.1       Worst Case Level Of Service: A[  8.4]
********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:         0  1  0  0  0    0  0  0  1  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       18   23     0     0   16     2     0    0    11     0    0     0
Growth Adj:   1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:    21   27     0     0   19     2     0    0    13     0    0     0
Added Vol:      24    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    45   27     0     0   19     2     0    0    13     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     45   27     0     0   19     2     0    0    13     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    45   27     0     0   19     2     0    0    13     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:   4.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:   2.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:    21 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx    20  xxxx xxxx xxxxx
Potent Cap.:  1608 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1064  xxxx xxxx xxxxx
Move Cap.:    1608 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  1064  xxxx xxxx xxxxx
Volume/Cap:   0.03 xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.01  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:     0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   0.0  xxxx xxxx xxxxx
Control Del:   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   8.4 xxxxx xxxx xxxxx
LOS by Move:     A    *     *     *    *     *     *    *     A     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.:  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:   0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              8.4           xxxxxx
ApproachLOS:        *                *                 A                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```



```
--------------------------------------------------------------------------------
                              Oro Verde Project
           Opening Year With Project (Post-Construction) Conditions
                                 PM Peak Hour
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #4 Sierra Hwy (NS) at Sopp Rd (EW)
********************************************************************************
Average Delay (sec/veh):      3.7       Worst Case Level Of Service: A[  9.0]
********************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled       Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:         0  0  0  1  0    0  1  0  0  0    0  0  0  0  0    0  0  1! 0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0   38    17     2   25     0     0    0     0    31    0     2
Growth Adj:   1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17  1.17 1.17  1.17
Initial Bse:     0   45    20     2   29     0     0    0     0    36    0     2
Added Vol:       0    0     0     0    0     0     0    0     0     0    0    24
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0   45    20     2   29     0     0    0     0    36    0    26
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:      0   45    20     2   29     0     0    0     0    36    0    26
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0   45    20     2   29     0     0    0     0    36    0    26
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.4  6.5   6.2
FollowUpTim:xxxxx xxxx xxxxx   2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx    65 xxxx xxxxx  xxxx xxxx xxxxx    89   89    55
Potent Cap.: xxxx xxxx xxxxx  1550 xxxx xxxxx  xxxx xxxx xxxxx   917  805  1018
Move Cap.:   xxxx xxxx xxxxx  1550 xxxx xxxxx  xxxx xxxx xxxxx   916  804  1018
Volume/Cap:  xxxx xxxx  xxxx  0.00 xxxx  xxxx  xxxx xxxx  xxxx  0.04 0.00  0.03
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:     *    *     *     A    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  956 xxxxx
SharedQueue:xxxxx xxxx xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.2 xxxxx
Shrd ConDel:xxxxx xxxx xxxxx   7.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  9.0 xxxxx
Shared LOS:      *    *     *     A    *     *     *    *     *     *    A     *
ApproachDel:     xxxxxx           xxxxxx           xxxxxx              9.0
ApproachLOS:        *                *                *                 A
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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B15. 2018 Traffic Impact Assessment

Traffic Impact Analysis
Gen-Tie Routes for Edwards Air Force Base (AFB)
Solar Enhanced Use Lease (EUL) Project

Prepared for:

Edwards Air Force Base Solar, LLC
11512 El Camino Real, Suite 370
San Diego, California 920130
Contact: Simon Day

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Dennis Pascua, Transportation Services Manager
Charles Greely, PE, Principal Engineer

MARCH 2018

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1 INTRODUCTION

The purpose of this Traffic Impact Analysis (TIA) is to identify potential construction-related traffic impacts associated with the proposed gen-tie route options on Edwards Air Force Base (AFB) and Kern County that need to be evaluated under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). The purpose of this TIA is to evaluate the gen-tie route options and to:

- Document existing traffic conditions including roadway segment and intersection levels of service along or in proximity to the gen-tie route options;
- Estimate trip generation and trip characteristics for construction-related activities of the gen-tie options;
- Analyze the potential for traffic impacts to occur as a result of construction of the gen-tie;
- Describe the significance of the potential impacts; and
- Identify mitigation measures, for construction-related traffic impacts.

1.1 Project Description

A 230-kilovolt gen-tie would connect the Edwards AFB solar generation site (located off Trotter Avenue) with the existing and privately owned electrical substation, the Westwind Substation, in the first phase of the project, and to the Southern California Edison Windhub Substation in subsequent phases of the project (located off Oak Creek Road). The proposed gen-tie may be a shared facility with other solar projects in the future. In general, the gen-tie route can be broken down in to two categories based on the direction of the corridor: a north–south connection and an east-west connection. There are two options for the north–south gen-tie connection, and the proposed project would include only one of these two north-south route options. There are two options for the east–west gen-tie connection, and the proposed project would include only one of these two east–west route options.

Figure 1 shows the project's regional location, proposed gen-tie route options and the study area. The proposed project is located in the southeastern portion of the Kern County (County). Major highways in the project vicinity include State Route 14 (SR-14) and Sierra Highway that provide access to the proposed gen-tie routes via Backus Road and Silver Queen Road.

1.2.1 Gen-Tie Route Options

Table 1 provides a brief description of the two north–south route options and the two east–west route options for the gen-tie alignment. It should be noted that although only one of the two north-south and one of the two east-west routes will be selected, the TIA has analyzed all the alignments for a maximum/peak construction activity. The applicant has noted that construction along the alignment would occur sequentially, with one portion of the route completed at a time.

Table 1
Proposed Gen-Tie Route Options

Direction from Solar Generation Site to Substations	Option	Description
North–South	1	5.6-mile-long gen-tie route; runs from the Edwards AFB solar generation site north to the intersection of Purdy Avenue and the BNSF.
	2	4.5-mile-long gen-tie route; runs from the northwestern edge of the Edwards AFB solar generation site to the intersection of United Street and Purdy Avenue.
East–West	1-A	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 miles there are two options for the east–west gen-tie route: Option A would run north of Oak Creek Road.
	1-B	9.8-mile-long gen-tie route; runs from the intersection of Purdy Avenue and the BNSF west to the Westwind Substation and the Windhub Substation. Along Oak Creek Road for 0.6 miles there are two options for the east–west gen-tie route: Option B would run south of Oak Creek Road

Figure 1 illustrates the alignments of all the proposed gen-tie route options. Based on proposed gen-tie route options provided in Table 1, following scenarios were considered for analysis of construction-related project traffic in the TIA.

Gen-Tie Route Option 1

The gen-tie alignment for Option 1 is located east of SR-14. Construction-related traffic (i.e., workers and truck traffic) would access the study area via SR-14 and its intersections with Backus Road. Project traffic would travel south along Sierra Highway towards the Sierra Highway/Sopp Road intersection, then use the at-grade railroad crossing at Sopp Road and travel north along Lone Butte Road to access gen-tie work areas. Construction-related activities for Option 1 would primarily occur east of SR-14 along unpaved/undeveloped land on Edwards AFB.

Gen-Tie Route Option 2

The gen-tie alignment for Option 2 is located east of SR-14. Like Option 1, construction-related traffic (i.e., workers and truck traffic) would also access the study area via SR-14 and its intersections with Backus Road. Construction-related activities for Option 2 would also primarily occur east of SR-14, mostly along Lone Butte Road, Reed Avenue, and United Street.

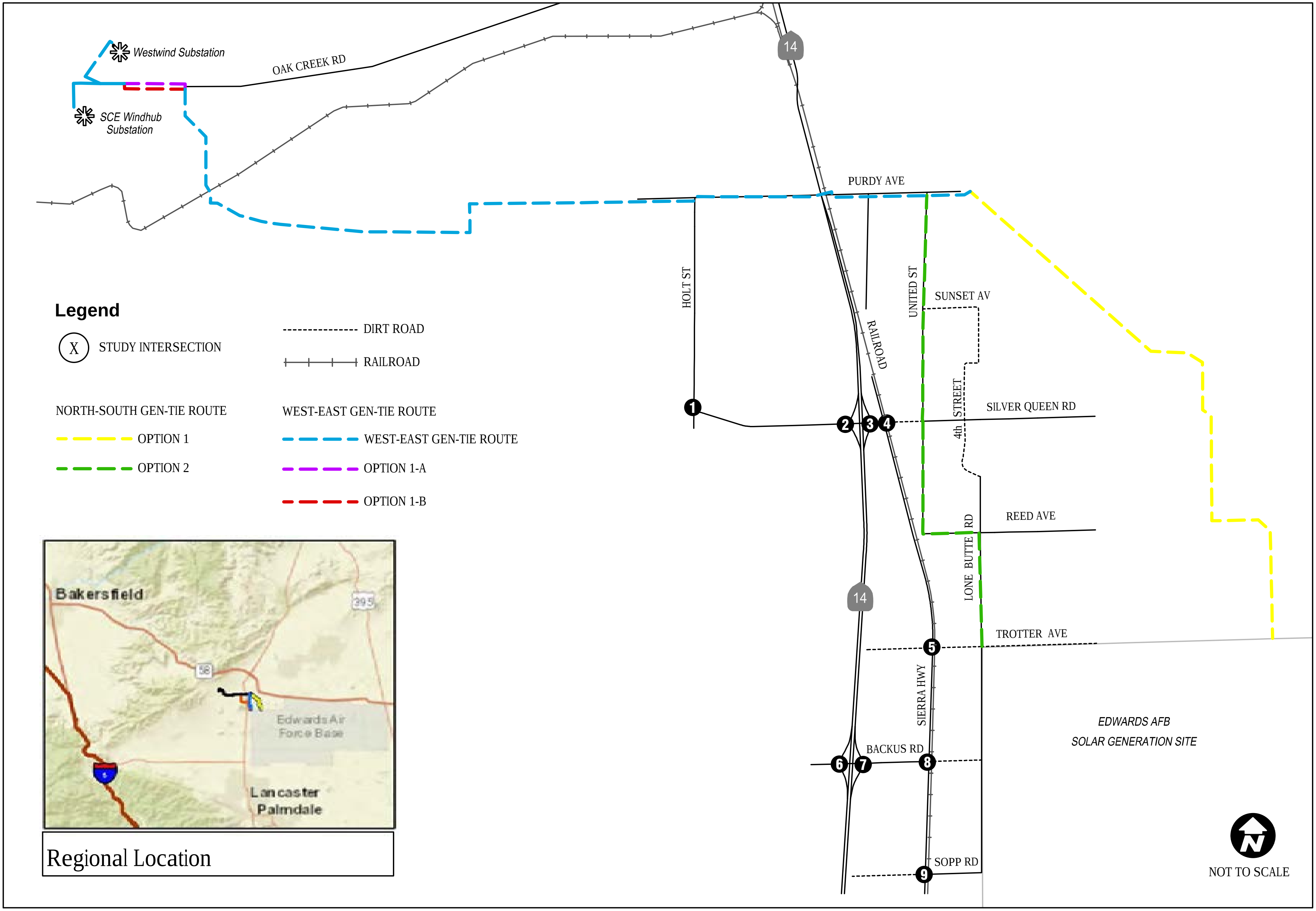

FIGURE 1

Project Location and Study Area

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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Gen-Tie Route Options 1-A and 1-B

The gen-tie route alignment for Options 1A and 1B are located both east and west of SR-14. Construction-related traffic (i.e., workers and truck traffic) would access the study area via SR-14 and its intersections with Backus Road (for work areas east of SR-14) and Silver Queen Road (for work areas west of SR-14) and travel north to the route alignment. Construction-related activities for Option 1A and 1B would occur both east and west of SR-14, along Purdy Avenue, Oak Creek Road as well as along some unpaved/undeveloped land on Edwards AFB. This route option also includes the gen-tie crossing the south side of Purdy Avenue at its intersection with SR-14. Construction-related activities across SR-14, and any other State highway facilities, will be required to be conducted consistent with the Caltrans Encroachment Permit process.

Based on the location of the proposed alignments described above and primary access via Backus Road and Silver Queen Road, it is reasonable to assume that Gen-Tie Route Options 1 and 2 would have a similar travel pattern for construction traffic; and Gen-Tie Route Options 1A and 1B would have a similar travel pattern for construction traffic. As described under Study Area and Scope in this section, the TIA analyzed a worst-case construction traffic scenario for the route-options.

1.2.2 Construction of Gen-Tie Line

The gen-tie line would both be overhead and underground depending on the route option that is selected. Installation of the overhead line would generally comprise the following activities: layout and survey, clearing and grading, pole installation, pole dressing, stringing and tensioning, finishing testing and site restoration. For certain sections of the gen-tie route, the underground section of gen-tie line may be installed with the fiber optic cables. Installation of underground facilities would require the use of trenchers, backhoes, excavators, haul vehicles, compaction equipment, and water trucks. Structures for the gen-tie line would be assembled at a temporary staging area at each pole location to minimize damage during transport. In addition, areas of disturbance would be required in certain locations along the gen-tie route to string the lines.

Per the applicant, each gen-tie line would require four crews of 12 workers each (i.e., 48 workers) for the overhead section and two crews of 12 workers each (i.e., 24 workers) for the underground section. Therefore, a maximum of 72 workers would be working on the gen-tie line at any given time during its construction/installation. A total of 60 trucks (30 off-site delivery trucks, and 30 on-site trucks) would be required for equipment and material delivery as well as on-site transportation from laydown and parking areas to specific locations along the gen-tie line. As described under Gen-Tie Route Options, it anticipated that the gen-tie line would primarily follow existing roads and main access to the gen-tie route would be via existing roads. However, new temporary unpaved access roads may need to be installed to access the laydown areas for each pole and areas where the gen-tie line is installed underground. These roads would also be used to access the poles for future maintenance activities.

As previously noted, construction-related activities across SR-14, and any other State highway facilities, will be required to be conducted consistent with the Caltrans Encroachment Permit process.

1.2.3 Operation and Maintenance of Gen-Tie Line

Operation and maintenance of the Edwards AFB solar facility would require trucks, forklifts, and loaders for routine and unscheduled maintenance, and water trucks for solar panel washing. The solar facility may require 10 full-time personnel for operation, maintenance and security. Additional maintenance and security personnel would be dispatched to the solar facility, as needed.

Activities associated with the operation and maintenance of the gen-tie line would be only be as needed and are not likely to generate significant daily or peak hour traffic. Hence, this TIA focusses only on construction-related traffic impacts of the proposed gen-tie route options.

1.2.4 Construction Schedule of Gen-Tie Line

Proposed schedule for construction of gen-tie line is approximately nine months from October 2019 to July 2020. The proposed schedule of construction for the solar generation facility is approximately 24 months from July 2018 to July 2020. Therefore, there would be a nine-month overlap during construction activities of gen-tie line and the solar generation facility from October 2019 to July 2020.

1.2 Study Area and Scope

As illustrated in Figure 2, there are three north south and two east-west gen-tie route options. However, not all the proposed alignments are located along existing roadways or intersections. Some of the route options are located along dirt roads or vacant/undeveloped land in Edwards AFB and Kern County. However, access to the Edwards solar generation site and to the proposed routes would be primarily via Backus Road and Silver Queen Road and its intersections with SR-14 and Sierra Highway. Therefore, for the purpose of traffic analysis, the study area was defined along Backus Road, Silver Queen Road, Sierra Highway and SR-14. The study area is comprised of nine intersections, six roadway segments, and two freeway segments (SR-14 north and south of Silver Queen Road) that would be most impacted by construction of any of the proposed gen-tie route options.

The study area intersections include:

1. Holt Road/Silver Queen Road
2. SR-14 Southbound Ramps/ Silver Queen Road
3. SR-14 Northbound Ramps/ Silver Queen Road
4. Sierra Highway/ Silver Queen Road
5. Sierra Highway/Trotter Avenue
6. SR-14 Southbound Ramps/Backus Road
7. SR-14 Northbound Ramps/Backus Road
8. Sierra Highway/Backus Road
9. Sierra Highway/Sopp Road

The study area roadway/freeway segments include:

1. Lone Butte Road, north of Trotter Avenue
2. United Street, from Purdy Avenue and Reed Avenue
3. Sierra Highway, from Silver Queen Road and Trotter Avenue
4. Holt Street, from Purdy Avenue and Silver Queen Road
5. Purdy Avenue, east of SR-14
6. Oak Creek Road, near Westwind and Windhub Substations
7. SR-14, north of Silver Queen Road
8. SR-14, between Silver Queen Road and Backus Road

This analysis focuses on both the average daily traffic (24 hour) and the weekday AM (7:00 to 9:00 AM) peak period and the PM (4:00 to 6:00 PM) peak period. The peak periods represent the highest cumulative total traffic for the adjacent street system. The study area roadway segments and intersections were analyzed for the following study scenarios:

Existing Conditions

This TIA includes a description of existing conditions in the site vicinity, including existing street system, existing weekday AM and PM peak hour traffic volumes, existing roadway segment daily traffic volumes and traffic operations. The Existing Conditions are representative of the year 2017.

Existing plus Option 1 and Existing plus Option 2

The gen-tie alignments for Option 1 and 2 are located east of SR-14. These options would have similar construction traffic distributions and assignments, resulting in similar traffic patterns in the study area. Therefore, Option 1 and 2 have been analyzed as one scenario in the TIA (i.e., Existing plus Option1/Option 2).

Existing plus Option 1-A and 1-B

The gen-tie route alignments for Options 1A and 1B are located both east and west of SR-14. Construction of these route options would have similar traffic distribution and assignment, and therefore, Option 1-A and 1-B are anticipated to have similar traffic impacts in the study area. Therefore, Option 1-A and 1-B have been analyzed as one scenario in the TIA (i.e., Existing plus Option 1-A or 1-B).

1.3 Congestion Management Program

The Kern Council of Governments (COG) is designated as the Congestion Management Agency in the County. The purpose of the COG is to establish level of service (LOS) standards for the Congestion Management road network in Kern County. California Government Code Section 65089(b)(1)(B) requires that level of service standards be established at no worse than LOS E, or LOS F if that is the current level of service. LOS E has been established as the minimum system-wide LOS traffic standard in the Kern COG Congestion Management Plan (CMP). Those roads currently experiencing worse traffic congestion have been accepted at their existing traffic level of LOS F.

In the study area, SR-14 is part of the CMP network. CMP generally requires evaluation of all CMP intersections where the project adds 50 or more new peak hour trips and all CMP freeway mainline where the project adds 150 or more peak hour trips. The project construction generates fewer than 150 peak hour trips, and therefore would not add 150 trips to SR-14 facility, however it adds more than 50 peak hour trips to the intersection of Backus Road and Silver Queen Road with SR-14.

1.4 Methodology

Level of service (LOS) is commonly used as a qualitative description of roadway segments and intersection operations and is based on the capacity and the volume of traffic using the segment or the intersection.

1.4.1 Intersections

The County of Kern and Caltrans utilize the Highway Capacity Manual (HCM) intersection analysis methodology to analyze the operation of signalized and unsignalized study intersections. It should be noted that all study intersections are currently unsignalized. The HCM analysis methodology describes the operation of an intersection using a range of LOS from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding control delay experienced per vehicle for unsignalized intersections.

At unsignalized intersections, as well as all Caltrans study area intersections, the level of service was calculated using the HCM 2010 methodology. The Synchro 10 LOS software was used to determine intersection LOS for all study scenarios. Synchro is consistent with the HCM 2010 methodology (Transportation Research Board 2010). Table 2 shows the LOS for unsignalized and signalized intersections under the HCM methodology (delay).

Table 2
Levels of Service for Intersections using HCM Methodology

Level of Service	Unsignalized Intersections Control Delay (in seconds)	Signalized Intersections Control Delay (in seconds)
A	< 10.0	< 10.0
B	> 10.0 to < 15.0	> 10.0 to < 20.0
C	> 15.0 to < 25.0	> 20.0 to < 35.0
D	> 25.0 to < 35.0	> 35.0 to < 55.0
E	> 35.0 to < 50.0	> 55.0 to < 80.0
F	> 50.0	> 80.0

Source: HCM 2010

1.4.2 Roadway Segments

Kern County uses the Florida Department of Transportation's (FDOT) 2009 Quality/Level of Handbook (Florida Tables) to evaluate roadway segment LOS. Table 3 presents the roadway segment LOS thresholds by facility type in the study area as provided in the Florida Tables.

Table 3
FDOT Daily Roadway Segment LOS Thresholds

All Roadway Facilities Volumes-to-Capacity (V/C)	LOS A	LOS B	LOS C	LOS D	LOS E
	<0.6	0.6-0.7	0.70-0.8	0.8-0.9	0.9-1.0
Roadway Configuration	**Two-way Average Traffic (ADT) Threshold**				
	LOS A	*LOS B*	*LOS C*	*LOS D*	*LOS E*
2 Lane Undivided	-	4,500	8,100	13,800	27,600
4 lane Divided	-	26,300	41,100	52,100	59,100

Source: FDOT 2009 Generalized Average Annual Daily Volumes for Rural Undeveloped Areas and Cities - Table 3
Thresholds based on 2009 FDOT Quality/Level of Service Handbook, Florida Department of Transportation. Adjustments made according to appropriate area conditions, following FDOT guidelines.
All volumes are approximate and assume typical roadway characteristics. Actual threshold volumes for each LOS listed above may vary depending on a variety of factors including (but not limited to) roadway curvature and grade, intersection or interchange spacing, driveway spacing, percentage of trucks and other heavy vehicles, travel lane widths, signal timing characteristics, on-street parking, volume of cross traffic and pedestrians, etc.

1.4.3 Significance Criteria

Kern County

The Kern County General Plan Circulation Element has established the following significance criteria for traffic impacts:

- A significant project impact occurs and mitigation is required if development causes affected roadways to fall below LOS D.

The proposed project is located within the County and hence this TIA uses the significance criteria provided in the Kern County General Plan Circulation Element that is to maintain a minimum level of service of LOS D for all roads throughout the County.

Caltrans

The freeway facility of SR-14 and its intersections with Silver Queen Road and Backus Road in the study area are under the jurisdiction of Caltrans. As stated in the Caltrans Guide for the Preparation of Traffic Impact Studies, December 2002, the level of service for operating State highway facilities is based upon measures of effectiveness. These MOEs describe the measures best suited for analyzing State highway facilities (i.e., freeway segments, signalized intersections, on- or off-ramps, etc.). Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities; however, Caltrans acknowledges that this may not always be feasible and if an existing State highway facility is operating at less than the appropriate target LOS, the existing MOE should be maintained.

2 EXISTING CONDITIONS

This section describes existing conditions within the identified study area. Characteristics are provided for the existing street system, daily roadway segment traffic volumes, peak hour traffic volumes, and traffic operations.

2.1 Existing Street System

The existing traffic controls and geometrics at the study area intersections are shown in Figure 2. All the intersections identified in the study area are unsignalized. Characteristics of the existing street system in the study are described below.

State Route 14 (SR-14) begins at Interstate 5 (I-5) just north of the San Fernando Valley, and continues north into Kern County where it ends at Highway 395 (US-395) north of Inyokern. The freeway varies between two and four lanes (or one to two lanes in each direction). Near the project site, SR-14 is a four-lane divided highway, which heads north to Mojave, and south to Rosamond.

Silver Queen Road is a two-lane, east-west road that provides access to industrial areas west of Sierra Highway. East of Sierra Highway, Silver Queen Road connects United Street and 4th Street, an unpaved, dirt road. Silver Queen Road has an interchange with SR-14 Road that would be utilized by some of the construction-related traffic for the gen-tie routes.

Backus Road is a two-lane, east-west road that provides access to industrial areas primarily west of Sierra Highway. Backus Road has an interchange with SR-14 Road that would be utilized by most of the construction-related traffic for the gen-tie routes.

Sierra Highway is mainly a two-lane north south road that provides greater local circulation within the vicinity of the proposed project since it serves as a parallel route to SR-14. Sierra Highway is a main thoroughfare within the county, which begins south of the City of Palmdale, and travels northward following SR-14 before terminating into Silver Queen Road. In the study area, Sierra Highway is between SR-14 and the Southern Pacific Railroad (SPRR) tracks.

Lone Butte Road is a two-lane, north-south road that serves as a local connection for industrial uses east of SR-14. At its most southern point, Lone Butte Road feeds into Sopp Road. While travelling northward, the paved portion of the roadway ends by merging into Reed Avenue (also paved). Unpaved portions continue northward to facilitate travel for several homes.

United Street is also a two-lane, north-south road that functions as a local route for industrial uses east of SR-14. It provides a connection to SR-14 through its northern terminus with Purdy Avenue and travels southward to Reed Avenue. West of Sierra Highway, United Street is an unpaved, dirt road.

Holt Street is also a two-lane, north-south road that provides local access for many of the pocket subdivisions west of SR-14, as well as access for adjacent industrial and solar facilities. From its northern point near the Mojave Community, it connects Arroyo Avenue with State Route 58 (SR-58), terminating southward at Silver Queen Road.

Sopp Road is a two-lane, east-west road that provides access to industrial areas east of Sierra Highway via a railroad crossing intersection. Sopp Road connects to Lone Butte Road and provides paved access to most of the construction-related traffic for the gen-tie routes.

Purdy Avenue is a two-lane, east-west road that primarily provides access to industrial uses, solar facilities, and wind turbines located west of SR-14. From its western edge, the road is mainly unpaved, until SR-14 after which, Purdy Avenue feeds directly into United Street.

Oak Creek Road is also a two-lane, east-west road that provides direct access to the proposed project as well as other industrial, solar, and wind facilities in the area. It connects from Tehachapi at Willow Springs Road, and travels eastward crossing SR-14 and SR-58, into the residential enclave of Mojave, before terminating at K Street.

2.2 Transit System

Kern Transit provides passenger bus service between, and within, the rural communities of Kern County. There are 17 fixed transit routes, and Dial-A-Ride (DAR) service is available in most communities. The transit system offers intercity service along with local transit service as well as connections to Metrolink in Lancaster. Currently, there are no transit stops located in the study area or along the gen-tie route options.

2.3 Traffic Volumes

2.3.1 Existing Traffic Volumes

Existing peak hour counts and average daily traffic (ADT) counts at the study intersections and roadway segments, respectively, were conducted in November 2017 during a typical non-holiday week. Raw traffic count worksheets are provided in Appendix A. Existing weekday AM and PM peak hour and ADTs are summarized on Figure 3.

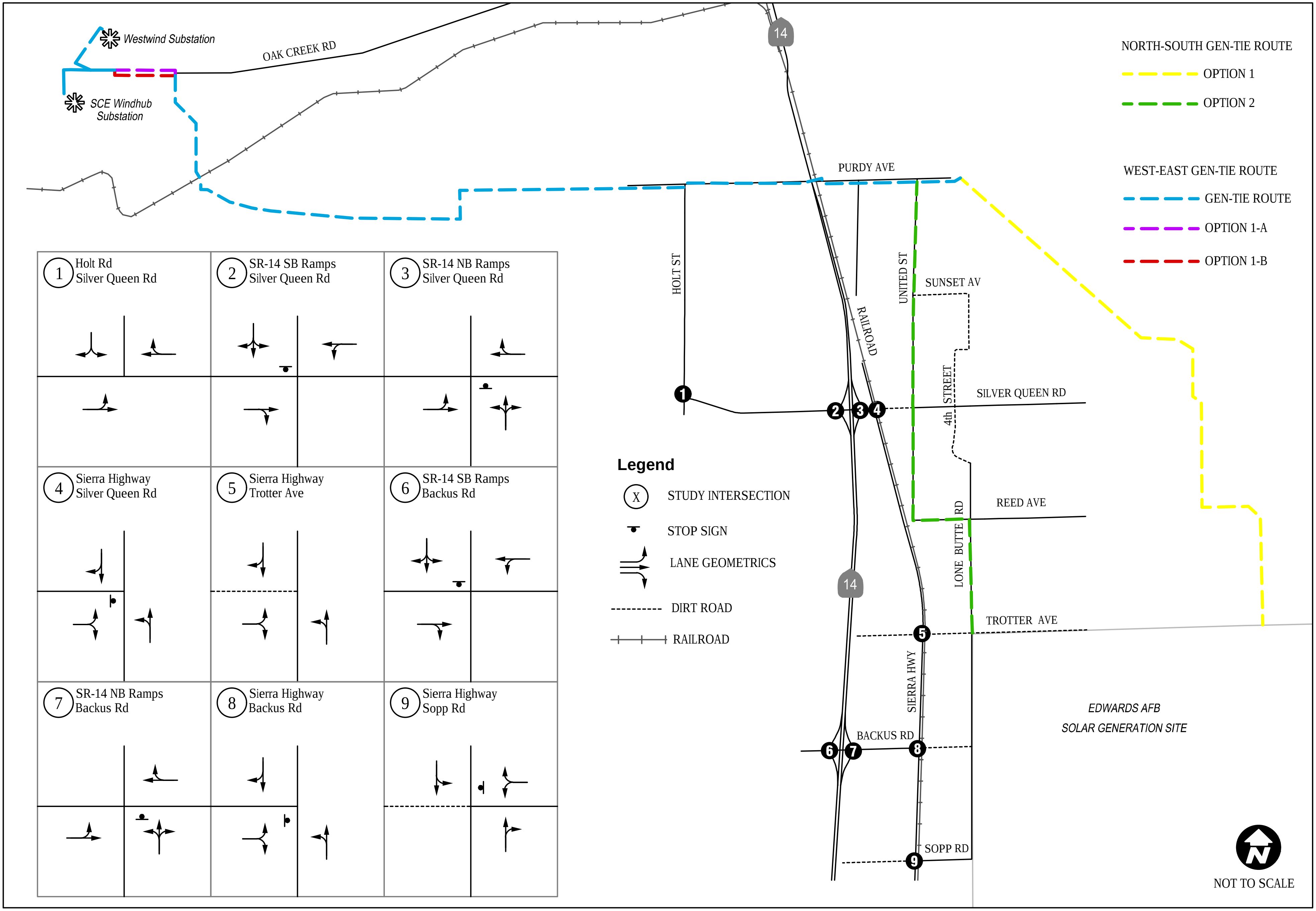

FIGURE 2
Existing Roadways and Intersection Conditions
Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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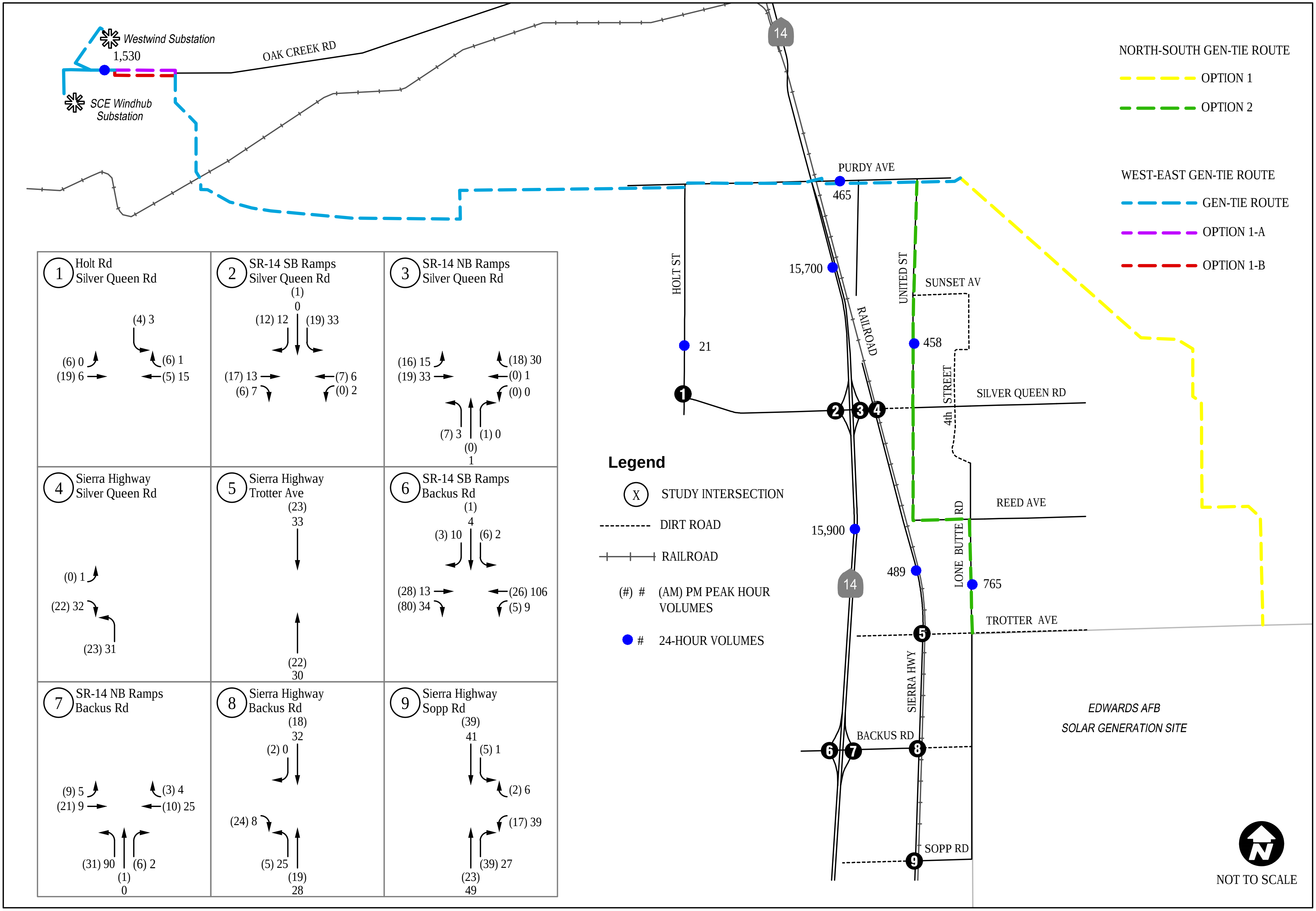

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FIGURE 3

Existing Traffic Volumes

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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2.4 Existing Traffic Conditions

2.4.1 Existing Intersection Conditions

An intersection LOS analysis was prepared for the existing conditions using HCM 2010 methodology via the Synchro LOS software as discussed in Chapter 1. Table 4 shows the results of the existing conditions LOS analysis. As shown in the table, all of the study area intersections are currently operating at LOS A under existing conditions, during both peak hours.

Table 4
Existing Weekday Peak Hour Intersection LOS

No.	Intersection	LOS Method	Critical Movement	AM Peak		PM Peak	
				Delay[1]	*LOS*[2]	*Delay*[1]	*LOS*[2]
1	Holt Road/Silver Queen Road	HCM	SBL	8.9	A	8.7	A
2	SR-14 Southbound Ramps/Silver Queen Road	HCM	SBL	8.7	A	8.8	A
3	SR-14 Northbound Ramps/Silver Queen Road	HCM	NBL	9.1	A	9.1	A
4	Sierra Highway/Silver Queen Road	HCM	EBL	8.4	A	8.5	A
5	Sierra Highway/Trotter Avenue (unimproved)	HCM	EBL	0.0	A	0.0	A
6	SR-14 Southbound Ramps/ Backus Road	HCM	SBL	9.0	A	9.0	A
7	SR-14 Northbound Ramps/Backus Road	HCM	NBL	9.0	A	9.2	A
8	Sierra Highway/Backus Road	HCM	EBL	8.5	A	8.5	A
9	Sierra Highway/Sopp Road	HCM	WBL	9.1	A	9.4	A

HCM = Highway Capacity Manual
1 Delay in seconds per vehicle
2 Level of Service (LOS)

2.4.2 Existing Roadway Segment Conditions

A roadway segment LOS analysis was prepared for the existing conditions using the roadway segment LOS methodologies as discussed in Chapter 1. Table 5 shows the results of the existing conditions LOS analysis for the study roadway segments. As shown in the table, all of the study area roadway segments are currently operating at LOS A/B or better under existing conditions.

Table 5
Existing Daily Roadway Segment LOS

Roadway Segment	Configuration	LOS "D" ADT	Existing ADT[1]	Existing LOS[2]
Lone Butte Road -north of Trotter Avenue	2 Lane Undivided	13,800	765	A/B
United Street -Purdy Avenue and Reed Avenue	2 Lane Undivided	13,800	458	A/B
Sierra Highway -Silver Queen Road and Trotter Avenue	2 Lane Undivided	13,800	489	A/B
Holt Street -Purdy Avenue and Silver Queen Road	2 Lane Undivided	13,800	21	A/B
Purdy Avenue -east of SR 14	2 Lane Undivided	13,800	465	A/B
Oak Creek Road -near Westwind and Windhub Substations	2 Lane Undivided	13,800	1,530	A/B
SR-14 -north of Silver Queen Road -between Silver Queen Road and Backus Road	 4 lane Divided 4 lane Divided	 52,100 52,100	 15,700 15,900	 A/B A/B

Source: Dudek, ADT counts collected in 2017.
Note: LOS based is on FDOT 2009 Generalized Average Annual Daily Volumes for Rural Undeveloped Areas or Cities - Table 3 (Rural Undeveloped Areas)
1 ADT – Average Daily Traffic
2 LOS – Level of Service

3 TRIP GENERATION

This section documents the trip generation, distribution and assignment of construction-related project traffic associated with the proposed gen-tie route options.

3.1 Trip Generation

Trip generation estimates for the construction phase of the project were calculated based on the worst case/maximum traffic during construction of a gen-tie. The construction traffic includes the number of workers, and the amount of delivery and on-site truck traffic that would be generated to and from the site during the AM and PM peak hours. The construction activities will occur during daylight for approximately 10 hours over the weekdays, Monday through Friday. According to the applicant, construction along any of the gen-tie alignment options would require a maximum of 72 workers, 30 off-site delivery trucks (trucks delivering materials from off-site locations), and 30 on-site trucks (trucks delivering workers and/or materials between the staging areas and alignment work areas). Due to the remote location of the site, the proposed project will encourage workers to carpool to the site. Therefore, a carpool factor of 1.25 (i.e., 1.25 persons per vehicle) has been applied to the 72 workers. On-site and delivery truck traffic to and from the site would be evenly distributed over the 10 hour workday.

The calculation of project trip generation estimates is shown in Table 6. Passenger car equivalent (PCE) factors were used to account for the project’s truck traffic and provide a more realistic measurement in terms of the impact of project-related truck traffic.

Table 6
Project Trip Generation

Vehicle Type	Daily Quantity	Daily Trips	AM Peak Hour			PM Peak Hour		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Trip Generation								
Workers	72 workers	116	58	0	58	0	58	58
Delivery Trucks	30 Trucks	60	3	3	6	3	3	6
On-site Trucks	30 Trucks	60	3	3	6	3	3	6
Total		**236**	**64**	**6**	**70**	**6**	**64**	**70**
Trip Generation w/PCE								
Workers (1.0 PCE)[1]	72 workers	116	58	0	58	0	58	58
Delivery Trucks (3.0 PCE)[2]	30 Trucks	180	9	9	18	9	9	18
On-site Trucks (3.0 PCE)[3]	30 Trucks	180	9	9	18	9	9	18
Workers & Delivery Trucks (w/PCE)		*296*	*67*	*9*	*76*	*9*	*67*	*76*
On-site Trucks (w/PCE)		*180*	*9*	*9*	*18*	*9*	*9*	*18*
Total (w/PCE)		**476**	**76**	**18**	**94**	**18**	**76**	**94**

PCE – Passenger Car Equivalent
Note:
1 Car pool factor of 1.25 was utilized to estimate number of employee passenger cars that would be generated.
2 PCE factor of 3 was utilized for delivery trucks
3 PCE factor of 3 was utilized for on-site trucks

As shown in the table, the project would generate 236 daily trips, 70 AM peak hour trips (64 inbound and six outbound), and 70 PM peak hour trips (six inbound and 64 outbound). With the application of PCE factors to truck trips, the proposed project would generate 476 PCE daily trips, and 94 PCE trips during the AM peak hour (76 inbound and 18 outbound) and 94 PCE trips during the PM peak hour (18 inbound and 76 outbound).

3.2 Trip Distribution and Assignment

Project trips were distributed to the study area intersections and roadway segments using the regional location of the project, logical commute routes for workers, and available truck routes for project-related trucks.

A majority of construction-related project traffic for the proposed gen-tie route options will access the study area via SR-14 at its existing intersection with Backus Road. For construction of gen-tie routes west of SR-14, some of the traffic may access the work sites via SR-14 at its interchange with Silver Queen Road. The project traffic utilizing SR-14 will consist of all of the material and equipment delivery trucks, and construction workers accessing the site. Consistent with the 2013 RBF traffic study[1] prepared for the photovoltaic solar generation site, it was

1 Oro Verde Solar Project Traffic Impact Analysis, RBF Consulting, December 30, 2013

assumed that 15 percent of the traffic would access the project from the north (from the Ridgecrest, Barstow, and Victor Valley areas), and approximately 85 percent of the traffic would access the project from the south (greater Los Angeles area).

Project trips were assigned to the study area intersections by applying the project trip generation estimates to the trip distribution percentages at each study area intersection and roadway segments. The project trip distribution for workers, off-site delivery trucks, and on-site trucks is shown in Figure 4 for Option 1/Option 2; Figure 5 Option 1-A or 1-B for work areas east of SR-14; and, Figure 6 for Option 1-A or 1-B for work areas west of SR-14. Since the TIA analyzes the worst-case scenario for the gen-tie alignments, the project trip assignment shows the maximum trips that the proposed route option would have on any intersection or roadway segment in the study area.

The resulting project trip assignments are shown in Figure 7 for Option 1/Option 2, and Figure 8 for Option 1-A or 1-B.

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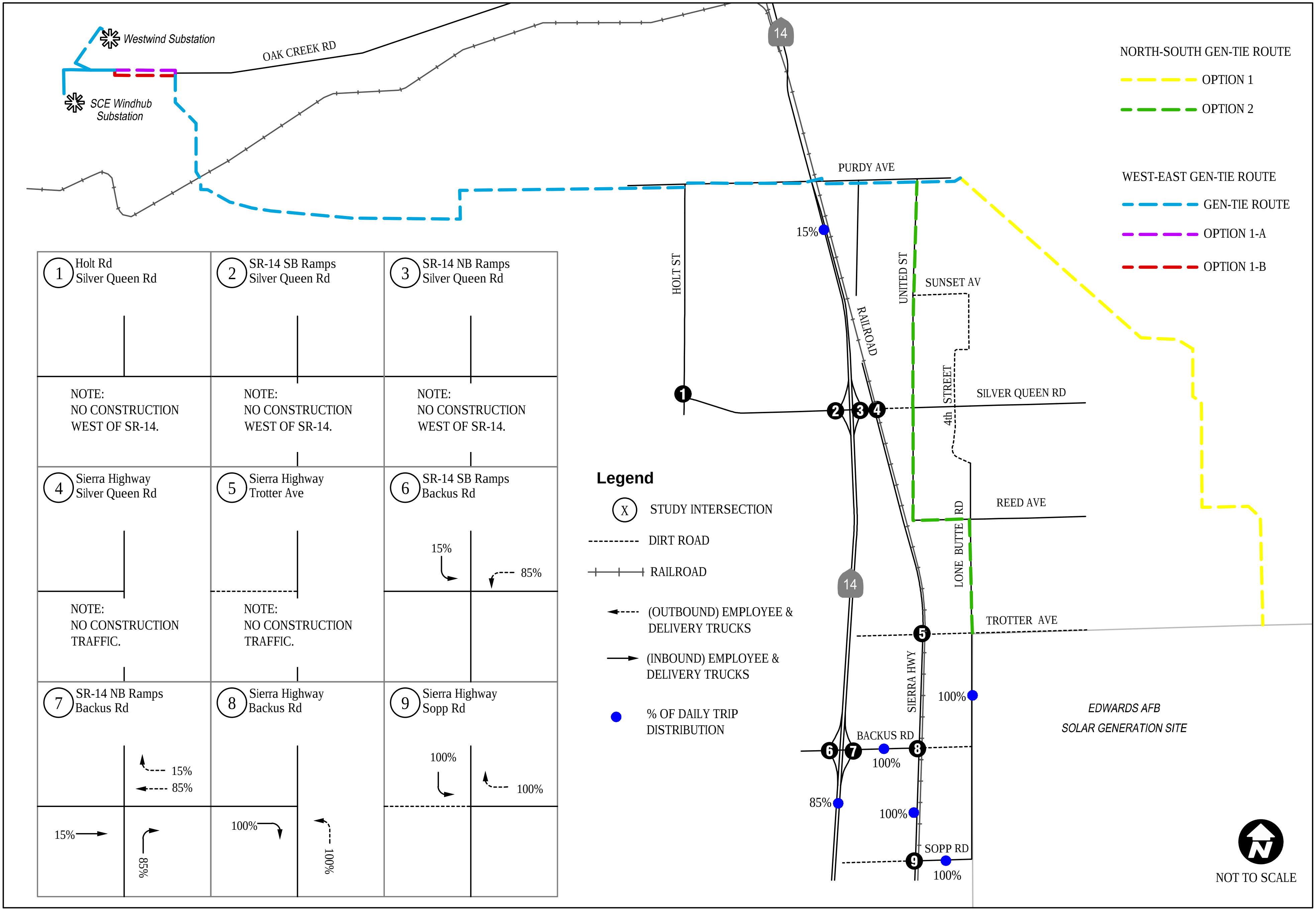

FIGURE 4

Project Trip Distribution - Option 1/Option 2

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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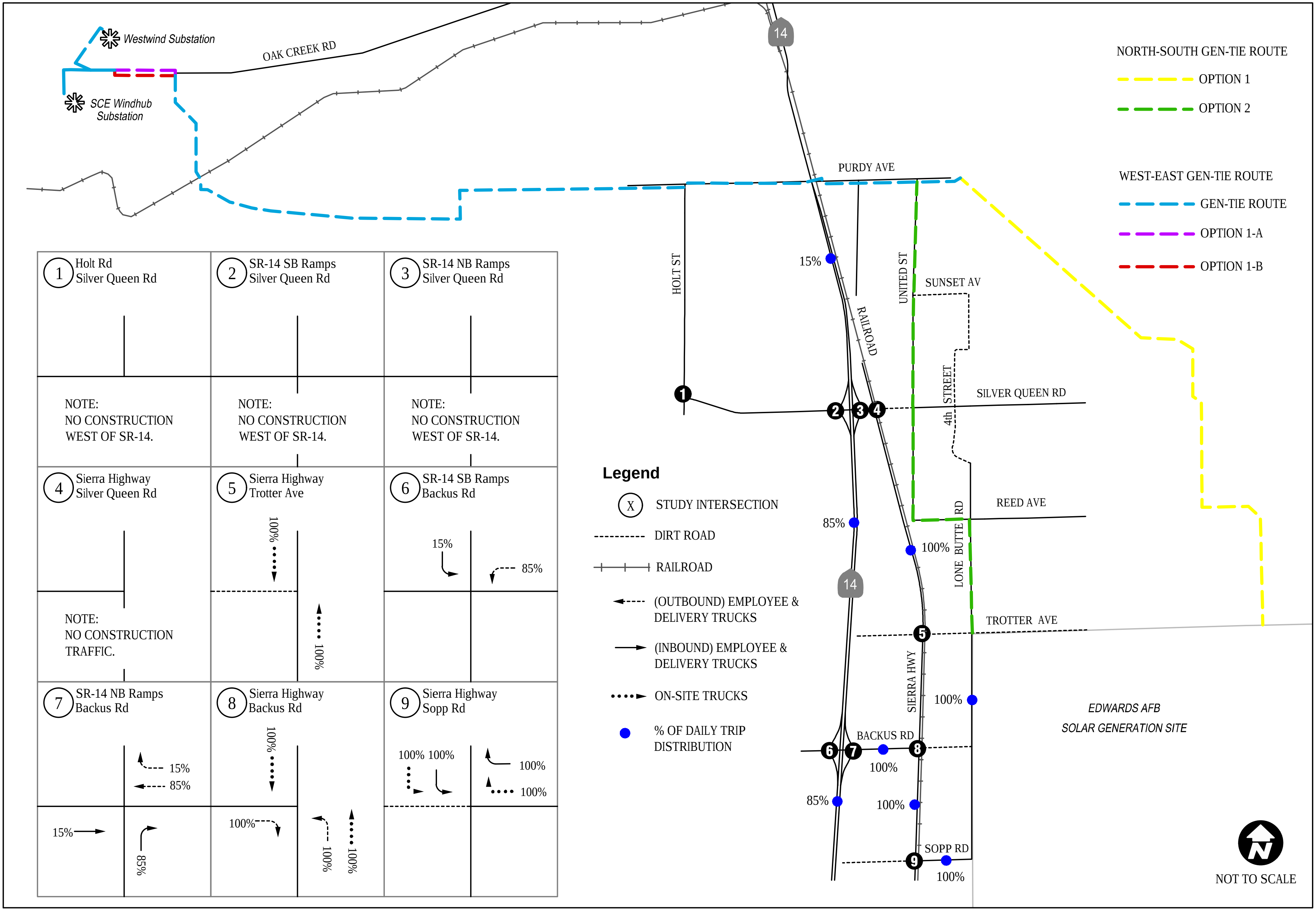

FIGURE 5

Project Trip Distribution - Option 1-A or 1-B (Work Areas East of SR-14)

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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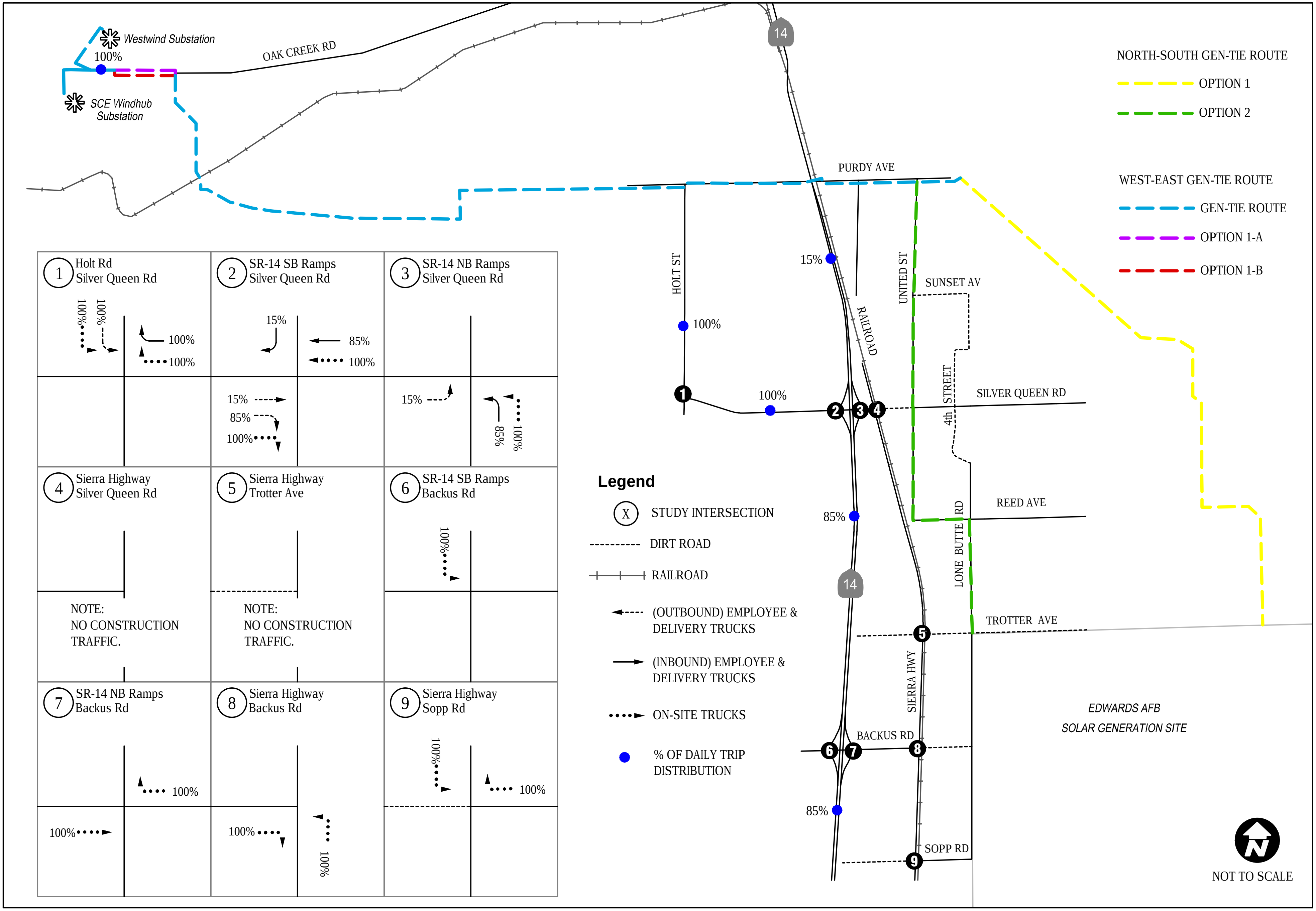

FIGURE 6

Project Trip Distribution - Option 1-A or 1-B (Work Areas West of SR-14)

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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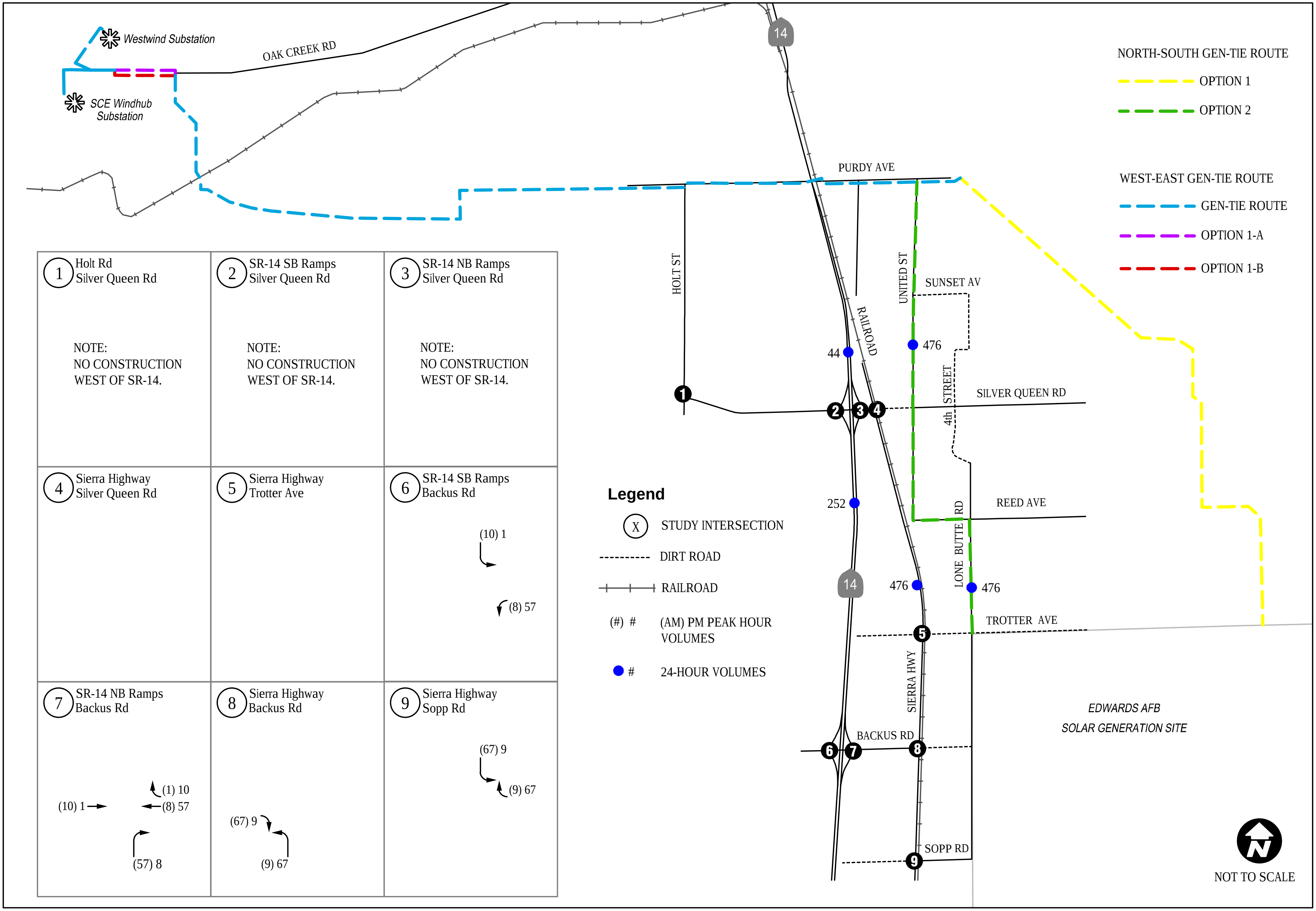

FIGURE 7

Project Trip Assignment - Option 1/Option 2

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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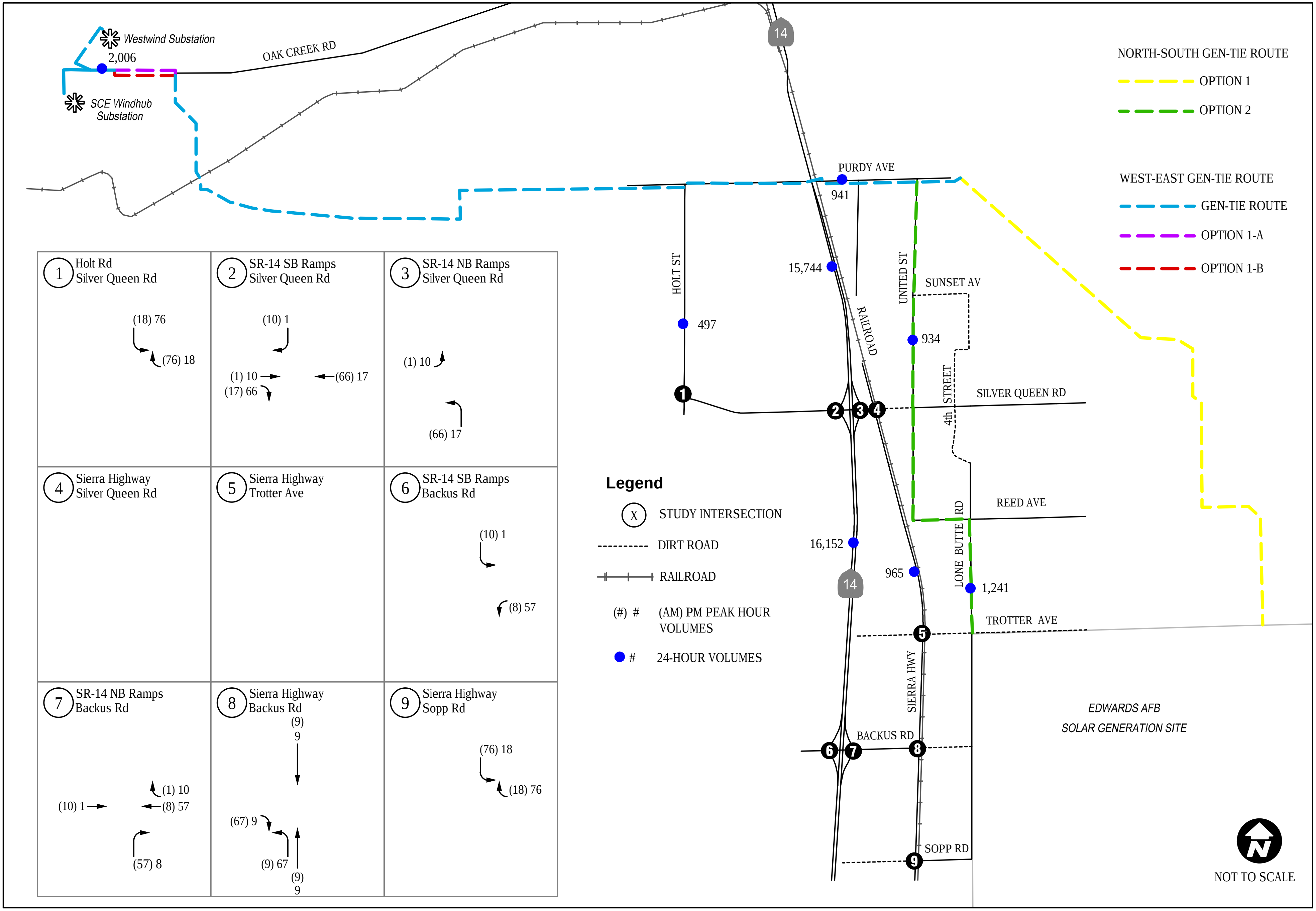

FIGURE 8

Project Trip Assignment - Option 1-A or 1-B

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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4 PROJECT IMPACTS

This section documents impacts on study area intersections and roadway segments related to construction-related project traffic associated with the proposed gen-tie route options under Existing plus Project (construction phase) conditions.

4.1 Traffic Volumes

Existing traffic volumes were collected in November 2017 and are shown in Figure 3. As shown under the existing conditions analysis, the traffic volumes in the study area are relatively low, and as such, no new growth is anticipated in the near term. Therefore, project impacts were calculated for the Existing plus Project (construction phase) options. However, as noted under construction schedule for the project, there would be an overlap during construction activities for the Edwards solar facility and gen-tie line for approximately nine months. Construction-related traffic for both the projects would mainly utilize SR-14 and its intersections with Backus Road, Sierra Highway/Backus Road intersection, and Backus Road/Sopp Road intersection to access the work sites. Therefore, under Existing plus Project options for all the gen-tie route options, construction traffic from the solar facility (approximately 550 workers/vehicles inbound during the AM and 550 workers/vehicles outbound during the PM peak hours) was added to the existing traffic volumes at these intersections to estimate the nine month overlap in construction activities at the solar facility and gen-tie routes. Additionally, daily construction traffic from the Edwards solar facility (i.e., workers and truck trips) were added to the segment of SR-14 between Silver Queen Road and Backus Road.

4.1.1 Existing plus Option 1/Option 2

The project trip assignments (in PCE) shown in Figure 7 (for Option 1/Option 2) for construction-related project traffic (workers, off-site delivery trucks, and on-site trucks), were added to the existing traffic volumes shown in Figure 3 to derive the Existing plus Option 1/Option 2 traffic volumes. Figure 9 illustrates the Existing plus Option 1/Option 2 traffic volumes that were used to evaluate Existing plus Option 1/Option 2 traffic conditions.

4.1.2 Existing plus Option 1-A or 1-B

Similarly, the project trip assignments (in PCE) shown in Figure 8 (for Option 1-A or 1-B) for construction-related project traffic (workers, off-site delivery trucks, and on-site trucks), were added to the existing traffic volumes shown in Figure 3 to derive the Existing plus Option 1-A or 1B traffic volumes. Figure 10 illustrates the Existing plus Option 1-A or 1B traffic volumes that were used to evaluate Existing plus Option 1-A or 1B traffic conditions.

4.2 Intersection Operations

An intersection operations analysis was conducted for the study area to evaluate the Existing plus Option 1/Option 2 and Existing plus Option 1-A or 1-B weekday AM and PM peak hour conditions. Intersection operations were calculated using the LOS methodology described in Chapter 1. The following presents the results of the project analysis.

4.2.1 Existing plus Option 1/Option 2

Table 7 shows the results of the Existing plus Option 1/Option 2 LOS analysis and provides a comparison to the existing (without project) conditions for the weekday peak hours using HCM methodology for unsignalized intersections and Caltrans jurisdiction intersections. Detailed LOS worksheets are included in Appendix B. Based on the appropriate significance criteria, with the exception of Sierra Highway/Sopp Road intersection, all study area intersections are forecast to continue to operate at LOS D or better with the addition of the construction-related project traffic with gen-tie route Option 1 or Option 2. The Sierra Highway/Sopp Road intersection is forecast to operate at LOS F during the AM peak hour and at LOS D during the PM peak hour under Existing plus Option 1/Option 2 conditions.

It should be noted that the Sierra Highway/Sopp Road intersection would operate under LOS F conditions due to the construction traffic generated from both the solar facility and gen-tie line. This represents a worst-case scenario that would occur for a temporary period. Therefore, the construction traffic management mitigation measure required for the solar facility as previously noted in the RBF traffic impact study[2] has also been recommended for the gen-tie line during the nine-month overlap of solar facility and gen-tie line construction activities. Section 5 below, outlines the details of the construction traffic management mitigation measure.

[2] Oro Verde Solar Project Traffic Impact Analysis, RBF Consulting, December 30, 2013

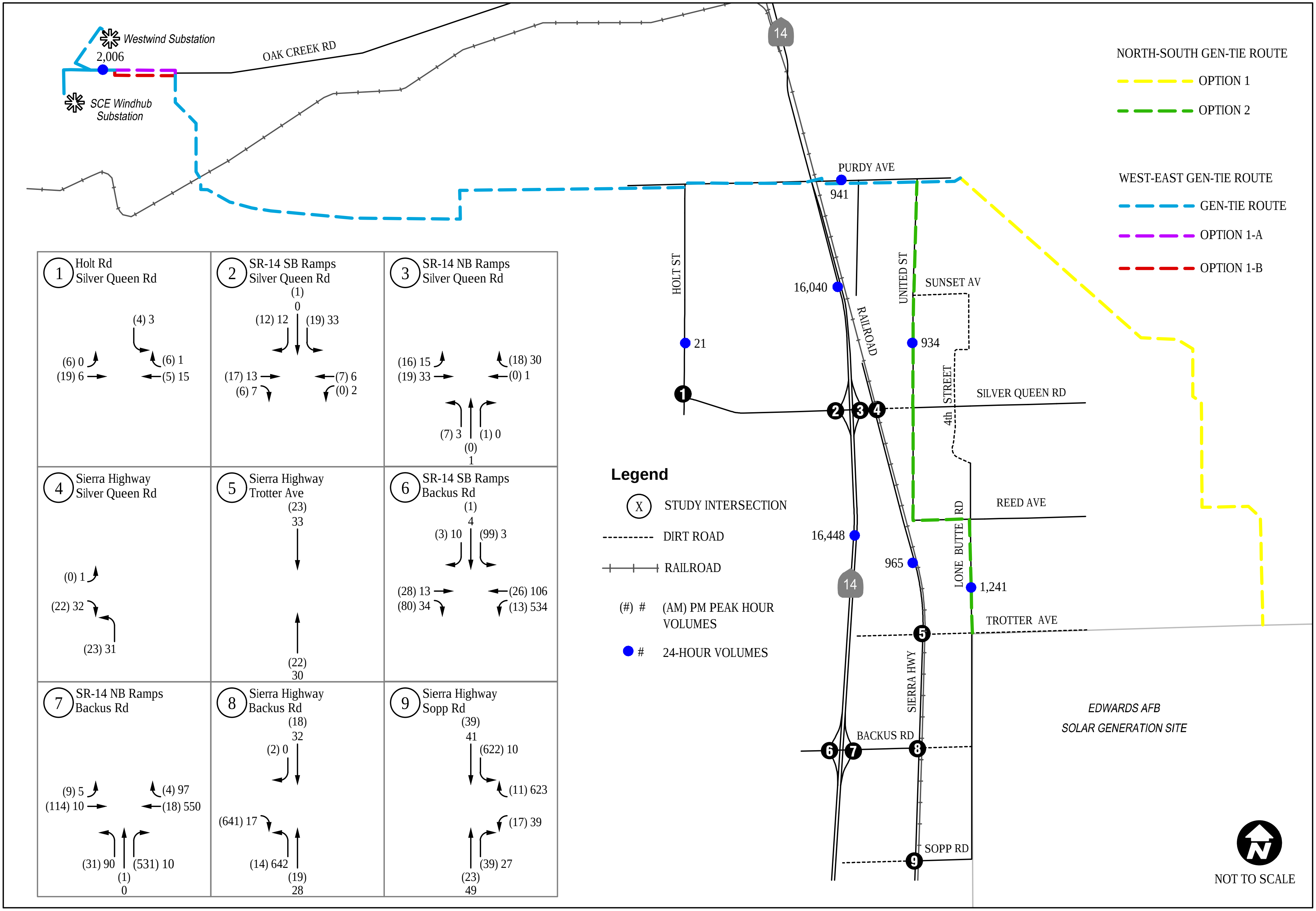

FIGURE 9

Existing Plus Option 1/Option 2 Traffic Volumes

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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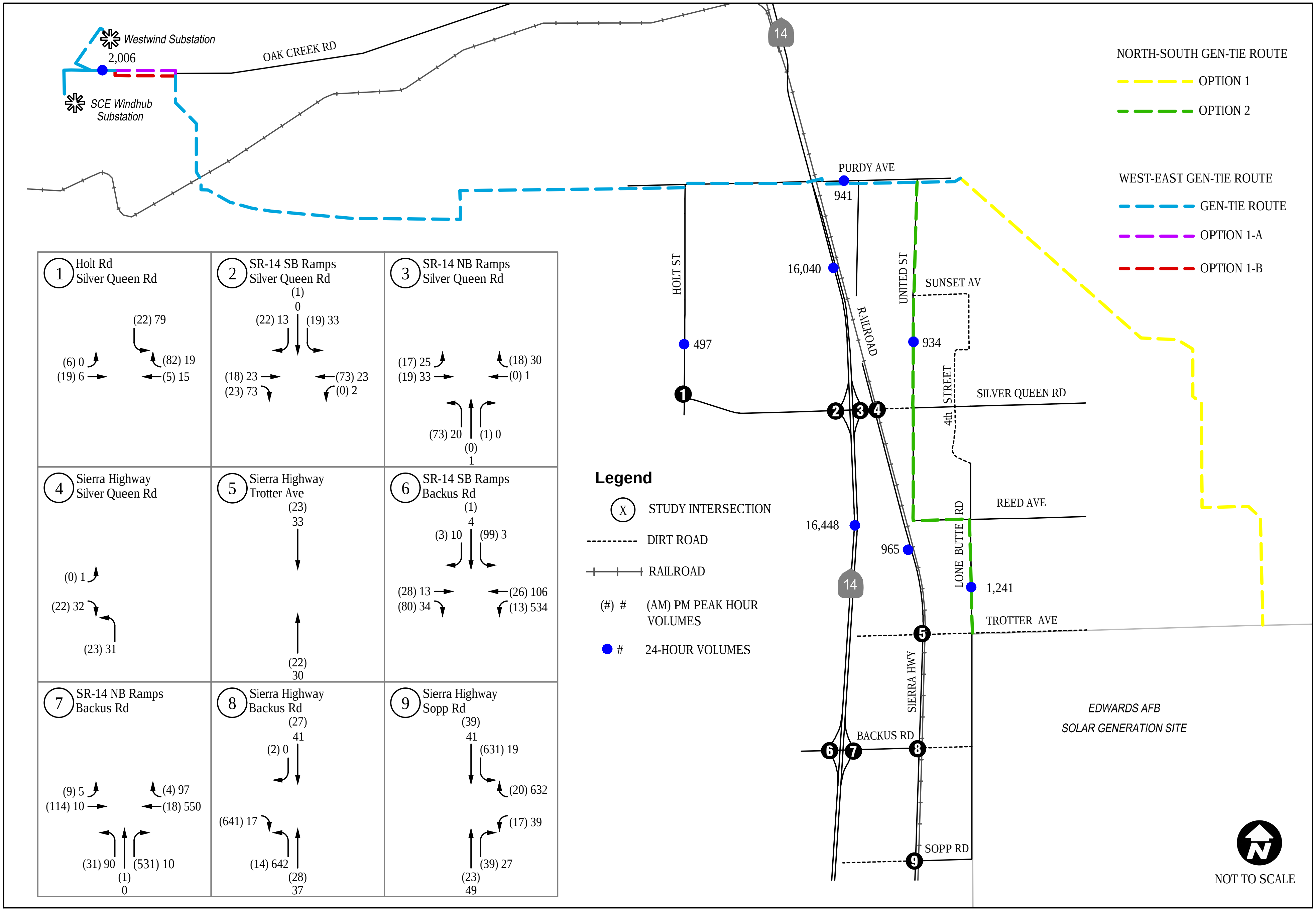

FIGURE 10

Existing Plus Option 1-A or 1-B Traffic Volumes

Traffic Impact Analysis Gen-Tie Routes for Edwards Air Force Base (AFB) Solar Enhanced Use Lease (EUL) Project

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4.2.2 Existing plus Option 1-A or 1-B

Table 8 shows the results of the Existing plus Option 1-A or 1-B LOS analysis and provides a comparison to the existing (without project) conditions for the weekday peak hours using HCM methodology for unsignalized intersections and Caltrans jurisdiction intersections. Detailed LOS worksheets are included in Appendix B. Based on the appropriate significance criteria, with the exception of Sierra Highway/Sopp Road intersection, all study area intersections are also forecast to continue to operate at LOS D or better with the addition of the construction-related project traffic with gen-tie route Option 1A or 1B. The Sierra Highway/Sopp Road intersection is also forecast to operate at LOS F during the AM peak hour and LOS D during the PM peak hour under Existing plus Option 1-A or 1-B conditions. The same construction traffic management mitigation measure discussed for Option 1/Option 2 above would also be required for Option 1-A or 1-B. Section 5 below, outlines the details of the construction traffic management mitigation measure.

During construction of Option 1-A or 1-B, in addition to the intersections analyzed in Table 8, construction-related activities associated with this option may cross SR-14, along the south side of Purdy Avenue. It is anticipated that construction activities across SR-14 would have a relatively short duration. Construction-related activities across SR-14, and any other State highway facilities, will be required to be conducted consistent with the Caltrans Encroachment Permit process.

The existing at-grade intersection of SR-14/Purdy Road has clear lines of sight in all directions; relatively long left-turn/deceleration lanes in both directions on SR-14 (620 feet in the northbound direction, and 560 feet in the southbound direction); and, wide shoulders on SR-14 in both directions (15-20 feet wide shoulders, with 10 feet of paved width and 5-10 feet of soft shoulder). In addition, since the traffic volumes in the study area are low, construction-related traffic would not have an adverse impact on the operations and LOS at the SR-14/Purdy Avenue intersection.

Table 7
Existing plus Option 1/Option 2 Peak Hour Intersection LOS

No.	Intersection	LOS Method	Critical Movement	Existing				Existing plus Option1/Option2				Significant Impact?	
				AM Peak		*PM Peak*		*AM Peak*		*PM Peak*			
				Delay[1]	*LOS[2]*	*Delay[1]*	*LOS[2]*	*Delay[1]*	*LOS[2]*	*Delay[1]*	*LOS[2]*	*AM*	*PM*
1.	Holt Road/Silver Queen Road	HCM	SBL	8.9	A	8.7	A	8.9	A	8.7	A	No	No
2	SR-14 Southbound Ramps/Silver Queen Road	HCM	SBL	8.7	A	8.8	A	8.7	A	8.8	A	No	No
3	SR-14 Northbound Ramps/Silver Queen Road	HCM	NBL	9.1	A	9.1	A	9.1	A	9.1	A	No	No
4	Sierra Highway/Silver Queen Road	HCM	EBL	8.4	A	8.5	A	8.4	A	8.5	A	No	No
5	Sierra Highway/Trotter Avenue (unimproved)	HCM	WBL	0.0	A	0.0	A	0.0	A	0.0	A	No	No
6	SR-14 Southbound Ramps/ Backus Road	HCM	SBL	9.0	A	9.0	A	10.1	B	16.3	C	No	No
7	SR-14 Northbound Ramps/Backus Road	HCM	NBL	9.0	A	9.2	A	28.2	D	16.4	C	No	No
8	Sierra Highway/Backus Road	HCM	EBL	8.5	A	8.5	A	17.1	C	8.5	A	No	No
9	Sierra Highway/Sopp Road	HCM	WBL	9.1	A	9.4	A	**59.3**	**F**	25.6	D	**Yes**	No

HCM = Highway Capacity Manual
1 Delay in seconds per vehicle
2 Level of Service (LOS)

Table 8
Existing plus Option 1-A or 1-B Peak Hour Intersection Level of Service

				Existing				Existing plus Option 1-A or 1-B				Significant Impact?	
				AM Peak		*PM Peak*		*AM Peak*		*PM Peak*			
No.	**Intersection**	**LOS Method**	**Critical Movement**	*Delay*[1]	*LOS*[2]	*Delay*[1]	*LOS*[2]	*Delay*[1]	*LOS*[2]	*Delay*[1]	*LOS*[2]	*AM*	*PM*
1	Holt Road/Silver Queen Road	HCM	SBL	8.9	A	8.7	A	9.3	A	9.1	A	No	No
2	SR-14 Southbound Ramps/ Silver Queen Road	HCM	SBL	8.7	A	8.8	A	9.3	A	9.2	A	No	No
3	SR-14 Northbound Ramps/ Silver Queen Road	HCM	NBL	9.1	A	9.1	A	9.8	A	9.3	A	No	No
4	Sierra Highway/ Silver Queen Road	HCM	EBL	8.4	A	8.5	A	8.4	A	8.5	A	No	No
5	Sierra Highway/ Trotter Avenue (unimproved)	HCM	WBL	0.0	A	0.0	A	0.0	A	0.0	A	No	No
6	SR-14 Southbound Ramps/ Backus Road	HCM	SBL	9.0	A	9.0	A	10.1	B	16.3	C	No	No
7	SR-14 Northbound Ramps/Backus Road	HCM	NBL	9.0	A	9.2	A	28.2	D	16.4	C	No	No
8	Sierra Highway/Backus Road	HCM	EBL	8.5	A	8.5	A	17.8	C	8.6	A	No	No
9	Sierra Highway/Sopp Road	HCM	WBL	9.1	A	9.4	A	**50.0**	**F**	27.0	D	**Yes**	No

HCM = Highway Capacity Manual
1 Delay in seconds per vehicle
2 Level of Service (LOS)

4.3 Roadway Segment Analysis/Operations

An average daily traffic (ADT) roadway segment LOS analysis was conducted for the study area to evaluate the Existing plus Option 1/Option 2, and Existing plus Option 1-A or 1-B for 24-hour roadway capacity conditions. The study area roadway segments were analyzed using the FDOT methodology described in Chapter 1. The following presents the results of the project analysis.

4.3.1 Existing plus Option 1/Option 2

Table 9 shows the results of the Existing plus Option 1/Option 2 LOS analysis and provides a comparison to the existing (without project) conditions for average daily traffic volumes. Based on the appropriate significance criteria, all roadway segments are forecast to continue to operate at LOS A/B (combined LOS in FDOT methodology) or better with the addition of the construction-related project traffic with gen-tie route Option 1 or Option 2.

4.3.2 Existing plus Option 1-A or 1-B

Table 10 shows the results of the Existing plus Option 1-A or 1-B LOS analysis and provides a comparison to the existing (without project) conditions for average daily traffic volumes. Based on the appropriate significance criteria, all roadway segments are forecast to continue to operate at LOS A/B or better with the addition of the construction-related project traffic with gen-tie route Option 1A or 1B.

Table 9
Existing plus Option 1/Option 2 Roadway Segment Level of Service

Roadway Segment	Configuration	LOS "D" ADT	*Existing ADT*[1]	*Existing LOS*[2]	*Option 1/2 Project Traffic*	*Existing plus Option 1/2 ADT*[1]	*Existing plus Option 1/2 LOS*[2]
Lone Butte Road							
-north of Trotter Avenue	2 Lane Undivided	13,800	765	A/B	476	1,241	A/B
United Street							
-Purdy Avenue and Reed Avenue	2 Lane Undivided	13,800	458	A/B	476	934	A/B
Sierra Highway							
-Silver Queen Road and Trotter Avenue	2 Lane Undivided	13,800	489	A/B	476	965	A/B
Holt Street							
-Purdy Avenue and Silver Queen Road	2 Lane Undivided	13,800	21	A/B	0	21	A/B
Purdy Avenue							
-east of SR 14	2 Lane Undivided	13,800	465	A/B	476	941	A/B
Oak Creek Road							
-near Westwind and Windhub Substations	2 Lane Undivided	13,800	1,530	A/B	476	2,006	A/B
SR-14							
-north of Silver Queen Road	4 lane Divided	52,100	15,996	A/B	44	16,040	A/B
- between Silver Queen Road and Backus Road	4 lane Divided	52,100	16,196	A/B	252	16,448	A/B

Source: Dudek 2018
Note: LOS based is on FDOT 2009 Generalized Average Annual Daily Volumes for Rural Undeveloped Areas and Cities - Table 3
1 ADT – Average Daily Traffic
2 LOS – Level of Service

Table 10
Existing plus Option 1-A or 1B Roadway Segment Level of Service

Roadway Segment	Configuration	LOS "D" ADT	Existing ADT[1]	Existing LOS[2]	Option 1-A or 1B Project Traffic	Existing plus Option 1-A or 1B ADT[1]	Existing plus Option 1-A or 1B LOS[2]
Lone Butte Road							
-north of Trotter Avenue	2 Lane Undivided	13,800	765	A/B	476	1,241	A/B
United Street							
-Purdy Avenue and Reed Avenue	2 Lane Undivided	13,800	458	A/B	476	934	A/B
Sierra Highway							
-Silver Queen Road and Trotter Avenue	2 Lane Undivided	13,800	489	A/B	476	965	A/B
Holt Street							
-Purdy Avenue and Silver Queen Road	2 Lane Undivided	13,800	21	A/B	476	497	A/B
Purdy Avenue							
-east of SR 14	2 Lane Undivided	13,800	465	A/B	476	941	A/B
Oak Creek Road							
-near Westwind and Windhub Substations	2 Lane Undivided	13,800	1,530	A/B	476	2,006	A/B
SR-14							
-north of Silver Queen Road	4 lane Divided	52,100	15,996	A/B	44	16,040	A/B
- between Silver Queen Road and Backus Road	4 lane Divided	52,100	16,196	A/B	252	16,448	A/B

Source: Dudek 2018
Note: LOS based is on FDOT 2009 Generalized Average Annual Daily Volumes for Rural Undeveloped Areas and Cities - Table 3
1 ADT – Average Daily Traffic
2 LOS – Level of Service

5 MITIGATION MEASURES

As shown in the TIA, all the study area intersections and roadway segments are operating at acceptable level of service under existing conditions. The level of service analysis provided above demonstrates that with the maximum level of construction-related traffic added to the study area. With the exception of Sierra Highway/Sopp Road intersection, the projected LOS for the study area intersections and roadway segments would not be significantly impacted by the proposed project.

The Sierra Highway/Sopp Road intersection is forecast to operate at LOS F during the AM peak hour and LOS D during the PM peak hour under Existing plus Option 1, 2, 1-A and 1-B conditions. Consistent with the construction traffic management mitigation measure required for the photovoltaic solar generation site (i.e., solar facility), as outlined in the RBF traffic study[3], following mitigation measure is also proposed for the Sierra Highway/Sopp Road intersection.

MM TRAF-1 **Sierra Highway/Sopp Road** – The Sierra Highway/ Sopp Road intersection shall utilize a trained and qualified traffic flagger for the duration of project construction. The traffic flagger shall be in place for at least one hour at the beginning of each staggered work shift. With implementation of this mitigation measure, the Sierra Highway/ Sopp Road intersection will operate at an acceptable LOS C during both the peak hours. Appendix B includes worksheet for mitigated LOS at this intersection.

According to the Kern County and Caltrans significance criteria, the construction-related traffic from all the gen-tie routes proposed project would not create significant traffic impacts to all other study area intersections and roadway segments under the Existing plus Options 1, 2, 1-A or 1-B conditions.

However, the construction of the selected route option would result in a temporary impact on the existing transportation system in the study area. This would primarily be due to the need for potential lane closures along roadway segments and at intersections. Per the applicant, road closures are anticipated to be minimal, only for pole installation as well as stringing and tensioning of segments, and would be localized. Roads would stay open and a safety crew member would stop or direct traffic at specific locations where construction is ongoing. Therefore, such general mitigation measures would be undertaken to reduce these temporary impacts resulting from the construction-related traffic and lane closures. These general mitigation measures would be identified in a Construction Traffic Management Plan.

3 Oro Verde Solar Project Traffic Impact Analysis, RBF Consulting, December 30, 2013

The Construction Traffic Management Plan would include but not necessarily be limited to the following:

- Temporary traffic control devices in accordance with Caltrans' California Manual on Uniform Traffic Control Device (CAMUTCD), and notification to the Kern County Public Works Department to identify locations/sections along gen-tie line where construction is ongoing. This may include slow-moving-vehicle warning signs, signage to warn of merging trucks, barriers for separating construction and non-construction traffic, use of traffic control flagmen, and any additional measures required for the sole convenience of safely passing non-construction traffic through and around construction areas. Some parts of the gen-tie alignment will occur adjacent to existing roadways where extra precautions will be necessary to provide for the safe passage of non-construction traffic.
- Scheduling of heavy truck traffic, hauling materials and equipment to the site, during non-peak periods to the maximum extent possible. Scheduling of worker shift changes so as not to coincide with existing background traffic peak periods if feasible.
- Establish procedures for coordinating with local emergency response agencies to ensure dissemination of information regarding emergency response vehicle routes affected by construction activities.
- Encourage carpooling among workers to reduce worker commute trips entering and exiting the study area.

6 FINDINGS AND RECOMMENDATIONS

Based on the results of the traffic analysis in this TIA, the following summarizes the traffic impacts of the proposed gen-tie route options for the Edwards AFB Solar EUL. General findings include:

- The project would generate 236 daily trips, 70 AM peak hour trips (64 inbound and six outbound), and 70 PM peak hour trips (six inbound and 64 outbound). With the application of PCE factors to truck trips and a car pool factor of 1.25 for workers, the proposed project would generate 476 PCE daily trips, and 94 PCE trips during the AM peak hour (76 inbound and 18 outbound) and 94 PCE trips during the PM peak hour (18 inbound and 76 outbound).
- All of the study area intersections and roadway segments currently operate at LOS A (intersections) or LOS A/B (roadway segments) under existing conditions during both the peak hour and daily traffic conditions.
- With the exception of Sierra Highway/Sopp Road intersection all other study area intersections and roadway segments would operate at LOS D or better (intersections) and LOS A/B (roadway segments) during both the peak hours and daily traffic conditions under all the project options (Options 1, 2, 1-A and 1-B) analyzed in the TIA.
- The Sierra Highway/Sopp Road intersection shall utilize a trained and qualified traffic flagger for the duration of project construction. The traffic flagger shall be in place for at least one hour at the beginning of each staggered work shift. With implementation of mitigation measure, the Sierra Highway/ Sopp Road intersection will operate at an acceptable LOS C during both the peak hours.
- During construction of Option 1-A or 1-B, in addition to the intersections analyzed, construction-related activities associated with this option may cross SR-14, along the south side of Purdy Avenue. Construction-related activities across SR-14, and any other State highway facilities, will be conducted consistent with the Caltrans Encroachment Permit process. Based on the adequate existing geometry at SR-14/Purdy Avenue, and since the traffic volumes in the study area are low, construction-related traffic would not have an adverse impact on the operations and LOS at the SR-14/Purdy Avenue intersection.
- General mitigation measures would be identified in a Construction Traffic Management Plan to reduce temporary impacts resulting from the construction-related traffic and lane closures associated with the gen-tie line installation.

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APPENDIX A

Traffic Counts

National Data & Surveying Services Intersection Turning Movement Count

Location: Holt St & Silver Queen Rd
City: Mojave
Control: No Control

Project ID: 17-08110-005
Date: 11/14/2017

Total

NS/EW Streets:	Holt St				Holt St				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	1	0	0	0	0	2	0	0	0	3	2	0	8
7:15 AM	0	0	0	0	1	0	0	0	0	8	0	0	0	1	2	0	12
7:30 AM	0	0	0	0	1	0	0	0	1	9	0	0	0	1	2	0	14
7:45 AM	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	4
8:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
8:30 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	2	0	5
8:45 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	5	0	0	0	4	25	0	0	0	7	8	0	49
APPROACH %'s :					100.00%	0.00%	0.00%	0.00%	13.79%	86.21%	0.00%	0.00%	0.00%	46.67%	53.33%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	4	0	0	0	4	19	0	0	0	5	6	0	38
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.333	0.528	0.000	0.000	0.000	0.417	0.750	0.000	0.679
					1.000				0.575				0.550				

	Holt St				Holt St				Silver Queen Rd				Silver Queen Rd				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2	0	9
4:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4
4:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4
4:45 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	4	1	0	7
5:00 PM	0	0	0	0	2	0	0	0	0	2	0	0	0	2	0	0	6
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4
5:30 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	8
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	3	0	0	0	0	11	0	0	0	29	3	0	46
APPROACH %'s :					100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	90.63%	9.38%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	3	0	0	0	0	6	0	0	0	15	1	0	25
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.625	0.250	0.000	0.781
					0.375				0.750				0.667				

National Data & Surveying Services **Intersection Turning Movement Count**

Location: Holt St & Silver Queen Rd
City: Mojave
Control: No Control

Project ID: 17-08110-005
Date: 11/14/2017

PV

NS/EW Streets:	Holt St				Holt St				Silver Queen Rd				Silver Queen Rd				
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	1	0	0	0	0	2	0	0	0	3	2	0	8
7:15 AM	0	0	0	0	1	0	0	0	0	8	0	0	0	1	2	0	12
7:30 AM	0	0	0	0	1	0	0	0	1	9	0	0	0	1	2	0	14
7:45 AM	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
8:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
8:30 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	2	0	5
8:45 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	5	0	0	0	2	25	0	0	0	7	8	0	47
APPROACH %'s :					100.00%	0.00%	0.00%	0.00%	7.41%	92.59%	0.00%	0.00%	0.00%	46.67%	53.33%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	4	0	0	0	2	19	0	0	0	5	6	0	36
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.500	0.528	0.000	0.000	0.000	0.417	0.750	0.000	0.643
					1.000				0.525				0.550				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	4	2	0	9
4:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4
4:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4
4:45 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	4	1	0	7
5:00 PM	0	0	0	0	2	0	0	0	0	2	0	0	0	2	0	0	6
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	4
5:30 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	0	8
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	3	0	0	0	0	11	0	0	0	29	3	0	46
APPROACH %'s :					100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	90.63%	9.38%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	3	0	0	0	0	6	0	0	0	15	1	0	25
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.625	0.250	0.000	0.781
					0.375				0.750				0.667				

National Data & Surveying Services Intersection Turning Movement Count

Location: Holt St & Silver Queen Rd
City: Mojave
Control: No Control

Project ID: 17-08110-005
Date: 11/14/2017

MT

NS/EW Streets:	Holt St				Holt St				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
APPROACH %'s :									100.00%	0.00%	0.00%	0.00%					
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
									0.250								

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

National Data & Surveying Services **Intersection Turning Movement Count**

Location: Holt St & Silver Queen Rd
City: Mojave
Control: No Control

Project ID: 17-08110-005
Date: 11/14/2017

HT

NS/EW Streets:	Holt St				Holt St				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Prepared by National Data & Surveying Services

Holt St & Silver Queen Rd

Peak Hour Turning Movement Count

ID: 17-08110-005
City: Mojave

Day: Tuesday
Date: 11/14/2017

PEAK HOURS		COUNT PERIODS
AM	07:00 AM - 08:00 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Holt St — SOUTHBOUND

	Right	Through	Left	U-Turn	Departing
AM	0	0	4	0	10
NOON	0	0	0	0	0
PM	0	0	3	0	1
Bikes	0	1	0	0	

Silver Queen Rd — EASTBOUND

	AM	NOON	PM	Bikes
Departing	5	0	15	
U-Turn	0	0	0	0
Left	4	0	0	0
Through	19	0	6	1
Right	0	0	0	0

Silver Queen Rd — WESTBOUND

	Bikes	PM	NOON	AM
Right	0	1	0	6
Through	1	15	0	5
Left	0	0	0	0
U-Turn	0	0	0	0
Departing		9	0	23

Holt St — NORTHBOUND

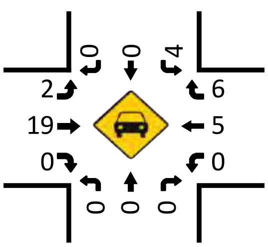
	Departing	U-Turn	Left	Through	Right
Bikes		0	0	0	0
PM	0	0	0	0	0
NOON	0	0	0	0	0
AM	0	0	0	0	0

CONTROL

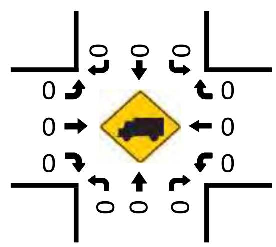
No Control

	AM	NOON	PM
TEV	38	0	25
PHF	0.68		0.78

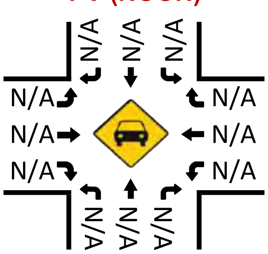
PV (AM)



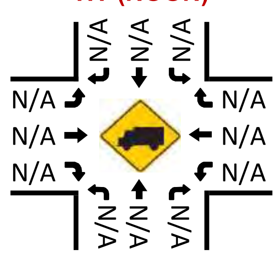
HT (AM)



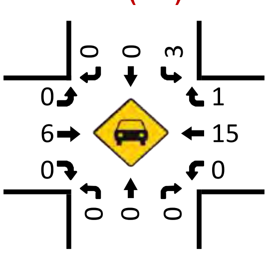
PV (NOON)



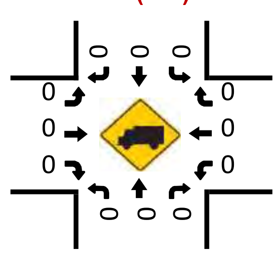
HT (NOON)



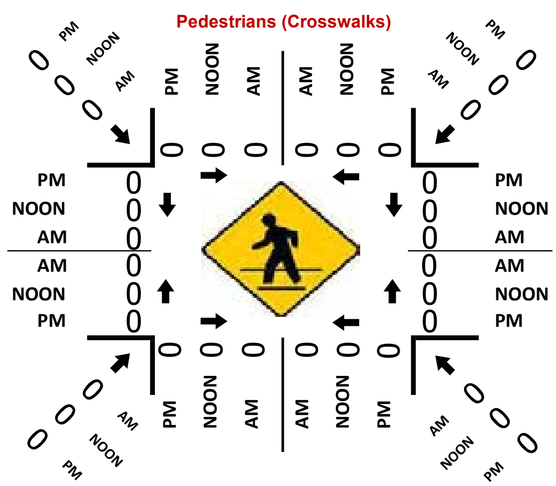
PV (PM)



HT (PM)



Pedestrians (Crosswalks)



National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-004
Date: 11/14/2017

Total

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	2	0	7	0	0	3	1	0	0	4	0	0	17
7:15 AM	0	0	0	0	4	0	2	0	0	4	0	0	0	1	0	0	11
7:30 AM	0	0	0	0	6	0	1	0	0	9	4	0	0	2	0	0	22
7:45 AM	0	0	0	0	6	1	1	0	0	1	1	0	0	0	0	0	10
8:00 AM	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	7
8:15 AM	0	0	0	0	2	0	0	0	0	1	0	0	0	1	0	0	4
8:30 AM	0	0	0	0	7	0	2	0	0	3	1	0	0	0	0	0	13
8:45 AM	0	0	0	0	5	0	1	0	0	0	0	0	0	1	0	0	7
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	37	1	14	0	0	23	7	0	0	9	0	0	91
APPROACH %'s :					71.15%	1.92%	26.92%	0.00%	0.00%	76.67%	23.33%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	18	1	11	0	0	17	6	0	0	7	0	0	60
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.750	0.250	0.393	0.000	0.000	0.472	0.375	0.000	0.000	0.438	0.000	0.000	0.682
					0.833				0.442				0.438				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	3	1	1	0	0	4	0	0	0	1	0	0	10
4:15 PM	0	0	0	0	4	0	4	0	0	5	0	0	0	1	0	1	15
4:30 PM	0	0	0	0	11	0	4	0	0	4	2	0	0	1	0	0	22
4:45 PM	0	0	0	0	12	0	3	0	0	2	3	0	0	1	0	0	21
5:00 PM	0	0	0	0	6	0	1	0	0	2	2	0	1	0	0	0	12
5:15 PM	0	0	0	0	3	0	3	0	0	4	2	0	0	0	0	0	12
5:30 PM	0	0	0	0	5	1	4	0	0	8	4	0	0	0	0	0	22
5:45 PM	0	0	0	0	5	0	4	0	0	0	0	0	0	2	0	0	11
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	49	2	24	0	0	29	13	0	1	6	0	1	125
APPROACH %'s :					65.33%	2.67%	32.00%	0.00%	0.00%	69.05%	30.95%	0.00%	12.50%	75.00%	0.00%	12.50%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	33	0	12	0	0	13	7	0	1	3	0	1	70
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.688	0.000	0.750	0.000	0.000	0.650	0.583	0.000	0.250	0.750	0.000	0.250	0.795
					0.750				0.833				0.625				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-004
Date: 11/14/2017

PV

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	2	0	6	0	0	3	1	0	0	4	0	0	16
7:15 AM	0	0	0	0	4	0	2	0	0	4	0	0	0	1	0	0	11
7:30 AM	0	0	0	0	5	0	1	0	0	9	4	0	0	2	0	0	21
7:45 AM	0	0	0	0	6	1	1	0	0	1	1	0	0	0	0	0	10
8:00 AM	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	7
8:15 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	3
8:30 AM	0	0	0	0	6	0	2	0	0	2	1	0	0	0	0	0	11
8:45 AM	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	5
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	33	1	13	0	0	22	7	0	0	8	0	0	84
APPROACH %'s :					70.21%	2.13%	27.66%	0.00%	0.00%	75.86%	24.14%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	17	1	10	0	0	17	6	0	0	7	0	0	58
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.708	0.250	0.417	0.000	0.000	0.472	0.375	0.000	0.000	0.438	0.000	0.000	0.690
					0.875				0.442				0.438				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	3	0	1	0	0	4	0	0	0	1	0	0	9
4:15 PM	0	0	0	0	4	0	4	0	0	5	0	0	0	1	0	1	15
4:30 PM	0	0	0	0	11	0	4	0	0	4	2	0	0	1	0	0	22
4:45 PM	0	0	0	0	12	0	3	0	0	2	3	0	0	1	0	0	21
5:00 PM	0	0	0	0	6	0	1	0	0	2	2	0	1	0	0	0	12
5:15 PM	0	0	0	0	2	0	3	0	0	4	2	0	0	0	0	0	11
5:30 PM	0	0	0	0	4	0	4	0	0	8	4	0	0	0	0	0	20
5:45 PM	0	0	0	0	4	0	4	0	0	0	0	0	0	2	0	0	10
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	46	0	24	0	0	29	13	0	1	6	0	1	120
APPROACH %'s :					65.71%	0.00%	34.29%	0.00%	0.00%	69.05%	30.95%	0.00%	12.50%	75.00%	0.00%	12.50%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	33	0	12	0	0	13	7	0	1	3	0	1	70
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.688	0.000	0.750	0.000	0.000	0.650	0.583	0.000	0.250	0.750	0.000	0.250	0.795
					0.750				0.833				0.625				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-004
Date: 11/14/2017

MT

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	5
APPROACH %'s :					80.00%	0.00%	20.00%	0.00%									
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500
					0.500												

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-004
Date: 11/14/2017

HT

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
APPROACH %'s :									0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	5
APPROACH %'s :					60.00%	40.00%	0.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Prepared by National Data & Surveying Services

SR 14 SB Ramps & Silver Queen Rd

Peak Hour Turning Movement Count

ID: 17-08110-004
City: Mojave

Day: Tuesday
Date: 11/14/2017

PEAK HOURS		COUNT PERIODS
07:00 AM - 08:00 AM	AM	07:00 AM - 09:00 AM
NONE	NOON	NONE
04:15 PM - 05:15 PM	PM	04:00 PM - 06:00 PM

SR 14 SB Ramps — SOUTHBOUND

	Right	Through	Left	U-Turn	Exiting (NB direction)
AM	11	1	18	0	0
NOON	0	0	0	0	0
PM	12	0	33	0	0
	0	1	0	0	

Silver Queen Rd — EASTBOUND

	AM	NOON	PM	
Exiting (WB direction)	18	0	15	
U-Turn	0	0	0	0
Left	0	0	0	0
Through	17	0	13	1
Right	6	0	7	0

Silver Queen Rd — WESTBOUND

		PM	NOON	AM
Right	0	0	0	0
Through	1	3	0	7
Left	0	1	0	0
U-Turn	0	1	0	0
Exiting (EB direction)		47	0	35

SR 14 SB Ramps — NORTHBOUND

	Exiting (SB direction)	U-Turn	Left	Through	Right
		0	0	0	0
PM	8	0	0	0	0
NOON	0	0	0	0	0
AM	7	0	0	0	0

CONTROL

1-Way Stop(SB)

	AM	NOON	PM
TEV	60	0	70
PHF	0.68		0.80

PV (AM)

	U-Turn	Left	Through	Right
Southbound	0	17	1	10
Eastbound	0	0	17	6
Westbound	0	0	7	0
Northbound	0	0	0	0

HT (AM)

	U-Turn	Left	Through	Right
Southbound		0	0	0
Eastbound		0	0	0
Westbound		0	0	0
Northbound		0	0	0

PV (NOON)

	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

PV (PM)

	Left	Through	Right
Southbound	33	0	12
Eastbound	0	13	7
Westbound	1	3	0
Northbound	0	0	0

HT (PM)

	Left	Through	Right
Southbound	0	0	0
Eastbound	0	0	0
Westbound	0	0	0
Northbound	0	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg	0	0	0
South leg	0	0	0
East leg	0	0	0
West leg	0	0	0
Diagonals	0	0	0

National Data & Surveying Services **Intersection Turning Movement Count**

Location: SR 14 NB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-003
Date: 11/14/2017

Total

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	4	0	1	0	0	0	0	0	3	2	0	0	0	0	2	0	12
7:15 AM	1	0	0	0	0	0	0	0	4	4	0	0	0	0	1	0	10
7:30 AM	2	0	0	0	0	0	0	0	8	7	0	0	0	0	9	0	26
7:45 AM	0	0	0	0	0	0	0	0	1	5	0	0	0	0	4	0	10
8:00 AM	0	0	0	0	0	0	0	0	2	4	0	0	0	0	2	0	8
8:15 AM	0	0	0	0	0	0	0	0	1	4	0	0	0	1	5	0	11
8:30 AM	0	0	0	0	0	0	0	0	3	7	0	0	0	0	4	0	14
8:45 AM	1	0	0	0	0	0	0	0	0	3	0	0	0	0	7	0	11
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	8	0	1	0	0	0	0	0	22	36	0	0	0	1	34	0	102
APPROACH %'s :	88.89%	0.00%	11.11%	0.00%					37.93%	62.07%	0.00%	0.00%	0.00%	2.86%	97.14%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	7	0	1	0	0	0	0	0	16	18	0	0	0	0	16	0	58
PEAK HR FACTOR :	0.438	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.500	0.643	0.000	0.000	0.000	0.000	0.444	0.000	0.558
	0.400								0.567				0.444				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	1	0	0	0	0	0	0	0	2	3	0	0	0	0	3	0	9
4:15 PM	0	0	0	0	0	0	0	0	7	4	0	0	0	1	8	0	20
4:30 PM	1	0	0	0	0	0	0	0	3	11	0	0	0	0	10	0	25
4:45 PM	1	0	0	0	0	0	0	0	3	11	0	0	0	0	4	0	19
5:00 PM	1	1	0	0	0	0	0	0	2	7	0	0	0	0	6	0	17
5:15 PM	0	0	0	0	0	0	0	0	4	3	0	0	0	0	4	0	11
5:30 PM	0	0	0	0	0	0	0	0	8	3	0	0	0	0	9	0	20
5:45 PM	2	0	0	0	0	0	0	0	0	7	0	0	0	0	1	0	10
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	6	1	0	0	0	0	0	0	29	49	0	0	0	1	45	0	131
APPROACH %'s :	85.71%	14.29%	0.00%	0.00%					37.18%	62.82%	0.00%	0.00%	0.00%	2.17%	97.83%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	3	1	0	0	0	0	0	0	15	33	0	0	0	1	28	0	81
PEAK HR FACTOR :	0.750	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.536	0.750	0.000	0.000	0.000	0.250	0.700	0.000	0.810
	0.500								0.857				0.725				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 NB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-003
Date: 11/14/2017

PV

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	4	0	1	0	0	0	0	0	3	2	0	0	0	0	2	0	12
7:15 AM	1	0	0	0	0	0	0	0	4	4	0	0	0	0	1	0	10
7:30 AM	2	0	0	0	0	0	0	0	8	6	0	0	0	0	7	0	23
7:45 AM	0	0	0	0	0	0	0	0	1	5	0	0	0	0	4	0	10
8:00 AM	0	0	0	0	0	0	0	0	2	4	0	0	0	0	2	0	8
8:15 AM	0	0	0	0	0	0	0	0	1	3	0	0	0	1	5	0	10
8:30 AM	0	0	0	0	0	0	0	0	2	6	0	0	0	0	4	0	12
8:45 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	6	0	9
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	7	0	1	0	0	0	0	0	21	33	0	0	0	1	31	0	94
APPROACH %'s :	87.50%	0.00%	12.50%	0.00%					38.89%	61.11%	0.00%	0.00%	0.00%	3.13%	96.88%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	7	0	1	0	0	0	0	0	16	17	0	0	0	0	14	0	55
PEAK HR FACTOR :	0.438	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.500	0.708	0.000	0.000	0.000	0.000	0.500	0.000	0.598
	0.400								0.589				0.500				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	1	0	0	0	0	0	0	0	2	3	0	0	0	0	3	0	9
4:15 PM	0	0	0	0	0	0	0	0	7	4	0	0	0	1	7	0	19
4:30 PM	1	0	0	0	0	0	0	0	3	11	0	0	0	0	10	0	25
4:45 PM	1	0	0	0	0	0	0	0	3	11	0	0	0	0	4	0	19
5:00 PM	1	1	0	0	0	0	0	0	2	7	0	0	0	0	6	0	17
5:15 PM	0	0	0	0	0	0	0	0	4	2	0	0	0	0	4	0	10
5:30 PM	0	0	0	0	0	0	0	0	8	3	0	0	0	0	9	0	20
5:45 PM	2	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	8
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	6	1	0	0	0	0	0	0	29	46	0	0	0	1	44	0	127
APPROACH %'s :	85.71%	14.29%	0.00%	0.00%					38.67%	61.33%	0.00%	0.00%	0.00%	2.22%	97.78%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	3	1	0	0	0	0	0	0	15	33	0	0	0	1	27	0	80
PEAK HR FACTOR :	0.75	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.536	0.750	0.000	0.000	0.000	0.250	0.675	0.000	0.800
	0.500								0.857				0.700				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 NB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-003
Date: 11/14/2017

MT

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	3
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	3	0	0	0	0	2	0	5
APPROACH %'s :									0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	3
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.250
									0.250				0.250				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 NB Ramps & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-003
Date: 11/14/2017

HT

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
8:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	3
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%					100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	4
APPROACH %'s :									0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250
													0.250				

Prepared by National Data & Surveying Services

SR 14 NB Ramps & Silver Queen Rd

Peak Hour Turning Movement Count

ID: 17-08110-003
City: Mojave

Day: Tuesday
Date: 11/14/2017

	PEAK HOURS	COUNT PERIODS
AM	07:00 AM - 08:00 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:15 PM - 05:15 PM	04:00 PM - 06:00 PM

SR 14 NB Ramps — SOUTHBOUND

	Right	Thru	Left	U-Turn	Exit (Northbound departure)
AM	0	0	0	0	32
NOON	0	0	0	0	0
PM	0	0	0	0	44
Bikes	0	0	0	0	

Silver Queen Rd — EASTBOUND

	AM	NOON	PM	Bikes
Exit (Westbound departure)	7	0	4	
U-Turn	0	0	0	0
Left	16	0	15	0
Thru	18	0	33	1
Right	0	0	0	0

Silver Queen Rd — WESTBOUND

	PM	NOON	AM	Bikes
Right	28	0	16	0
Thru	1	0	0	1
Left	0	0	0	0
U-Turn	0	0	0	0
Exit (Eastbound departure)	33	0	19	

SR 14 NB Ramps — NORTHBOUND

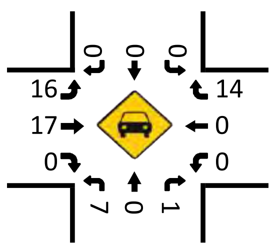
	Exit (Southbound departure)	U-Turn	Left	Thru	Right
Bikes		0	0	1	0
PM	0	0	3	1	0
NOON	0	0	0	0	0
AM	0	0	7	0	1

CONTROL

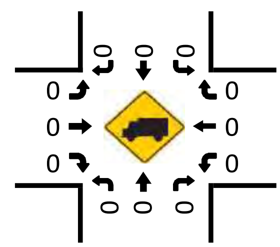
1-Way Stop(NB)

	AM	NOON	PM
TEV	58	0	81
PHF	0.56		0.81

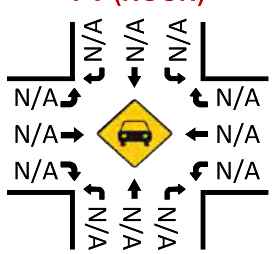
PV (AM)



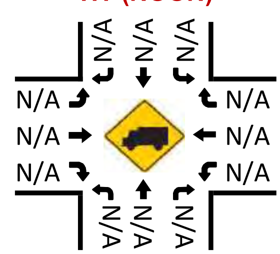
HT (AM)



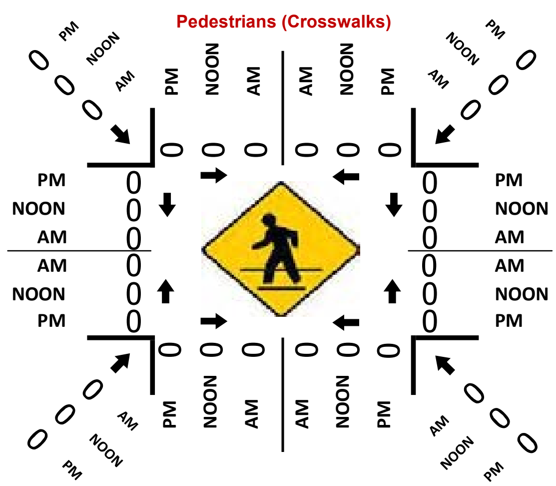
PV (NOON)



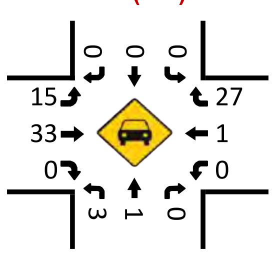
HT (NOON)



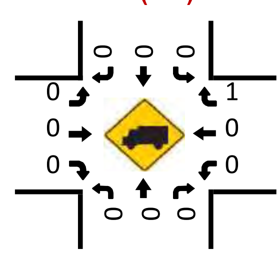
Pedestrians (Crosswalks)



PV (PM)



HT (PM)



National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-002
Date: 11/14/2017

Total

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	1	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	5
7:15 AM	1	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	5
7:30 AM	10	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	17
7:45 AM	3	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	8
8:00 AM	2	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	6
8:15 AM	6	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	10
8:30 AM	4	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	11
8:45 AM	7	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	10
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	34	0	0	0	0	0	1	0	1	0	36	0	0	0	0	0	72
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	2.70%	0.00%	97.30%	0.00%					
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	21	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	41
PEAK HR FACTOR :	0.525	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.714	0.000	0.000	0.000	0.000	0.000	0.603
	0.525								0.714								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	6
4:15 PM	9	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	13
4:30 PM	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	20
4:45 PM	4	0	0	0	0	0	0	0	1	0	11	0	0	0	0	0	16
5:00 PM	6	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	13
5:15 PM	4	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	8
5:30 PM	9	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	12
5:45 PM	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	8
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	46	0	0	0	0	1	0	0	1	0	48	0	0	0	0	0	96
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	2.04%	0.00%	97.96%	0.00%					
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	29	0	0	0	0	0	0	0	1	0	32	0	0	0	0	0	62
PEAK HR FACTOR :	0.725	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.727	0.000	0.000	0.000	0.000	0.000	0.775
	0.725								0.688								

National Data & Surveying Services **Intersection Turning Movement Count**

Location: Sierra Hwy & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-002
Date: 11/14/2017

PV

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	1	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	5
7:15 AM	1	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	5
7:30 AM	8	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	14
7:45 AM	3	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	8
8:00 AM	2	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	6
8:15 AM	6	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	9
8:30 AM	4	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	10
8:45 AM	6	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	9
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	31	0	0	0	0	0	1	0	1	0	33	0	0	0	0	0	66
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	2.94%	0.00%	97.06%	0.00%					
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	19	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	37
PEAK HR FACTOR :	0.594	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.661
	0.594								0.750								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	6
4:15 PM	8	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	12
4:30 PM	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	20
4:45 PM	4	0	0	0	0	0	0	0	1	0	11	0	0	0	0	0	16
5:00 PM	6	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	13
5:15 PM	4	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	7
5:30 PM	9	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	12
5:45 PM	1	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	6
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	45	0	0	0	0	1	0	0	1	0	45	0	0	0	0	0	92
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	2.17%	0.00%	97.83%	0.00%					
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	28	0	0	0	0	0	0	0	1	0	32	0	0	0	0	0	61
PEAK HR FACTOR :	0.70	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.727	0.000	0.000	0.000	0.000	0.000	0.763
	0.700								0.688								

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-002
Date: 11/14/2017

MT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	2	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	5
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%					0.00%	0.00%	100.00%	0.00%					
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	4
PEAK HR FACTOR :	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.333
	0.250								0.500								

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Silver Queen Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-002
Date: 11/14/2017

HT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Silver Queen Rd				Silver Queen Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%													
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	4
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%					0.00%	0.00%	100.00%	0.00%					
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
PEAK HR FACTOR :	0.25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
	0.250																

Prepared by National Data & Surveying Services

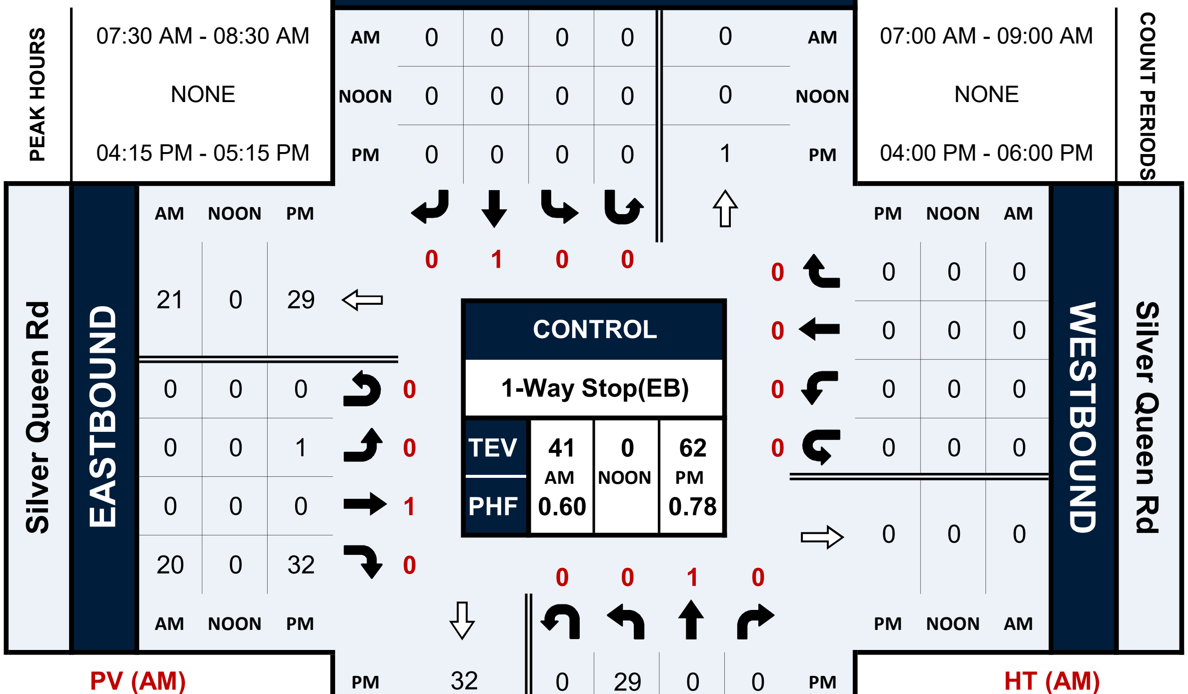
Sierra Hwy & Silver Queen Rd

Peak Hour Turning Movement Count

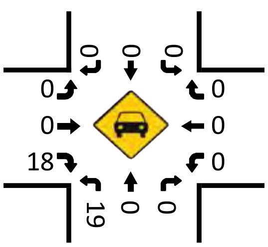
ID: 17-08110-002
City: Mojave

Day: Tuesday
Date: 11/14/2017

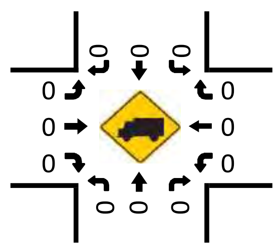
PEAK HOURS		COUNT PERIODS
AM	07:30 AM - 08:30 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:15 PM - 05:15 PM	04:00 PM - 06:00 PM



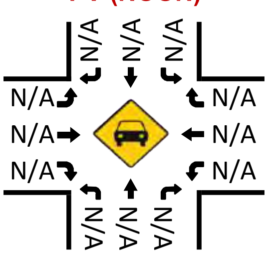
PV (AM)



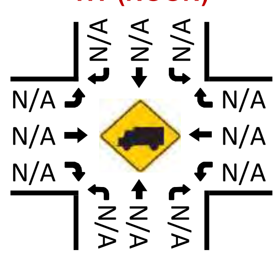
HT (AM)



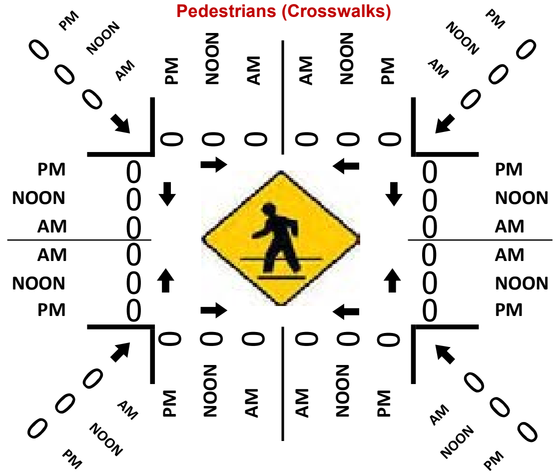
PV (NOON)



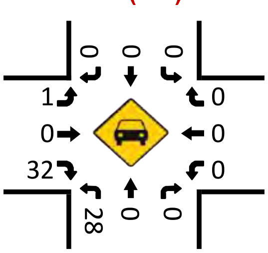
HT (NOON)



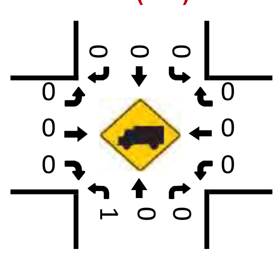
Pedestrians (Crosswalks)



PV (PM)



HT (PM)



National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Trotter Ave
City: Mojave
Control: No Control

Project ID: 17-08110-001
Date: 11/14/2017

Total

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Trotter Ave				Trotter Ave				
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4
7:15 AM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	7
7:30 AM	0	6	0	0	0	8	0	0	0	0	0	0	0	0	0	0	14
7:45 AM	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	5
8:00 AM	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	9
8:15 AM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	8
8:30 AM	0	6	0	0	0	7	0	0	0	0	0	0	0	0	0	0	13
8:45 AM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	33	0	0	0	37	0	0	0	0	0	0	0	0	0	0	70
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	19	0	0	0	21	0	0	0	0	0	0	0	0	0	0	40
PEAK HR FACTOR :	0.000	0.792	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.769
	0.792				0.750												

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	6
4:15 PM	0	10	0	0	0	4	0	0	0	0	0	0	0	0	0	0	14
4:30 PM	0	8	0	0	0	9	0	0	0	0	0	0	0	0	0	0	17
4:45 PM	0	5	0	0	0	12	0	0	0	0	0	0	0	0	0	0	17
5:00 PM	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	0	15
5:15 PM	0	7	0	0	0	5	0	0	0	0	0	0	0	0	0	0	12
5:30 PM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10
5:45 PM	0	1	0	0	0	7	0	0	0	0	0	0	0	0	0	0	8
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	48	0	0	0	51	0	0	0	0	0	0	0	0	0	0	99
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	30	0	0	0	33	0	0	0	0	0	0	0	0	0	0	63
PEAK HR FACTOR :	0.000	0.750	0.000	0.000	0.000	0.688	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.926
	0.750				0.688												

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Trotter Ave
City: Mojave
Control: No Control

Project ID: 17-08110-001
Date: 11/14/2017

PV

NS/EW Streets: Sierra Hwy | Sierra Hwy | Trotter Ave | Trotter Ave

AM

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4
7:15 AM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	7
7:30 AM	0	4	0	0	0	7	0	0	0	0	0	0	0	0	0	0	11
7:45 AM	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	5
8:00 AM	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	9
8:15 AM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	7
8:30 AM	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	0	11
8:45 AM	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	9
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	29	0	0	0	34	0	0	0	0	0	0	0	0	0	0	63
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	17	0	0	0	19	0	0	0	0	0	0	0	0	0	0	36
PEAK HR FACTOR :	0.000	0.850	0.000	0.000	0.000	0.792	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.818
	0.850				0.792												

PM

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	5
4:15 PM	0	10	0	0	0	4	0	0	0	0	0	0	0	0	0	0	14
4:30 PM	0	8	0	0	0	9	0	0	0	0	0	0	0	0	0	0	17
4:45 PM	0	5	0	0	0	12	0	0	0	0	0	0	0	0	0	0	17
5:00 PM	0	7	0	0	0	8	0	0	0	0	0	0	0	0	0	0	15
5:15 PM	0	7	0	0	0	4	0	0	0	0	0	0	0	0	0	0	11
5:30 PM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	10
5:45 PM	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	6
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	47	0	0	0	48	0	0	0	0	0	0	0	0	0	0	95
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	30	0	0	0	33	0	0	0	0	0	0	0	0	0	0	63
PEAK HR FACTOR :	0.00	0.750	0.000	0.000	0.000	0.688	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.926
	0.750				0.688												

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Trotter Ave
City: Mojave
Control: No Control

Project ID: 17-08110-001
Date: 11/14/2017

MT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Trotter Ave				Trotter Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	6
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
PEAK HR FACTOR :	0.000	0.250	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.750
	0.250				0.500												

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Trotter Ave
City: Mojave
Control: No Control

Project ID: 17-08110-001
Date: 11/14/2017

HT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Trotter Ave				Trotter Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%													
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
PEAK HR FACTOR :	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
	0.250																

	Sierra Hwy				Sierra Hwy				Trotter Ave				Trotter Ave				
PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	4
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Prepared by National Data & Surveying Services

Sierra Hwy & Trotter Ave

Peak Hour Turning Movement Count

ID: 17-08110-001
City: Mojave

Day: Tuesday
Date: 11/14/2017

	PEAK HOURS	COUNT PERIODS
AM	08:00 AM - 09:00 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:15 PM - 05:15 PM	04:00 PM - 06:00 PM

Sierra Hwy — SOUTHBOUND

AM	0	21	0	0	19
NOON	0	0	0	0	0
PM	0	33	0	0	30
	0	1	0	0	

Trotter Ave — EASTBOUND

AM	NOON	PM	
0	0	0	
0	0	0	0
0	0	0	0
0	0	0	1
0	0	0	0

Trotter Ave — WESTBOUND

	PM	NOON	AM
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
	0	0	0

Sierra Hwy — NORTHBOUND

		0	0	1	0
PM	33	0	0	30	0
NOON	0	0	0	0	0
AM	21	0	0	19	0

CONTROL

No Control

	AM	NOON	PM
TEV	40	0	63
PHF	0.77		0.93

PV (AM)
SB: 0, 19, 0 · EB: 0, 0, 0 · WB: 0, 0, 0 · NB: 0, 17, 0

HT (AM)
SB: 0, 0, 0 · EB: 0, 0, 0 · WB: 0, 0, 0 · NB: 0, 1, 0

PV (NOON)
N/A

HT (NOON)
N/A

PV (PM)
SB: 0, 33, 0 · EB: 0, 0, 0 · WB: 0, 0, 0 · NB: 0, 30, 0

HT (PM)
SB: 0, 0, 0 · EB: 0, 0, 0 · WB: 0, 0, 0 · NB: 0, 0, 0

Pedestrians (Crosswalks)
All crosswalks, AM / NOON / PM: 0

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-006
Date: 11/14/2017

Total

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	1	0	0	8	25	0	2	6	0	0	42
7:15 AM	0	0	0	0	3	1	0	0	0	9	23	0	2	7	0	0	45
7:30 AM	0	0	0	0	3	0	0	0	0	3	17	0	0	6	0	0	29
7:45 AM	0	0	0	0	0	0	2	0	0	7	14	0	1	5	0	0	29
8:00 AM	0	0	0	0	0	1	0	0	0	3	15	0	4	11	0	0	34
8:15 AM	0	0	0	0	0	1	2	0	0	1	14	0	0	8	0	0	26
8:30 AM	0	0	0	0	1	0	0	0	0	2	13	0	0	8	0	0	24
8:45 AM	0	0	0	0	0	0	1	0	0	5	9	0	1	10	0	0	26
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	7	3	6	0	0	38	130	0	10	61	0	0	255
APPROACH %'s :					43.75%	18.75%	37.50%	0.00%	0.00%	22.62%	77.38%	0.00%	14.08%	85.92%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	6	1	3	0	0	27	79	0	5	24	0	0	145
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.500	0.250	0.375	0.000	0.000	0.750	0.790	0.000	0.625	0.857	0.000	0.000	0.806
					0.625				0.803				0.806				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	1	3	4	0	0	1	5	0	1	19	0	0	34
4:15 PM	0	0	0	0	1	1	2	0	0	3	7	0	3	27	0	0	44
4:30 PM	0	0	0	0	0	0	5	0	0	4	6	0	4	28	0	0	47
4:45 PM	0	0	0	0	0	1	1	0	0	4	9	0	2	23	0	0	40
5:00 PM	0	0	0	0	1	1	2	0	0	2	12	0	0	27	0	0	45
5:15 PM	0	0	0	0	2	0	3	0	0	2	10	0	1	17	0	0	35
5:30 PM	0	0	0	0	0	1	1	0	0	3	10	0	0	15	0	0	30
5:45 PM	0	0	0	0	1	0	5	0	0	2	6	0	1	13	0	0	28
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	6	7	23	0	0	21	65	0	12	169	0	0	303
APPROACH %'s :					16.67%	19.44%	63.89%	0.00%	0.00%	24.42%	75.58%	0.00%	6.63%	93.37%	0.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	2	3	10	0	0	13	34	0	9	105	0	0	176
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.500	0.750	0.500	0.000	0.000	0.813	0.708	0.000	0.563	0.938	0.000	0.000	0.936
					0.750				0.839				0.891				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-006
Date: 11/14/2017

PV

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	1	0	0	8	24	0	2	6	0	0	41
7:15 AM	0	0	0	0	3	1	0	0	0	9	23	0	2	6	0	0	44
7:30 AM	0	0	0	0	3	0	0	0	0	3	17	0	0	6	0	0	29
7:45 AM	0	0	0	0	0	0	2	0	0	6	14	0	1	5	0	0	28
8:00 AM	0	0	0	0	0	1	0	0	0	3	15	0	4	9	0	0	32
8:15 AM	0	0	0	0	0	0	1	0	0	1	14	0	0	8	0	0	24
8:30 AM	0	0	0	0	0	0	0	0	0	1	11	0	0	6	0	0	18
8:45 AM	0	0	0	0	0	0	1	0	0	5	9	0	1	8	0	0	24
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	6	2	5	0	0	36	127	0	10	54	0	0	240
APPROACH %'s :					46.15%	15.38%	38.46%	0.00%	0.00%	22.09%	77.91%	0.00%	15.63%	84.38%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	6	1	3	0	0	26	78	0	5	23	0	0	142
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.500	0.250	0.375	0.000	0.000	0.722	0.813	0.000	0.625	0.958	0.000	0.000	0.807
					0.625				0.813				0.875				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	1	3	2	0	0	1	5	0	1	19	0	0	32
4:15 PM	0	0	0	0	1	1	2	0	0	3	7	0	3	27	0	0	44
4:30 PM	0	0	0	0	0	0	5	0	0	4	6	0	4	28	0	0	47
4:45 PM	0	0	0	0	0	0	1	0	0	4	9	0	2	23	0	0	39
5:00 PM	0	0	0	0	1	1	2	0	0	2	12	0	0	26	0	0	44
5:15 PM	0	0	0	0	2	0	3	0	0	2	9	0	1	17	0	0	34
5:30 PM	0	0	0	0	0	1	0	0	0	3	10	0	0	15	0	0	29
5:45 PM	0	0	0	0	1	0	5	0	0	2	6	0	1	13	0	0	28
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	6	6	20	0	0	21	64	0	12	168	0	0	297
APPROACH %'s :					18.75%	18.75%	62.50%	0.00%	0.00%	24.71%	75.29%	0.00%	6.67%	93.33%	0.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	2	2	10	0	0	13	34	0	9	104	0	0	174
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.500	0.500	0.500	0.000	0.000	0.813	0.708	0.000	0.563	0.929	0.000	0.000	0.926
					0.700				0.839				0.883				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-006
Date: 11/14/2017

MT

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	1	1	0	0	3	0	0	5
APPROACH %'s :									0.00%	50.00%	50.00%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.500
									0.500								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	1	1	0	0	0	1	0	0	1	0	0	4
APPROACH %'s :					0.00%	50.00%	50.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.500
					0.250								0.250				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 SB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(SB)

Project ID: 17-08110-006
Date: 11/14/2017

HT

NS/EW Streets:	SR 14 SB Ramps				SR 14 SB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
8:15 AM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
8:30 AM	0	0	0	0	1	0	0	0	0	1	2	0	0	2	0	0	6
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	1	1	1	0	0	1	2	0	0	4	0	0	10
APPROACH %'s :					33.33%	33.33%	33.33%	0.00%	0.00%	33.33%	66.67%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250
													0.250				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
APPROACH %'s :					0.00%	0.00%	100.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Prepared by National Data & Surveying Services

SR 14 SB Ramps & Backus Rd

Peak Hour Turning Movement Count

ID: 17-08110-006
City: Mojave

Day: Tuesday
Date: 11/14/2017

	PEAK HOURS	COUNT PERIODS
AM	07:00 AM - 08:00 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:15 PM - 05:15 PM	04:00 PM - 06:00 PM

SR 14 SB Ramps — SOUTHBOUND

	Right	Through	Left	U-Turn	Departing
AM	3	1	6	0	0
NOON	0	0	0	0	0
PM	10	3	2	0	0
	0	1	0	0	

Backus Rd — EASTBOUND

	AM	NOON	PM	
Departing	27	0	115	
U-Turn	0	0	0	0
Left	0	0	0	0
Through	27	0	13	1
Right	79	0	34	0

Backus Rd — WESTBOUND

		PM	NOON	AM
Right	0	0	0	0
Through	1	105	0	24
Left	0	9	0	5
U-Turn	0	0	0	0
Departing		15	0	33

SR 14 SB Ramps — NORTHBOUND

	Departing	U-Turn	Left	Through	Right
		0	0	0	0
PM	46	0	0	0	0
NOON	0	0	0	0	0
AM	85	0	0	0	0

CONTROL

1-Way Stop(SB)

	AM	NOON	PM
TEV	145	0	176
PHF	0.81		0.94

PV (AM)

	Left	Through	Right	U-Turn
Southbound	6	1	3	
Eastbound	0	26	78	
Westbound	5	23	0	
Northbound	0	0	0	

HT (AM)

	Left	Through	Right
Southbound	0	0	0
Eastbound	0	0	0
Westbound	0	1	0
Northbound	0	0	0

PV (NOON)

	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

PV (PM)

	Left	Through	Right
Southbound	2	2	10
Eastbound	0	13	34
Westbound	9	104	0
Northbound	0	0	0

HT (PM)

	Left	Through	Right
Southbound	0	0	0
Eastbound	0	0	0
Westbound	0	0	0
Northbound	0	0	0

Pedestrians (Crosswalks)

	AM	NOON	PM
North crosswalk	0	0	0
North crosswalk	0	0	0
South crosswalk	0	0	0
South crosswalk	0	0	0
West crosswalk	0	0	0
West crosswalk	0	0	0
East crosswalk	0	0	0
East crosswalk	0	0	0
Northwest diagonal	0	0	0
Northeast diagonal	0	0	0
Southwest diagonal	0	0	0
Southeast diagonal	0	0	0

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 NB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-007
Date: 11/14/2017

Total

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	6	0	0	0	0	0	0	0	4	3	0	0	0	2	0	0	15
7:15 AM	7	0	2	0	0	0	0	0	4	9	0	0	0	2	1	0	25
7:30 AM	6	0	3	0	0	0	0	0	0	5	0	0	0	0	1	0	15
7:45 AM	4	0	0	0	0	0	0	0	4	4	0	0	0	2	0	0	14
8:00 AM	9	1	1	0	0	0	0	0	1	2	0	0	0	6	1	0	21
8:15 AM	5	0	0	0	0	0	0	0	1	0	0	0	0	3	2	0	11
8:30 AM	6	0	2	0	0	0	0	0	2	1	0	0	0	1	1	0	13
8:45 AM	8	0	1	0	0	0	0	0	2	2	0	0	0	3	2	0	18
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	51	1	9	0	0	0	0	0	18	26	0	0	0	19	8	0	132
APPROACH %'s :	83.61%	1.64%	14.75%	0.00%					40.91%	59.09%	0.00%	0.00%	0.00%	70.37%	29.63%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	26	1	6	0	0	0	0	0	9	20	0	0	0	10	3	0	75
PEAK HR FACTOR :	0.722	0.250	0.500	0.000	0.000	0.000	0.000	0.000	0.563	0.556	0.000	0.000	0.000	0.417	0.750	0.000	0.750
	0.750								0.558				0.464				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	15	0	1	0	0	0	0	0	0	2	0	0	0	5	0	0	23
4:15 PM	22	0	2	0	0	0	0	0	1	3	0	0	0	7	0	0	35
4:30 PM	24	0	0	0	0	0	0	0	0	3	0	0	0	9	2	0	38
4:45 PM	20	0	0	0	0	0	0	0	3	1	0	0	0	5	1	0	30
5:00 PM	23	0	0	0	0	0	0	0	1	2	0	0	0	4	1	0	31
5:15 PM	16	0	1	0	0	0	0	0	0	4	0	0	0	2	2	0	25
5:30 PM	13	0	2	0	0	0	0	0	0	3	0	0	0	2	1	0	21
5:45 PM	10	0	0	0	0	0	0	0	0	2	0	0	0	4	0	0	16
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	143	0	6	0	0	0	0	0	5	20	0	0	0	38	7	0	219
APPROACH %'s :	95.97%	0.00%	4.03%	0.00%					20.00%	80.00%	0.00%	0.00%	0.00%	84.44%	15.56%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	89	0	2	0	0	0	0	0	5	9	0	0	0	25	4	0	134
PEAK HR FACTOR :	0.927	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.417	0.750	0.000	0.000	0.000	0.694	0.500	0.000	0.882
	0.948								0.875				0.659				

National Data & Surveying Services Intersection Turning Movement Count

Location: SR 14 NB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-007
Date: 11/14/2017

PV

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	6	0	0	0	0	0	0	0	4	3	0	0	0	2	0	0	15
7:15 AM	6	0	2	0	0	0	0	0	4	9	0	0	0	2	1	0	24
7:30 AM	6	0	3	0	0	0	0	0	0	5	0	0	0	0	1	0	15
7:45 AM	4	0	0	0	0	0	0	0	4	3	0	0	0	2	0	0	13
8:00 AM	7	1	1	0	0	0	0	0	1	2	0	0	0	6	1	0	19
8:15 AM	5	0	0	0	0	0	0	0	1	0	0	0	0	3	1	0	10
8:30 AM	4	0	2	0	0	0	0	0	1	0	0	0	0	1	1	0	9
8:45 AM	7	0	1	0	0	0	0	0	2	2	0	0	0	2	2	0	16
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	45	1	9	0	0	0	0	0	17	24	0	0	0	18	7	0	121
APPROACH %'s :	81.82%	1.82%	16.36%	0.00%					41.46%	58.54%	0.00%	0.00%	0.00%	72.00%	28.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	23	1	6	0	0	0	0	0	9	19	0	0	0	10	3	0	71
PEAK HR FACTOR :	0.821	0.250	0.500	0.000	0.000	0.000	0.000	0.000	0.563	0.528	0.000	0.000	0.000	0.417	0.750	0.000	0.740
	0.833								0.538				0.464				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	15	0	1	0	0	0	0	0	0	2	0	0	0	5	0	0	23
4:15 PM	22	0	2	0	0	0	0	0	1	3	0	0	0	7	0	0	35
4:30 PM	24	0	0	0	0	0	0	0	0	3	0	0	0	9	2	0	38
4:45 PM	20	0	0	0	0	0	0	0	3	1	0	0	0	5	1	0	30
5:00 PM	22	0	0	0	0	0	0	0	1	2	0	0	0	4	1	0	30
5:15 PM	16	0	1	0	0	0	0	0	0	4	0	0	0	2	2	0	25
5:30 PM	13	0	2	0	0	0	0	0	0	3	0	0	0	2	1	0	21
5:45 PM	10	0	0	0	0	0	0	0	0	2	0	0	0	4	0	0	16
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	142	0	6	0	0	0	0	0	5	20	0	0	0	38	7	0	218
APPROACH %'s :	95.95%	0.00%	4.05%	0.00%					20.00%	80.00%	0.00%	0.00%	0.00%	84.44%	15.56%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	88	0	2	0	0	0	0	0	5	9	0	0	0	25	4	0	133
PEAK HR FACTOR :	0.92	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.417	0.750	0.000	0.000	0.000	0.694	0.500	0.000	0.875
	0.938								0.875				0.659				

National Data & Surveying Services **Intersection Turning Movement Count**

Location: SR 14 NB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-007
Date: 11/14/2017

MT

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	5
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%					0.00%	100.00%	0.00%	0.00%	0.00%	50.00%	50.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
PEAK HR FACTOR :	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.500
	0.250								0.250								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%													
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
PEAK HR FACTOR :	0.25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
	0.250																

National Data & Surveying Services **Intersection Turning Movement Count**

Location: SR 14 NB Ramps & Backus Rd
City: Mojave
Control: 1-Way Stop(NB)

Project ID: 17-08110-007
Date: 11/14/2017

HT

NS/EW Streets:	SR 14 NB Ramps				SR 14 NB Ramps				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	4
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	6
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%					50.00%	50.00%	0.00%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
PEAK HR FACTOR :	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500
	0.500																

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH %'s :																	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Prepared by National Data & Surveying Services

SR 14 NB Ramps & Backus Rd

Peak Hour Turning Movement Count

ID: 17-08110-007
City: Mojave

Day: Tuesday
Date: 11/14/2017

	PEAK HOURS	COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:15 PM - 05:15 PM	04:00 PM - 06:00 PM

SR 14 NB Ramps — SOUTHBOUND

	Right	Through	Left	U-Turn	Departing
AM	0	0	0	0	13
NOON	0	0	0	0	0
PM	0	0	0	0	9
Bikes	0	0	0	0	

Backus Rd — WESTBOUND

	Bikes	PM	NOON	AM
Right	0	4	0	3
Through	1	25	0	10
Left	0	0	0	0
U-Turn	0	0	0	0
Departing		11	0	26

Backus Rd — EASTBOUND

	AM	NOON	PM	Bikes
Departing	36	0	114	
U-Turn	0	0	0	0
Left	9	0	5	0
Through	20	0	9	1
Right	0	0	0	0

SR 14 NB Ramps — NORTHBOUND

	Departing	U-Turn	Left	Through	Right
Bikes		0	0	1	0
PM	0	0	89	0	2
NOON	0	0	0	0	0
AM	0	0	26	1	6

CONTROL

1-Way Stop(NB)

	AM	NOON	PM
TEV	75	0	134
PHF	0.75		0.88

PV (AM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	9	19	0
Westbound	0	10	3
Northbound	23	1	6

HT (AM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	0	0	0
Westbound	0	0	0
Northbound	2	0	0

PV (NOON)

Approach	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

HT (NOON)

Approach	Left	Through	Right
Southbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A

PV (PM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	5	9	0
Westbound	0	25	4
Northbound	88	0	2

HT (PM)

Approach	Left	Through	Right
Southbound	0	0	0
Eastbound	0	0	0
Westbound	0	0	0
Northbound	0	0	0

Pedestrians (Crosswalks)

Crosswalk	AM	NOON	PM
North leg	0	0	0
South leg	0	0	0
East leg	0	0	0
West leg	0	0	0
Diagonals (all four corners)	0	0	0

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Backus Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-008
Date: 11/14/2017

Total

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	2	2	0	0	0	2	0	0	0	0	4	0	0	0	0	0	10
7:15 AM	2	6	0	0	0	3	0	0	0	0	8	0	0	0	0	0	19
7:30 AM	0	4	0	0	0	7	1	0	0	0	7	0	0	0	0	0	19
7:45 AM	0	2	0	0	0	4	0	0	0	0	4	0	0	0	0	0	10
8:00 AM	3	5	0	0	0	4	0	0	0	0	4	0	0	0	0	0	16
8:15 AM	5	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	12
8:30 AM	1	5	0	0	0	7	0	0	0	0	3	0	0	0	0	0	16
8:45 AM	1	5	0	0	0	5	0	0	1	0	0	0	0	0	0	0	12
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	14	32	0	0	0	36	1	0	1	0	30	0	0	0	0	0	114
APPROACH %'s :	30.43%	69.57%	0.00%	0.00%	0.00%	97.30%	2.70%	0.00%	3.23%	0.00%	96.77%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	5	17	0	0	0	18	1	0	0	0	23	0	0	0	0	0	64
PEAK HR FACTOR :	0.417	0.708	0.000	0.000	0.000	0.643	0.250	0.000	0.000	0.000	0.719	0.000	0.000	0.000	0.000	0.000	0.842
	0.688				0.594				0.719								

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	4	7	0	0	0	2	0	0	0	0	3	0	0	0	0	0	16
4:15 PM	8	7	0	0	0	4	0	0	0	0	4	0	0	0	0	0	23
4:30 PM	7	10	0	0	0	8	0	0	0	0	1	0	0	0	0	0	26
4:45 PM	5	4	0	0	0	13	0	0	0	0	1	0	0	0	0	0	23
5:00 PM	5	7	0	0	0	7	0	0	0	0	2	0	0	0	0	0	21
5:15 PM	2	7	0	0	0	5	1	0	0	0	3	0	0	0	0	0	18
5:30 PM	5	5	0	0	0	4	0	0	0	0	4	0	0	0	0	0	18
5:45 PM	1	1	0	0	0	7	0	0	0	0	3	0	0	0	0	0	12
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	37	48	0	0	0	50	1	0	0	0	21	0	0	0	0	0	157
APPROACH %'s :	43.53%	56.47%	0.00%	0.00%	0.00%	98.04%	1.96%	0.00%	0.00%	0.00%	100.00%	0.00%					
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	25	28	0	0	0	32	0	0	0	0	8	0	0	0	0	0	93
PEAK HR FACTOR :	0.781	0.700	0.000	0.000	0.000	0.615	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.894
	0.779				0.615				0.500								

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Backus Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-008
Date: 11/14/2017

PV

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	2	2	0	0	0	2	0	0	0	0	4	0	0	0	0	0	10
7:15 AM	2	5	0	0	0	3	0	0	0	0	8	0	0	0	0	0	18
7:30 AM	0	3	0	0	0	7	0	0	0	0	7	0	0	0	0	0	17
7:45 AM	0	2	0	0	0	4	0	0	0	0	3	0	0	0	0	0	9
8:00 AM	3	5	0	0	0	4	0	0	0	0	4	0	0	0	0	0	16
8:15 AM	5	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	11
8:30 AM	1	4	0	0	0	6	0	0	0	0	2	0	0	0	0	0	13
8:45 AM	0	4	0	0	0	5	0	0	1	0	0	0	0	0	0	0	10
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	13	28	0	0	0	34	0	0	1	0	28	0	0	0	0	0	104
APPROACH %'s :	31.71%	68.29%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	3.45%	0.00%	96.55%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	5	15	0	0	0	18	0	0	0	0	22	0	0	0	0	0	60
PEAK HR FACTOR :	0.417	0.750	0.000	0.000	0.000	0.643	0.000	0.000	0.000	0.000	0.688	0.000	0.000	0.000	0.000	0.000	0.833
	0.625				0.643				0.688								

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	4	6	0	0	0	2	0	0	0	0	3	0	0	0	0	0	15
4:15 PM	8	7	0	0	0	4	0	0	0	0	4	0	0	0	0	0	23
4:30 PM	7	10	0	0	0	8	0	0	0	0	1	0	0	0	0	0	26
4:45 PM	5	4	0	0	0	13	0	0	0	0	1	0	0	0	0	0	23
5:00 PM	5	7	0	0	0	7	0	0	0	0	2	0	0	0	0	0	21
5:15 PM	2	7	0	0	0	4	1	0	0	0	3	0	0	0	0	0	17
5:30 PM	5	5	0	0	0	4	0	0	0	0	4	0	0	0	0	0	18
5:45 PM	1	1	0	0	0	5	0	0	0	0	3	0	0	0	0	0	10
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	37	47	0	0	0	47	1	0	0	0	21	0	0	0	0	0	153
APPROACH %'s :	44.05%	55.95%	0.00%	0.00%	0.00%	97.92%	2.08%	0.00%	0.00%	0.00%	100.00%	0.00%					
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	25	28	0	0	0	32	0	0	0	0	8	0	0	0	0	0	93
PEAK HR FACTOR :	0.78	0.700	0.000	0.000	0.000	0.615	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.894
	0.779				0.615				0.500								

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Backus Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-008
Date: 11/14/2017

MT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	3	0	0	0	2	1	0	0	0	1	0	0	0	0	0	8
APPROACH %'s :	25.00%	75.00%	0.00%	0.00%	0.00%	66.67%	33.33%	0.00%	0.00%	0.00%	100.00%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4
PEAK HR FACTOR :	0.000	0.500	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.500
	0.500				0.250				0.250								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
APPROACH %'s :					0.00%	100.00%	0.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

National Data & Surveying Services # Intersection Turning Movement Count

Location: Sierra Hwy & Backus Rd
City: Mojave
Control: 1-Way Stop(EB)

Project ID: 17-08110-008
Date: 11/14/2017

HT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Backus Rd				Backus Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%					0.00%	0.00%	100.00%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Prepared by National Data & Surveying Services

Sierra Hwy & Backus Rd

Peak Hour Turning Movement Count

ID: 17-08110-008
City: Mojave

Day: Tuesday
Date: 11/14/2017

PEAK HOURS		COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:15 PM - 05:15 PM	04:00 PM - 06:00 PM

Sierra Hwy – SOUTHBOUND

	Right	Through	Left	U-turn	Exit
AM	1	18	0	0	17
NOON	0	0	0	0	0
PM	0	32	0	0	28
	0	1	0	0	

Backus Rd – EASTBOUND

	AM	NOON	PM	
Exit	6	0	25	
U-turn	0	0	0	0
Left	0	0	0	0
Through	0	0	0	1
Right	23	0	8	0

Backus Rd – WESTBOUND

		PM	NOON	AM
Right	0	0	0	0
Through	0	0	0	0
Left	0	0	0	0
U-turn	0	0	0	0
Exit		0	0	0

Sierra Hwy – NORTHBOUND

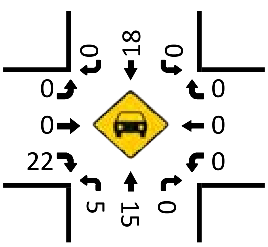
	Exit	U-turn	Left	Through	Right
		0	0	1	0
PM	40	0	25	28	0
NOON	0	0	0	0	0
AM	41	0	5	17	0

CONTROL

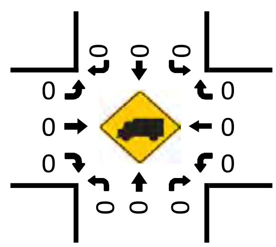
1-Way Stop(EB)

	AM	NOON	PM
TEV	64	0	93
PHF	0.84		0.89

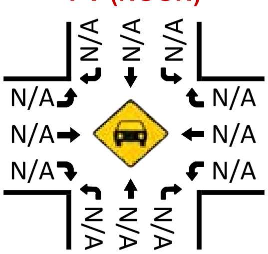
PV (AM)



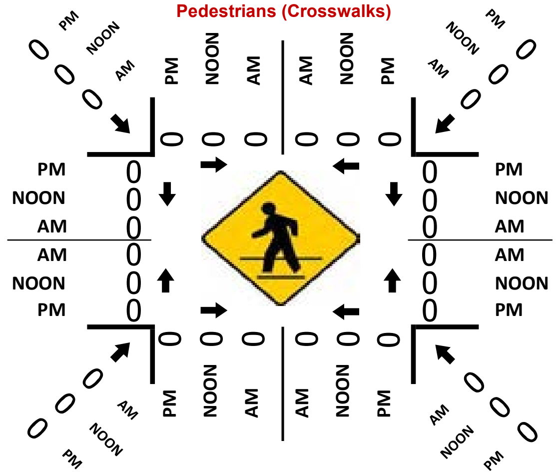
HT (AM)



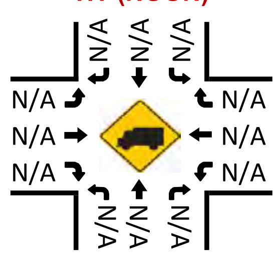
PV (NOON)



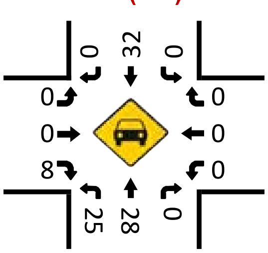
Pedestrians (Crosswalks)



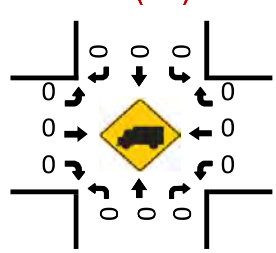
HT (NOON)



PV (PM)



HT (PM)



National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Sopp Rd
City: Mojave
Control: 1-Way Stop(WB)

Project ID: 17-08110-009
Date: 11/14/2017

Total

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Sopp Rd				Sopp Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	3	6	0	0	4	0	0	0	0	0	0	7	0	0	0	20
7:15 AM	0	8	10	0	1	12	0	0	0	0	0	0	5	0	0	0	36
7:30 AM	0	4	10	0	1	14	0	0	0	0	0	0	3	0	0	0	32
7:45 AM	0	3	13	0	1	7	0	0	0	0	0	0	4	0	0	0	28
8:00 AM	0	6	6	0	1	6	0	0	0	0	0	0	5	0	2	0	26
8:15 AM	0	6	5	0	0	5	0	0	0	0	0	0	3	0	3	0	22
8:30 AM	0	6	7	0	1	8	0	0	0	0	0	0	2	0	0	0	24
8:45 AM	0	6	1	0	0	5	0	0	0	0	0	0	2	0	0	0	14
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	42	58	0	5	61	0	0	0	0	0	0	31	0	5	0	202
APPROACH %'s :	0.00%	42.00%	58.00%	0.00%	7.58%	92.42%	0.00%	0.00%					86.11%	0.00%	13.89%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	21	39	0	4	39	0	0	0	0	0	0	17	0	2	0	122
PEAK HR FACTOR :	0.000	0.656	0.750	0.000	1.000	0.696	0.000	0.000	0.000	0.000	0.000	0.000	0.850	0.000	0.250	0.000	0.847
	0.833				0.717								0.679				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	10	7	0	0	3	0	0	0	0	0	0	7	0	1	0	28
4:15 PM	0	14	4	0	0	7	0	0	0	0	0	0	5	0	3	0	33
4:30 PM	0	14	6	0	0	11	0	0	0	0	0	0	17	0	3	0	51
4:45 PM	0	9	9	0	0	13	0	0	0	0	0	0	8	0	0	0	39
5:00 PM	0	12	7	0	1	10	0	0	0	0	0	0	6	0	0	0	36
5:15 PM	0	8	5	0	1	4	0	0	0	0	0	0	5	0	0	0	23
5:30 PM	0	10	5	0	1	8	0	0	0	0	0	0	5	0	0	0	29
5:45 PM	0	5	7	0	0	10	0	0	0	0	0	0	8	0	0	0	30
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	82	50	0	3	66	0	0	0	0	0	0	61	0	7	0	269
APPROACH %'s :	0.00%	62.12%	37.88%	0.00%	4.35%	95.65%	0.00%	0.00%					89.71%	0.00%	10.29%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	49	26	0	1	41	0	0	0	0	0	0	36	0	6	0	159
PEAK HR FACTOR :	0.000	0.875	0.722	0.000	0.250	0.788	0.000	0.000	0.000	0.000	0.000	0.000	0.529	0.000	0.500	0.000	0.779
	0.938				0.808								0.525				

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Sopp Rd
City: Mojave
Control: 1-Way Stop(WB)

Project ID: 17-08110-009
Date: 11/14/2017

PV

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Sopp Rd				Sopp Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	3	5	0	0	4	0	0	0	0	0	0	7	0	0	0	19
7:15 AM	0	7	10	0	1	12	0	0	0	0	0	0	5	0	0	0	35
7:30 AM	0	3	10	0	1	14	0	0	0	0	0	0	3	0	0	0	31
7:45 AM	0	3	13	0	0	7	0	0	0	0	0	0	4	0	0	0	27
8:00 AM	0	6	6	0	1	6	0	0	0	0	0	0	5	0	2	0	26
8:15 AM	0	6	5	0	0	4	0	0	0	0	0	0	3	0	3	0	21
8:30 AM	0	5	7	0	1	6	0	0	0	0	0	0	2	0	0	0	21
8:45 AM	0	4	1	0	0	5	0	0	0	0	0	0	2	0	0	0	12
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	37	57	0	4	58	0	0	0	0	0	0	31	0	5	0	192
APPROACH %'s :	0.00%	39.36%	60.64%	0.00%	6.45%	93.55%	0.00%	0.00%					86.11%	0.00%	13.89%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	19	39	0	3	39	0	0	0	0	0	0	17	0	2	0	119
PEAK HR FACTOR :	0.000	0.679	0.750	0.000	0.750	0.696	0.000	0.000	0.000	0.000	0.000	0.000	0.850	0.000	0.250	0.000	0.850
	0.853				0.700								0.679				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	9	7	0	0	3	0	0	0	0	0	0	7	0	1	0	27
4:15 PM	0	14	4	0	0	7	0	0	0	0	0	0	5	0	3	0	33
4:30 PM	0	14	5	0	0	11	0	0	0	0	0	0	16	0	3	0	49
4:45 PM	0	9	9	0	0	13	0	0	0	0	0	0	7	0	0	0	38
5:00 PM	0	12	7	0	1	10	0	0	0	0	0	0	6	0	0	0	36
5:15 PM	0	8	5	0	1	3	0	0	0	0	0	0	5	0	0	0	22
5:30 PM	0	10	5	0	1	8	0	0	0	0	0	0	5	0	0	0	29
5:45 PM	0	5	7	0	0	8	0	0	0	0	0	0	8	0	0	0	28
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	81	49	0	3	63	0	0	0	0	0	0	59	0	7	0	262
APPROACH %'s :	0.00%	62.31%	37.69%	0.00%	4.55%	95.45%	0.00%	0.00%					89.39%	0.00%	10.61%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	49	25	0	1	41	0	0	0	0	0	0	34	0	6	0	156
PEAK HR FACTOR :	0.00	0.875	0.694	0.000	0.250	0.788	0.000	0.000	0.000	0.000	0.000	0.000	0.531	0.000	0.500	0.000	0.796
	0.974				0.808								0.526				

National Data & Surveying Services Intersection Turning Movement Count

Location: Sierra Hwy & Sopp Rd
City: Mojave
Control: 1-Way Stop(WB)

Project ID: 17-08110-009
Date: 11/14/2017

MT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Sopp Rd				Sopp Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	4	1	0	1	2	0	0	0	0	0	0	0	0	0	0	8
APPROACH %'s :	0.00%	80.00%	20.00%	0.00%	33.33%	66.67%	0.00%	0.00%									
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
PEAK HR FACTOR :	0.000	0.500	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.750
	0.500				0.250												

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
APPROACH %'s :	0.00%	0.00%	100.00%	0.00%									100.00%	0.00%	0.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
PEAK HR FACTOR :	0.00	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.500
	0.250												0.250				

National Data & Surveying Services **Intersection Turning Movement Count**

Location: Sierra Hwy & Sopp Rd
City: Mojave
Control: 1-Way Stop(WB)

Project ID: 17-08110-009
Date: 11/14/2017

HT

NS/EW Streets:	Sierra Hwy				Sierra Hwy				Sopp Rd				Sopp Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%									
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	0	3	0	0	0	0	0	0	1	0	0	0	5
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%					100.00%	0.00%	0.00%	0.00%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.250
													0.250				

Prepared by National Data & Surveying Services

Sierra Hwy & Sopp Rd

Peak Hour Turning Movement Count

ID: 17-08110-009
City: Mojave

Day: Tuesday
Date: 11/14/2017

PEAK HOURS		COUNT PERIODS
07:15 AM - 08:15 AM	AM	07:00 AM - 09:00 AM
NONE	NOON	NONE
04:15 PM - 05:15 PM	PM	04:00 PM - 06:00 PM

Sierra Hwy — SOUTHBOUND

	U-turn	Left	Thru	Right	Departing
AM	0	4	39	0	23
NOON	0	0	0	0	0
PM	0	1	41	0	55
Peds/Bikes	0	0	1	0	

Sopp Rd — EASTBOUND

	AM	NOON	PM	
Departing	0	0	0	
U-turn	0	0	0	0
Left	0	0	0	0
Thru	0	0	0	0
Right	0	0	0	0

Sopp Rd — WESTBOUND

	PM	NOON	AM	
Right	6	0	2	0
Thru	0	0	0	1
Left	36	0	17	0
U-turn	0	0	0	0
Departing	27	0	43	

Sierra Hwy — NORTHBOUND

	Departing	U-turn	Left	Thru	Right
Peds/Bikes		0	0	1	0
PM	77	0	0	49	26
NOON	0	0	0	0	0
AM	56	0	0	21	39

CONTROL

1-Way Stop(WB)

	AM	NOON	PM
TEV	122	0	159
PHF	0.85		0.78

PV (AM)

Approach	U-turn	Left	Thru	Right
SB	0	3	39	0
EB		0	0	0
WB		17	0	2
NB	0		19	39

PV (NOON)

All movements: N/A

PV (PM)

Approach	U-turn	Left	Thru	Right
SB	0	1	41	0
EB		0	0	0
WB		34	0	6
NB	0		49	25

HT (AM)

All movements: 0

HT (NOON)

All movements: N/A

HT (PM)

Approach	Left	Thru	Right
SB	0	0	0
EB	0	0	0
WB	1	0	0
NB	0	0	0

Pedestrians (Crosswalks)

All crosswalk counts (AM, NOON, PM): 0

Existing AM (PCE)															
			Movement												PHF
Int. ID	N/S Street Name	E/W Street Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	PHF
1	Holt Rd	Silver Queen Rd													
		PV	0	0	0	4	0	0	2	19	0	0	5	6	0.643
		MT	0	0	0	0	0	0	2	0	0	0	0	0	0.250
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	**0**	**0**	**0**	**4**	**0**	**0**	**6**	**19**	**0**	**0**	**5**	**6**	
2	SR-14 SB Ramps	Silver Queen Rd													
		PV	0	0	0	17	1	10	0	17	6	0	7	0	0.690
		MT	0	0	0	1	0	1	0	0	0	0	0	0	0.500
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**0**	**0**	**0**	**19**	**1**	**12**	**0**	**17**	**6**	**0**	**7**	**0**	
3	SR-14 NB Ramps	Silver Queen Rd													
		PV	7	0	1	0	0	0	16	17	0	0	0	14	0.598
		MT	0	0	0	0	0	0	0	1	0	0	0	2	0.250
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**7**	**0**	**1**	**0**	**0**	**0**	**16**	**19**	**0**	**0**	**0**	**18**	
4	Sierra Highway	Silver Queen Rd													
		PV	19	0	0	0	0	0	0	0	18	0	0	0	0.661
		MT	2	0	0	0	0	0	0	0	2	0	0	0	0.333
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**22**	**0**	**0**	**0**	
5	Sierra Highway	Trotter Ave													
		PV	0	17	0	0	19	0	0	0	0	0	0	0	0.818
		MT	0	1	0	0	2	0	0	0	0	0	0	0	0.750
		HT	0	1	0	0	0	0	0	0	0	0	0	0	0.250
		Total	**0**	**22**	**0**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
6	SR-14 SB Ramps	Backus Rd													
		PV	0	0	0	6	1	3	0	26	78	5	23	0	0.807
		MT	0	0	0	0	0	0	0	1	1	0	0	0	0.500
		HT	0	0	0	0	0	0	0	0	0	0	1	0	0.250
		Total	**0**	**0**	**0**	**6**	**1**	**3**	**0**	**28**	**80**	**5**	**26**	**0**	
7	SR-14 NB Ramps	Backus Rd													
		PV	23	1	6	0	0	0	9	19	0	0	10	3	0.740
		MT	1	0	0	0	0	0	0	1	0	0	0	0	0.500
		HT	2	0	0	0	0	0	0	0	0	0	0	0	0.500
		Total	**31**	**1**	**6**	**0**	**0**	**0**	**9**	**21**	**0**	**0**	**10**	**3**	
8	Sierra Highway	Backus Rd													
		PV	5	15	0	0	18	0	0	0	22	0	0	0	0.833
		MT	0	2	0	0	0	1	0	0	1	0	0	0	0.500
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**5**	**19**	**0**	**0**	**18**	**2**	**0**	**0**	**24**	**0**	**0**	**0**	
9	Sierra Highway	Sopp Rd													
		PV	0	19	39	3	39	0	0	0	0	17	0	2	0.850
		MT	0	2	0	1	0	0	0	0	0	0	0	0	0.750
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**0**	**23**	**39**	**5**	**39**	**0**	**0**	**0**	**0**	**17**	**0**	**2**	

Existing PM (PCE)															
			Movement												PHF
Int. ID	N/S Street Name	E/W Street Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	PHF
1	**Holt Rd**	**Silver Queen Rd**													
		PV	0	0	0	3	0	0	0	6	0	0	15	1	0.781
		MT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**6**	**0**	**0**	**15**	**1**	
2	**SR-14 SB Ramps**	**Silver Queen Rd**													
		PV	0	0	0	33	0	12	0	13	7	2	6	0	0.795
		MT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**0**	**0**	**0**	**33**	**0**	**12**	**0**	**13**	**7**	**2**	**6**	**0**	
3	**SR-14 NB Ramps**	**Silver Queen Rd**													
		PV	3	1	0	0	0	0	15	33	0	0	1	27	0.800
		MT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		HT	0	0	0	0	0	0	0	0	0	0	0	1	0.250
		Total	**3**	**1**	**0**	**0**	**0**	**0**	**15**	**33**	**0**	**0**	**1**	**30**	
4	**Sierra Highway**	**Silver Queen Rd**													
		PV	28	0	0	0	0	0	1	0	32	0	0	0	0.763
		MT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		HT	1	0	0	0	0	0	0	0	0	0	0	0	0.250
		Total	**31**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**32**	**0**	**0**	**0**	
5	**Sierra Highway**	**Trotter Ave**													
		PV	0	30	0	0	33	0	0	0	0	0	0	0	0.926
		MT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**0**	**30**	**0**	**0**	**33**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
6	**SR-14 SB Ramps**	**Backus Rd**													
		PV	0	0	0	2	2	10	0	13	34	9	104	0	0.926
		MT	0	0	0	0	1	0	0	0	0	0	1	0	0.500
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**0**	**0**	**0**	**2**	**4**	**10**	**0**	**13**	**34**	**9**	**106**	**0**	
7	**SR-14 NB Ramps**	**Backus Rd**													
		PV	88	0	2	0	0	0	5	9	0	0	25	4	0.875
		MT	1	0	0	0	0	0	0	0	0	0	0	0	0.250
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**90**	**0**	**2**	**0**	**0**	**0**	**5**	**9**	**0**	**0**	**25**	**4**	
8	**Sierra Highway**	**Backus Rd**													
		PV	25	28	0	0	32	0	0	0	8	0	0	0	0.894
		MT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		HT	0	0	0	0	0	0	0	0	0	0	0	0	0.000
		Total	**25**	**28**	**0**	**0**	**32**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	
9	**Sirra Highway**	**Sopp Rd**													
		PV	0	49	25	1	41	0	0	0	0	34	0	6	0.796
		MT	0	0	1	0	0	0	0	0	0	1	0	0	0.500
		HT	0	0	0	0	0	0	0	0	0	1	0	0	0.250
		Total	**0**	**49**	**27**	**1**	**41**	**0**	**0**	**0**	**0**	**39**	**0**	**6**	

Prepared by NDS/ATD

VOLUME

Lone Butte Rd N/O Trotter Ave

Day: Thursday
Date: 11/16/2017

City: Mojave
Project #: CA17_8111_001

DAILY TOTALS	NB	SB	EB	WB	Total
	358	407	0	0	765

AM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0				0	
00:15	0		0				0	
00:30	0		0				0	
00:45	0		0				0	
01:00	0		0				0	
01:15	1		0				1	
01:30	0		0				0	
01:45	0	1	0				0	1
02:00	0		0				0	
02:15	1		0				1	
02:30	0		0				0	
02:45	0	1	0				0	1
03:00	0		1				1	
03:15	1		0				1	
03:30	0		0				0	
03:45	4	5	1	2			5	7
04:00	4		2				6	
04:15	6		4				10	
04:30	8		2				10	
04:45	22	40	1	9			23	49
05:00	3		3				6	
05:15	8		2				10	
05:30	14		16				30	
05:45	11	36	4	25			15	61
06:00	2		2				4	
06:15	2		2				4	
06:30	13		6				19	
06:45	16	33	3	13			19	46
07:00	7		7				14	
07:15	5		2				7	
07:30	4		3				7	
07:45	14	30	2	14			16	44
08:00	9		1				10	
08:15	4		4				8	
08:30	3		3				6	
08:45	2	18	2	10			4	28
09:00	1		2				3	
09:15	3		4				7	
09:30	1		5				6	
09:45	6	11	4	15			10	26
10:00	5		8				13	
10:15	3		3				6	
10:30	1		6				7	
10:45	2	11	4	21			6	32
11:00	1		8				9	
11:15	2		4				6	
11:30	4		5				9	
11:45	4	11	3	20			7	31
TOTALS		197		129				**326**
SPLIT %		60.4%		39.6%				**42.6%**

PM Period	NB		SB		EB	WB	TOTAL	
12:00	6		1				7	
12:15	3		4				7	
12:30	10		2				12	
12:45	9	28	4	11			13	39
13:00	2		6				8	
13:15	1		2				3	
13:30	1		21				22	
13:45	4	8	10	39			14	47
14:00	5		7				12	
14:15	3		9				12	
14:30	2		8				10	
14:45	4	14	8	32			12	46
15:00	8		10				18	
15:15	5		9				14	
15:30	5		25				30	
15:45	5	23	13	57			18	80
16:00	4		9				13	
16:15	2		9				11	
16:30	3		24				27	
16:45	5	14	12	54			17	68
17:00	2		8				10	
17:15	5		3				8	
17:30	5		3				8	
17:45	5	17	4	18			9	35
18:00	2		3				5	
18:15	1		3				4	
18:30	3		9				12	
18:45	3	9	6	21			9	30
19:00	4		2				6	
19:15	2		1				3	
19:30	4		1				5	
19:45	5	15	2	6			7	21
20:00	5		1				6	
20:15	4		1				5	
20:30	8		2				10	
20:45	2	19	2	6			4	25
21:00	0		1				1	
21:15	2		2				4	
21:30	1		21				22	
21:45	4	7	0	24			4	31
22:00	3		2				5	
22:15	1		2				3	
22:30	0		0				0	
22:45	1	5	1	5			2	10
23:00	1		2				3	
23:15	1		0				1	
23:30	0		2				2	
23:45	0	2	1	5			1	7
TOTALS		161		278				**439**
SPLIT %		36.7%		63.3%				**57.4%**

DAILY TOTALS	NB	SB	EB	WB	Total
	358	407	0	0	765

	NB	SB	EB	WB	Total
AM Peak Hour	04:45	05:00			**04:45**
AM Pk Volume	47	25			**69**
Pk Hr Factor	0.534	0.391			**0.575**
7 - 9 Volume	48	24	0	0	**72**
7 - 9 Peak Hour	07:15	07:00			**07:00**
7 - 9 Pk Volume	32	14	0	0	**44**
Pk Hr Factor	0.571	0.500	0.000	0.000	**0.688**

	NB	SB	EB	WB	Total
PM Peak Hour	12:00	15:00			**15:00**
PM Pk Volume	28	57			**80**
Pk Hr Factor	0.700	0.570			**0.667**
4 - 6 Volume	31	72	0	0	**103**
4 - 6 Peak Hour	16:45	16:00			**16:00**
4 - 6 Pk Volume	17	54	0	0	**68**
Pk Hr Factor	0.850	0.563	0.000	0.000	**0.630**

Prepared by NDS/ATD

VOLUME

United St Bet. Purdy Ave & Reed Ave

Day: Thursday
Date: 11/16/2017

City: Mojave
Project #: CA17_8111_003

DAILY TOTALS	NB	SB	EB	WB	Total
	225	233	0	0	458

AM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0				0	
00:15	0		0				0	
00:30	0		0				0	
00:45	0		0				0	
01:00	0		0				0	
01:15	0		1				1	
01:30	0		0				0	
01:45	0		0	1			0	1
02:00	0		0				0	
02:15	1		0				1	
02:30	1		0				1	
02:45	0	2	0				0	2
03:00	0		1				1	
03:15	0		0				0	
03:30	0		0				0	
03:45	1	1	0	1			1	2
04:00	0		1				1	
04:15	0		2				2	
04:30	0		1				1	
04:45	2	2	2	6			4	8
05:00	2		4				6	
05:15	0		0				0	
05:30	2		6				8	
05:45	2	6	8	18			10	24
06:00	1		4				5	
06:15	2		3				5	
06:30	0		4				4	
06:45	4	7	8	19			12	26
07:00	5		9				14	
07:15	3		2				5	
07:30	2		4				6	
07:45	0	10	3	18			3	28
08:00	4		5				9	
08:15	1		1				2	
08:30	4		4				8	
08:45	2	11	3	13			5	24
09:00	3		8				11	
09:15	1		6				7	
09:30	5		6				11	
09:45	3	12	6	26			9	38
10:00	2		4				6	
10:15	4		5				9	
10:30	7		5				12	
10:45	6	19	6	20			12	39
11:00	4		3				7	
11:15	5		4				9	
11:30	11		3				14	
11:45	6	26	2	12			8	38
TOTALS		96		134				**230**
SPLIT %		41.7%		58.3%				**50.2%**

PM Period	NB		SB		EB	WB	TOTAL	
12:00	3		5				8	
12:15	5		6				11	
12:30	3		6				9	
12:45	4	15	2	19			6	34
13:00	4		2				6	
13:15	1		1				2	
13:30	7		4				11	
13:45	1	13	3	10			4	23
14:00	3		3				6	
14:15	2		2				4	
14:30	4		1				5	
14:45	2	11	6	12			8	23
15:00	10		4				14	
15:15	5		4				9	
15:30	21		4				25	
15:45	8	44	2	14			10	58
16:00	4		1				5	
16:15	3		4				7	
16:30	10		4				14	
16:45	5	22	4	13			9	35
17:00	2		3				5	
17:15	3		1				4	
17:30	1		5				6	
17:45	4	10	5	14			9	24
18:00	0		2				2	
18:15	3		2				5	
18:30	1		0				1	
18:45	0	4	0	4			0	8
19:00	0		2				2	
19:15	1		1				2	
19:30	0		0				0	
19:45	1	2	0	3			1	5
20:00	0		2				2	
20:15	1		1				2	
20:30	1		0				1	
20:45	1	3	2	5			3	8
21:00	0		0				0	
21:15	0		1				1	
21:30	2		0				2	
21:45	1	3	0	1			1	4
22:00	0		0				0	
22:15	0		2				2	
22:30	0		0				0	
22:45	1	1	2	4			3	5
23:00	1		0				1	
23:15	0		0				0	
23:30	0		0				0	
23:45	0	1	0				0	1
TOTALS		129		99				**228**
SPLIT %		56.6%		43.4%				**49.8%**

DAILY TOTALS	NB	SB	EB	WB	Total
	225	233	0	0	458

	NB	SB	EB	WB	Total
AM Peak Hour	10:45	09:00			**10:45**
AM Pk Volume	26	26			**42**
Pk Hr Factor	0.591	0.813			**0.750**
7 - 9 Volume	21	31	0	0	**52**
7 - 9 Peak Hour	08:00	07:00			**07:00**
7 - 9 Pk Volume	11	18	0	0	**28**
Pk Hr Factor	0.688	0.500	0.000	0.000	**0.500**

	NB	SB	EB	WB	Total
PM Peak Hour	15:00	12:00			**15:00**
PM Pk Volume	44	19			**58**
Pk Hr Factor	0.524	0.792			**0.580**
4 - 6 Volume	32	27	0	0	**59**
4 - 6 Peak Hour	16:00	16:15			**16:00**
4 - 6 Pk Volume	22	15	0	0	**35**
Pk Hr Factor	0.550	0.938	0.000	0.000	**0.625**

Prepared by NDS/ATD

VOLUME

Sierra Hwy Bet. Silver Queen Rd & Trotter Ave

Day: Thursday
Date: 11/16/2017

City: Mojave
Project #: CA17_8111_002

DAILY TOTALS	NB	SB	EB	WB	Total
	281	208	0	0	489

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0				0		12:00	4		4				8	
00:15	0		0				0		12:15	2		4				6	
00:30	0		0				0		12:30	4		3				7	
00:45	0		0				0		12:45	5	15	5	16			10	31
01:00	0		0				0		13:00	5		4				9	
01:15	2		1				3		13:15	5		4				9	
01:30	0		0				0		13:30	12		5				17	
01:45	0	2	0	1			0	3	13:45	6	28	4	17			10	45
02:00	1		0				1		14:00	6		5				11	
02:15	0		0				0		14:15	3		2				5	
02:30	0		0				0		14:30	5		3				8	
02:45	0	1	0				0	1	14:45	6	20	2	12			8	32
03:00	0		0				0		15:00	4		2				6	
03:15	1		1				2		15:15	4		6				10	
03:30	0		0				0		15:30	10		6				16	
03:45	2	3	1	2			3	5	15:45	4	22	9	23			13	45
04:00	1		0				1		16:00	5		5				10	
04:15	1		0				1		16:15	8		4				12	
04:30	2		0				2		16:30	8		10				18	
04:45	0	4	0				0	4	16:45	8	29	8	27			16	56
05:00	0		0				0		17:00	9		6				15	
05:15	7		0				7		17:15	5		3				8	
05:30	0		0				0		17:30	4		2				6	
05:45	5	12	1	1			6	13	17:45	4	22	3	14			7	36
06:00	0		1				1		18:00	7		3				10	
06:15	3		1				4		18:15	3		2				5	
06:30	6		2				8		18:30	5		4				9	
06:45	6	15	2	6			8	21	18:45	5	20	2	11			7	31
07:00	3		2				5		19:00	2		2				4	
07:15	3		3				6		19:15	2		2				4	
07:30	3		7				10		19:30	1		2				3	
07:45	4	13	9	21			13	34	19:45	1	6	0	6			1	12
08:00	2		2				4		20:00	2		0				2	
08:15	5		3				8		20:15	0		2				2	
08:30	1		4				5		20:30	3		2				5	
08:45	2	10	4	13			6	23	20:45	2	7	2	6			4	13
09:00	4		4				8		21:00	4		1				5	
09:15	4		2				6		21:15	0		0				0	
09:30	2		1				3		21:30	4		0				4	
09:45	3	13	2	9			5	22	21:45	1	9	0	1			1	10
10:00	1		2				3		22:00	0		1				1	
10:15	4		3				7		22:15	1		0				1	
10:30	2		2				4		22:30	1		0				1	
10:45	3	10	4	11			7	21	22:45	0	2	1	2			1	4
11:00	3		3				6		23:00	0		0				0	
11:15	10		3				13		23:15	0		0				0	
11:30	2		1				3		23:30	0		0				0	
11:45	2	17	1	8			3	25	23:45	1	1	1	1			2	2
TOTALS	100		72					**172**	**TOTALS**	181		136					**317**
SPLIT %	58.1%		41.9%					**35.2%**	**SPLIT %**	57.1%		42.9%					**64.8%**

DAILY TOTALS	NB	SB	EB	WB	Total
	281	208	0	0	489

	NB	SB	EB	WB	Total		NB	SB	EB	WB	Total
AM Peak Hour	06:15	07:00			**07:30**	**PM Peak Hour**	16:15	15:45			**16:15**
AM Pk Volume	18	21			**35**	**PM Pk Volume**	33	28			**61**
Pk Hr Factor	0.750	0.583			**0.673**	**Pk Hr Factor**	0.917	0.700			**0.847**
7 - 9 Volume	23	34	0	0	**57**	**4 - 6 Volume**	51	41	0	0	**92**
7 - 9 Peak Hour	07:30	07:00			**07:30**	**4 - 6 Peak Hour**	16:15	16:15			**16:15**
7 - 9 Pk Volume	14	21	0	0	**35**	**4 - 6 Pk Volume**	33	28	0	0	**61**
Pk Hr Factor	0.700	0.583	0.000	0.000	**0.673**	**Pk Hr Factor**	0.917	0.700	0.000	0.000	**0.847**

Prepared by NDS/ATD

VOLUME

Holt St Bet. Purdy Ave & Silver Queen Rd

Day: Thursday
Date: 11/16/2017

City: Mojave
Project #: CA17_8111_004

DAILY TOTALS	NB	SB	EB	WB	Total
	10	11	0	0	21

AM Period	NB		SB		EB	WB	TOTAL	
00:00	0		0				0	
00:15	0		0				0	
00:30	0		0				0	
00:45	0		0				0	
01:00	0		0				0	
01:15	0		0				0	
01:30	0		0				0	
01:45	0		0				0	
02:00	0		0				0	
02:15	0		0				0	
02:30	0		0				0	
02:45	0		0				0	
03:00	0		0				0	
03:15	0		0				0	
03:30	0		0				0	
03:45	0		0				0	
04:00	0		0				0	
04:15	0		0				0	
04:30	0		0				0	
04:45	0		0				0	
05:00	0		0				0	
05:15	0		0				0	
05:30	0		0				0	
05:45	0		0				0	
06:00	0		0				0	
06:15	0		1				1	
06:30	0		0				0	
06:45	0		0	1			0	1
07:00	0		0				0	
07:15	0		0				0	
07:30	0		0				0	
07:45	0		0				0	
08:00	0		0				0	
08:15	0		0				0	
08:30	0		0				0	
08:45	0		0				0	
09:00	0		1				1	
09:15	0		1				1	
09:30	0		1				1	
09:45	0		0	3			0	3
10:00	0		0				0	
10:15	0		0				0	
10:30	0		0				0	
10:45	0		0				0	
11:00	0		0				0	
11:15	0		0				0	
11:30	2		0				2	
11:45	0	2	0				0	2
TOTALS		2		4				6
SPLIT %		33.3%		66.7%				28.6%

PM Period	NB		SB		EB	WB	TOTAL	
12:00	0		0				0	
12:15	0		0				0	
12:30	0		0				0	
12:45	0		0				0	
13:00	0		1				1	
13:15	0		1				1	
13:30	0		0				0	
13:45	0		0	2			0	2
14:00	0		0				0	
14:15	0		0				0	
14:30	1		0				1	
14:45	0	1	1	1			1	2
15:00	0		0				0	
15:15	1		2				3	
15:30	0		1				1	
15:45	1	2	0	3			1	5
16:00	0		0				0	
16:15	2		0				2	
16:30	0		0				0	
16:45	0	2	0				0	2
17:00	1		0				1	
17:15	0		0				0	
17:30	0		0				0	
17:45	0	1	0				0	1
18:00	0		0				0	
18:15	0		0				0	
18:30	0		0				0	
18:45	1	1	0				1	1
19:00	0		0				0	
19:15	0		0				0	
19:30	0		0				0	
19:45	0		0				0	
20:00	0		1				1	
20:15	0		0				0	
20:30	0		0				0	
20:45	1	1	0	1			1	2
21:00	0		0				0	
21:15	0		0				0	
21:30	0		0				0	
21:45	0		0				0	
22:00	0		0				0	
22:15	0		0				0	
22:30	0		0				0	
22:45	0		0				0	
23:00	0		0				0	
23:15	0		0				0	
23:30	0		0				0	
23:45	0		0				0	
TOTALS		8		7				15
SPLIT %		53.3%		46.7%				71.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	10	11	0	0	21

	NB	SB	EB	WB	Total
AM Peak Hour	10:45	08:45			08:45
AM Pk Volume	2	3			3
Pk Hr Factor	0.250	0.750			0.750
7 - 9 Volume	0	0	0	0	0
7 - 9 Peak Hour					
7 - 9 Pk Volume	0	0	0	0	0
Pk Hr Factor	0.000	0.000	0.000	0.000	0.000

	NB	SB	EB	WB	Total
PM Peak Hour	15:30	14:45			14:30
PM Pk Volume	3	4			5
Pk Hr Factor	0.375	0.500			0.417
4 - 6 Volume	3	0	0	0	3
4 - 6 Peak Hour	16:15				16:15
4 - 6 Pk Volume	3	0	0	0	3
Pk Hr Factor	0.375	0.000	0.000	0.000	0.375

Prepared by NDS/ATD

VOLUME

Purdy Ave E/O SR 14

Day: Thursday
Date: 11/16/2017

City: Mojave
Project #: CA17_8111_005

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	239	226	465

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			0		0		0		12:00			6		3		9	
00:15			0		0		0		12:15			5		4		9	
00:30			0		0		0		12:30			6		4		10	
00:45			0		0		0		12:45			4	21	7	18	11	39
01:00			0		0		0		13:00			1		4		5	
01:15			1		0		1		13:15			2		1		3	
01:30			0		0		0		13:30			4		6		10	
01:45			0	1	0		0	1	13:45			3	10	2	13	5	23
02:00			0		0		0		14:00			2		3		5	
02:15			0		1		1		14:15			2		2		4	
02:30			0		1		1		14:30			2		4		6	
02:45			0		0	2	0	2	14:45			7	13	2	11	9	24
03:00			1		0		1		15:00			3		9		12	
03:15			0		0		0		15:15			5		1		6	
03:30			0		0		0		15:30			3		20		23	
03:45			0	1	1	1	1	2	15:45			1	12	9	39	10	51
04:00			2		0		2		16:00			1		4		5	
04:15			1		0		1		16:15			5		4		9	
04:30			1		0		1		16:30			4		9		13	
04:45			2	6	2	2	4	8	16:45			6	16	6	23	12	39
05:00			4		2		6		17:00			2		5		7	
05:15			1		0		1		17:15			1		4		5	
05:30			7		2		9		17:30			5		1		6	
05:45			7	19	2	6	9	25	17:45			4	12	4	14	8	26
06:00			3		1		4		18:00			2		1		3	
06:15			3		2		5		18:15			2		2		4	
06:30			4		0		4		18:30			0		2		2	
06:45			8	18	4	7	12	25	18:45			0	4	0	5	0	9
07:00			9		4		13		19:00			2		0		2	
07:15			3		3		6		19:15			1		1		2	
07:30			3		2		5		19:30			0		0		0	
07:45			5	20	1	10	6	30	19:45			0	3	1	2	1	5
08:00			3		4		7		20:00			2		0		2	
08:15			1		1		2		20:15			1		0		1	
08:30			5		3		8		20:30			1		2		3	
08:45			5	14	3	11	8	25	20:45			1	5	1	3	2	8
09:00			8		2		10		21:00			0		0		0	
09:15			4		2		6		21:15			1		0		1	
09:30			7		4		11		21:30			0		2		2	
09:45			5	24	2	10	7	34	21:45			0	1	1	3	1	4
10:00			4		3		7		22:00			0		0		0	
10:15			6		4		10		22:15			2		0		2	
10:30			4		6		10		22:30			0		0		0	
10:45			9	23	6	19	15	42	22:45			2	4	1	1	3	5
11:00			2		2		4		23:00			0		1		1	
11:15			4		7		11		23:15			0		0		0	
11:30			3		7		10		23:30			0		0		0	
11:45			3	12	9	25	12	37	23:45			0		0	1	0	1
TOTALS				138		93		**231**	**TOTALS**				101		133		**234**
SPLIT %				59.7%		40.3%		**49.7%**	**SPLIT %**				43.2%		56.8%		**50.3%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	239	226	465

	NB	SB	EB	WB	Total		NB	SB	EB	WB	Total
AM Peak Hour			06:15	11:15	**10:00**	PM Peak Hour			12:00	15:00	**15:00**
AM Pk Volume			24	26	**42**	PM Pk Volume			21	39	**51**
Pk Hr Factor			0.667	0.722	**0.700**	Pk Hr Factor			0.875	0.488	**0.554**
7 - 9 Volume	0	0	34	21	**55**	4 - 6 Volume	0	0	28	37	**65**
7 - 9 Peak Hour			07:00	08:00	**07:00**	4 - 6 Peak Hour			16:15	16:15	**16:15**
7 - 9 Pk Volume	0	0	20	11	**30**	4 - 6 Pk Volume	0	0	17	24	**41**
Pk Hr Factor	0.000	0.000	0.556	0.688	**0.577**	Pk Hr Factor	0.000	0.000	0.708	0.667	**0.788**

Prepared by NDS/ATD

VOLUME

Oak Creek Rd & Westwind & Windhub Substations

Day: Thursday
Date: 11/16/2017

City: Mojave
Project #: CA17_8111_006

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	713	817	1,530

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			4		0		4		12:00			13		10		23	
00:15			0		0		0		12:15			11		12		23	
00:30			0		0		0		12:30			11		14		25	
00:45			2	6	0		2	6	12:45			7	42	13	49	20	91
01:00			0		3		3		13:00			8		16		24	
01:15			0		0		0		13:15			7		11		18	
01:30			0		0		0		13:30			6		11		17	
01:45			0		3	6	3	6	13:45			6	27	13	51	19	78
02:00			3		4		7		14:00			14		10		24	
02:15			4		8		12		14:15			12		12		24	
02:30			8		7		15		14:30			13		25		38	
02:45			6	21	4	23	10	44	14:45			10	49	11	58	21	107
03:00			6		2		8		15:00			7		20		27	
03:15			3		9		12		15:15			12		13		25	
03:30			6		9		15		15:30			11		20		31	
03:45			5	20	2	22	7	42	15:45			7	37	20	73	27	110
04:00			4		6		10		16:00			10		20		30	
04:15			4		5		9		16:15			13		21		34	
04:30			7		2		9		16:30			8		21		29	
04:45			13	28	2	15	15	43	16:45			5	36	24	86	29	122
05:00			3		3		6		17:00			7		23		30	
05:15			3		15		18		17:15			2		19		21	
05:30			19		19		38		17:30			13		11		24	
05:45			30	55	16	53	46	108	17:45			9	31	8	61	17	92
06:00			12		9		21		18:00			8		2		10	
06:15			18		6		24		18:15			2		7		9	
06:30			28		7		35		18:30			2		6		8	
06:45			33	91	11	33	44	124	18:45			1	13	4	19	5	32
07:00			19		18		37		19:00			6		4		10	
07:15			12		10		22		19:15			1		5		6	
07:30			15		11		26		19:30			0		4		4	
07:45			6	52	11	50	17	102	19:45			1	8	3	16	4	24
08:00			11		16		27		20:00			4		4		8	
08:15			14		10		24		20:15			1		4		5	
08:30			7		9		16		20:30			0		5		5	
08:45			17	49	6	41	23	90	20:45			5	10	3	16	8	26
09:00			11		13		24		21:00			2		1		3	
09:15			11		4		15		21:15			4		1		5	
09:30			7		18		25		21:30			1		4		5	
09:45			11	40	7	42	18	82	21:45			1	8	5	11	6	19
10:00			11		9		20		22:00			2		0		2	
10:15			12		10		22		22:15			4		0		4	
10:30			7		15		22		22:30			6		4		10	
10:45			10	40	10	44	20	84	22:45			3	15	0	4	3	19
11:00			7		9		16		23:00			2		5		7	
11:15			10		8		18		23:15			0		1		1	
11:30			4		10		14		23:30			0		5		5	
11:45			8	29	3	30	11	59	23:45			4	6	3	14	7	20
TOTALS				431		359		**790**	**TOTALS**				282		458		**740**
SPLIT %				54.6%		45.4%		**51.6%**	**SPLIT %**				38.1%		61.9%		**48.4%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	713	817	1,530

	NB	SB	EB	WB	Total		NB	SB	EB	WB	Total
AM Peak Hour			06:15	05:15	**06:15**	**PM Peak Hour**			14:00	16:15	**15:30**
AM Pk Volume			98	59	**140**	**PM Pk Volume**			49	89	**122**
Pk Hr Factor			0.742	0.776	**0.795**	**Pk Hr Factor**			0.875	0.927	**0.897**
7 - 9 Volume	0	0	101	91	**192**	**4 - 6 Volume**	0	0	67	147	**214**
7 - 9 Peak Hour			07:00	07:00	**07:00**	**4 - 6 Peak Hour**			16:00	16:15	**16:00**
7 - 9 Pk Volume	0	0	52	50	**102**	**4 - 6 Pk Volume**	0	0	36	89	**122**
Pk Hr Factor	0.000	0.000	0.684	0.694	**0.689**	**Pk Hr Factor**	0.000	0.000	0.692	0.927	**0.897**

Dist	Route		County		Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
07	014		LA		39.854	AGUA DULCE CANYON ROAD	7600	110000	105000	7600	108000	103000
07	014		LA		43.288	ESCONDIDO CANYON ROAD	7600	108000	103000	7600	108000	102000
07	014		LA		46.759	WARD ROAD	7600	108000	102000	7700	109000	104000
07	014		LA	R	48.607	CROWN VALLEY ROAD	7700	109000	104000	7700	110000	104000
07	014		LA	R	50.746	SANTIAGO ROAD	7700	110000	104000	7800	111000	105000
07	014		LA	R	52.172	SOLEDAD CANYON RD/SIERRA HIGHWAY	7800	111000	105000	8000	112000	105000
07	014		LA	R	54.543	ANGELES FOREST HIGHWAY	8000	112000	105000	6000	85000	80000
07	014		LA	R	58.172	PALMDALE, AVENUE S	6000	85000	80000	6900	85000	84000
07	014		LA	R	59.803	PALMDALE, SOUTH JCT. RTE. 138	6900	85000	84000	7400	90000	89000
07	014		LA	R	61.766	PALMDALE, 10TH STREET WEST	7400	90000	89000	7500	91000	89000
07	014		LA	R	63.671	PALMDALE, AVENUE N	7500	91000	89000	8100	96000	94000
07	014		LA	R	64.678	LANCASTER, COLUMBIA WAY/AVENUE M	8100	96000	94000	7900	93000	91000
07	014		LA	R	65.683	LANCASTER, AVENUE L	7900	93000	91000	6700	78000	76000
07	014		LA	R	66.73	LANCASTER, AVENUE K	6700	78000	76000	5500	63000	62000
07	014		LA	R	67.39	LANCASTER, AVENUE J-8/20TH STREET WEST	5500	63000	62000	4000	46000	45000
07	014		LA	R	67.957	LANCASTER, AVENUE J	4000	46000	45000	4600	52000	51000
07	014		LA	R	68.965	LANCASTER, AVENUE I	4600	52000	51000	3950	44500	43500
07	014		LA	R	69.991	LANCASTER, AVENUE H	3950	44500	43500	3600	43000	42000
07	014		LA	R	70.992	AVENUE G	3600	43000	42000	3600	42500	41500
07	014		LA	R	71.995	AVENUE F	3600	42500	41500	3500	41500	40000
07	014		LA	R	74.003	NORTH JCT. RTE. 138	3500	41500	40000	3300	38500	37500
07	014		LA	R	77.008	AVENUE A, LOS ANGELES/KERN COUNTY LINE	3300	38500	37500			
09	014		KER	R	0	AVENUE A, LOS ANGELES/KERN COUNTY LINE				3250	35500	33500
09	014		KER	R	3.018	ROSAMOND BOULEVARD	2850	31000	29500	1700	16900	15900
09	014		KER	R	12.147	SILVER QUEEN ROAD	1700	16900	15900	1700	16900	15900
09	014		KER		16.07	JCT. RTE. 58	1600	16800	15700	1750	17200	16900
09	014		KER		16.08	BREAK IN ROUTE						
09	014		KER		19.239	MOJAVE, NORTH JCT RTE 58	1700	17100	15900	850	10900	9600
09	014		KER		21.29	RANDSBURG CUT-OFF RD,CA CITY/BAKERSFIELD RD	850	10800	9600	910	6900	5900
09	014		KER		35.56	RANDSBURG ROAD	910	6800	5900	730	5500	4500
09	014		KER		57.767	FREEMAN JCT. JCT. RTE. 178 WEST	790	6100	5100	930	6500	5600
09	014		KER		60.571	HOMESTEAD SOUTH JUNCTION, JCT. RTE. 178 EAST	790	5900	5050	600	3700	2750
09	014		KER		64.559	HOMESTEAD NORTH JCT. RTE. 395	700	4550	3600			
11	015	S	SD		11.89	BEGIN ROUTE 15S HOV LANES ONLY ROUTE				2500	21800	19900
11	015	S	SD		15	CARROLL CANYON ROAD	2500	21800	19900	5600	46500	44000
11	015	S	SD		20.577	CARMEL MOUNTAIN ROAD	4600	41000	37500	4900	43000	39000
11	015	S	SD		23.688	RANCHO BERNARDO ROAD	4900	43000	39000	4700	40000	35500

APPENDIX B

LOS Worksheets

- Existing Conditions

Intersection						
Int Delay, s/veh	2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	19	5	6	4	0
Future Vol, veh/h	6	19	5	6	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	64	64	64	64	64	64
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	30	8	9	6	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	17	0	-	0	61	13
Stage 1	-	-	-	-	13	-
Stage 2	-	-	-	-	48	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1600	-	-	-	945	1067
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	974	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1600	-	-	-	939	1067
Mov Cap-2 Maneuver	-	-	-	-	939	-
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	974	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1600	-	-	-	939
HCM Lane V/C Ratio	0.006	-	-	-	0.007
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	15	1	3	0
Future Vol, veh/h	0	6	15	1	3	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	19	1	4	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	20	0	-	0	28	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	8	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1596	-	-	-	987	1058
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	1015	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1596	-	-	-	987	1058
Mov Cap-2 Maneuver	-	-	-	-	987	-
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	1015	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1596	-	-	-	987
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	8.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	17	6	0	7	0	0	0	0	19	1	12
Future Vol, veh/h	0	17	6	0	7	0	0	0	0	19	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	25	9	0	10	0	0	0	0	28	1	17

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	34	0	0				40	44	10
Stage 1	-	-	-	-	-	-				10	10	-
Stage 2	-	-	-	-	-	-				30	34	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1578	-	0				972	848	1071
Stage 1	0	-	-	-	-	0				1013	887	-
Stage 2	0	-	-	-	-	0				993	867	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1578	-	-				972	0	1071
Mov Cap-2 Maneuver	-	-	-	-	-	-				972	0	-
Stage 1	-	-	-	-	-	-				1013	0	-
Stage 2	-	-	-	-	-	-				993	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1578	-	1008
HCM Lane V/C Ratio	-	-	-	-	0.046
HCM Control Delay (s)	-	-	0	-	8.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	13	7	2	6	0	0	0	0	33	0	12
Future Vol, veh/h	0	13	7	2	6	0	0	0	0	33	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	16	9	3	8	0	0	0	0	41	0	15

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	25	0	0				35	39	8
Stage 1	-	-	-	-	-	-				14	14	-
Stage 2	-	-	-	-	-	-				21	25	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1589	-	0				978	853	1074
Stage 1	0	-	-	-	-	0				1009	884	-
Stage 2	0	-	-	-	-	0				1002	874	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1589	-	-				976	0	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-				976	0	-
Stage 1	-	-	-	-	-	-				1007	0	-
Stage 2	-	-	-	-	-	-				1002	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1589	-	1000
HCM Lane V/C Ratio	-	-	0.002	-	0.056
HCM Control Delay (s)	-	-	7.3	0	8.8
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	19	0	0	0	18	7	0	1	0	0	0
Future Vol, veh/h	16	19	0	0	0	18	7	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	32	0	0	0	30	12	0	2	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	30	0	-	-	-	0	101	116	32
Stage 1	-	-	-	-	-	-	86	86	-
Stage 2	-	-	-	-	-	-	15	30	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1583	-	0	0	-	-	898	774	1042
Stage 1	-	-	0	0	-	-	937	824	-
Stage 2	-	-	0	0	-	-	1008	870	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1583	-	-	-	-	-	883	0	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-	883	0	-
Stage 1	-	-	-	-	-	-	921	0	-
Stage 2	-	-	-	-	-	-	1008	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3.3	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	900	1583	-	-	-
HCM Lane V/C Ratio	0.015	0.017	-	-	-
HCM Control Delay (s)	9.1	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	0.1	-	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	33	0	0	1	30	3	1	0	0	0	0
Future Vol, veh/h	15	33	0	0	1	30	3	1	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	41	0	0	1	38	4	1	0	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	39	0	-	-	-	0	99	118	41
Stage 1	-	-	-	-	-	-	79	79	-
Stage 2	-	-	-	-	-	-	20	39	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1571	-	0	0	-	-	900	772	1030
Stage 1	-	-	0	0	-	-	944	829	-
Stage 2	-	-	0	0	-	-	1003	862	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1571	-	-	-	-	-	889	0	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	889	0	-
Stage 1	-	-	-	-	-	-	933	0	-
Stage 2	-	-	-	-	-	-	1003	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.3	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	889	1571	-	-	-
HCM Lane V/C Ratio	0.006	0.012	-	-	-
HCM Control Delay (s)	9.1	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	0	-	-	-

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	23	0	0	0
Future Vol, veh/h	0	22	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	35	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	72	2	2	0	-	0
Stage 1	2	-	-	-	-	-
Stage 2	70	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	932	1082	1620	-	-	-
Stage 1	1021	-	-	-	-	-
Stage 2	953	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	911	1082	1620	-	-	-
Mov Cap-2 Maneuver	911	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	953	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1620	-	1082	-	-
HCM Lane V/C Ratio	0.022	-	0.031	-	-
HCM Control Delay (s)	7.3	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	32	31	0	0	0
Future Vol, veh/h	1	32	31	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	42	41	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	83	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	82	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	919	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	941	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	896	1084	1622	-	-	-
Mov Cap-2 Maneuver	896	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	941	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	8.5		7.3		0	
HCM LOS	A					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1622	-	1077	-	-
HCM Lane V/C Ratio	0.025	-	0.04	-	-
HCM Control Delay (s)	7.3	0	8.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	22	23	0
Future Vol, veh/h	0	0	0	22	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	27	28	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	55	28	28	0	-	0
Stage 1	28	-	-	-	-	-
Stage 2	27	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	953	1047	1585	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	996	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	953	1047	1585	-	-	-
Mov Cap-2 Maneuver	953	-	-	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	996	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1585	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	30	33	0
Future Vol, veh/h	0	0	0	30	33	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	32	35	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	67	35	35	0	-	0
Stage 1	35	-	-	-	-	-
Stage 2	32	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	938	1038	1576	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	991	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	938	1038	1576	-	-	-
Mov Cap-2 Maneuver	938	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	991	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1576	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	28	80	5	26	0	0	0	0	6	1	3
Future Vol, veh/h	0	28	80	5	26	0	0	0	0	6	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	35	99	6	32	0	0	0	0	7	1	4

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	134	0	0				129	178	32
Stage 1	-	-	-	-	-	-				44	44	-
Stage 2	-	-	-	-	-	-				85	134	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1451	-	0				865	716	1042
Stage 1	0	-	-	-	-	0				978	858	-
Stage 2	0	-	-	-	-	0				938	785	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1451	-	-				862	0	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-				862	0	-
Stage 1	-	-	-	-	-	-				974	0	-
Stage 2	-	-	-	-	-	-				938	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.2	9
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1451	-	915
HCM Lane V/C Ratio	-	-	0.004	-	0.013
HCM Control Delay (s)	-	-	7.5	0	9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	13	34	9	106	0	0	0	0	2	4	10
Future Vol, veh/h	0	13	34	9	106	0	0	0	0	2	4	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	14	37	10	114	0	0	0	0	2	4	11

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	51	0	0				167	185	114
Stage 1	-	-	-	-	-	-				134	134	-
Stage 2	-	-	-	-	-	-				33	51	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1555	-	0				823	709	939
Stage 1	0	-	-	-	-	0				892	785	-
Stage 2	0	-	-	-	-	0				989	852	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1555	-	-				817	0	939
Mov Cap-2 Maneuver	-	-	-	-	-	-				817	0	-
Stage 1	-	-	-	-	-	-				886	0	-
Stage 2	-	-	-	-	-	-				989	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.6	9
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1555	-	916
HCM Lane V/C Ratio	-	-	0.006	-	0.019
HCM Control Delay (s)	-	-	7.3	0	9
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	21	0	0	10	3	31	1	6	0	0	0
Future Vol, veh/h	9	21	0	0	10	3	31	1	6	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	28	0	0	14	4	42	1	8	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	18	0	-	-	-	0	68	70	28
Stage 1	-	-	-	-	-	-	52	52	-
Stage 2	-	-	-	-	-	-	16	18	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1599	-	0	0	-	-	937	821	1047
Stage 1	-	-	0	0	-	-	970	852	-
Stage 2	-	-	0	0	-	-	1007	880	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1599	-	-	-	-	-	930	0	1047
Mov Cap-2 Maneuver	-	-	-	-	-	-	930	0	-
Stage 1	-	-	-	-	-	-	962	0	-
Stage 2	-	-	-	-	-	-	1007	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.2	0	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	947	1599	-	-	-
HCM Lane V/C Ratio	0.054	0.008	-	-	-
HCM Control Delay (s)	9	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	0	-	-	-

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	9	0	0	25	4	90	0	2	0	0	0
Future Vol, veh/h	5	9	0	0	25	4	90	0	2	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	10	0	0	28	5	102	0	2	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	33	0	-	-	-	0	53	55	10
Stage 1	-	-	-	-	-	-	22	22	-
Stage 2	-	-	-	-	-	-	31	33	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1579	-	0	0	-	-	955	836	1071
Stage 1	-	-	0	0	-	-	1001	877	-
Stage 2	-	-	0	0	-	-	992	868	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1579	-	-	-	-	-	951	0	1071
Mov Cap-2 Maneuver	-	-	-	-	-	-	951	0	-
Stage 1	-	-	-	-	-	-	997	0	-
Stage 2	-	-	-	-	-	-	992	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.6	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	953	1579	-	-	-
HCM Lane V/C Ratio	0.11	0.004	-	-	-
HCM Control Delay (s)	9.2	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.4	0	-	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	24	5	19	18	2
Future Vol, veh/h	0	24	5	19	18	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	29	6	23	22	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	58	23	24	0	-	0
Stage 1	23	-	-	-	-	-
Stage 2	35	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	949	1054	1591	-	-	-
Stage 1	1000	-	-	-	-	-
Stage 2	987	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	945	1054	1591	-	-	-
Mov Cap-2 Maneuver	945	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	987	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1591	-	1054	-	-
HCM Lane V/C Ratio	0.004	-	0.027	-	-
HCM Control Delay (s)	7.3	0	8.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection						
Int Delay, s/veh	2.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	8	25	28	32	0
Future Vol, veh/h	0	8	25	28	32	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	28	31	36	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	123	36	36	0	-	0
Stage 1	36	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	872	1037	1575	-	-	-
Stage 1	986	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	856	1037	1575	-	-	-
Mov Cap-2 Maneuver	856	-	-	-	-	-
Stage 1	968	-	-	-	-	-
Stage 2	936	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	3.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1575	-	1037	-	-
HCM Lane V/C Ratio	0.018	-	0.009	-	-
HCM Control Delay (s)	7.3	0	8.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	2	23	39	5	39
Future Vol, veh/h	17	2	23	39	5	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	2	27	46	6	46

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	108	50	0	0	73	0
Stage 1	50	-	-	-	-	-
Stage 2	58	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	889	1018	-	-	1527	-
Stage 1	972	-	-	-	-	-
Stage 2	965	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	885	1018	-	-	1527	-
Mov Cap-2 Maneuver	885	-	-	-	-	-
Stage 1	968	-	-	-	-	-
Stage 2	965	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	0.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	897	1527	-
HCM Lane V/C Ratio	-	-	0.025	0.004	-
HCM Control Delay (s)	-	-	9.1	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection						
Int Delay, s/veh	2.6					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	39	6	49	27	1	41
Future Vol, veh/h	39	6	49	27	1	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	8	61	34	1	51

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	131	78	0	0	95	0
Stage 1	78	-	-	-	-	-
Stage 2	53	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	863	983	-	-	1499	-
Stage 1	945	-	-	-	-	-
Stage 2	970	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	862	983	-	-	1499	-
Mov Cap-2 Maneuver	862	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	970	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	0.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	876	1499	-
HCM Lane V/C Ratio	-	-	0.064	0.001	-
HCM Control Delay (s)	-	-	9.4	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

- Existing Plus Option 1/Option 2

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	19	5	6	4	0
Future Vol, veh/h	6	19	5	6	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	64	64	64	64	64	64
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	30	8	9	6	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	17	0	-	0	61	13
Stage 1	-	-	-	-	13	-
Stage 2	-	-	-	-	48	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1600	-	-	-	945	1067
Stage 1	-	-	-	-	1010	-
Stage 2	-	-	-	-	974	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1600	-	-	-	939	1067
Mov Cap-2 Maneuver	-	-	-	-	939	-
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	974	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1600	-	-	-	939
HCM Lane V/C Ratio	0.006	-	-	-	0.007
HCM Control Delay (s)	7.3	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	15	1	3	0
Future Vol, veh/h	0	6	15	1	3	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	19	1	4	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	20	0	-	0	28	20
Stage 1	-	-	-	-	20	-
Stage 2	-	-	-	-	8	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1596	-	-	-	987	1058
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	1015	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1596	-	-	-	987	1058
Mov Cap-2 Maneuver	-	-	-	-	987	-
Stage 1	-	-	-	-	1003	-
Stage 2	-	-	-	-	1015	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1596	-	-	-	987
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	8.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	17	6	0	7	0	0	0	0	19	1	12
Future Vol, veh/h	0	17	6	0	7	0	0	0	0	19	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	25	9	0	10	0	0	0	0	28	1	17

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	34	0	0				40	44	10
Stage 1	-	-	-	-	-	-				10	10	-
Stage 2	-	-	-	-	-	-				30	34	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1578	-	0				972	848	1071
Stage 1	0	-	-	-	-	0				1013	887	-
Stage 2	0	-	-	-	-	0				993	867	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1578	-	-				972	0	1071
Mov Cap-2 Maneuver	-	-	-	-	-	-				972	0	-
Stage 1	-	-	-	-	-	-				1013	0	-
Stage 2	-	-	-	-	-	-				993	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1578	-	1008
HCM Lane V/C Ratio	-	-	-	-	0.046
HCM Control Delay (s)	-	-	0	-	8.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	13	7	2	6	0	0	0	0	33	0	12
Future Vol, veh/h	0	13	7	2	6	0	0	0	0	33	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	16	9	3	8	0	0	0	0	41	0	15

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	25	0	0				35	39	8
Stage 1	-	-	-	-	-	-				14	14	-
Stage 2	-	-	-	-	-	-				21	25	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1589	-	0				978	853	1074
Stage 1	0	-	-	-	-	0				1009	884	-
Stage 2	0	-	-	-	-	0				1002	874	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1589	-	-				976	0	1074
Mov Cap-2 Maneuver	-	-	-	-	-	-				976	0	-
Stage 1	-	-	-	-	-	-				1007	0	-
Stage 2	-	-	-	-	-	-				1002	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	1.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1589	-	1000
HCM Lane V/C Ratio	-	-	0.002	-	0.056
HCM Control Delay (s)	-	-	7.3	0	8.8
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	19	0	0	0	18	7	0	1	0	0	0
Future Vol, veh/h	16	19	0	0	0	18	7	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	32	0	0	0	30	12	0	2	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	30	0	-	-	-	0	101	116	32
Stage 1	-	-	-	-	-	-	86	86	-
Stage 2	-	-	-	-	-	-	15	30	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1583	-	0	0	-	-	898	774	1042
Stage 1	-	-	0	0	-	-	937	824	-
Stage 2	-	-	0	0	-	-	1008	870	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1583	-	-	-	-	-	883	0	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-	883	0	-
Stage 1	-	-	-	-	-	-	921	0	-
Stage 2	-	-	-	-	-	-	1008	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3.3	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	900	1583	-	-	-
HCM Lane V/C Ratio	0.015	0.017	-	-	-
HCM Control Delay (s)	9.1	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	0.1	-	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	33	0	0	1	30	3	1	0	0	0	0
Future Vol, veh/h	15	33	0	0	1	30	3	1	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	41	0	0	1	38	4	1	0	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	39	0	-	-	-	0	99	118	41
Stage 1	-	-	-	-	-	-	79	79	-
Stage 2	-	-	-	-	-	-	20	39	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1571	-	0	0	-	-	900	772	1030
Stage 1	-	-	0	0	-	-	944	829	-
Stage 2	-	-	0	0	-	-	1003	862	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1571	-	-	-	-	-	889	0	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	889	0	-
Stage 1	-	-	-	-	-	-	933	0	-
Stage 2	-	-	-	-	-	-	1003	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.3	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	889	1571	-	-	-
HCM Lane V/C Ratio	0.006	0.012	-	-	-
HCM Control Delay (s)	9.1	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	0	-	-	-

Intersection						
Int Delay, s/veh	7.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	23	0	0	0
Future Vol, veh/h	0	22	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	35	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	72	2	2	0	-	0
Stage 1	2	-	-	-	-	-
Stage 2	70	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	932	1082	1620	-	-	-
Stage 1	1021	-	-	-	-	-
Stage 2	953	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	911	1082	1620	-	-	-
Mov Cap-2 Maneuver	911	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	953	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1620	-	1082	-	-
HCM Lane V/C Ratio	0.022	-	0.031	-	-
HCM Control Delay (s)	7.3	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	32	31	0	0	0
Future Vol, veh/h	1	32	31	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	42	41	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	83	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	82	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	919	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	941	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	896	1084	1622	-	-	-
Mov Cap-2 Maneuver	896	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	941	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	8.5		7.3		0	
HCM LOS	A					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1622	-	1077	-	-
HCM Lane V/C Ratio	0.025	-	0.04	-	-
HCM Control Delay (s)	7.3	0	8.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	22	23	0
Future Vol, veh/h	0	0	0	22	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	27	28	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	55	28	28	0	-	0
Stage 1	28	-	-	-	-	-
Stage 2	27	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	953	1047	1585	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	996	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	953	1047	1585	-	-	-
Mov Cap-2 Maneuver	953	-	-	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	996	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1585	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	30	33	0
Future Vol, veh/h	0	0	0	30	33	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	32	35	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	67	35	35	0	-	0
Stage 1	35	-	-	-	-	-
Stage 2	32	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	938	1038	1576	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	991	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	938	1038	1576	-	-	-
Mov Cap-2 Maneuver	938	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	991	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1576	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	28	80	13	26	0	0	0	0	99	1	3
Future Vol, veh/h	0	28	80	13	26	0	0	0	0	99	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	35	99	16	32	0	0	0	0	122	1	4

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	134	0	0				149	198	32
Stage 1	-	-	-	-	-	-				64	64	-
Stage 2	-	-	-	-	-	-				85	134	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1451	-	0				843	698	1042
Stage 1	0	-	-	-	-	0				959	842	-
Stage 2	0	-	-	-	-	0				938	785	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1451	-	-				834	0	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-				834	0	-
Stage 1	-	-	-	-	-	-				948	0	-
Stage 2	-	-	-	-	-	-				938	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	2.5	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1451	-	839
HCM Lane V/C Ratio	-	-	0.011	-	0.152
HCM Control Delay (s)	-	-	7.5	0	10.1
HCM Lane LOS	-	-	A	A	B
HCM 95th %tile Q(veh)	-	-	0	-	0.5

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	13	34	534	106	0	0	0	0	3	4	10
Future Vol, veh/h	0	13	34	534	106	0	0	0	0	3	4	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	14	37	574	114	0	0	0	0	3	4	11

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	51	0	0				1295	1313	114
Stage 1	-	-	-	-	-	-				1262	1262	-
Stage 2	-	-	-	-	-	-				33	51	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1555	-	0				179	158	939
Stage 1	0	-	-	-	-	0				266	241	-
Stage 2	0	-	-	-	-	0				989	852	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1555	-	-				108	0	939
Mov Cap-2 Maneuver	-	-	-	-	-	-				108	0	-
Stage 1	-	-	-	-	-	-				161	0	-
Stage 2	-	-	-	-	-	-				989	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	7.2	16.3
HCM LOS			C

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1555	-	338
HCM Lane V/C Ratio	-	-	0.369	-	0.054
HCM Control Delay (s)	-	-	8.7	0	16.3
HCM Lane LOS	-	-	A	A	C
HCM 95th %tile Q(veh)	-	-	1.7	-	0.2

Intersection	
Int Delay, s/veh	22.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	114	0	0	18	4	31	1	531	0	0	0
Future Vol, veh/h	9	114	0	0	18	4	31	1	531	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	154	0	0	24	5	42	1	718	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	29	0	-	-	-	0	205	207	154
Stage 1	-	-	-	-	-	-	178	178	-
Stage 2	-	-	-	-	-	-	27	29	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1584	-	0	0	-	-	783	690	892
Stage 1	-	-	0	0	-	-	853	752	-
Stage 2	-	-	0	0	-	-	996	871	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1584	-	-	-	-	-	777	0	892
Mov Cap-2 Maneuver	-	-	-	-	-	-	777	0	-
Stage 1	-	-	-	-	-	-	846	0	-
Stage 2	-	-	-	-	-	-	996	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0.5	0	28.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	885	1584	-	-	-
HCM Lane V/C Ratio	0.86	0.008	-	-	-
HCM Control Delay (s)	28.2	7.3	0	-	-
HCM Lane LOS	D	A	A	-	-
HCM 95th %tile Q(veh)	10.8	0	-	-	-

Intersection												
Int Delay, s/veh	2.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	10	0	0	550	97	90	0	10	0	0	0
Future Vol, veh/h	5	10	0	0	550	97	90	0	10	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	11	0	0	625	110	102	0	11	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	735	0	-	-	-	0	703	758	11
Stage 1	-	-	-	-	-	-	23	23	-
Stage 2	-	-	-	-	-	-	680	735	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	870	-	0	0	-	-	404	336	1070
Stage 1	-	-	0	0	-	-	1000	876	-
Stage 2	-	-	0	0	-	-	503	425	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	870	-	-	-	-	-	401	0	1070
Mov Cap-2 Maneuver	-	-	-	-	-	-	401	0	-
Stage 1	-	-	-	-	-	-	993	0	-
Stage 2	-	-	-	-	-	-	503	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3.1	0	16.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	428	870	-	-	-
HCM Lane V/C Ratio	0.266	0.007	-	-	-
HCM Control Delay (s)	16.4	9.2	0	-	-
HCM Lane LOS	C	A	A	-	-
HCM 95th %tile Q(veh)	1.1	0	-	-	-

Intersection						
Int Delay, s/veh	15.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	641	14	19	18	2
Future Vol, veh/h	0	641	14	19	18	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	772	17	23	22	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	80	23	24	0	-	0
Stage 1	23	-	-	-	-	-
Stage 2	57	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	922	1054	1591	-	-	-
Stage 1	1000	-	-	-	-	-
Stage 2	966	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	912	1054	1591	-	-	-
Mov Cap-2 Maneuver	912	-	-	-	-	-
Stage 1	989	-	-	-	-	-
Stage 2	966	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.1	3.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1591	-	1054	-	-
HCM Lane V/C Ratio	0.011	-	0.733	-	-
HCM Control Delay (s)	7.3	0	17.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	6.9	-	-

Intersection	
Int Delay, s/veh	8.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	17	642	28	32	0
Future Vol, veh/h	0	17	642	28	32	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	19	721	31	36	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1509	36	36	0	-	0
Stage 1	36	-	-	-	-	-
Stage 2	1473	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	133	1037	1575	-	-	-
Stage 1	986	-	-	-	-	-
Stage 2	210	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	71	1037	1575	-	-	-
Mov Cap-2 Maneuver	71	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	210	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	8.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1575	-	1037	-	-
HCM Lane V/C Ratio	0.458	-	0.018	-	-
HCM Control Delay (s)	9.2	0	8.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	2.5	-	0.1	-	-

Intersection						
Int Delay, s/veh	10					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	11	23	39	622	39
Future Vol, veh/h	17	11	23	39	622	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	13	27	46	732	46

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1560	50	0	0	73	0
Stage 1	50	-	-	-	-	-
Stage 2	1510	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	123	1018	-	-	1527	-
Stage 1	972	-	-	-	-	-
Stage 2	202	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	62	1018	-	-	1527	-
Mov Cap-2 Maneuver	62	-	-	-	-	-
Stage 1	494	-	-	-	-	-
Stage 2	202	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	59.3	0	8.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	98	1527	-
HCM Lane V/C Ratio	-	-	0.336	0.479	-
HCM Control Delay (s)	-	-	59.3	9.5	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	1.3	2.7	-

Intersection						
Int Delay, s/veh	21.6					
Movement	**WBL**	**WBR**	**NBT**	**NBR**	**SBL**	**SBT**
Lane Configurations						
Traffic Vol, veh/h	39	623	49	27	10	41
Future Vol, veh/h	39	623	49	27	10	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	779	61	34	13	51

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	155	78	0	0	95	0
Stage 1	78	-	-	-	-	-
Stage 2	77	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	836	983	-	-	1499	-
Stage 1	945	-	-	-	-	-
Stage 2	946	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	828	983	-	-	1499	-
Mov Cap-2 Maneuver	828	-	-	-	-	-
Stage 1	936	-	-	-	-	-
Stage 2	946	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.6	0	1.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	972	1499	-
HCM Lane V/C Ratio	-	-	0.851	0.008	-
HCM Control Delay (s)	-	-	25.6	7.4	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	10.8	0	-

- Existing Plus Option 1-A or 1-B

Intersection						
Int Delay, s/veh	1.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	19	5	82	22	0
Future Vol, veh/h	6	19	5	82	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	64	64	64	64	64	64
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	30	8	128	34	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	136	0	-	0	120	72
Stage 1	-	-	-	-	72	-
Stage 2	-	-	-	-	48	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1448	-	-	-	876	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	974	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1448	-	-	-	871	990
Mov Cap-2 Maneuver	-	-	-	-	871	-
Stage 1	-	-	-	-	945	-
Stage 2	-	-	-	-	974	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1448	-	-	-	871
HCM Lane V/C Ratio	0.006	-	-	-	0.039
HCM Control Delay (s)	7.5	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection						
Int Delay, s/veh	6					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	15	19	79	0
Future Vol, veh/h	0	6	15	19	79	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	19	24	101	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	43	0	-	0	39	31
Stage 1	-	-	-	-	31	-
Stage 2	-	-	-	-	8	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1566	-	-	-	973	1043
Stage 1	-	-	-	-	992	-
Stage 2	-	-	-	-	1015	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1566	-	-	-	973	1043
Mov Cap-2 Maneuver	-	-	-	-	973	-
Stage 1	-	-	-	-	992	-
Stage 2	-	-	-	-	1015	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1566	-	-	-	973
HCM Lane V/C Ratio	-	-	-	-	0.104
HCM Control Delay (s)	0	-	-	-	9.1
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	18	23	0	73	0	0	0	0	19	1	22
Future Vol, veh/h	0	18	23	0	73	0	0	0	0	19	1	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	69	69	69	69	69	69	69	69	69
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	26	33	0	106	0	0	0	0	28	1	32

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	59	0	0				149	165	106
Stage 1	-	-	-	-	-	-				106	106	-
Stage 2	-	-	-	-	-	-				43	59	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1545	-	0				843	728	948
Stage 1	0	-	-	-	-	0				918	807	-
Stage 2	0	-	-	-	-	0				979	846	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1545	-	-				843	0	948
Mov Cap-2 Maneuver	-	-	-	-	-	-				843	0	-
Stage 1	-	-	-	-	-	-				918	0	-
Stage 2	-	-	-	-	-	-				979	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1545	-	896
HCM Lane V/C Ratio	-	-	-	-	0.068
HCM Control Delay (s)	-	-	0	-	9.3
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	23	73	2	23	0	0	0	0	33	0	13
Future Vol, veh/h	0	23	73	2	23	0	0	0	0	33	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	29	91	3	29	0	0	0	0	41	0	16

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	120	0	0				110	155	29
Stage 1	-	-	-	-	-	-				35	35	-
Stage 2	-	-	-	-	-	-				75	120	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1468	-	0				887	737	1046
Stage 1	0	-	-	-	-	0				987	866	-
Stage 2	0	-	-	-	-	0				948	796	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1468	-	-				885	0	1046
Mov Cap-2 Maneuver	-	-	-	-	-	-				885	0	-
Stage 1	-	-	-	-	-	-				985	0	-
Stage 2	-	-	-	-	-	-				948	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0.6	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1468	-	925
HCM Lane V/C Ratio	-	-	0.002	-	0.062
HCM Control Delay (s)	-	-	7.5	0	9.2
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	19	0	0	0	18	73	0	1	0	0	0
Future Vol, veh/h	17	19	0	0	0	18	73	0	1	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	32	0	0	0	30	122	0	2	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	30	0	-	-	-	0	103	118	32
Stage 1	-	-	-	-	-	-	88	88	-
Stage 2	-	-	-	-	-	-	15	30	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1583	-	0	0	-	-	895	772	1042
Stage 1	-	-	0	0	-	-	935	822	-
Stage 2	-	-	0	0	-	-	1008	870	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1583	-	-	-	-	-	879	0	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-	879	0	-
Stage 1	-	-	-	-	-	-	918	0	-
Stage 2	-	-	-	-	-	-	1008	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3.5	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	881	1583	-	-	-
HCM Lane V/C Ratio	0.14	0.018	-	-	-
HCM Control Delay (s)	9.8	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.5	0.1	-	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	33	0	0	1	30	20	1	0	0	0	0
Future Vol, veh/h	25	33	0	0	1	30	20	1	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	31	41	0	0	1	38	25	1	0	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	39	0	-	-	-	0	123	142	41
Stage 1	-	-	-	-	-	-	103	103	-
Stage 2	-	-	-	-	-	-	20	39	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1571	-	0	0	-	-	872	749	1030
Stage 1	-	-	0	0	-	-	921	810	-
Stage 2	-	-	0	0	-	-	1003	862	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1571	-	-	-	-	-	855	0	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	855	0	-
Stage 1	-	-	-	-	-	-	903	0	-
Stage 2	-	-	-	-	-	-	1003	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3.2	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	855	1571	-	-	-
HCM Lane V/C Ratio	0.031	0.02	-	-	-
HCM Control Delay (s)	9.3	7.3	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	-

Intersection						
Int Delay, s/veh	7.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	22	23	0	0	0
Future Vol, veh/h	0	22	23	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	35	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	72	2	2	0	-	0
Stage 1	2	-	-	-	-	-
Stage 2	70	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	932	1082	1620	-	-	-
Stage 1	1021	-	-	-	-	-
Stage 2	953	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	911	1082	1620	-	-	-
Mov Cap-2 Maneuver	911	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	953	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.4	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1620	-	1082	-	-
HCM Lane V/C Ratio	0.022	-	0.031	-	-
HCM Control Delay (s)	7.3	0	8.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection						
Int Delay, s/veh	7.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	32	31	0	0	0
Future Vol, veh/h	1	32	31	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	76	76	76	76
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	42	41	0	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	83	1	1	0	-	0
Stage 1	1	-	-	-	-	-
Stage 2	82	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	919	1084	1622	-	-	-
Stage 1	1022	-	-	-	-	-
Stage 2	941	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	896	1084	1622	-	-	-
Mov Cap-2 Maneuver	896	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	941	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.5	7.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1622	-	1077	-	-
HCM Lane V/C Ratio	0.025	-	0.04	-	-
HCM Control Delay (s)	7.3	0	8.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	22	23	0
Future Vol, veh/h	0	0	0	22	23	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	27	28	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	55	28	28	0	-	0
Stage 1	28	-	-	-	-	-
Stage 2	27	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	953	1047	1585	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	996	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	953	1047	1585	-	-	-
Mov Cap-2 Maneuver	953	-	-	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	996	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1585	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	30	33	0
Future Vol, veh/h	0	0	0	30	33	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	32	35	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	67	35	35	0	-	0
Stage 1	35	-	-	-	-	-
Stage 2	32	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	938	1038	1576	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	991	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	938	1038	1576	-	-	-
Mov Cap-2 Maneuver	938	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	991	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1576	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	28	80	13	26	0	0	0	0	99	1	3
Future Vol, veh/h	0	28	80	13	26	0	0	0	0	99	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	35	99	16	32	0	0	0	0	122	1	4

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	134	0	0				149	198	32
Stage 1	-	-	-	-	-	-				64	64	-
Stage 2	-	-	-	-	-	-				85	134	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1451	-	0				843	698	1042
Stage 1	0	-	-	-	-	0				959	842	-
Stage 2	0	-	-	-	-	0				938	785	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1451	-	-				834	0	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-				834	0	-
Stage 1	-	-	-	-	-	-				948	0	-
Stage 2	-	-	-	-	-	-				938	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	2.5	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1451	-	839
HCM Lane V/C Ratio	-	-	0.011	-	0.152
HCM Control Delay (s)	-	-	7.5	0	10.1
HCM Lane LOS	-	-	A	A	B
HCM 95th %tile Q(veh)	-	-	0	-	0.5

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	13	34	534	106	0	0	0	0	3	4	10
Future Vol, veh/h	0	13	34	534	106	0	0	0	0	3	4	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	14	37	574	114	0	0	0	0	3	4	11

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	51	0	0				1295	1313	114
Stage 1	-	-	-	-	-	-				1262	1262	-
Stage 2	-	-	-	-	-	-				33	51	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1555	-	0				179	158	939
Stage 1	0	-	-	-	-	0				266	241	-
Stage 2	0	-	-	-	-	0				989	852	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1555	-	-				108	0	939
Mov Cap-2 Maneuver	-	-	-	-	-	-				108	0	-
Stage 1	-	-	-	-	-	-				161	0	-
Stage 2	-	-	-	-	-	-				989	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	7.2	16.3
HCM LOS			C

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	-	1555	-	338
HCM Lane V/C Ratio	-	-	0.369	-	0.054
HCM Control Delay (s)	-	-	8.7	0	16.3
HCM Lane LOS	-	-	A	A	C
HCM 95th %tile Q(veh)	-	-	1.7	-	0.2

Intersection	
Int Delay, s/veh	22.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	114	0	0	18	4	31	1	531	0	0	0
Future Vol, veh/h	9	114	0	0	18	4	31	1	531	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	154	0	0	24	5	42	1	718	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	29	0	-	-	-	0	205	207	154
Stage 1	-	-	-	-	-	-	178	178	-
Stage 2	-	-	-	-	-	-	27	29	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	1584	-	0	0	-	-	783	690	892
Stage 1	-	-	0	0	-	-	853	752	-
Stage 2	-	-	0	0	-	-	996	871	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1584	-	-	-	-	-	777	0	892
Mov Cap-2 Maneuver	-	-	-	-	-	-	777	0	-
Stage 1	-	-	-	-	-	-	846	0	-
Stage 2	-	-	-	-	-	-	996	0	-

Approach	EB	WB	NB
HCM Control Delay, s	0.5	0	28.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	885	1584	-	-	-
HCM Lane V/C Ratio	0.86	0.008	-	-	-
HCM Control Delay (s)	28.2	7.3	0	-	-
HCM Lane LOS	D	A	A	-	-
HCM 95th %tile Q(veh)	10.8	0	-	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	10	0	0	550	97	90	0	10	0	0	0
Future Vol, veh/h	5	10	0	0	550	97	90	0	10	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	11	0	0	625	110	102	0	11	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	735	0	-	-	-	0	703	758	11
Stage 1	-	-	-	-	-	-	23	23	-
Stage 2	-	-	-	-	-	-	680	735	-
Critical Hdwy	4.12	-	-	-	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	2.218	-	-	-	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	870	-	0	0	-	-	404	336	1070
Stage 1	-	-	0	0	-	-	1000	876	-
Stage 2	-	-	0	0	-	-	503	425	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	870	-	-	-	-	-	401	0	1070
Mov Cap-2 Maneuver	-	-	-	-	-	-	401	0	-
Stage 1	-	-	-	-	-	-	993	0	-
Stage 2	-	-	-	-	-	-	503	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3.1	0	16.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	428	870	-	-	-
HCM Lane V/C Ratio	0.266	0.007	-	-	-
HCM Control Delay (s)	16.4	9.2	0	-	-
HCM Lane LOS	C	A	A	-	-
HCM 95th %tile Q(veh)	1.1	0	-	-	-

Intersection						
Int Delay, s/veh	16.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	641	14	28	27	2
Future Vol, veh/h	0	641	14	28	27	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	772	17	34	33	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	102	34	35	0	-	0
Stage 1	34	-	-	-	-	-
Stage 2	68	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	896	1039	1576	-	-	-
Stage 1	988	-	-	-	-	-
Stage 2	955	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	886	1039	1576	-	-	-
Mov Cap-2 Maneuver	886	-	-	-	-	-
Stage 1	977	-	-	-	-	-
Stage 2	955	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.8	2.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1576	-	1039	-	-
HCM Lane V/C Ratio	0.011	-	0.743	-	-
HCM Control Delay (s)	7.3	0	17.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	7.2	-	-

Intersection						
Int Delay, s/veh	8.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	17	642	37	41	0
Future Vol, veh/h	0	17	642	37	41	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	19	721	42	46	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1530	46	46	0	-	0
Stage 1	46	-	-	-	-	-
Stage 2	1484	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	129	1023	1562	-	-	-
Stage 1	976	-	-	-	-	-
Stage 2	208	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	68	1023	1562	-	-	-
Mov Cap-2 Maneuver	68	-	-	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	208	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	8.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1562	-	1023	-	-
HCM Lane V/C Ratio	0.462	-	0.019	-	-
HCM Control Delay (s)	9.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	2.5	-	0.1	-	-

Intersection						
Int Delay, s/veh	10.2					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	20	23	39	631	39
Future Vol, veh/h	17	20	23	39	631	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	24	27	46	742	46

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1580	50	0	0	73	0
Stage 1	50	-	-	-	-	-
Stage 2	1530	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	120	1018	-	-	1527	-
Stage 1	972	-	-	-	-	-
Stage 2	197	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	60	1018	-	-	1527	-
Mov Cap-2 Maneuver	60	-	-	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	197	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	50	0	9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	122	1527	-
HCM Lane V/C Ratio	-	-	0.357	0.486	-
HCM Control Delay (s)	-	-	50	9.6	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	1.4	2.8	-

Intersection						
Int Delay, s/veh	22.6					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	39	632	49	27	19	41
Future Vol, veh/h	39	632	49	27	19	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	49	790	61	34	24	51

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	177	78	0	0	95	0
Stage 1	78	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	813	983	-	-	1499	-
Stage 1	945	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	800	983	-	-	1499	-
Mov Cap-2 Maneuver	800	-	-	-	-	-
Stage 1	930	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27	0	2.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	970	1499	-
HCM Lane V/C Ratio	-	-	0.865	0.016	-
HCM Control Delay (s)	-	-	27	7.4	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	11.3	0	-

- Mitigated Conditions

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	11	23	39	622	39
Future Volume (veh/h)	17	11	23	39	622	39
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1900	1863
Adj Flow Rate, veh/h	20	13	27	46	732	46
Adj No. of Lanes	0	0	1	0	0	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	39	25	70	120	908	57
Arrive On Green	0.04	0.04	0.11	0.11	0.54	0.54
Sat Flow, veh/h	999	649	620	1056	1674	105
Grp Volume(v), veh/h	34	0	0	73	778	0
Grp Sat Flow(s),veh/h/ln	1698	0	0	1676	1779	0
Q Serve(g_s), s	0.9	0.0	0.0	1.8	15.7	0.0
Cycle Q Clear(g_c), s	0.9	0.0	0.0	1.8	15.7	0.0
Prop In Lane	0.59	0.38		0.63	0.94	
Lane Grp Cap(c), veh/h	66	0	0	190	965	0
V/C Ratio(X)	0.52	0.00	0.00	0.38	0.81	0.00
Avail Cap(c_a), veh/h	692	0	0	683	1632	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.8	0.0	0.0	18.1	8.2	0.0
Incr Delay (d2), s/veh	6.2	0.0	0.0	1.3	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.0	0.9	8.0	0.0
LnGrp Delay(d),s/veh	27.0	0.0	0.0	19.4	9.9	0.0
LnGrp LOS	C			B	A	
Approach Vol, veh/h	34		73			778
Approach Delay, s/veh	27.0		19.4			9.9
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		9.5				28.4		6.2
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		18.0				40.5		18.0
Max Q Clear Time (g_c+I1), s		3.8				17.7		2.9
Green Ext Time (p_c), s		0.2				6.2		0.0

Intersection Summary			
HCM 2010 Ctrl Delay			11.3
HCM 2010 LOS			B

Notes

Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Traffic Volume (veh/h)	39	632	49	27	19	41		
Future Volume (veh/h)	39	632	49	27	19	41		
Number	3	18	2	12	1	6		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1900	1863		
Adj Flow Rate, veh/h	49	790	61	34	24	51		
Adj No. of Lanes	0	0	1	0	0	1		
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80		
Percent Heavy Veh, %	0	0	2	2	2	2		
Cap, veh/h	53	854	106	59	53	113		
Arrive On Green	0.57	0.57	0.09	0.09	0.09	0.09		
Sat Flow, veh/h	93	1499	1125	627	587	1247		
Grp Volume(v), veh/h	840	0	0	95	75	0		
Grp Sat Flow(s),veh/h/ln	1594	0	0	1752	1833	0		
Q Serve(g_s), s	26.4	0.0	0.0	2.9	2.1	0.0		
Cycle Q Clear(g_c), s	26.4	0.0	0.0	2.9	2.1	0.0		
Prop In Lane	0.06	0.94		0.36	0.32			
Lane Grp Cap(c), veh/h	908	0	0	165	166	0		
V/C Ratio(X)	0.93	0.00	0.00	0.57	0.45	0.00		
Avail Cap(c_a), veh/h	1143	0	0	601	602	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.8	0.0	0.0	23.9	23.7	0.0		
Incr Delay (d2), s/veh	10.8	0.0	0.0	3.1	1.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	14.2	0.0	0.0	1.5	1.2	0.0		
LnGrp Delay(d),s/veh	21.6	0.0	0.0	27.0	25.6	0.0		
LnGrp LOS	C			C	C			
Approach Vol, veh/h	840		95			75		
Approach Delay, s/veh	21.6		27.0			25.6		
Approach LOS	C		C			C		
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		9.7				9.5		35.9
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		18.9				18.1		39.5
Max Q Clear Time (g_c+I1), s		4.9				4.1		28.4
Green Ext Time (p_c), s		0.3				0.2		3.0
Intersection Summary								
HCM 2010 Ctrl Delay			22.4					
HCM 2010 LOS			C					
Notes								

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	17	20	23	39	631	39
Future Volume (veh/h)	17	20	23	39	631	39
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1900	1863
Adj Flow Rate, veh/h	20	24	27	46	742	46
Adj No. of Lanes	0	0	1	0	0	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	30	36	149	253	904	56
Arrive On Green	0.04	0.04	0.24	0.24	0.54	0.54
Sat Flow, veh/h	742	890	620	1056	1675	104
Grp Volume(v), veh/h	45	0	0	73	788	0
Grp Sat Flow(s),veh/h/ln	1669	0	0	1676	1779	0
Q Serve(g_s), s	2.0	0.0	0.0	2.6	27.5	0.0
Cycle Q Clear(g_c), s	2.0	0.0	0.0	2.6	27.5	0.0
Prop In Lane	0.44	0.53		0.63	0.94	
Lane Grp Cap(c), veh/h	68	0	0	402	960	0
V/C Ratio(X)	0.67	0.00	0.00	0.18	0.82	0.00
Avail Cap(c_a), veh/h	400	0	0	402	960	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.5	0.0	0.0	22.7	14.3	0.0
Incr Delay (d2), s/veh	10.7	0.0	0.0	1.0	7.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.0	1.3	15.4	0.0
LnGrp Delay(d),s/veh	46.2	0.0	0.0	23.7	22.1	0.0
LnGrp LOS	D			C	C	
Approach Vol, veh/h	45		73			788
Approach Delay, s/veh	46.2		23.7			22.1
Approach LOS	D		C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		22.5				45.0		7.5
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		18.0				40.5		18.0
Max Q Clear Time (g_c+I1), s		4.6				29.5		4.0
Green Ext Time (p_c), s		0.2				4.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	23.4
HCM 2010 LOS	C

Notes

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	39	632	49	27	19	41
Future Volume (veh/h)	39	632	49	27	19	41
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1900	1900	1863
Adj Flow Rate, veh/h	49	790	61	34	24	51
Adj No. of Lanes	0	0	1	0	0	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	53	854	106	59	53	113
Arrive On Green	0.57	0.57	0.09	0.09	0.09	0.09
Sat Flow, veh/h	93	1499	1125	627	587	1247
Grp Volume(v), veh/h	840	0	0	95	75	0
Grp Sat Flow(s),veh/h/ln	1594	0	0	1752	1833	0
Q Serve(g_s), s	26.4	0.0	0.0	2.9	2.1	0.0
Cycle Q Clear(g_c), s	26.4	0.0	0.0	2.9	2.1	0.0
Prop In Lane	0.06	0.94		0.36	0.32	
Lane Grp Cap(c), veh/h	908	0	0	165	166	0
V/C Ratio(X)	0.93	0.00	0.00	0.57	0.45	0.00
Avail Cap(c_a), veh/h	1143	0	0	601	602	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.8	0.0	0.0	23.9	23.7	0.0
Incr Delay (d2), s/veh	10.8	0.0	0.0	3.1	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.2	0.0	0.0	1.5	1.2	0.0
LnGrp Delay(d),s/veh	21.6	0.0	0.0	27.0	25.6	0.0
LnGrp LOS	C			C	C	
Approach Vol, veh/h	840		95			75
Approach Delay, s/veh	21.6		27.0			25.6
Approach LOS	C		C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		9.7				9.5		35.9
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		18.9				18.1		39.5
Max Q Clear Time (g_c+I1), s		4.9				4.1		28.4
Green Ext Time (p_c), s		0.3				0.2		3.0

Intersection Summary		
HCM 2010 Ctrl Delay		22.4
HCM 2010 LOS		C

Notes

B16. Preliminary Flood Hazard Assessment

BLUE OAK ENERGY®

Oro Verde Solar Project
Preliminary Flood Hazard Assesment
Kern County, California

Sam Laughlin, PE

Prepared for:

SunEdison
simplifying solar

Revision	Date	Description
1 (Final)	June 27, 2014	Prelim. Flood Hzd Analysis

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1.0 Introduction

1.1 Executive Summary

A preliminary hydrologic study and hydraulic analysis was undertaken to investigate anticipated offsite runoff contribution volumes, depths, and velocities expected to impact the Oro Verde Solar project located on the north-western corner of Edwards Air Force Base, in Kern County, California. Contributing watershed flow modeling primarily occurred using the Hydrologic Engineering Calculator (HEC)-1 hydrodynamic modeling software, developed by the United States Army Corps of Engineers. Onsite (and near offsite) flow depth and velocity modeling utilized the two-dimensional flood routing model, Flo-2D.

The purpose of this study was to provide a preliminary assessment and conceptual plan of the mitigation measures that would be necessary in order to protect the site and downstream land should a significant storm occur. Therefore, while calculations, areas of estimation, and methodologies are thoroughly discussed, and HEC-1 model inputs are included as an appendix, the preliminary nature of this study should exclude it from submission to Kern County or any other governing agency for the purpose of supporting detailed grading or improvement plans. If the project moves forward, more in-depth and exacting calculations will need to occur.

Hydrographs were developed for the 2 and 100 year 24 hour rainfall events in accordance with the Kern County Hydrology Manuals. Computational flow modeling occurred for both return period rainfall events, and results can be seen in Appendix A. Offsite runoff was not altered for the post-construction scenario, since construction should not affect offsite flows.

The contributing watershed, including the preliminary site is just over 53 square miles, and peak runoff for the 100 year storm is nearly 6,200 cubic feet per second (CFS). This estimation is high, but not unreasonable given the size of the watershed, the infiltration characteristics, and the rainfall rate and distribution of the 100 year storm.

Flow will enter the proposed site from three directions, north, west, and south, with the bulk of the flow passing through the north and west boundaries. Preliminary two-dimensional (2D) flow analysis shows that at high flowrates, flow crossing the northern and western boundaries will be both overland and channelized. The site generally slopes from west to east, and acts as a collection zone, with a singular watershed outlet located on the eastern edge of the site. Given the topography of the site, it is our recommendation that offsite flows be routed through the site in channels, and then spread and energy dissipated before exiting the existing drainage path on the eastern edge of the site.

1.2 Project Description

The current land available for the Project's use is approximately 3,500 acres in size, and is located on Edwards Air Force Base, in Kern County, California. The project is located approximately six miles southeast of the town of Mojave, just east of Highway 14. Maps included in Appendix A show the site to be located in a small valley (see Figure 1) which is the concentration point for the approximately 53 square-mile contributing watershed.

The site generally slopes from the west to east at a low slope of just over 15 feet per mile (0.003), and is in an area that could be defined as desert, having multiple varieties of low desert shrub. There exists some evidence (as seen on Google Earth) of channelization, but most flow is expected to be overland or along defined features.

1.3 Purpose and Scope of Study

The purpose of this study is to preliminarily assess offsite overland flow volumes, velocities, and depths. Estimations of these numbers are required to size flow mitigation structures, routing channels, and detention structures to ensure the proposed site can be adequately protected, and to route flow to its original locations at its original velocities so that downstream effects will be negligible.

1.4 Flood Zone Designation

Flood Insurance Rate Maps (FIRM) in ArcGIS shapefile form were downloaded to assess the Federal Emergency Management Agency (FEMA) flood zone designation. The entirety of the project area on Edwards Air Force Base falls within Zone D, defined as an area as having "possible but undetermined flood hazards, as no analysis of flood hazards has been conducted." Flood insurance for properties is not required at the Federal level in Zone D areas. Inspection of Figure

1 shows immediate offsite areas of Zone A flooding hazard that would seem to carry onto the site if not crossing a (non-physical) boundary into Edwards Air Force Base. Further and exacting investigation into flood depths and extents will need to occur as part of the final hydrologic assessment. Approximate flood depths and velocities are given as part of this preliminary assessment.

2.0 One-Dimensional (HEC-1) and Two Dimensional (Flo-2D) Model Methodology

Adherence to the *Kern County Hydrology Manual, (KCHM)* was maintained as appropriate for development of this preliminary report.

2.1 Soil Mapping and Curve Numbers

A soil coverage map was downloaded from the NRCS Soil Data Mart website and subsequently imported to Arc-GIS based Watershed Modeling Software (WMS) to delineate and determine appropriate soil Hydrologic Soil Group (HSG) designations for the study area. NRCS infiltration methodology was employed for use within the hydrologic model. USDA Natural Resources Conservation Service Curve Numbers (CN) were estimated based on HSG maps, impervious surface GIS layers, and vegetation coverage maps.

CN's were assigned to different soil groups by interpolating between "poor" and "fair" rows under the Chaparral, Narrowleaf category of the *Curve Numbers for Pervious Areas* table of the Kern County Hydrology Manual. Interpolation resulted in the following numbers:

Table 1 - Soil Group Assigned Curve Numbers

Soil Group Percentage	HSG Soil Type	Assigned Curve Number
50%	A	67
25%	B	77
12%	C	86
13%	D	90

For the purpose of the HEC-1 model run, the above numbers were given a weighted average, and a CN of 75 was assigned to the basin. A map showing HSG designations is given as Figure 2 of appendix A.

2.2 Watershed & Sub-Watershed Delineation and Approximate Stream Mapping

Watershed delineation occurred by using TOPAZ software. The software creates probable channelized flow paths, and subsequently maps contributing watersheds when an outlet location is chosen. The calculated watershed extent was compared to known maps for verification. The watershed extent and flow channels are visible within Figure 1. Channels were compared to Google Earth images for verification.

2.3 Precipitation Estimation

2 year and 100 year 24 hour rainfall amounts were taken from the NOAA Atlas 14 database for the center of each delineated sub basin, and were distributed using the Type I storm distribution, as taken from Appendix B of the USDA's Urban Hydrology for Small Watersheds (TR-55). Antecedent Moisture Condition II (AMC-II) for average soil moisture was used to delineate the CN's as specified by the KCHM. The rainfall events for the required return periods are as follows:

Table 2 - NOAA 14 Rainfall Amounts

Return Period	Amount
2 year, 6 hour	0.739
2 year, 24 hour	1.280
100 year, 6 hour	1.870
100 year, 24 hour	3.720

2.4 Other Calculation Considerations

The synthetic unit hydrograph method was used to predict flow though the basin. Lag was calculated according to Section E.3.2 of the KCHM. The equation of Section E.3.2 is a slightly modified version of the Denver Lag Time Equation, and is given as:

Equation 1 - Lag Equation

$$T_{LAG} = C_t\left(\frac{L \times L_{ca}}{\sqrt{S}}\right)^m$$

Where:

- C_t is a constant, 24 x n, (n=0.03), C_t = 0.72
- L is the length of the longest water course
- L_{ca} is the length along the longest water course measured upstream to a point opposite the center of the area
- S is the overall slope of the drainage area between the headwaters and collection point
- m is a constant (0.38)

Muskingum's method was used to route flow through the basins. An X value of 0.15 was used as an approximation. No infiltration losses were taken in the channel. Since this is a constant loss, and since peak rainfall was observed to overwhelm the infiltration capacity of the soil during the 100 year return storm event, this was assumed to be a conservative estimate. Increasing losses would have the obvious effect of attenuating the peak flow. The K value in Muskingum's method was left blank, as changing this value to the lag of the basin had no effect on peak flow or timing.

2.5 Two-Dimensional (2D) Hydraulic Model Development

2.5.1 Computational Grid

The computational grid for the 2D hydraulic model was created using the FLO-2D Grid Developer System (GDS). FLO-2D uses an orthogonal computational grid with square grid cells to perform overland flow calculations. The FLO-2D model domain was set to be rectangular with a surface area of approximately 20 square miles. The domain was set to be large enough to allow a buffer of approximately one mile between the proposed development site and the edges of the model boundary. For this preliminary hydraulic model assessment, a grid size of 100 feet was chosen for the computational mesh, totaling over 46,000 elements in the computational domain.

2.5.2 Topography

A combination of USGS Digital Elevation Map (DEM) data and site-survey data was used to create the base topographic surface used for modeling. The USGS DEM is available publicly from the National Elevation Dataset (NED). In order to give the smoothest possible results this data was downloaded in 10 meter resolution, the maximum available resolution for Kern County. The topographic datasets were merged in ArcGIS to form a continuous surface in ESRI GRID format (raster) with a 30 foot grid size. GDS requires a text file as input in XYZ format to interpolate elevations to the computational grid. The X-coordinate, Y-coordinate, and elevation (Z-coordinate) of the cell centers of the 30-foot GRID in GIS were exported to a text file in XYZ format for use in GDS.

Topographic data at this resolution cannot be used in place of high resolution LIDAR mapping or surveying if representative results are expected for on-site flow (i.e. channelized depths/velocities and preferential flow-paths in the floodplain). Therefore, the results of the 2D modeling should be taken as an "order-of-magnitude" (OOM) estimation of depth, velocity, and inundation extent only, and not a precise calculation, especially offsite where detailed topographic information was not available.

2.5.3 Hydraulic Roughness

Hydraulic roughness was set to a Manning's n-value of 0.035 for the entire model domain, which is consistent with the soil types and ground cover present on the project site. In further revisions of the model, Manning's n will vary spatially dependent upon coverage and construction. This will lead to higher accuracy onsite velocities and depths, and ultimately better estimations of scour and sediment transport.

2.5.4 Boundary Conditions

In order to obtain depth and velocity across the proposed site, the output hydrographs for the 2-yr and 100-yr storm events from the HEC-1 hydrologic model were used to define the inflow boundary conditions for the 2D hydraulic model. For this preliminary hydraulic model assessment, two steady-state runs were performed using the peak discharge from the 2-yr and 100-yr storms respectively. Because the peak discharge was calculated at the outlet of the watershed downstream of the site, the total flow for each event needed to be distributed along the model boundary to represent flow coming into the model domain from off-site. This was necessary as the Flo-2D domain encompasses the onsite and just offsite area, approximately 15% of the watershed. To distribute the flow, the 2-yr and 100-yr peak flow values were scaled by the relative catchment areas of the nine largest tributaries and assigned as inflow boundaries on the edge of the model domain, as can be seen in Figures 5 - 8. This assumption was determined to be conservative because the total flow at the outlet calculated in HEC-1 assumes there is on-site contribution from the 20 square mile catchment area encompassed by the model domain. Therefore the flow calculated at the nine inflow locations was slightly higher than what we would expect the actual 2-yr and 100-yr flows would be. For a final hydraulic analysis, each sub watershed for each of the nine inlet flows will be individually assessed and a hydrograph from each will make up the inflow boundary conditions to the Flo-2D portion of the model. The steady state inflows for the two model runs are listed in Table X:

Table 3 - FLO-2D Inflow Boundaries

Inflow Location	2-yr Discharge (cfs)	100-yr Discharge (cfs)
1	28	677
2	15	369
3	51	1,231
4	18	431
5	13	308
6	71	1,724
7	38	923
8	15	369
9	5	123
Peak Flow at Outlet	255	6,156

The outflow boundary was set to be the entire eastern edge of the model domain. The water-surface elevation along the outflow boundary was calculated using the normal depth equation.

3.0 Results and Recommendations

3.1 Off-Site Sub-Basin Flow

Figures 3 and 4 show the results of the HEC-1 run for the 2 year and 100 year 24 hour storms for the watershed. These hydrographs peak at 255 and 6,156 CFS respectively. It should be noted that these results represent a worst case scenario, and investigation into soil conditions must be done before final modeling. The main impact point of these flows at the listed flow rates is not expected to be a point source but will be a combination of overland and channelized flow entering the proposed site on the northern, western, and southern sides. The hydrographs shown depict flow exiting the proposed site. The volume of this hydrograph was moved to nine inlet points, depicted in Figures 5 - 8. The flow was broken up based on approximate water shed area served by each of the nine channels. Improvement of this estimation technique should be made for the final hydrologic study when better offsite elevation data is available.

Since the condition and characterization of flow entering the site was of significance, the boundary conditions of the 2D flow model were moved far upstream, so flow could spread out and follow a more natural, and expected flood path. Taking into consideration the limitation of the low resolution elevation mapping offsite, the flow patterns depicted should be treated as preliminary. Further topographic mapping will be required if a more exact model is to be produced.

3.2 Flow Crossing the Proposed Site

Figures 5 through 8 show approximate depth and velocity across the proposed site when no flow mitigation techniques are employed. The scope of this study is to define the impacts caused by offsite flow entering the site. A separate report has been written and submitted discussing onsite flow for both pre and post-construction conditions. While obvious, it is important to note that changes to the site will have no observable impact on upstream flow conditions, and therefore offsite peak flow will remain unchanged for the post-construction condition.

Given the topography and hydraulic conditions of the proposed site as discussed in the accompanying Onsite Conceptual Hydrology and Water Quality Assessment preliminary report, the expected increase of flow due to changing site conditions and increased CNs is expected to be minor in relation to offsite flow contribution, and should have minimal impact on increased velocities or depths at or near structural areas. When a full site evaluation and preliminary design are completed, a CN increase can be estimated and treated as a separate sub-watershed. Increase in flow can then be assessed which can be used to refine onsite basin size and configuration estimations.

For the 2 year 24 hour event flood, flow across the site is generally shallow and slow moving. Low laying areas may see depths up to 15 inches and flow velocities of up to 1 foot per second. (Figures 5,6). The majority of the site for the 2 year event is characterized by very shallow (< 3 inches) depths and very low (< 0.25 foot per second) flows. This shallow, slow flow will most likely form small channels, but overall the chance for scour and transportation is very low for all areas of the site except the outlet on the eastern edge.

The 100 year, 24 hour event brings a much greater volume of water which leads to an increase in both depth and velocity across the site (Figures 7,8). The greatest depths and velocities are still concentrated along the center portion of the site with depths near 3 feet and velocities approaching 3 feet per second present near the eastern edge outlet. The majority of the site is inundated during this storm event with roughly 35% covered in greater than 6 inches of water. If no flow mitigation measures are put in place, storms of this magnitude could potentially cause scour and sediment transport on site. It may be advisable to limit solar installation to the higher areas of the site, leaving the low lying, channelized areas open to maintain natural flow patterns. Special attention should be paid to characterizing natural flow paths as part of the final hydrologic/hydraulic assessment should one be required.

3.3 Preliminary Proposed Offsite Flow Mitigation Techniques

The goal of flow mitigation within the context of offsite origination flow is to route the post-construction offsite flow to its original locations at its original velocities and depths. The goal of onsite flow mitigation is to limit post-construction peak flow to its pre-construction values, in addition to its original depths and velocities at its original locations, assuring that downstream locations are not adversely effected by upstream additions or changes.

3.4 Mitigation for Offsite Originating Flow

Given the results of the preliminary two-dimensional on/near-site flow study conducted in Flo2D discussed in Section 3.2, it may be advisable to route off site flow strategically through the site or raise electrical equipment as needed to mitigate inundation depths and velocities during large storm events. The option of locating the PV arrays out of direct flow lines should be further analyzed during final engineering and deisgn. Flow velocities across the natural site are very low due to its relative flatness. Further inspection, research, and modeling must be undertaken before any design decisions are made.

4.0 Conclusions

The proposed Oro Verde Solar Project lies in a valley surrounded on three sides on Edwards Air Force Base in Kern County, California. The upstream watershed is approximately 53 square miles, and the site itself has a very low longitudinal slope, measuring roughly 0.003 absolute in the west-east direction. 100 year 24-hour storm offsite originating flows impacting the northern, western, and southern edges of the site are expected to be in the range of 6,200 CFS when all inlet channels combine before exiting the eastern edge of the site. Flow mitigation and protection of the site is possible through the use of mitigation techniques. Alternatively, selective construction could occur, whereby installation would only happen out of the floodplain. Before an exact determination of design is made, further research will have to be done to better delineate onsite (and just offsite) elevations and natural channel orientation and distribution through improved topography and existing site information, as well as detailed grading and improvement plans.

5.0 References

- Frank M. White, *Fluid Mechanics,* McGraw-Hill, February, 2010
- Hanif (MH) Chaudhry, *Open-Channel Flow,* Springer, December, 2007
- *Kern County Hydrology Manual,* T.V. Hromadka, II.
- *Urban Hydrology for Small Watersheds (TR-55),* USDA, 1986.

END OF MAIN REPORT

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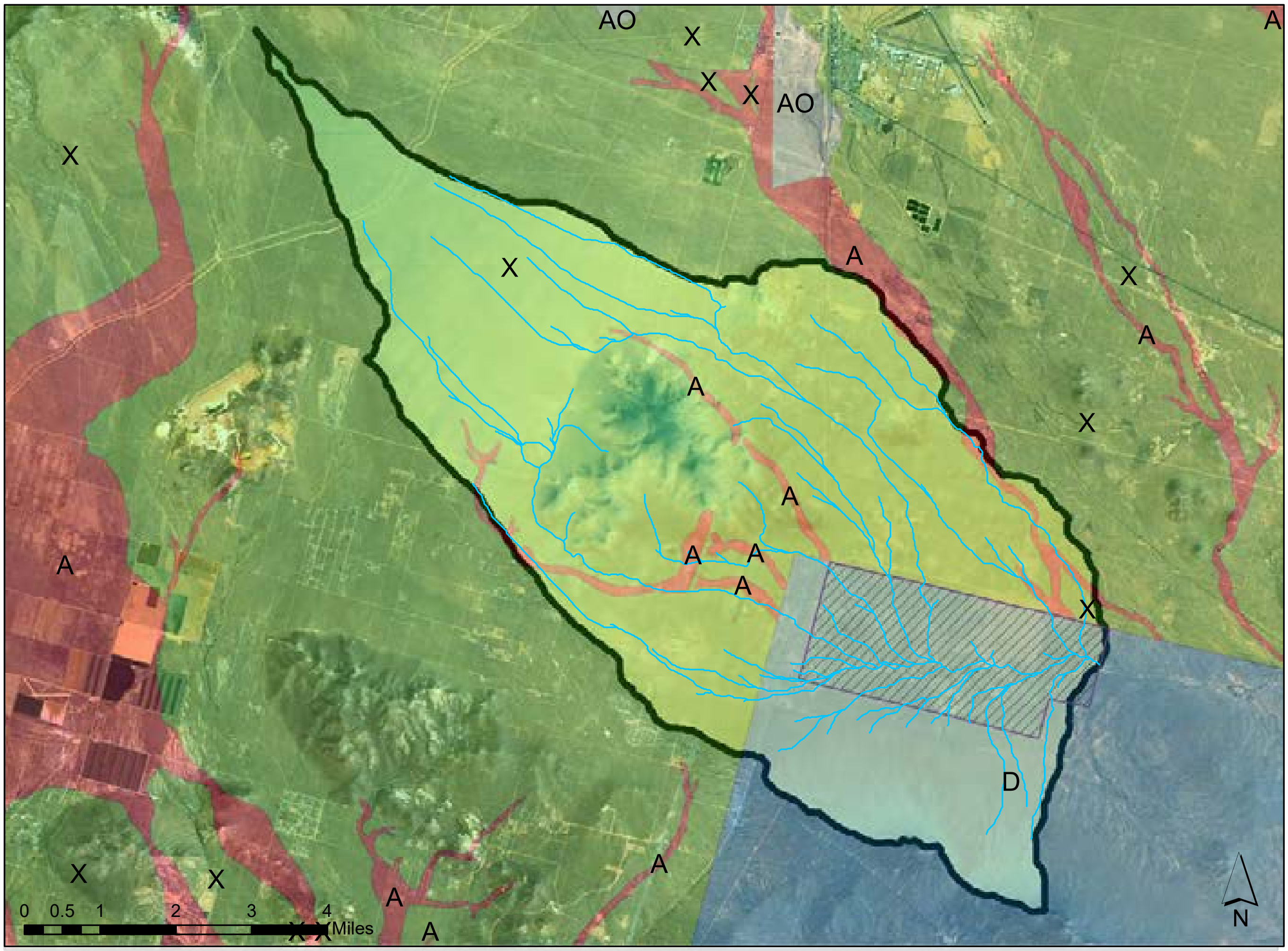
Appendix A
Figures



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REV. NO.	DESCRIPTION	BY
0	SITE OVERVIEW - CHANNEL - Flood Zone	

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PROJECT: VALLEY VIEW
PROJECT NO.:
ENGINEER: SL
DATE: 06/11/14
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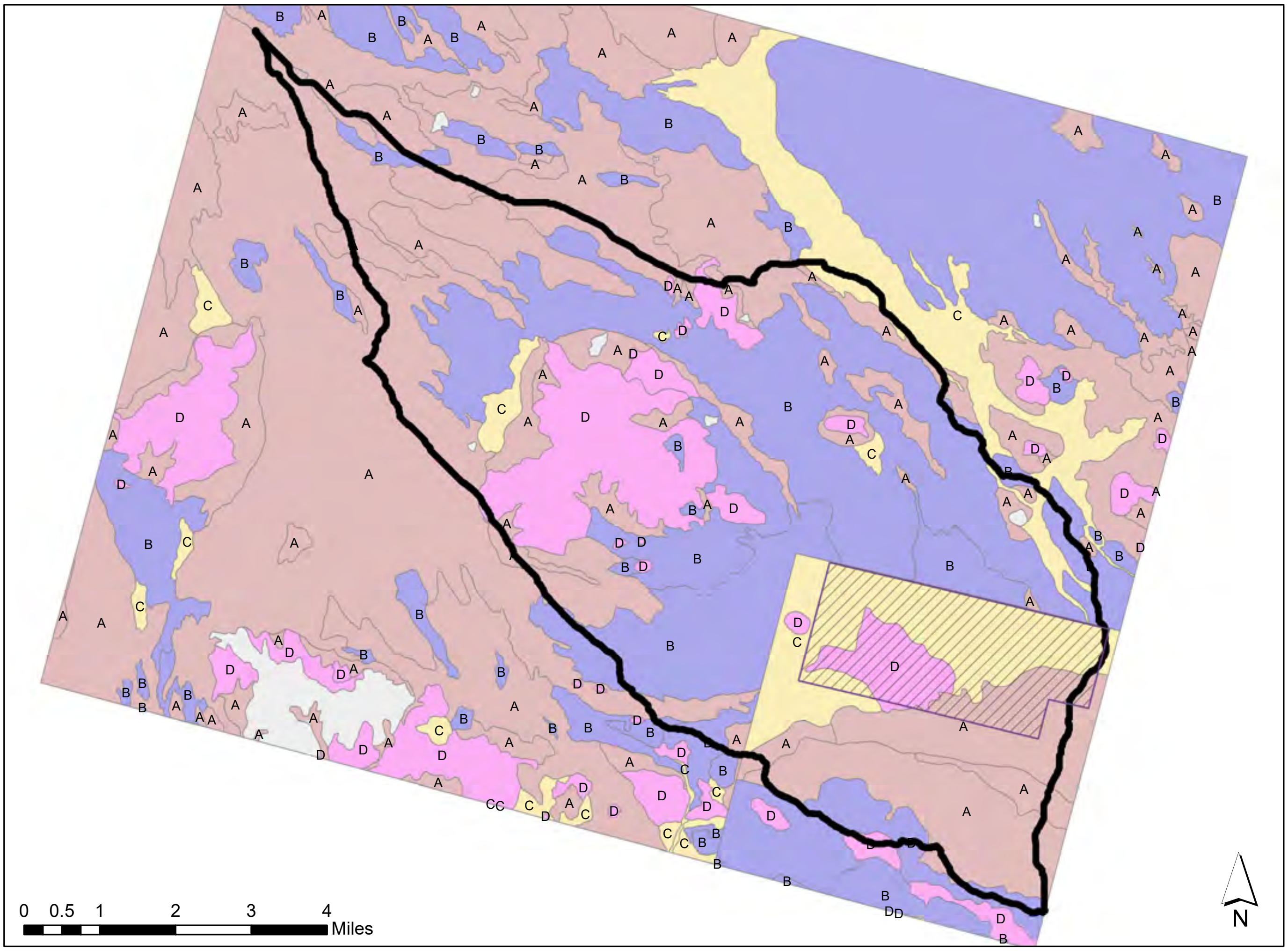

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REV. NO.	DESCRIPTION	BY
0	Soil Type	

CLIENT: IBERDROLA

PROJECT: VALLEY VIEW

PROJECT NO.:

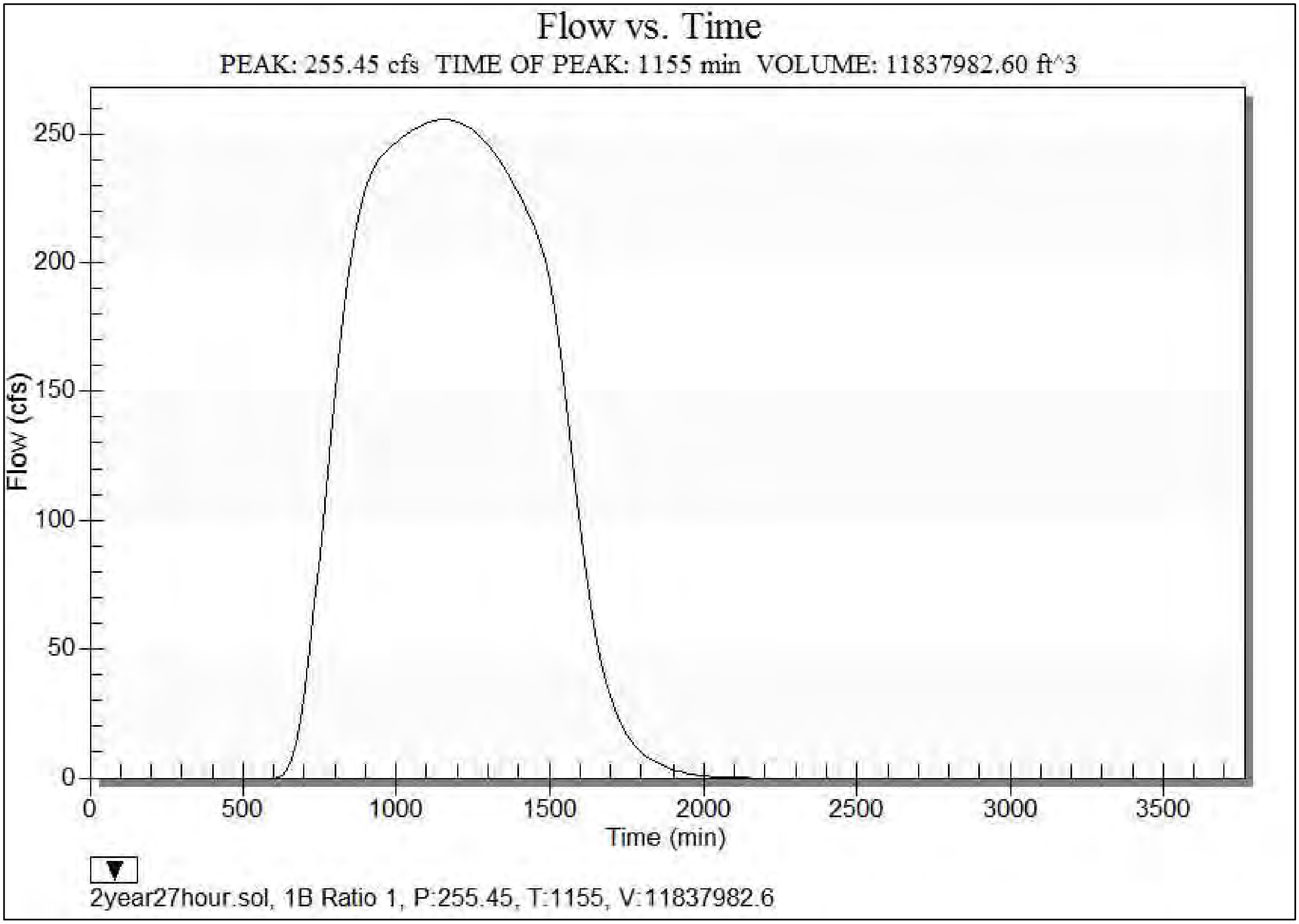
ENGINEER: SL

DATE: 06/11/14

PAGE: 20 OF 45

DRAWING NO.

FIGURE 2



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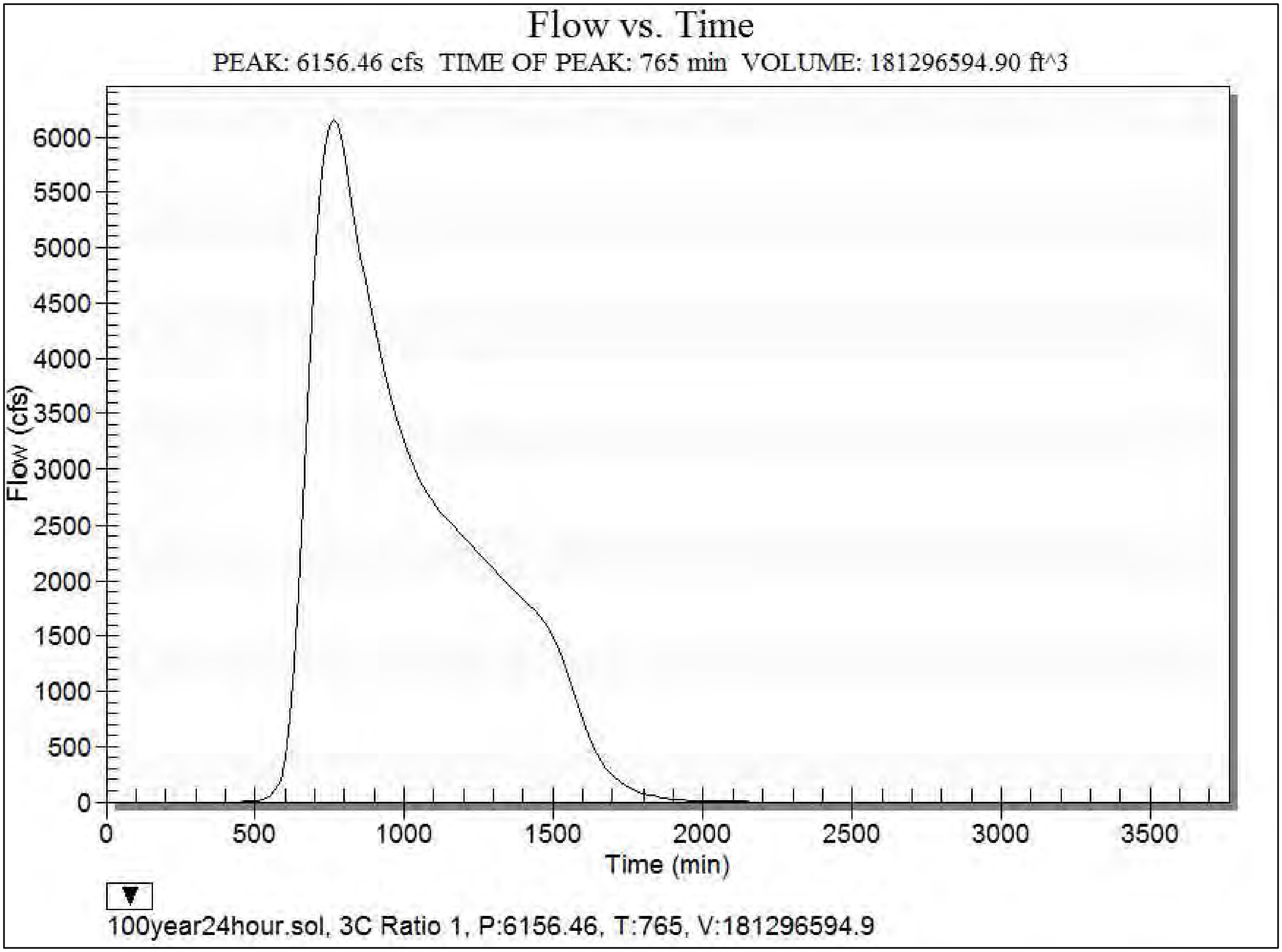
1560 Drew Avenue, Davis, CA 95618 www.blueoakenergy.com - Phone: 530.747.2026 Fax: 530.747.0311

REV. NO.	DESCRIPTION	BY
	Worst Case Scenario	
0	2 Year 24 Hour Hydrograph	

CLIENT: IBERDROLA	
PROJECT: VALLEY VIEW	
PROJECT NO.:	
ENGINEER: SL	
DATE: 06/11/14	DRAWING NO.
PAGE: 21 OF 45	FIGURE 3



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REV. NO.	DESCRIPTION	BY
	Worst Case Scenario	
0	100-YEAR 24-HOUR HYDROGRAPH	

CLIENT: IBERDROLA

PROJECT: VALLEY VIEW

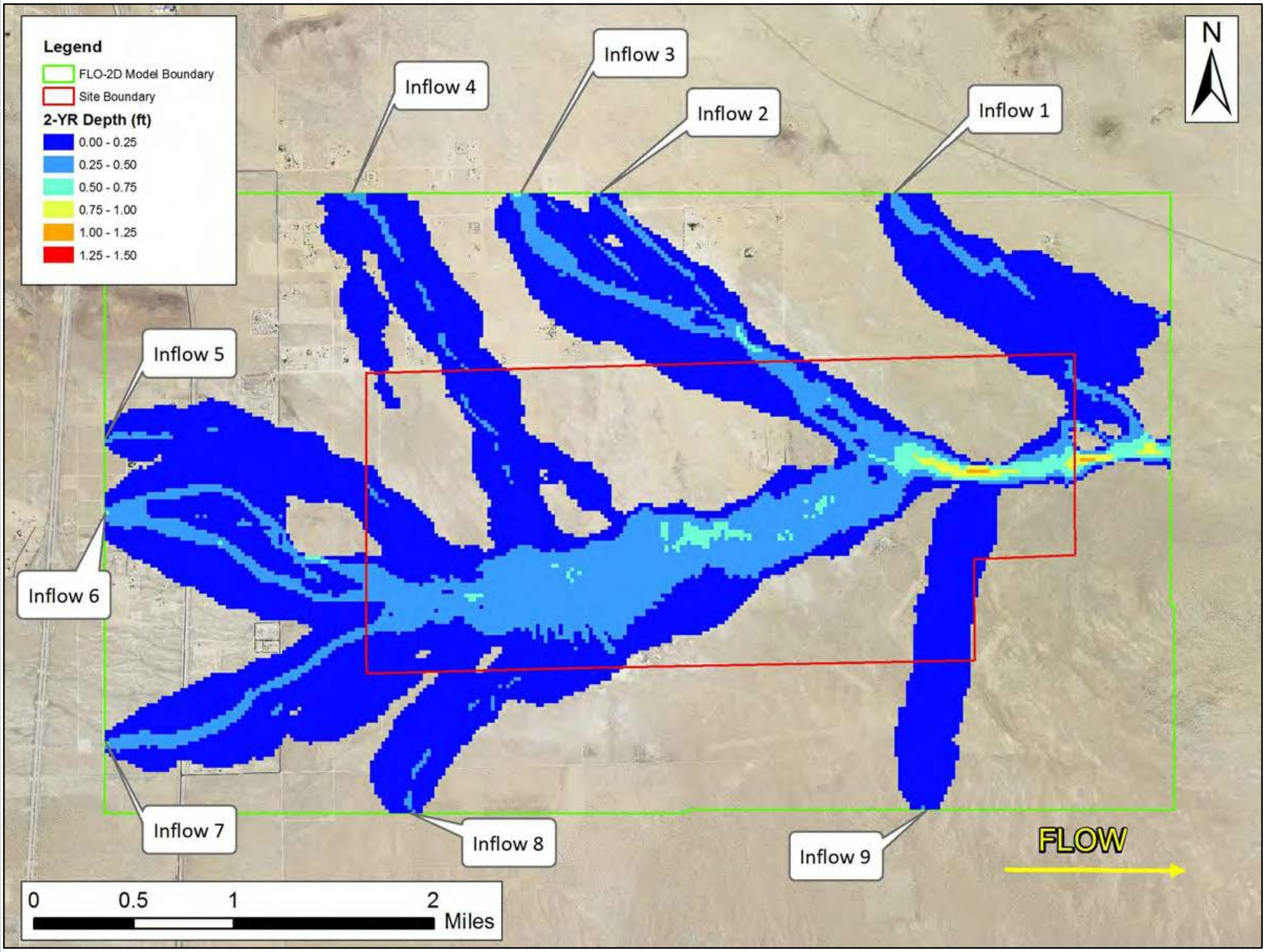
PROJECT NO.:

ENGINEER: SL

DATE: 06/11/14

DRAWING NO.

FIGURE 4



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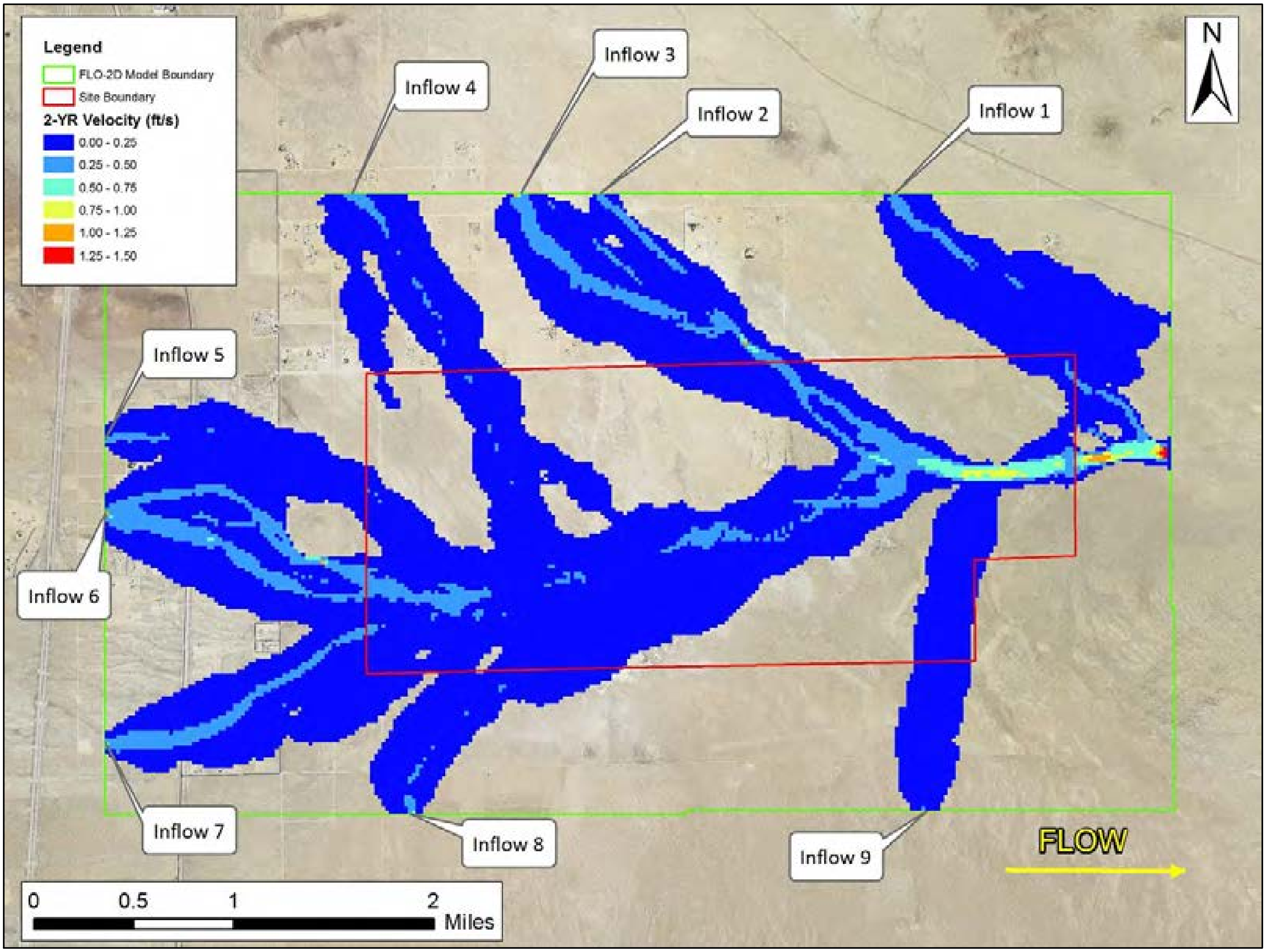
REV. NO.	DESCRIPTION	BY
	Worst Case Scenario	
0	FLO-2D 2 Year Depth	

CLIENT: IBERDROLA
PROJECT: VALLEY VIEW
PROJECT NO.:
ENGINEER: SL
DATE: 06/11/14
DRAWING NO.
FIGURE 5



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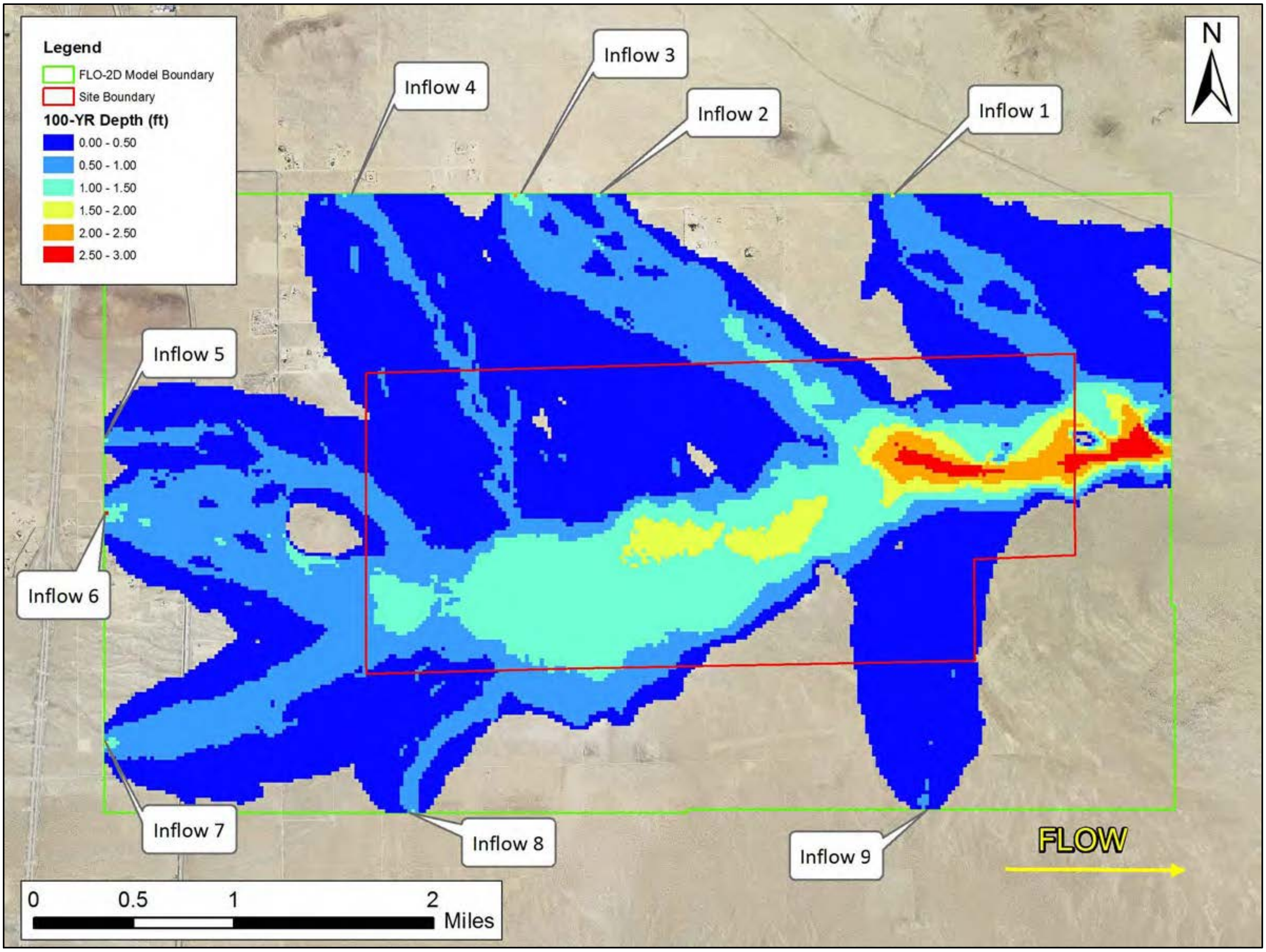
REV. NO.	DESCRIPTION	BY
	Worst Case Scenario	
0	FLO-2D 2 Year Velocity	

CLIENT: IBERDROLA
PROJECT: VALLEY VIEW
PROJECT NO.:
ENGINEER: SL
DATE: 06/11/14
DRAWING NO. FIGURE 6



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REV. NO.	DESCRIPTION	BY
	Worst Case Scenario	
0	FLO-2D 100 Year Depth	

CLIENT: IBERDROLA

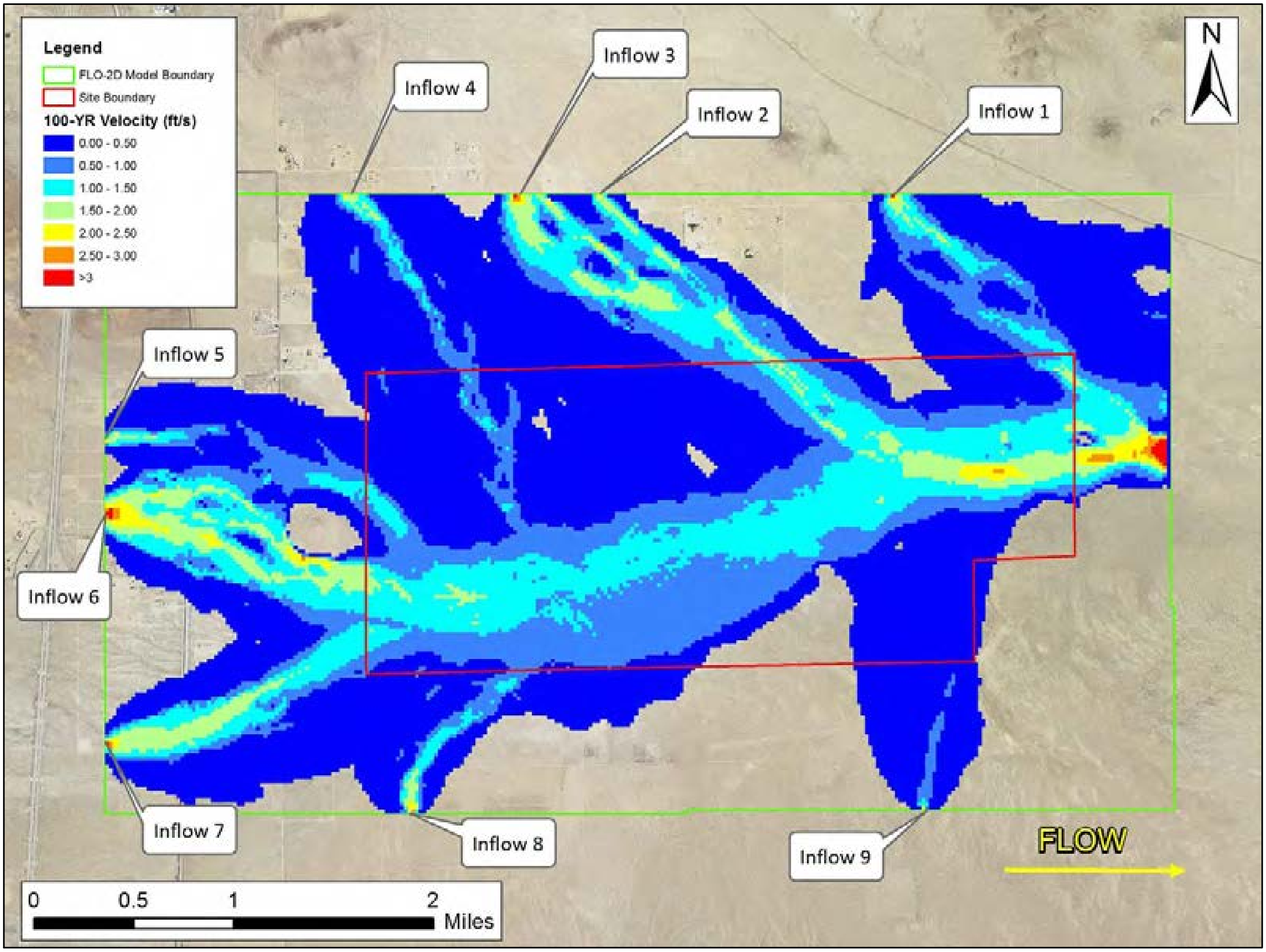
PROJECT: VALLEY VIEW

PROJECT NO.:

ENGINEER: SL

DATE: 06/11/14

DRAWING NO. FIGURE 7



BLUE OAK ENERGY®

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REV. NO.	DESCRIPTION	BY
	Worst Case Scenario	
0	FLO-2D 100 Year Velocity	

CLIENT: IBERDROLA
PROJECT: VALLEY VIEW
PROJECT NO.:
ENGINEER: SL
DATE: 06/11/14
PAGE: 26 OF 45
DRAWING NO.
FIGURE 8

Appendix B
HEC-1 Inputs

```
1*****************************************
***************************************
 *                                       *                                                   *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *    U.S. ARMY CORPS OF ENGINEERS
*
 *              MAY   1991               *                                                   *    HYDROLOGIC ENGINEERING CENTER
*
 *           VERSION 4.0.1E              *                                                   *          609 SECOND STREET
*
 *                                       *                                                   *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE           TIME              *                                                   *           (916) 551-1748
*
 *                                       *                                                   *
*
 *****************************************
***************************************



                                                  X     X  XXXXXXX   XXXXX           X
                                                  X     X  X         X     X        XX
                                                  X     X  X         X               X
                                                  XXXXXXX  XXXX      X       XXXXX   X
                                                  X     X  X         X               X
                                                  X     X  X         X     X         X
                                                  X     X  XXXXXXX   XXXXX          XXX



            THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

            THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
            THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
            NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
            DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
            KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


                                               HEC-1 INPUT                                          PAGE  1

            LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

              1           ID  HEC-1 Analysis using WMS
              2           ID
              3           ID
                          *DIAGRAM
              4           IT      15 06JUN14       0     240
              5           IO       0

              6           KK      1B
              7           KO       0       0     0.0       0      22
              8           BA  53.460
              9           PB    3.72
             10           IN       6 06JUN14       0
                          * typeI-24hour
             11           PC     0.0  0.0017  0.0035  0.0052   0.007  0.0087  0.0105  0.0122   0.014  0.0157
             12           PC  0.0175  0.0192   0.021  0.0227  0.0245  0.0262   0.028  0.0297  0.0315  0.0332
             13           PC   0.035  0.0368  0.0386  0.0404  0.0423  0.0442  0.0461   0.048    0.05   0.052
             14           PC  0.0541  0.0561  0.0582  0.0603  0.0625  0.0647  0.0669  0.0691  0.0714  0.0737
             15           PC   0.076  0.0784  0.0807  0.0831  0.0854  0.0878  0.0902  0.0926  0.0951  0.0975
             16           PC  0.0999  0.1024  0.1049  0.1074  0.1098  0.1123  0.1148  0.1174  0.1199  0.1225
             17           PC   0.125  0.1276  0.1303  0.1332  0.1361  0.1392  0.1423  0.1456  0.1489  0.1524
             18           PC   0.156  0.1597  0.1633  0.1671  0.1708  0.1746  0.1784  0.1823  0.1861  0.1901
             19           PC   0.194  0.1982  0.2028  0.2077  0.2132   0.219  0.2252  0.2319  0.2389  0.2462
             20           PC   0.254  0.2623  0.2714  0.2812  0.2917   0.303  0.3194  0.3454  0.3878  0.4632
             21           PC   0.515  0.5322  0.5476  0.5612   0.573   0.583  0.5919  0.6003  0.6083  0.6159
             22           PC   0.623  0.6298  0.6365   0.643  0.6493  0.6555  0.6615  0.6674  0.6731  0.6786
             23           PC   0.684  0.6893  0.6944  0.6995  0.7044  0.7093   0.714  0.7187  0.7232  0.7277
             24           PC   0.732  0.7362  0.7404  0.7444  0.7484  0.7522   0.756  0.7597  0.7632  0.7667
             25           PC    0.77  0.7733  0.7766  0.7798   0.783  0.7863  0.7894  0.7926  0.7958  0.7989
             26           PC   0.802  0.8051  0.8082  0.8112  0.8142  0.8173  0.8202  0.8232  0.8262  0.8291
             27           PC   0.832  0.8349  0.8378  0.8406  0.8434  0.8462   0.849  0.8518  0.8546  0.8573
             28           PC    0.86  0.8627  0.8654   0.868  0.8706  0.8732  0.8758  0.8784   0.881  0.8835
             29           PC   0.886  0.8885   0.891  0.8934  0.8958  0.8982  0.9006   0.903  0.9054  0.9077
             30           PC    0.91  0.9123  0.9146  0.9168   0.919  0.9213  0.9234  0.9256  0.9278  0.9299
```

```
PC   0.932  0.9341  0.9362  0.9382  0.9402  0.9423  0.9442  0.9462  0.9482  0.9501
PC   0.952  0.9539  0.9558  0.9576  0.9594  0.9613   0.963  0.9648  0.9666  0.9683
PC    0.97  0.9717  0.9734   0.975  0.9766  0.9782  0.9798  0.9814   0.983  0.9845
PC   0.986  0.9875   0.989  0.9904  0.9918  0.9932  0.9946   0.996  0.9974  0.9987
PC     1.0
LS     0.0    75.0     0.0
UD  2.2795

KK      3R   CNAME      3C
KO       0       0     0.0       0      22
RM       1     0.0     0.2
ZZ
```

```
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    6          1B
                V
                V
   38          3R

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
***************************************
 *                                       *                                                    *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *    U.S. ARMY CORPS OF ENGINEERS
*
 *               MAY   1991              *                                                    *    HYDROLOGIC ENGINEERING CENTER
*
 *            VERSION 4.0.1E             *                                                    *          609 SECOND STREET
*
 *                                       *                                                    *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE            TIME             *                                                    *           (916) 551-1748
*
 *                                       *                                                    *
*
 *****************************************
***************************************



                           HEC-1 Analysis using WMS



    5 IO         OUTPUT CONTROL VARIABLES
                       IPRNT          0  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT         HYDROGRAPH TIME DATA
                        NMIN         15  MINUTES IN COMPUTATION INTERVAL
                       IDATE     6JUN14  STARTING DATE
                       ITIME       0000  STARTING TIME
                           NQ,      240  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE     8JUN14  ENDING DATE
                      NDTIME       1145  ENDING TIME
                      ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL    0.25 HOURS
                        TOTAL TIME BASE   59.75 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
***


             **************
             *            *
    6 KK     *        1B  *
             *            *
             **************

    7 KO         OUTPUT CONTROL VARIABLES
                       IPRNT          0  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
```

```
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT      0.250  TIME INTERVAL IN HOURS


  10 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN          6  TIME INTERVAL IN MINUTES
                     JXDATE     6JUN14  STARTING DATE
                     JXTIME          0  STARTING TIME

               SUBBASIN RUNOFF DATA

   8 BA          SUBBASIN CHARACTERISTICS
                      TAREA,     53.46  SUBBASIN AREA

                 PRECIPITATION DATA

   9 PB               STORM       3.72  BASIN TOTAL PRECIPITATION

  11 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.03      0.06      0.15
                     0.04      0.03      0.02      0.02      0.02      0.02      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00

  36 LS          SCS LOSS RATE
                      STRTL       0.67  INITIAL ABSTRACTION
                     CRVNBR      75.00  CURVE NUMBER
                      RTIMP       0.00  PERCENT IMPERVIOUS AREA

  37 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG       2.28  LAG

                                                         ***

                                                   UNIT HYDROGRAPH
                                              48 END-OF-PERIOD ORDINATES
              352.     1152.     2197.     3607.     5460.     7507.     9147.    10206.    10684.    10711.
            10364.     9642.     8804.     7790.     6544.     5339.     4438.     3733.     3143.     2699.
             2291.     1944.     1609.     1376.     1152.      984.      819.      696.      579.      495.
              416.      355.      298.      254.      213.      180.      151.      129.      111.       98.
               84.       71.       58.       46.       35.       23.       12.        1.


*********************************************************************************************************************************
*

                                                   HYDROGRAPH AT STATION       1B


*********************************************************************************************************************************
*
                                                                 *
        DA MON HRMN  ORD    RAIN    LOSS  EXCESS     COMP Q      *       DA MON HRMN  ORD    RAIN    LOSS  EXCESS     COMP Q
                                                                 *
         6 JUN 0000    1    0.00    0.00    0.00         0.      *        7 JUN 0600  121    0.00    0.00    0.00        76.
         6 JUN 0015    2    0.02    0.02    0.00         0.      *        7 JUN 0615  122    0.00    0.00    0.00        64.
         6 JUN 0030    3    0.02    0.02    0.00         0.      *        7 JUN 0630  123    0.00    0.00    0.00        54.
         6 JUN 0045    4    0.02    0.02    0.00         0.      *        7 JUN 0645  124    0.00    0.00    0.00        45.
         6 JUN 0100    5    0.02    0.02    0.00         0.      *        7 JUN 0700  125    0.00    0.00    0.00        38.
         6 JUN 0115    6    0.02    0.02    0.00         0.      *        7 JUN 0715  126    0.00    0.00    0.00        31.
         6 JUN 0130    7    0.02    0.02    0.00         0.      *        7 JUN 0730  127    0.00    0.00    0.00        26.
         6 JUN 0145    8    0.02    0.02    0.00         0.      *        7 JUN 0745  128    0.00    0.00    0.00        22.
         6 JUN 0200    9    0.02    0.02    0.00         0.      *        7 JUN 0800  129    0.00    0.00    0.00        18.
         6 JUN 0215   10    0.02    0.02    0.00         0.      *        7 JUN 0815  130    0.00    0.00    0.00        15.
         6 JUN 0230   11    0.02    0.02    0.00         0.      *        7 JUN 0830  131    0.00    0.00    0.00        12.
         6 JUN 0245   12    0.02    0.02    0.00         0.      *        7 JUN 0845  132    0.00    0.00    0.00        10.
         6 JUN 0300   13    0.02    0.02    0.00         0.      *        7 JUN 0900  133    0.00    0.00    0.00         8.
         6 JUN 0315   14    0.02    0.02    0.00         0.      *        7 JUN 0915  134    0.00    0.00    0.00         7.
         6 JUN 0330   15    0.02    0.02    0.00         0.      *        7 JUN 0930  135    0.00    0.00    0.00         5.
         6 JUN 0345   16    0.02    0.02    0.00         0.      *        7 JUN 0945  136    0.00    0.00    0.00         4.
```

6 JUN 0400	17	0.02	0.02	0.00	0.	*	7 JUN 1000	137	0.00	0.00	0.00	3.
6 JUN 0415	18	0.02	0.02	0.00	0.	*	7 JUN 1015	138	0.00	0.00	0.00	2.
6 JUN 0430	19	0.02	0.02	0.00	0.	*	7 JUN 1030	139	0.00	0.00	0.00	2.
6 JUN 0445	20	0.02	0.02	0.00	0.	*	7 JUN 1045	140	0.00	0.00	0.00	1.
6 JUN 0500	21	0.02	0.02	0.00	0.	*	7 JUN 1100	141	0.00	0.00	0.00	1.
6 JUN 0515	22	0.02	0.02	0.00	0.	*	7 JUN 1115	142	0.00	0.00	0.00	0.
6 JUN 0530	23	0.02	0.02	0.00	0.	*	7 JUN 1130	143	0.00	0.00	0.00	0.
6 JUN 0545	24	0.02	0.02	0.00	0.	*	7 JUN 1145	144	0.00	0.00	0.00	0.
6 JUN 0600	25	0.02	0.02	0.00	0.	*	7 JUN 1200	145	0.00	0.00	0.00	0.
6 JUN 0615	26	0.03	0.03	0.00	0.	*	7 JUN 1215	146	0.00	0.00	0.00	0.
6 JUN 0630	27	0.03	0.03	0.00	0.	*	7 JUN 1230	147	0.00	0.00	0.00	0.
6 JUN 0645	28	0.03	0.03	0.00	0.	*	7 JUN 1245	148	0.00	0.00	0.00	0.
6 JUN 0700	29	0.03	0.03	0.00	0.	*	7 JUN 1300	149	0.00	0.00	0.00	0.
6 JUN 0715	30	0.03	0.03	0.00	0.	*	7 JUN 1315	150	0.00	0.00	0.00	0.
6 JUN 0730	31	0.03	0.03	0.00	0.	*	7 JUN 1330	151	0.00	0.00	0.00	0.
6 JUN 0745	32	0.04	0.04	0.00	0.	*	7 JUN 1345	152	0.00	0.00	0.00	0.
6 JUN 0800	33	0.04	0.04	0.00	0.	*	7 JUN 1400	153	0.00	0.00	0.00	0.
6 JUN 0815	34	0.04	0.04	0.00	2.	*	7 JUN 1415	154	0.00	0.00	0.00	0.
6 JUN 0830	35	0.05	0.05	0.00	5.	*	7 JUN 1430	155	0.00	0.00	0.00	0.
6 JUN 0845	36	0.06	0.05	0.01	14.	*	7 JUN 1445	156	0.00	0.00	0.00	0.
6 JUN 0900	37	0.07	0.06	0.01	30.	*	7 JUN 1500	157	0.00	0.00	0.00	0.
6 JUN 0915	38	0.08	0.07	0.01	58.	*	7 JUN 1515	158	0.00	0.00	0.00	0.
6 JUN 0930	39	0.10	0.08	0.02	107.	*	7 JUN 1530	159	0.00	0.00	0.00	0.
6 JUN 0945	40	0.24	0.17	0.06	196.	*	7 JUN 1545	160	0.00	0.00	0.00	0.
6 JUN 1000	41	0.55	0.33	0.22	403.	*	7 JUN 1600	161	0.00	0.00	0.00	0.
6 JUN 1015	42	0.15	0.08	0.07	760.	*	7 JUN 1615	162	0.00	0.00	0.00	0.
6 JUN 1030	43	0.11	0.05	0.05	1246.	*	7 JUN 1630	163	0.00	0.00	0.00	0.
6 JUN 1045	44	0.08	0.04	0.04	1886.	*	7 JUN 1645	164	0.00	0.00	0.00	0.
6 JUN 1100	45	0.07	0.03	0.04	2680.	*	7 JUN 1700	165	0.00	0.00	0.00	0.
6 JUN 1115	46	0.06	0.03	0.03	3554.	*	7 JUN 1715	166	0.00	0.00	0.00	0.
6 JUN 1130	47	0.06	0.03	0.03	4366.	*	7 JUN 1730	167	0.00	0.00	0.00	0.
6 JUN 1145	48	0.05	0.02	0.03	5042.	*	7 JUN 1745	168	0.00	0.00	0.00	0.
6 JUN 1200	49	0.05	0.02	0.03	5553.	*	7 JUN 1800	169	0.00	0.00	0.00	0.
6 JUN 1215	50	0.05	0.02	0.03	5904.	*	7 JUN 1815	170	0.00	0.00	0.00	0.
6 JUN 1230	51	0.05	0.02	0.03	6103.	*	7 JUN 1830	171	0.00	0.00	0.00	0.
6 JUN 1245	52	0.04	0.02	0.03	6156.	*	7 JUN 1845	172	0.00	0.00	0.00	0.
6 JUN 1300	53	0.04	0.02	0.03	6109.	*	7 JUN 1900	173	0.00	0.00	0.00	0.
6 JUN 1315	54	0.04	0.01	0.02	5956.	*	7 JUN 1915	174	0.00	0.00	0.00	0.
6 JUN 1330	55	0.04	0.01	0.02	5703.	*	7 JUN 1930	175	0.00	0.00	0.00	0.
6 JUN 1345	56	0.03	0.01	0.02	5416.	*	7 JUN 1945	176	0.00	0.00	0.00	0.
6 JUN 1400	57	0.03	0.01	0.02	5155.	*	7 JUN 2000	177	0.00	0.00	0.00	0.
6 JUN 1415	58	0.03	0.01	0.02	4916.	*	7 JUN 2015	178	0.00	0.00	0.00	0.
6 JUN 1430	59	0.03	0.01	0.02	4693.	*	7 JUN 2030	179	0.00	0.00	0.00	0.
6 JUN 1445	60	0.03	0.01	0.02	4490.	*	7 JUN 2045	180	0.00	0.00	0.00	0.
6 JUN 1500	61	0.03	0.01	0.02	4292.	*	7 JUN 2100	181	0.00	0.00	0.00	0.
6 JUN 1515	62	0.03	0.01	0.02	4101.	*	7 JUN 2115	182	0.00	0.00	0.00	0.
6 JUN 1530	63	0.03	0.01	0.02	3915.	*	7 JUN 2130	183	0.00	0.00	0.00	0.
6 JUN 1545	64	0.03	0.01	0.02	3750.	*	7 JUN 2145	184	0.00	0.00	0.00	0.
6 JUN 1600	65	0.03	0.01	0.02	3594.	*	7 JUN 2200	185	0.00	0.00	0.00	0.
6 JUN 1615	66	0.03	0.01	0.02	3455.	*	7 JUN 2215	186	0.00	0.00	0.00	0.
6 JUN 1630	67	0.03	0.01	0.02	3326.	*	7 JUN 2230	187	0.00	0.00	0.00	0.
6 JUN 1645	68	0.03	0.01	0.02	3212.	*	7 JUN 2245	188	0.00	0.00	0.00	0.
6 JUN 1700	69	0.03	0.01	0.02	3107.	*	7 JUN 2300	189	0.00	0.00	0.00	0.
6 JUN 1715	70	0.02	0.01	0.02	3017.	*	7 JUN 2315	190	0.00	0.00	0.00	0.
6 JUN 1730	71	0.02	0.01	0.02	2934.	*	7 JUN 2330	191	0.00	0.00	0.00	0.
6 JUN 1745	72	0.02	0.01	0.02	2861.	*	7 JUN 2345	192	0.00	0.00	0.00	0.
6 JUN 1800	73	0.02	0.01	0.02	2794.	*	8 JUN 0000	193	0.00	0.00	0.00	0.
6 JUN 1815	74	0.02	0.01	0.02	2733.	*	8 JUN 0015	194	0.00	0.00	0.00	0.
6 JUN 1830	75	0.02	0.01	0.02	2675.	*	8 JUN 0030	195	0.00	0.00	0.00	0.
6 JUN 1845	76	0.02	0.01	0.02	2622.	*	8 JUN 0045	196	0.00	0.00	0.00	0.
6 JUN 1900	77	0.02	0.01	0.02	2571.	*	8 JUN 0100	197	0.00	0.00	0.00	0.
6 JUN 1915	78	0.02	0.01	0.01	2523.	*	8 JUN 0115	198	0.00	0.00	0.00	0.
6 JUN 1930	79	0.02	0.01	0.01	2478.	*	8 JUN 0130	199	0.00	0.00	0.00	0.
6 JUN 1945	80	0.02	0.01	0.01	2434.	*	8 JUN 0145	200	0.00	0.00	0.00	0.
6 JUN 2000	81	0.02	0.01	0.01	2391.	*	8 JUN 0200	201	0.00	0.00	0.00	0.
6 JUN 2015	82	0.02	0.01	0.01	2349.	*	8 JUN 0215	202	0.00	0.00	0.00	0.
6 JUN 2030	83	0.02	0.01	0.01	2306.	*	8 JUN 0230	203	0.00	0.00	0.00	0.
6 JUN 2045	84	0.02	0.01	0.01	2264.	*	8 JUN 0245	204	0.00	0.00	0.00	0.
6 JUN 2100	85	0.02	0.01	0.01	2221.	*	8 JUN 0300	205	0.00	0.00	0.00	0.
6 JUN 2115	86	0.02	0.01	0.01	2179.	*	8 JUN 0315	206	0.00	0.00	0.00	0.
6 JUN 2130	87	0.02	0.00	0.01	2136.	*	8 JUN 0330	207	0.00	0.00	0.00	0.
6 JUN 2145	88	0.02	0.00	0.01	2094.	*	8 JUN 0345	208	0.00	0.00	0.00	0.
6 JUN 2200	89	0.02	0.00	0.01	2053.	*	8 JUN 0400	209	0.00	0.00	0.00	0.
6 JUN 2215	90	0.02	0.00	0.01	2012.	*	8 JUN 0415	210	0.00	0.00	0.00	0.
6 JUN 2230	91	0.01	0.00	0.01	1972.	*	8 JUN 0430	211	0.00	0.00	0.00	0.
6 JUN 2245	92	0.01	0.00	0.01	1931.	*	8 JUN 0445	212	0.00	0.00	0.00	0.
6 JUN 2300	93	0.01	0.00	0.01	1890.	*	8 JUN 0500	213	0.00	0.00	0.00	0.
6 JUN 2315	94	0.01	0.00	0.01	1849.	*	8 JUN 0515	214	0.00	0.00	0.00	0.
6 JUN 2330	95	0.01	0.00	0.01	1808.	*	8 JUN 0530	215	0.00	0.00	0.00	0.
6 JUN 2345	96	0.01	0.00	0.01	1767.	*	8 JUN 0545	216	0.00	0.00	0.00	0.

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        7 JUN 0000   97    0.01    0.00    0.01      1725.       *        8 JUN 0600  217    0.00    0.00    0.00         0.
        7 JUN 0015   98    0.00    0.00    0.00      1680.       *        8 JUN 0615  218    0.00    0.00    0.00         0.
        7 JUN 0030   99    0.00    0.00    0.00      1628.       *        8 JUN 0630  219    0.00    0.00    0.00         0.
        7 JUN 0045  100    0.00    0.00    0.00      1567.       *        8 JUN 0645  220    0.00    0.00    0.00         0.
        7 JUN 0100  101    0.00    0.00    0.00      1495.       *        8 JUN 0700  221    0.00    0.00    0.00         0.
        7 JUN 0115  102    0.00    0.00    0.00      1407.       *        8 JUN 0715  222    0.00    0.00    0.00         0.
        7 JUN 0130  103    0.00    0.00    0.00      1304.       *        8 JUN 0730  223    0.00    0.00    0.00         0.
        7 JUN 0145  104    0.00    0.00    0.00      1188.       *        8 JUN 0745  224    0.00    0.00    0.00         0.
        7 JUN 0200  105    0.00    0.00    0.00      1066.       *        8 JUN 0800  225    0.00    0.00    0.00         0.
        7 JUN 0215  106    0.00    0.00    0.00       943.       *        8 JUN 0815  226    0.00    0.00    0.00         0.
        7 JUN 0230  107    0.00    0.00    0.00       823.       *        8 JUN 0830  227    0.00    0.00    0.00         0.
        7 JUN 0245  108    0.00    0.00    0.00       709.       *        8 JUN 0845  228    0.00    0.00    0.00         0.
        7 JUN 0300  109    0.00    0.00    0.00       605.       *        8 JUN 0900  229    0.00    0.00    0.00         0.
        7 JUN 0315  110    0.00    0.00    0.00       511.       *        8 JUN 0915  230    0.00    0.00    0.00         0.
        7 JUN 0330  111    0.00    0.00    0.00       428.       *        8 JUN 0930  231    0.00    0.00    0.00         0.
        7 JUN 0345  112    0.00    0.00    0.00       359.       *        8 JUN 0945  232    0.00    0.00    0.00         0.
        7 JUN 0400  113    0.00    0.00    0.00       303.       *        8 JUN 1000  233    0.00    0.00    0.00         0.
        7 JUN 0415  114    0.00    0.00    0.00       255.       *        8 JUN 1015  234    0.00    0.00    0.00         0.
        7 JUN 0430  115    0.00    0.00    0.00       215.       *        8 JUN 1030  235    0.00    0.00    0.00         0.
        7 JUN 0445  116    0.00    0.00    0.00       182.       *        8 JUN 1045  236    0.00    0.00    0.00         0.
        7 JUN 0500  117    0.00    0.00    0.00       153.       *        8 JUN 1100  237    0.00    0.00    0.00         0.
        7 JUN 0515  118    0.00    0.00    0.00       129.       *        8 JUN 1115  238    0.00    0.00    0.00         0.
        7 JUN 0530  119    0.00    0.00    0.00       108.       *        8 JUN 1130  239    0.00    0.00    0.00         0.
        7 JUN 0545  120    0.00    0.00    0.00        91.       *        8 JUN 1145  240    0.00    0.00    0.00         0.
                                                                 *

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     TOTAL RAINFALL =    3.72, TOTAL LOSS =    2.26, TOTAL EXCESS =    1.46

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     59.75-HR
+   (CFS)       (HR)
                         (CFS)
+    6156.     12.75                4652.       2098.        843.         843.
                      (INCHES)     0.809       1.459       1.460        1.460
                       (AC-FT)     2307.       4161.       4162.        4162.

                       CUMULATIVE AREA =   53.46 SQ MI



 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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             **************
             *            *
   38 KK     *        3R  *        CNAME      3C
             *            *
             **************

   39 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          0  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE
                        IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                         IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT      0.250  TIME INTERVAL IN HOURS


                HYDROGRAPH ROUTING DATA

   40 RM          MUSKINGUM ROUTING
                        NSTPS         1 NUMBER OF SUBREACHES
                        AMSKK      0.00 MUSKINGUM K
                            X      0.20 MUSKINGUM X

                                                                ***
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH      3R.
       REDUCE NSTPS OR DECREASE YOUR COMPUTATION INTERVAL (FIRST FIELD OF THE IT RECORD).


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HYDROGRAPH AT STATION 3R

DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW	DA MON HRMN	ORD	FLOW
6 JUN 0000	1	0.	6 JUN 1500	61	4292.	7 JUN 0600	121	76.	7 JUN 2100	181	0.
6 JUN 0015	2	0.	6 JUN 1515	62	4101.	7 JUN 0615	122	64.	7 JUN 2115	182	0.
6 JUN 0030	3	0.	6 JUN 1530	63	3915.	7 JUN 0630	123	54.	7 JUN 2130	183	0.
6 JUN 0045	4	0.	6 JUN 1545	64	3750.	7 JUN 0645	124	45.	7 JUN 2145	184	0.
6 JUN 0100	5	0.	6 JUN 1600	65	3594.	7 JUN 0700	125	38.	7 JUN 2200	185	0.
6 JUN 0115	6	0.	6 JUN 1615	66	3455.	7 JUN 0715	126	31.	7 JUN 2215	186	0.
6 JUN 0130	7	0.	6 JUN 1630	67	3326.	7 JUN 0730	127	26.	7 JUN 2230	187	0.
6 JUN 0145	8	0.	6 JUN 1645	68	3212.	7 JUN 0745	128	22.	7 JUN 2245	188	0.
6 JUN 0200	9	0.	6 JUN 1700	69	3107.	7 JUN 0800	129	18.	7 JUN 2300	189	0.
6 JUN 0215	10	0.	6 JUN 1715	70	3017.	7 JUN 0815	130	15.	7 JUN 2315	190	0.
6 JUN 0230	11	0.	6 JUN 1730	71	2934.	7 JUN 0830	131	12.	7 JUN 2330	191	0.
6 JUN 0245	12	0.	6 JUN 1745	72	2861.	7 JUN 0845	132	10.	7 JUN 2345	192	0.
6 JUN 0300	13	0.	6 JUN 1800	73	2794.	7 JUN 0900	133	8.	8 JUN 0000	193	0.
6 JUN 0315	14	0.	6 JUN 1815	74	2733.	7 JUN 0915	134	7.	8 JUN 0015	194	0.
6 JUN 0330	15	0.	6 JUN 1830	75	2675.	7 JUN 0930	135	5.	8 JUN 0030	195	0.
6 JUN 0345	16	0.	6 JUN 1845	76	2622.	7 JUN 0945	136	4.	8 JUN 0045	196	0.
6 JUN 0400	17	0.	6 JUN 1900	77	2571.	7 JUN 1000	137	3.	8 JUN 0100	197	0.
6 JUN 0415	18	0.	6 JUN 1915	78	2523.	7 JUN 1015	138	2.	8 JUN 0115	198	0.
6 JUN 0430	19	0.	6 JUN 1930	79	2478.	7 JUN 1030	139	2.	8 JUN 0130	199	0.
6 JUN 0445	20	0.	6 JUN 1945	80	2434.	7 JUN 1045	140	1.	8 JUN 0145	200	0.
6 JUN 0500	21	0.	6 JUN 2000	81	2391.	7 JUN 1100	141	1.	8 JUN 0200	201	0.
6 JUN 0515	22	0.	6 JUN 2015	82	2349.	7 JUN 1115	142	0.	8 JUN 0215	202	0.
6 JUN 0530	23	0.	6 JUN 2030	83	2306.	7 JUN 1130	143	0.	8 JUN 0230	203	0.
6 JUN 0545	24	0.	6 JUN 2045	84	2264.	7 JUN 1145	144	0.	8 JUN 0245	204	0.
6 JUN 0600	25	0.	6 JUN 2100	85	2221.	7 JUN 1200	145	0.	8 JUN 0300	205	0.
6 JUN 0615	26	0.	6 JUN 2115	86	2179.	7 JUN 1215	146	0.	8 JUN 0315	206	0.
6 JUN 0630	27	0.	6 JUN 2130	87	2136.	7 JUN 1230	147	0.	8 JUN 0330	207	0.
6 JUN 0645	28	0.	6 JUN 2145	88	2094.	7 JUN 1245	148	0.	8 JUN 0345	208	0.
6 JUN 0700	29	0.	6 JUN 2200	89	2053.	7 JUN 1300	149	0.	8 JUN 0400	209	0.
6 JUN 0715	30	0.	6 JUN 2215	90	2012.	7 JUN 1315	150	0.	8 JUN 0415	210	0.
6 JUN 0730	31	0.	6 JUN 2230	91	1972.	7 JUN 1330	151	0.	8 JUN 0430	211	0.
6 JUN 0745	32	0.	6 JUN 2245	92	1931.	7 JUN 1345	152	0.	8 JUN 0445	212	0.
6 JUN 0800	33	0.	6 JUN 2300	93	1890.	7 JUN 1400	153	0.	8 JUN 0500	213	0.
6 JUN 0815	34	2.	6 JUN 2315	94	1849.	7 JUN 1415	154	0.	8 JUN 0515	214	0.
6 JUN 0830	35	5.	6 JUN 2330	95	1808.	7 JUN 1430	155	0.	8 JUN 0530	215	0.
6 JUN 0845	36	14.	6 JUN 2345	96	1767.	7 JUN 1445	156	0.	8 JUN 0545	216	0.
6 JUN 0900	37	30.	7 JUN 0000	97	1725.	7 JUN 1500	157	0.	8 JUN 0600	217	0.
6 JUN 0915	38	58.	7 JUN 0015	98	1680.	7 JUN 1515	158	0.	8 JUN 0615	218	0.
6 JUN 0930	39	107.	7 JUN 0030	99	1628.	7 JUN 1530	159	0.	8 JUN 0630	219	0.
6 JUN 0945	40	196.	7 JUN 0045	100	1567.	7 JUN 1545	160	0.	8 JUN 0645	220	0.
6 JUN 1000	41	403.	7 JUN 0100	101	1495.	7 JUN 1600	161	0.	8 JUN 0700	221	0.
6 JUN 1015	42	760.	7 JUN 0115	102	1407.	7 JUN 1615	162	0.	8 JUN 0715	222	0.
6 JUN 1030	43	1246.	7 JUN 0130	103	1304.	7 JUN 1630	163	0.	8 JUN 0730	223	0.
6 JUN 1045	44	1886.	7 JUN 0145	104	1188.	7 JUN 1645	164	0.	8 JUN 0745	224	0.
6 JUN 1100	45	2680.	7 JUN 0200	105	1066.	7 JUN 1700	165	0.	8 JUN 0800	225	0.
6 JUN 1115	46	3554.	7 JUN 0215	106	943.	7 JUN 1715	166	0.	8 JUN 0815	226	0.
6 JUN 1130	47	4366.	7 JUN 0230	107	823.	7 JUN 1730	167	0.	8 JUN 0830	227	0.
6 JUN 1145	48	5042.	7 JUN 0245	108	709.	7 JUN 1745	168	0.	8 JUN 0845	228	0.
6 JUN 1200	49	5553.	7 JUN 0300	109	605.	7 JUN 1800	169	0.	8 JUN 0900	229	0.
6 JUN 1215	50	5904.	7 JUN 0315	110	511.	7 JUN 1815	170	0.	8 JUN 0915	230	0.
6 JUN 1230	51	6103.	7 JUN 0330	111	428.	7 JUN 1830	171	0.	8 JUN 0930	231	0.
6 JUN 1245	52	6156.	7 JUN 0345	112	359.	7 JUN 1845	172	0.	8 JUN 0945	232	0.
6 JUN 1300	53	6109.	7 JUN 0400	113	303.	7 JUN 1900	173	0.	8 JUN 1000	233	0.
6 JUN 1315	54	5956.	7 JUN 0415	114	255.	7 JUN 1915	174	0.	8 JUN 1015	234	0.
6 JUN 1330	55	5703.	7 JUN 0430	115	215.	7 JUN 1930	175	0.	8 JUN 1030	235	0.
6 JUN 1345	56	5416.	7 JUN 0445	116	182.	7 JUN 1945	176	0.	8 JUN 1045	236	0.
6 JUN 1400	57	5155.	7 JUN 0500	117	153.	7 JUN 2000	177	0.	8 JUN 1100	237	0.
6 JUN 1415	58	4916.	7 JUN 0515	118	129.	7 JUN 2015	178	0.	8 JUN 1115	238	0.
6 JUN 1430	59	4693.	7 JUN 0530	119	108.	7 JUN 2030	179	0.	8 JUN 1130	239	0.
6 JUN 1445	60	4490.	7 JUN 0545	120	91.	7 JUN 2045	180	0.	8 JUN 1145	240	0.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	59.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 6156.	12.75		4652.	2098.	843.	843.
		(INCHES)	0.809	1.459	1.460	1.460
		(AC-FT)	2307.	4161.	4162.	4162.

CUMULATIVE AREA =   53.46 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1B	6156.	12.75	4652.	2098.	843.	53.46		
+	ROUTED TO	3R	6156.	12.75	4652.	2098.	843.	53.46		

*** NORMAL END OF HEC-1 ***

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1****************************************                                                  ***************************************
 *                                      *                                                  *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                  *   U.S. ARMY CORPS OF ENGINEERS     *
 *            MAY   1991                *                                                  *   HYDROLOGIC ENGINEERING CENTER    *
 *         VERSION 4.0.1E               *                                                  *        609 SECOND STREET           *
 *                                      *                                                  *      DAVIS, CALIFORNIA 95616       *
 *  RUN DATE           TIME             *                                                  *          (916) 551-1748            *
 *                                      *                                                  *                                     *
 ****************************************                                                  ***************************************
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                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
                    X     X  X        X               X
                    XXXXXXX  XXXX     X       XXXXX   X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX
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            THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

            THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
            THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
            NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
            DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
            KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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                                            HEC-1 INPUT                                            PAGE  1

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1           ID  HEC-1 Analysis using WMS
             2           ID
             3           ID
                         *DIAGRAM
             4           IT      15 06JUN14       0     240
             5           IO       0

             6           KK      1B
             7           KO       0       0     0.0       0      22
             8           BA  53.460
             9           PB    1.28
            10           IN       6 06JUN14       0
                         * typeI-24hour
            11           PC     0.0  0.0017  0.0035  0.0052   0.007  0.0087  0.0105  0.0122   0.014  0.0157
            12           PC  0.0175  0.0192   0.021  0.0227  0.0245  0.0262   0.028  0.0297  0.0315  0.0332
            13           PC   0.035  0.0368  0.0386  0.0404  0.0423  0.0442  0.0461   0.048    0.05   0.052
            14           PC  0.0541  0.0561  0.0582  0.0603  0.0625  0.0647  0.0669  0.0691  0.0714  0.0737
            15           PC   0.076  0.0784  0.0807  0.0831  0.0854  0.0878  0.0902  0.0926  0.0951  0.0975
            16           PC  0.0999  0.1024  0.1049  0.1074  0.1098  0.1123  0.1148  0.1174  0.1199  0.1225
            17           PC   0.125  0.1276  0.1303  0.1332  0.1361  0.1392  0.1423  0.1456  0.1489  0.1524
            18           PC   0.156  0.1597  0.1633  0.1671  0.1708  0.1746  0.1784  0.1823  0.1861  0.1901
            19           PC   0.194  0.1982  0.2028  0.2077  0.2132   0.219  0.2252  0.2319  0.2389  0.2462
            20           PC   0.254  0.2623  0.2714  0.2812  0.2917   0.303  0.3194  0.3454  0.3878  0.4632
            21           PC   0.515  0.5322  0.5476  0.5612   0.573   0.583  0.5919  0.6003  0.6083  0.6159
            22           PC   0.623  0.6298  0.6365   0.643  0.6493  0.6555  0.6615  0.6674  0.6731  0.6786
            23           PC   0.684  0.6893  0.6944  0.6995  0.7044  0.7093   0.714  0.7187  0.7232  0.7277
            24           PC   0.732  0.7362  0.7404  0.7444  0.7484  0.7522   0.756  0.7597  0.7632  0.7667
            25           PC    0.77  0.7733  0.7766  0.7798   0.783  0.7863  0.7894  0.7926  0.7958  0.7989
            26           PC   0.802  0.8051  0.8082  0.8112  0.8142  0.8173  0.8202  0.8232  0.8262  0.8291
            27           PC   0.832  0.8349  0.8378  0.8406  0.8434  0.8462   0.849  0.8518  0.8546  0.8573
            28           PC    0.86  0.8627  0.8654   0.868  0.8706  0.8732  0.8758  0.8784   0.881  0.8835
            29           PC   0.886  0.8885   0.891  0.8934  0.8958  0.8982  0.9006   0.903  0.9054  0.9077
            30           PC    0.91  0.9123  0.9146  0.9168   0.919  0.9213  0.9234  0.9256  0.9278  0.9299
            31           PC   0.932  0.9341  0.9362  0.9382  0.9402  0.9423  0.9442  0.9462  0.9482  0.9501
            32           PC   0.952  0.9539  0.9558  0.9576  0.9594  0.9613   0.963  0.9648  0.9666  0.9683
            33           PC    0.97  0.9717  0.9734   0.975  0.9766  0.9782  0.9798  0.9814   0.983  0.9845
            34           PC   0.986  0.9875   0.989  0.9904  0.9918  0.9932  0.9946   0.996  0.9974  0.9987
            35           PC     1.0
            36           LS     0.0    75.0     0.0
            37           UD  2.2795

            38           KK      3R   CNAME      3C
```

39	KO	0	0	0.0	0	22
40	RM	1	0.0	0.2		
41	ZZ					

```
               SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

    6          1B
                V
                V
   38          3R

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                              ***************************************
 *                                       *                                              *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                              *    U.S. ARMY CORPS OF ENGINEERS     *
 *             MAY   1991                *                                              *    HYDROLOGIC ENGINEERING CENTER    *
 *          VERSION 4.0.1E               *                                              *         609 SECOND STREET           *
 *                                       *                                              *       DAVIS, CALIFORNIA 95616       *
 *  RUN DATE           TIME              *                                              *           (916) 551-1748            *
 *                                       *                                              *                                     *
 *****************************************                                              ***************************************



                         HEC-1 Analysis using WMS



   5 IO         OUTPUT CONTROL VARIABLES
                      IPRNT          0  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN         15  MINUTES IN COMPUTATION INTERVAL
                      IDATE     6JUN14  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ,       240  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     8JUN14  ENDING DATE
                     NDTIME       1145  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL    0.25 HOURS
                       TOTAL TIME BASE   59.75 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   6 KK     *       1B   *
            *            *
            **************

   7 KO         OUTPUT CONTROL VARIABLES
                      IPRNT          0  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE
                      IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                       IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT      0.250  TIME INTERVAL IN HOURS


  10 IN         TIME DATA FOR INPUT TIME SERIES
                      JXMIN          6  TIME INTERVAL IN MINUTES
```

```
                   JXDATE      6JUN14  STARTING DATE
                   JXTIME           0  STARTING TIME

              SUBBASIN RUNOFF DATA

  8 BA          SUBBASIN CHARACTERISTICS
                      TAREA,      53.46  SUBBASIN AREA

                PRECIPITATION DATA

  9 PB                STORM        1.28  BASIN TOTAL PRECIPITATION

 11 PI            INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.02      0.02      0.02      0.03      0.06      0.15
                   0.04      0.03      0.02      0.02      0.02      0.02      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00

 36 LS          SCS LOSS RATE
                      STRTL        0.67  INITIAL ABSTRACTION
                     CRVNBR       75.00  CURVE NUMBER
                      RTIMP        0.00  PERCENT IMPERVIOUS AREA

 37 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        2.28  LAG

                                                         ***

                                                      UNIT HYDROGRAPH
                                                48 END-OF-PERIOD ORDINATES
             352.     1152.     2197.     3607.     5460.     7507.     9147.    10206.    10684.    10711.
           10364.     9642.     8804.     7790.     6544.     5339.     4438.     3733.     3143.     2699.
            2291.     1944.     1609.     1376.     1152.      984.      819.      696.      579.      495.
             416.      355.      298.      254.      213.      180.      151.      129.      111.       98.
              84.       71.       58.       46.       35.       23.       12.        1.

*****************************************************************************************************************************************

                                                 HYDROGRAPH AT STATION       1B

*****************************************************************************************************************************************
                                                         *
       DA MON HRMN  ORD    RAIN    LOSS  EXCESS     COMP Q      *      DA MON HRMN  ORD    RAIN    LOSS  EXCESS     COMP Q
                                                         *
        6 JUN 0000    1    0.00    0.00    0.00         0.      *       7 JUN 0600  121    0.00    0.00    0.00        10.
        6 JUN 0015    2    0.01    0.01    0.00         0.      *       7 JUN 0615  122    0.00    0.00    0.00         8.
        6 JUN 0030    3    0.01    0.01    0.00         0.      *       7 JUN 0630  123    0.00    0.00    0.00         7.
        6 JUN 0045    4    0.01    0.01    0.00         0.      *       7 JUN 0645  124    0.00    0.00    0.00         6.
        6 JUN 0100    5    0.01    0.01    0.00         0.      *       7 JUN 0700  125    0.00    0.00    0.00         5.
        6 JUN 0115    6    0.01    0.01    0.00         0.      *       7 JUN 0715  126    0.00    0.00    0.00         4.
        6 JUN 0130    7    0.01    0.01    0.00         0.      *       7 JUN 0730  127    0.00    0.00    0.00         3.
        6 JUN 0145    8    0.01    0.01    0.00         0.      *       7 JUN 0745  128    0.00    0.00    0.00         3.
        6 JUN 0200    9    0.01    0.01    0.00         0.      *       7 JUN 0800  129    0.00    0.00    0.00         2.
        6 JUN 0215   10    0.01    0.01    0.00         0.      *       7 JUN 0815  130    0.00    0.00    0.00         2.
        6 JUN 0230   11    0.01    0.01    0.00         0.      *       7 JUN 0830  131    0.00    0.00    0.00         2.
        6 JUN 0245   12    0.01    0.01    0.00         0.      *       7 JUN 0845  132    0.00    0.00    0.00         1.
        6 JUN 0300   13    0.01    0.01    0.00         0.      *       7 JUN 0900  133    0.00    0.00    0.00         1.
        6 JUN 0315   14    0.01    0.01    0.00         0.      *       7 JUN 0915  134    0.00    0.00    0.00         1.
        6 JUN 0330   15    0.01    0.01    0.00         0.      *       7 JUN 0930  135    0.00    0.00    0.00         1.
        6 JUN 0345   16    0.01    0.01    0.00         0.      *       7 JUN 0945  136    0.00    0.00    0.00         1.
        6 JUN 0400   17    0.01    0.01    0.00         0.      *       7 JUN 1000  137    0.00    0.00    0.00         0.
        6 JUN 0415   18    0.01    0.01    0.00         0.      *       7 JUN 1015  138    0.00    0.00    0.00         0.
        6 JUN 0430   19    0.01    0.01    0.00         0.      *       7 JUN 1030  139    0.00    0.00    0.00         0.
        6 JUN 0445   20    0.01    0.01    0.00         0.      *       7 JUN 1045  140    0.00    0.00    0.00         0.
        6 JUN 0500   21    0.01    0.01    0.00         0.      *       7 JUN 1100  141    0.00    0.00    0.00         0.
        6 JUN 0515   22    0.01    0.01    0.00         0.      *       7 JUN 1115  142    0.00    0.00    0.00         0.
        6 JUN 0530   23    0.01    0.01    0.00         0.      *       7 JUN 1130  143    0.00    0.00    0.00         0.
        6 JUN 0545   24    0.01    0.01    0.00         0.      *       7 JUN 1145  144    0.00    0.00    0.00         0.
        6 JUN 0600   25    0.01    0.01    0.00         0.      *       7 JUN 1200  145    0.00    0.00    0.00         0.
        6 JUN 0615   26    0.01    0.01    0.00         0.      *       7 JUN 1215  146    0.00    0.00    0.00         0.
        6 JUN 0630   27    0.01    0.01    0.00         0.      *       7 JUN 1230  147    0.00    0.00    0.00         0.
        6 JUN 0645   28    0.01    0.01    0.00         0.      *       7 JUN 1245  148    0.00    0.00    0.00         0.
        6 JUN 0700   29    0.01    0.01    0.00         0.      *       7 JUN 1300  149    0.00    0.00    0.00         0.
        6 JUN 0715   30    0.01    0.01    0.00         0.      *       7 JUN 1315  150    0.00    0.00    0.00         0.
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6 JUN 0730	31	0.01	0.01	0.00	0.	*	7 JUN 1330	151	0.00	0.00	0.00	0.
6 JUN 0745	32	0.01	0.01	0.00	0.	*	7 JUN 1345	152	0.00	0.00	0.00	0.
6 JUN 0800	33	0.01	0.01	0.00	0.	*	7 JUN 1400	153	0.00	0.00	0.00	0.
6 JUN 0815	34	0.01	0.01	0.00	0.	*	7 JUN 1415	154	0.00	0.00	0.00	0.
6 JUN 0830	35	0.02	0.02	0.00	0.	*	7 JUN 1430	155	0.00	0.00	0.00	0.
6 JUN 0845	36	0.02	0.02	0.00	0.	*	7 JUN 1445	156	0.00	0.00	0.00	0.
6 JUN 0900	37	0.02	0.02	0.00	0.	*	7 JUN 1500	157	0.00	0.00	0.00	0.
6 JUN 0915	38	0.03	0.03	0.00	0.	*	7 JUN 1515	158	0.00	0.00	0.00	0.
6 JUN 0930	39	0.03	0.03	0.00	0.	*	7 JUN 1530	159	0.00	0.00	0.00	0.
6 JUN 0945	40	0.08	0.08	0.00	0.	*	7 JUN 1545	160	0.00	0.00	0.00	0.
6 JUN 1000	41	0.19	0.19	0.00	0.	*	7 JUN 1600	161	0.00	0.00	0.00	0.
6 JUN 1015	42	0.05	0.05	0.00	0.	*	7 JUN 1615	162	0.00	0.00	0.00	0.
6 JUN 1030	43	0.04	0.04	0.00	1.	*	7 JUN 1630	163	0.00	0.00	0.00	0.
6 JUN 1045	44	0.03	0.03	0.00	3.	*	7 JUN 1645	164	0.00	0.00	0.00	0.
6 JUN 1100	45	0.02	0.02	0.00	7.	*	7 JUN 1700	165	0.00	0.00	0.00	0.
6 JUN 1115	46	0.02	0.02	0.00	13.	*	7 JUN 1715	166	0.00	0.00	0.00	0.
6 JUN 1130	47	0.02	0.02	0.00	23.	*	7 JUN 1730	167	0.00	0.00	0.00	0.
6 JUN 1145	48	0.02	0.02	0.00	35.	*	7 JUN 1745	168	0.00	0.00	0.00	0.
6 JUN 1200	49	0.02	0.02	0.00	50.	*	7 JUN 1800	169	0.00	0.00	0.00	0.
6 JUN 1215	50	0.02	0.01	0.00	68.	*	7 JUN 1815	170	0.00	0.00	0.00	0.
6 JUN 1230	51	0.02	0.01	0.00	86.	*	7 JUN 1830	171	0.00	0.00	0.00	0.
6 JUN 1245	52	0.01	0.01	0.00	106.	*	7 JUN 1845	172	0.00	0.00	0.00	0.
6 JUN 1300	53	0.01	0.01	0.00	125.	*	7 JUN 1900	173	0.00	0.00	0.00	0.
6 JUN 1315	54	0.01	0.01	0.00	144.	*	7 JUN 1915	174	0.00	0.00	0.00	0.
6 JUN 1330	55	0.01	0.01	0.00	162.	*	7 JUN 1930	175	0.00	0.00	0.00	0.
6 JUN 1345	56	0.01	0.01	0.00	178.	*	7 JUN 1945	176	0.00	0.00	0.00	0.
6 JUN 1400	57	0.01	0.01	0.00	192.	*	7 JUN 2000	177	0.00	0.00	0.00	0.
6 JUN 1415	58	0.01	0.01	0.00	204.	*	7 JUN 2015	178	0.00	0.00	0.00	0.
6 JUN 1430	59	0.01	0.01	0.00	214.	*	7 JUN 2030	179	0.00	0.00	0.00	0.
6 JUN 1445	60	0.01	0.01	0.00	222.	*	7 JUN 2045	180	0.00	0.00	0.00	0.
6 JUN 1500	61	0.01	0.01	0.00	228.	*	7 JUN 2100	181	0.00	0.00	0.00	0.
6 JUN 1515	62	0.01	0.01	0.00	233.	*	7 JUN 2115	182	0.00	0.00	0.00	0.
6 JUN 1530	63	0.01	0.01	0.00	237.	*	7 JUN 2130	183	0.00	0.00	0.00	0.
6 JUN 1545	64	0.01	0.01	0.00	240.	*	7 JUN 2145	184	0.00	0.00	0.00	0.
6 JUN 1600	65	0.01	0.01	0.00	242.	*	7 JUN 2200	185	0.00	0.00	0.00	0.
6 JUN 1615	66	0.01	0.01	0.00	244.	*	7 JUN 2215	186	0.00	0.00	0.00	0.
6 JUN 1630	67	0.01	0.01	0.00	246.	*	7 JUN 2230	187	0.00	0.00	0.00	0.
6 JUN 1645	68	0.01	0.01	0.00	247.	*	7 JUN 2245	188	0.00	0.00	0.00	0.
6 JUN 1700	69	0.01	0.01	0.00	248.	*	7 JUN 2300	189	0.00	0.00	0.00	0.
6 JUN 1715	70	0.01	0.01	0.00	249.	*	7 JUN 2315	190	0.00	0.00	0.00	0.
6 JUN 1730	71	0.01	0.01	0.00	251.	*	7 JUN 2330	191	0.00	0.00	0.00	0.
6 JUN 1745	72	0.01	0.01	0.00	252.	*	7 JUN 2345	192	0.00	0.00	0.00	0.
6 JUN 1800	73	0.01	0.01	0.00	253.	*	8 JUN 0000	193	0.00	0.00	0.00	0.
6 JUN 1815	74	0.01	0.01	0.00	254.	*	8 JUN 0015	194	0.00	0.00	0.00	0.
6 JUN 1830	75	0.01	0.01	0.00	254.	*	8 JUN 0030	195	0.00	0.00	0.00	0.
6 JUN 1845	76	0.01	0.01	0.00	255.	*	8 JUN 0045	196	0.00	0.00	0.00	0.
6 JUN 1900	77	0.01	0.01	0.00	255.	*	8 JUN 0100	197	0.00	0.00	0.00	0.
6 JUN 1915	78	0.01	0.01	0.00	255.	*	8 JUN 0115	198	0.00	0.00	0.00	0.
6 JUN 1930	79	0.01	0.01	0.00	255.	*	8 JUN 0130	199	0.00	0.00	0.00	0.
6 JUN 1945	80	0.01	0.01	0.00	255.	*	8 JUN 0145	200	0.00	0.00	0.00	0.
6 JUN 2000	81	0.01	0.01	0.00	255.	*	8 JUN 0200	201	0.00	0.00	0.00	0.
6 JUN 2015	82	0.01	0.00	0.00	254.	*	8 JUN 0215	202	0.00	0.00	0.00	0.
6 JUN 2030	83	0.01	0.00	0.00	253.	*	8 JUN 0230	203	0.00	0.00	0.00	0.
6 JUN 2045	84	0.01	0.00	0.00	252.	*	8 JUN 0245	204	0.00	0.00	0.00	0.
6 JUN 2100	85	0.01	0.00	0.00	250.	*	8 JUN 0300	205	0.00	0.00	0.00	0.
6 JUN 2115	86	0.01	0.00	0.00	249.	*	8 JUN 0315	206	0.00	0.00	0.00	0.
6 JUN 2130	87	0.01	0.00	0.00	247.	*	8 JUN 0330	207	0.00	0.00	0.00	0.
6 JUN 2145	88	0.01	0.00	0.00	245.	*	8 JUN 0345	208	0.00	0.00	0.00	0.
6 JUN 2200	89	0.01	0.00	0.00	243.	*	8 JUN 0400	209	0.00	0.00	0.00	0.
6 JUN 2215	90	0.01	0.00	0.00	240.	*	8 JUN 0415	210	0.00	0.00	0.00	0.
6 JUN 2230	91	0.01	0.00	0.00	237.	*	8 JUN 0430	211	0.00	0.00	0.00	0.
6 JUN 2245	92	0.01	0.00	0.00	235.	*	8 JUN 0445	212	0.00	0.00	0.00	0.
6 JUN 2300	93	0.00	0.00	0.00	232.	*	8 JUN 0500	213	0.00	0.00	0.00	0.
6 JUN 2315	94	0.00	0.00	0.00	228.	*	8 JUN 0515	214	0.00	0.00	0.00	0.
6 JUN 2330	95	0.00	0.00	0.00	225.	*	8 JUN 0530	215	0.00	0.00	0.00	0.
6 JUN 2345	96	0.00	0.00	0.00	221.	*	8 JUN 0545	216	0.00	0.00	0.00	0.
7 JUN 0000	97	0.00	0.00	0.00	218.	*	8 JUN 0600	217	0.00	0.00	0.00	0.
7 JUN 0015	98	0.00	0.00	0.00	213.	*	8 JUN 0615	218	0.00	0.00	0.00	0.
7 JUN 0030	99	0.00	0.00	0.00	208.	*	8 JUN 0630	219	0.00	0.00	0.00	0.
7 JUN 0045	100	0.00	0.00	0.00	201.	*	8 JUN 0645	220	0.00	0.00	0.00	0.
7 JUN 0100	101	0.00	0.00	0.00	193.	*	8 JUN 0700	221	0.00	0.00	0.00	0.
7 JUN 0115	102	0.00	0.00	0.00	182.	*	8 JUN 0715	222	0.00	0.00	0.00	0.
7 JUN 0130	103	0.00	0.00	0.00	169.	*	8 JUN 0730	223	0.00	0.00	0.00	0.
7 JUN 0145	104	0.00	0.00	0.00	155.	*	8 JUN 0745	224	0.00	0.00	0.00	0.
7 JUN 0200	105	0.00	0.00	0.00	139.	*	8 JUN 0800	225	0.00	0.00	0.00	0.
7 JUN 0215	106	0.00	0.00	0.00	123.	*	8 JUN 0815	226	0.00	0.00	0.00	0.
7 JUN 0230	107	0.00	0.00	0.00	108.	*	8 JUN 0830	227	0.00	0.00	0.00	0.
7 JUN 0245	108	0.00	0.00	0.00	93.	*	8 JUN 0845	228	0.00	0.00	0.00	0.
7 JUN 0300	109	0.00	0.00	0.00	79.	*	8 JUN 0900	229	0.00	0.00	0.00	0.
7 JUN 0315	110	0.00	0.00	0.00	67.	*	8 JUN 0915	230	0.00	0.00	0.00	0.

```
        7 JUN 0330  111    0.00    0.00    0.00        56.       *       8 JUN 0930  231    0.00    0.00    0.00         0.
        7 JUN 0345  112    0.00    0.00    0.00        47.       *       8 JUN 0945  232    0.00    0.00    0.00         0.
        7 JUN 0400  113    0.00    0.00    0.00        40.       *       8 JUN 1000  233    0.00    0.00    0.00         0.
        7 JUN 0415  114    0.00    0.00    0.00        33.       *       8 JUN 1015  234    0.00    0.00    0.00         0.
        7 JUN 0430  115    0.00    0.00    0.00        28.       *       8 JUN 1030  235    0.00    0.00    0.00         0.
        7 JUN 0445  116    0.00    0.00    0.00        24.       *       8 JUN 1045  236    0.00    0.00    0.00         0.
        7 JUN 0500  117    0.00    0.00    0.00        20.       *       8 JUN 1100  237    0.00    0.00    0.00         0.
        7 JUN 0515  118    0.00    0.00    0.00        17.       *       8 JUN 1115  238    0.00    0.00    0.00         0.
        7 JUN 0530  119    0.00    0.00    0.00        14.       *       8 JUN 1130  239    0.00    0.00    0.00         0.
        7 JUN 0545  120    0.00    0.00    0.00        12.       *       8 JUN 1145  240    0.00    0.00    0.00         0.
                                                                 *
*******************************************************************************************************************************

    TOTAL RAINFALL =    1.28, TOTAL LOSS =    1.18, TOTAL EXCESS =    0.10

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     59.75-HR
+   (CFS)       (HR)
                          (CFS)
+     255.     19.25                 251.        137.         55.          55.
                        (INCHES)     0.044       0.095       0.095        0.095
                         (AC-FT)      124.        272.        272.         272.

                         CUMULATIVE AREA =   53.46 SQ MI




*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   38 KK    *       3R   *        CNAME      3C
            *            *
            **************

   39 KO         OUTPUT CONTROL VARIABLES
                       IPRNT          0  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         22  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2        240  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT      0.250  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

   40 RM         MUSKINGUM ROUTING
                       NSTPS        1 NUMBER OF SUBREACHES
                       AMSKK      0.00 MUSKINGUM K
                           X      0.20 MUSKINGUM X

                                                                ***
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH      3R.
       REDUCE NSTPS OR DECREASE YOUR COMPUTATION INTERVAL (FIRST FIELD OF THE IT RECORD).

*******************************************************************************************************************************

                                                  HYDROGRAPH AT STATION       3R

*******************************************************************************************************************************
                                 *                                *                                *
   DA MON HRMN  ORD      FLOW    *   DA MON HRMN  ORD      FLOW   *   DA MON HRMN  ORD      FLOW   *   DA MON HRMN  ORD      FLOW
                                 *                                *                                *
    6 JUN 0000    1        0.    *    6 JUN 1500   61      228.   *    7 JUN 0600  121       10.   *    7 JUN 2100  181        0.
    6 JUN 0015    2        0.    *    6 JUN 1515   62      233.   *    7 JUN 0615  122        8.   *    7 JUN 2115  182        0.
    6 JUN 0030    3        0.    *    6 JUN 1530   63      237.   *    7 JUN 0630  123        7.   *    7 JUN 2130  183        0.
    6 JUN 0045    4        0.    *    6 JUN 1545   64      240.   *    7 JUN 0645  124        6.   *    7 JUN 2145  184        0.
    6 JUN 0100    5        0.    *    6 JUN 1600   65      242.   *    7 JUN 0700  125        5.   *    7 JUN 2200  185        0.
    6 JUN 0115    6        0.    *    6 JUN 1615   66      244.   *    7 JUN 0715  126        4.   *    7 JUN 2215  186        0.
    6 JUN 0130    7        0.    *    6 JUN 1630   67      246.   *    7 JUN 0730  127        3.   *    7 JUN 2230  187        0.
    6 JUN 0145    8        0.    *    6 JUN 1645   68      247.   *    7 JUN 0745  128        3.   *    7 JUN 2245  188        0.
    6 JUN 0200    9        0.    *    6 JUN 1700   69      248.   *    7 JUN 0800  129        2.   *    7 JUN 2300  189        0.
    6 JUN 0215   10        0.    *    6 JUN 1715   70      249.   *    7 JUN 0815  130        2.   *    7 JUN 2315  190        0.
    6 JUN 0230   11        0.    *    6 JUN 1730   71      251.   *    7 JUN 0830  131        2.   *    7 JUN 2330  191        0.
    6 JUN 0245   12        0.    *    6 JUN 1745   72      252.   *    7 JUN 0845  132        1.   *    7 JUN 2345  192        0.
    6 JUN 0300   13        0.    *    6 JUN 1800   73      253.   *    7 JUN 0900  133        1.   *    8 JUN 0000  193        0.
```

6 JUN 0315	14	0.	*	6 JUN 1815	74	254.	*	7 JUN 0915	134	1.	*	8 JUN 0015	194	0.
6 JUN 0330	15	0.	*	6 JUN 1830	75	254.	*	7 JUN 0930	135	1.	*	8 JUN 0030	195	0.
6 JUN 0345	16	0.	*	6 JUN 1845	76	255.	*	7 JUN 0945	136	1.	*	8 JUN 0045	196	0.
6 JUN 0400	17	0.	*	6 JUN 1900	77	255.	*	7 JUN 1000	137	0.	*	8 JUN 0100	197	0.
6 JUN 0415	18	0.	*	6 JUN 1915	78	255.	*	7 JUN 1015	138	0.	*	8 JUN 0115	198	0.
6 JUN 0430	19	0.	*	6 JUN 1930	79	255.	*	7 JUN 1030	139	0.	*	8 JUN 0130	199	0.
6 JUN 0445	20	0.	*	6 JUN 1945	80	255.	*	7 JUN 1045	140	0.	*	8 JUN 0145	200	0.
6 JUN 0500	21	0.	*	6 JUN 2000	81	255.	*	7 JUN 1100	141	0.	*	8 JUN 0200	201	0.
6 JUN 0515	22	0.	*	6 JUN 2015	82	254.	*	7 JUN 1115	142	0.	*	8 JUN 0215	202	0.
6 JUN 0530	23	0.	*	6 JUN 2030	83	253.	*	7 JUN 1130	143	0.	*	8 JUN 0230	203	0.
6 JUN 0545	24	0.	*	6 JUN 2045	84	252.	*	7 JUN 1145	144	0.	*	8 JUN 0245	204	0.
6 JUN 0600	25	0.	*	6 JUN 2100	85	250.	*	7 JUN 1200	145	0.	*	8 JUN 0300	205	0.
6 JUN 0615	26	0.	*	6 JUN 2115	86	249.	*	7 JUN 1215	146	0.	*	8 JUN 0315	206	0.
6 JUN 0630	27	0.	*	6 JUN 2130	87	247.	*	7 JUN 1230	147	0.	*	8 JUN 0330	207	0.
6 JUN 0645	28	0.	*	6 JUN 2145	88	245.	*	7 JUN 1245	148	0.	*	8 JUN 0345	208	0.
6 JUN 0700	29	0.	*	6 JUN 2200	89	243.	*	7 JUN 1300	149	0.	*	8 JUN 0400	209	0.
6 JUN 0715	30	0.	*	6 JUN 2215	90	240.	*	7 JUN 1315	150	0.	*	8 JUN 0415	210	0.
6 JUN 0730	31	0.	*	6 JUN 2230	91	237.	*	7 JUN 1330	151	0.	*	8 JUN 0430	211	0.
6 JUN 0745	32	0.	*	6 JUN 2245	92	235.	*	7 JUN 1345	152	0.	*	8 JUN 0445	212	0.
6 JUN 0800	33	0.	*	6 JUN 2300	93	232.	*	7 JUN 1400	153	0.	*	8 JUN 0500	213	0.
6 JUN 0815	34	0.	*	6 JUN 2315	94	228.	*	7 JUN 1415	154	0.	*	8 JUN 0515	214	0.
6 JUN 0830	35	0.	*	6 JUN 2330	95	225.	*	7 JUN 1430	155	0.	*	8 JUN 0530	215	0.
6 JUN 0845	36	0.	*	6 JUN 2345	96	221.	*	7 JUN 1445	156	0.	*	8 JUN 0545	216	0.
6 JUN 0900	37	0.	*	7 JUN 0000	97	218.	*	7 JUN 1500	157	0.	*	8 JUN 0600	217	0.
6 JUN 0915	38	0.	*	7 JUN 0015	98	213.	*	7 JUN 1515	158	0.	*	8 JUN 0615	218	0.
6 JUN 0930	39	0.	*	7 JUN 0030	99	208.	*	7 JUN 1530	159	0.	*	8 JUN 0630	219	0.
6 JUN 0945	40	0.	*	7 JUN 0045	100	201.	*	7 JUN 1545	160	0.	*	8 JUN 0645	220	0.
6 JUN 1000	41	0.	*	7 JUN 0100	101	193.	*	7 JUN 1600	161	0.	*	8 JUN 0700	221	0.
6 JUN 1015	42	0.	*	7 JUN 0115	102	182.	*	7 JUN 1615	162	0.	*	8 JUN 0715	222	0.
6 JUN 1030	43	1.	*	7 JUN 0130	103	169.	*	7 JUN 1630	163	0.	*	8 JUN 0730	223	0.
6 JUN 1045	44	3.	*	7 JUN 0145	104	155.	*	7 JUN 1645	164	0.	*	8 JUN 0745	224	0.
6 JUN 1100	45	7.	*	7 JUN 0200	105	139.	*	7 JUN 1700	165	0.	*	8 JUN 0800	225	0.
6 JUN 1115	46	13.	*	7 JUN 0215	106	123.	*	7 JUN 1715	166	0.	*	8 JUN 0815	226	0.
6 JUN 1130	47	23.	*	7 JUN 0230	107	108.	*	7 JUN 1730	167	0.	*	8 JUN 0830	227	0.
6 JUN 1145	48	35.	*	7 JUN 0245	108	93.	*	7 JUN 1745	168	0.	*	8 JUN 0845	228	0.
6 JUN 1200	49	50.	*	7 JUN 0300	109	79.	*	7 JUN 1800	169	0.	*	8 JUN 0900	229	0.
6 JUN 1215	50	68.	*	7 JUN 0315	110	67.	*	7 JUN 1815	170	0.	*	8 JUN 0915	230	0.
6 JUN 1230	51	86.	*	7 JUN 0330	111	56.	*	7 JUN 1830	171	0.	*	8 JUN 0930	231	0.
6 JUN 1245	52	106.	*	7 JUN 0345	112	47.	*	7 JUN 1845	172	0.	*	8 JUN 0945	232	0.
6 JUN 1300	53	125.	*	7 JUN 0400	113	40.	*	7 JUN 1900	173	0.	*	8 JUN 1000	233	0.
6 JUN 1315	54	144.	*	7 JUN 0415	114	33.	*	7 JUN 1915	174	0.	*	8 JUN 1015	234	0.
6 JUN 1330	55	162.	*	7 JUN 0430	115	28.	*	7 JUN 1930	175	0.	*	8 JUN 1030	235	0.
6 JUN 1345	56	178.	*	7 JUN 0445	116	24.	*	7 JUN 1945	176	0.	*	8 JUN 1045	236	0.
6 JUN 1400	57	192.	*	7 JUN 0500	117	20.	*	7 JUN 2000	177	0.	*	8 JUN 1100	237	0.
6 JUN 1415	58	204.	*	7 JUN 0515	118	17.	*	7 JUN 2015	178	0.	*	8 JUN 1115	238	0.
6 JUN 1430	59	214.	*	7 JUN 0530	119	14.	*	7 JUN 2030	179	0.	*	8 JUN 1130	239	0.
6 JUN 1445	60	222.	*	7 JUN 0545	120	12.	*	7 JUN 2045	180	0.	*	8 JUN 1145	240	0.
			*				*				*			

****

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	59.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	255.	19.25		251.	137.	55.	55.
			(INCHES)	0.044	0.095	0.095	0.095
			(AC-FT)	124.	272.	272.	272.

CUMULATIVE AREA = 53.46 SQ MI

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		1B	255.	19.25	251.	137.	55.	53.46		
	ROUTED TO									
+		3R	255.	19.25	251.	137.	55.	53.46		

*** NORMAL END OF HEC-1 ***

June 24, 2014

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B17. Jurisdictional Determination 2013

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): June 7, 2013

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Los Angeles District, Sunlight Partners Solar Array Project, SPL-2011-01084-SLP

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: California County/parish/borough**:** Los Angeles County City: near Palmdale
Center coordinates of overall site (lat/long in degree decimal format): Lat. 34.682210° **N**, Long. -118.104484° **W**.
Name of nearest waterbody: Antelope Valley Watershed (excluding Lake Palmdale and tributaries to Lake Palmdale)
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: N/A
Name of watershed or Hydrologic Unit Code (HUC): Antelope Valley Watershed (HUC 10 #s 1809020609 through 1809020624)

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: June 7, 2013
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: **.**

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):**

☐ TNWs, including territorial seas
☐ Wetlands adjacent to TNWs
☐ Relatively permanent waters[1] (RPWs) that flow directly or indirectly into TNWs
☐ Non-RPWs that flow directly or indirectly into TNWs (no adjacent wetlands)
☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
☐ Wetlands adjacent to but not directly abutting RPWs (with a surface connection) that flow directlyor indirectly into TNWs
☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
☐ Impoundments of jurisdictional waters
☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Pick List**
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[2]

☒ **Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain:** It should be noted this SWANCC watershed-level Approved JD for Antelope Valley (HUC 10 #s 1809020609 through 1809020624) specifically excludes the areas of Lake Palmdale and all waters tributary to Lake Palmdale (portions of HUC 12 #s 180902061501, 180902061102, 180902061103; portions of HUC 10 #s 1809020615, 1809020611). Lake Palmdale lies between 2,818 and 2,830 feet above sea level and covers approximately 234 acres, with relatively few waters tributary in its small subwatershed, including Palmdale Ditch. Lake Palmdale is a man-made lake originally constructed for water supply and storage, and currently also receives water inputs from the State Water Project. Though Lake

[1] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[2] Supporting documentation is presented in Section III.F.

Palmdale does not have a downstream surface connection with the lower Antelope Valley watershed (i.e. isolated), past approved jurisdictional determinations (SPL-2004-00063-AOA, SPL-2004-00073-KW, 2009-00634-PHT) have demonstrated a potential nexus to commerce (i.e. (a)(3)(i) water). Lake Palmdale has and currently does support navigation and substantial surface water related recreation with the potential for interstate commerce. The surface water related commerce includes recreational boating and fishing, further evidenced by the presence of over 65 docks within the lake perimeter, as well as an adjacent upland boat storage/parking area containing well over 150 boating vessels (2012 Google Earth aerials).

The Antelope Valley Watershed is a closed basin situated within the western Mojave Desert, with a system of Rosamond, Buckhorn, and Rogers dry lakes as the central watershed terminus. The watershed is triangular shaped, bordered on the southwest by the San Gabriel Mountains and the San Adreas Fault, on the northwest by the Tehachapi Mountains and the Garlock Fault, and on the east by hills and buttes generally following the boundary line between Los Angeles and San Bernardino Counties. Rosamond, Buckhorn and Rogers Lakes and their tributaries (Antelope Valley Watershed) function as an isolated intrastate watershed system, which lacks the presence of a TNW. Moreover, Rosamond, Buckhorn and Rogers Lakes and all tributaries to them are NOT (a)(3) waters as defined by 33 CFR 328.3, as they do NOT meet criteria (a)(3)(iii), since surface waters are NOT used for industrial or other commercial purposes by interstate commerce industries.

Rosamond, Buckhorn and Rogers Lakes are the central terminus point for surface waters within the Antelope Valley Watershed, which is situated in southern California within northern Los Angeles County, southern Kern County, and western San Bernardino County. Rosamond and Rogers dry lakes are the lowest elevational points of the watershed, with only slight differences in their individual lowest elevations (2,274 feet and 2,270 feet above sea level, respectively). The three dry lake areas cover a total area of about 76 square miles, with a mean surface elevation of 2,270 feet above sea level. Rosamond Lake, Buckhorn Lake, and Rogers Lake separately cover 22 mi^2, 3.9 mi^2 and 50.1 mi^2, respectively. Historically, these dry lake areas once comprised a single lake area (Lake Thompson) in the late Pleistocene era. The three dry lakes are located immediately south and southeast of Rosamond Hills and Bissell Hills, within the Edwards Air Force Base. The overall Antelope Valely Watershed occupies an area of approximately 2,400 mi^2. Historically, land use of the watershed consisted primarily of agriculture, but population growth has led to increased residential, industrial and commercial uses within both previous agriculture and undeveloped areas.

Antelope Valley is a semi-arid region, generally ranging in elevation from about 2,300 feet to 3,500 feet above sea level within the basin floor. Within the southern (Los Angeles County) portion of the watershed, elevations range from 2,270 feet above sea level at Rogers Dry Lake to 9,399 feet at Mt. Baden-Powell. Watershed surface flows are generated by mountain snow pack melting and by storm events. Most surface water flows within Antelope Valley either infiltrate into the groundwater basin or evaporate, or during large storm events continue to flow to the central three dry lakes situated on Edwards Air Force Base (Rosamond dry lake, Buckhorn dry lake, and Rogers dry lake). Surface flows that reach the dry lakes are typically are subject to evaporation due to underlying clay soils. Most rainfall occurs within the first few months of the year, with annual average precipitation ranging from 5 inches along the northern boundary to 10 inches along the southern boundary. Storm water runoff from the valley, surrounding mountains and hills is typically carried by ephemeral stream courses, with surface runoff divided between Little Rock and Santiago Canyons. Most of the major watershed drainages originate in the San Gabriel Mountains at the southwestern Valley edge, including Big Rock Creek, Little Rock Creek, Amargosa Creek and Anaverde Creek, as well as Oak Creek from the Tehachapi Mountains. Highly erodible soils, subsequently carried by mountain drainage flows over time, have resulted in the mountain base formation of a continuous alluvial fan area along the southern watershed edges, as well as resulted in a lack of well defined channels. Within the Valley floor, runoff is primarily carried by sheetflow. Use of groundwater resources within the Valley basin over time has also resulted in land subsidence within the region, with up to 7 foot level decreases recorded since the 1950s. Groundwater levels below the central dry lakes generally range 49 feet to 66 feet below the ground surface. The dry lakes are devoid of water, except following large or extended storm events where ponded water is subject to evaporation. Prior approved jurisdictional determinations have been made for tributaries to these dry lakes. Currently, there are no published commercial uses of the surface waters of any tributaries to Rosamond, Buckhorn and Rogers Lakes, and the review of aerial photographs (Google Earth) also did not depict surface water usage of any drainages tributary to the dry lakes. Therefore, all tributaries to Rosamond, Buckhorn and Rogers Lakes are NOT (a)(3) waters as defined by 33 CFR 328.3(a)(3)(i-iii).

Rosamond, Buckhorn and Rogers Lakes, as the terminus for all waters within the Antelope Valley Watershed, are NOT TNWs. Moreover, Rosamond, Buckhorn and Rogers Lakes are NOT (a)(3) waters as defined by 33 CFR 328.3. Rosamond, Buckhorn and Rogers dry lakes do NOT meet criteria (a)(3)(i-iii), as they: i) DO NOT have use for surface water recreation or other purposes by foreign or interstate travelers, ii) DO NOT have harvesting activities of fish or shellfish that may be sold in interstate or foreign commerce, and iii) DO NOT have surface water industrial usage by industries in interstate commerce. Military flight testing, NASA space shuttle landings and other aeronautical activities have taken place in Rosamond, Buckhorn and Rogers Lakes since approximately 1933. Published recreational uses for the dry lake areas are limited to a few non-surface water uses, including OHV use, rock hounding, and aircraft and military activity. Also, Buckhorn and Rogers dry lakes have been subject to clay mining. However, none of the above activities on the lakes utilize the lake surface waters.

The above is based upon: the California Groundwater Bulletin 118: Antelope Valley Groundwater Basin (last updated February 27, 2004); the South Lahontan Hydrologic Region Plan; Antelope Valley Water Resource Study (dated November 1995, prepared by Kennedy/Jenks Consultants); Comprehensive Flood Control and Water Conservation Plan (dated June 1987, prepared by Los Angeles County Department of Public Works); Antelope Valley Integrated Regional Water Management Plan (dated 2005, prepared by the Regional Water Management Group of the Antelope Vallay IRWMP); Lake

Thompson, Mojave Desert, California: A Dessicating Late Quaternary Lake System (dated January 2004, prepared by Antony Orme, ERDC); Land Use and Water Use in the Antelope Valley, California (dated 1995, William Templin et al.), 2012 Sanitary Survey and Drinking Water Source Assessment Update (Dated December 2012, prepared by Black & Veatch), the review of aerial photographs (Google Earth) that also did not show surface water usage of any tributaries to Rosamond, Buckhorn and Rogers Lakes or the dry lake terminii themselves, and 62 prior approved jurisdictional determinations within the same Antelope Valley Watershed (see specific JD information listed in Section IV). Therefore, since Rosamond, Buckhorn and Rogers Lakes are intrastate isolated waters without a surface water connection to commerce, all tributaries to Rosamond, Buckhorn and Rogers Lakes as part of the overall watershed system are also isolated and additionally have no nexus to commerce. Thus, the Antelope Valley Watershed, excluding Lake Palmdale and tributaries to Lake Palmdale, is an isolated watershed system that has no surface water connection to commerce under SWANCC.

Based on the information above, the Corps concludes that all tributaries to Rosamond, Buckhorn and Rogers Lakes, and Rosamond, Buckhorn and Rogers Lakes themselves, (i.e. the Antelope Valley Watershed, excluding Lake Palmdale and tributaries to Lake Palmdale) are NONJURISDICTIONAL waters of the United States under SWANCC, since Antelope Valley waters are NOT tributary to either a TNW or an (a)(3) water and Rosamond, Buckhorn and Rogers Lakes are NOT (a)(3) waters themselves. The Corps makes such a watershed conclusion since the Antelope Valley watershed is an isolated, intrastate watershed without any surface water related commerce.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[3] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

[3] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[4]: .
Tributary stream order, if known: .

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain: .
- ☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[5] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[6] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[4] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[5]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[6]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
  ☐ Federally Listed species. Explain findings: .
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
  Wetland size: acres
  Wetland type. Explain: .
  Wetland quality. Explain: .
Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:
Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**
  Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
  ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☐ Directly abutting
☐ Not directly abutting
  ☐ Discrete wetland hydrologic connection. Explain: .
  ☐ Ecological connection. Explain: .
  ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .
Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .
☐ Vegetation type/percent cover. Explain: .
☐ Habitat for:
  ☐ Federally Listed species. Explain findings: .
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   ☐ Tributary waters: linear feet width (ft).
   ☐ Other non-wetland waters: acres.
   Identify type(s) of waters: .

3. **Non-RPWs[7] that flow directly or indirectly into TNWs.**

[7]See Footnote # 3.

☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.[8]
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[9]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**
☐ Wetlands: acres.

[8] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[9] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.

☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.

☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).

☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: **.**

☐ Other: (explain, if not covered above): **.**

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).

☐ Lakes/ponds: acres.

☐ Other non-wetland waters: acres. List type of aquatic resource: .

☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).

☐ Lakes/ponds: acres.

☐ Other non-wetland waters: acres. List type of aquatic resource: .

☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Sunlight Partners watershed map with project sub-locations

☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.

☐ Office concurs with data sheets/delineation report.

☐ Office does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps: .

☐ Corps navigable waters' study: .

☐ U.S. Geological Survey Hydrologic Atlas: .

☐ USGS NHD data.

☐ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name: .

☐ USDA Natural Resources Conservation Service Soil Survey. Citation: .

☐ National wetlands inventory map(s). Cite name: .

☐ State/Local wetland inventory map(s): .

☐ FEMA/FIRM maps: .

☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)

☒ Photographs: ☒ Aerial (Name & Date): .

or ☒ Other (Name & Date): .

☒ Previous determination(s). File no. and date of response letter: 62 prior approved jurisdictional determinations (enclosed table).

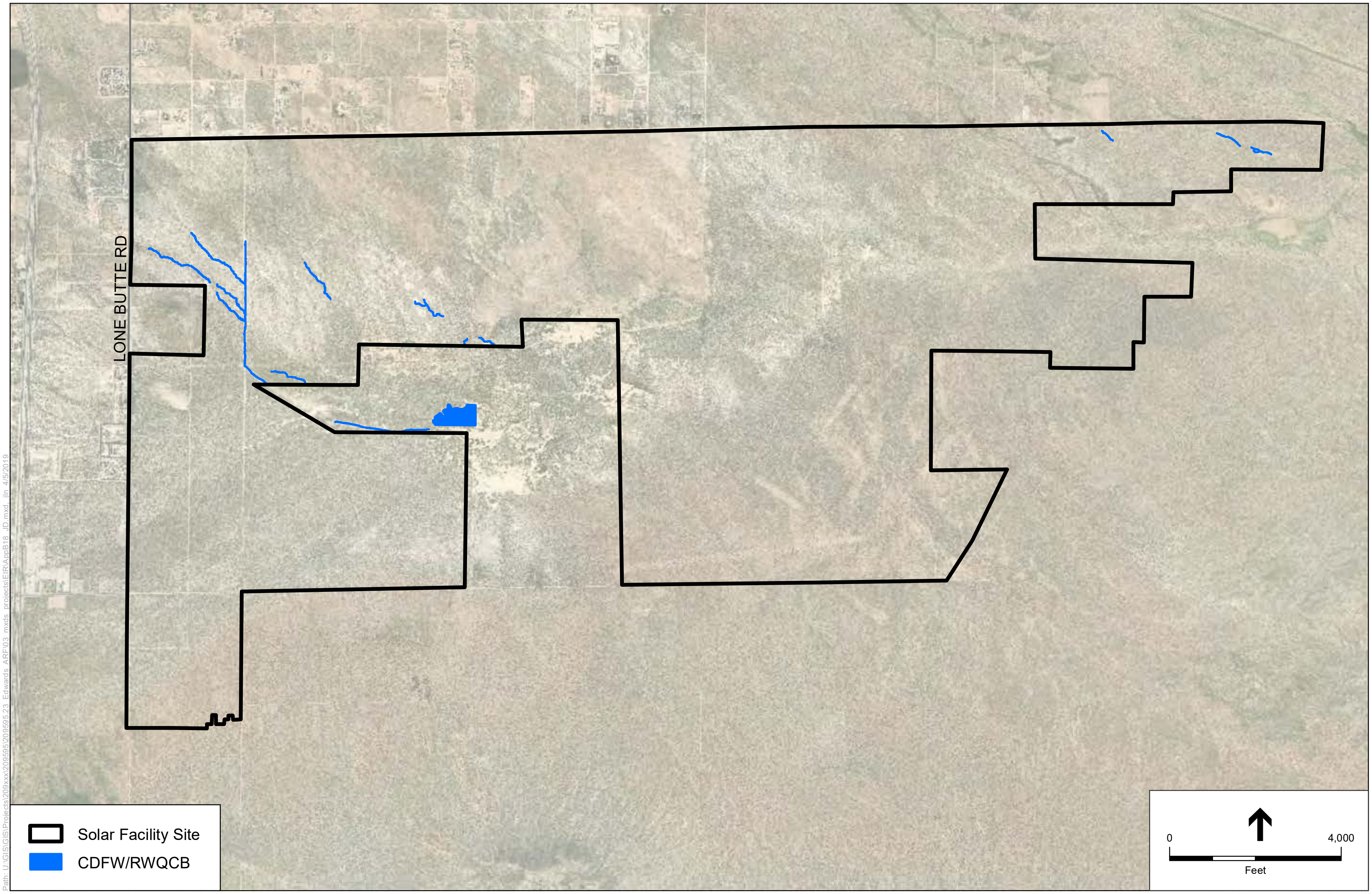
☐ Applicable/supporting case law: .

☐ Applicable/supporting scientific literature: .

☒ Other information (please specify): California Groundwater Bulletin 118: Antelope Valley Groundwater Basin (last updated February 27, 2004); the South Lahontan Hydrologic Region Plan; Antelope Valley Water Resource Study (dated November 1995, prepared by Kennedy/Jenks Consultants); Comprehensive Flood Control and Water Conservation Plan (dated June 1987, prepared by Los Angeles County Department of Public Works); Antelope Valley Integrated Regional Water Management Plan (dated 2005, prepared by the Regional Water Management Group of the Antelope Vallay IRWMP); Lake Thompson, Mojave Desert, California: A Dessicating Late Quaternary Lake System (dated January 2004, prepared by Antony Orme, ERDC); Land Use and Water Use in the Antelope Valley, California (dated 1995, William Templin et al.); 2012 Sanitary Survey and Drinking Water Source Assessment Update (Dated December 2012, prepared by Black & Veatch); and the review of aerial photographs (Google Earth).

B. ADDITIONAL COMMENTS TO SUPPORT JD:

B18 Jurisdictional Determination 2018



Appendix B18: Jurisdictional Delineation

B19 Edwards Solar WSA

Water Supply Assessment for Edwards Air Force Base Solar Project

Lead Agency:

Kern County
Planning and Natural Resources Department
2700 M Street, Suite 101
Bakersfield, California 93301

Prepared For:

Kern County
2700 M Street, Suite 101
Bakersfield, California 93301

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Kayvan Ilkhanipour

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ACRONYMS AND ABBREVIATIONS

AF	acre-feet
AFY	acre-feet per year
amsl	above mean sea level
AVEK	Antelope Valley–East Kern Water Agency
AVGB	Antelope Valley Groundwater Basin
bgs	below the ground surface
CEQA	California Environmental Quality Act
CWC	California Water Code
DWR	California Department of Water Resources
EAFB	Edwards Air Force Base
FVGB	Fremont Valley Groundwater Basin
gpm	gallons per minute
mg/L	milligrams per liter
MPUD	Mojave Public Utilities District
MW	megawatts
O&M	operations and maintenance
SB	Senate Bill
SWID	State Well Identification Number
SWP	State Water Project
UWMP	urban water management plan
WSA	Water Supply Assessment

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EXECUTIVE SUMMARY

This Water Supply Assessment (WSA) has been prepared to assist Kern County in satisfying the requirements of Senate Bill 610 (SB 610) for the proposed Edwards Air Force Base Solar Project (proposed project). The proposed project would require 400 acre-feet (AF) of water to support construction over a 24-month period. Thereafter, the project would require up to 30 acre-feet per year (AFY) to support operations and maintenance (O&M) activities. Several sources of water supply have been identified that, individually or in combination, would be available and sufficient to fully supply the proposed project's construction and/or O&M water demands. These include the following:

- **On-Site Groundwater.** An evaluation of groundwater resources underlying the project site indicates that development of one or more on-site groundwater wells is a feasible method of supplying the proposed project's O&M water demands, so long as such wells are located and developed prudently and a sufficient distance away from existing off-site wells to avoid pumping interferences.
- **The Mojave Public Utilities District (MPUD).** MPUD has provided a will-serve letter to provide up to 400 AF of water for construction of the project, as well as the 30 AFY needed for the O&M phase of the proposed project. MPUD may provide water for the proposed project through one of several sources consisting of (a) purchase of treated surface water and/or banked groundwater from the Antelope Valley–East Kern Water Agency (AVEK) or (b) groundwater pumped from wells located within its service area, namely MPUD's Well 30, which is non-potable, unconnected to its drinking water system, and suitable for construction and O&M purposes.
- **California City.** California City has indicated a willingness to provide for the construction demands of the project, if requested. Based on review of its Urban Water Management Plan, California City has voluminous surplus groundwater resources to supply the proposed project's construction demands, but is not available as a source of water for the proposed project's O&M demand.

In addition to identifying sufficient sources of available water for the proposed project, this WSA has evaluated the existing and planned future uses of the identified water supply sources and determined that they can accommodate the expected water demands in the cumulative context without unduly affecting the underlying groundwater basin. Regardless of the water supply source ultimately used, the impact on groundwater resources would be minimal, and would not appreciably contribute to aquifer depletion or adjacent well interference.

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1 INTRODUCTION

1.1 Purpose of Document

Senate Bill (SB) 610 became effective on January 1, 2002, amending the California Water Code (CWC) by requiring detailed analysis of water supply availability for certain types of development projects. The primary purpose of SB 610 is to improve the linkage between water and land use planning by ensuring greater communication between water providers and local planning agencies and ensuring that land use decisions for certain large development projects are fully informed as to whether sufficient water supplies are available to meet project demands. SB 610 requires the preparation of a water supply assessment (WSA) for any project that is subject to the California Environmental Quality Act (CEQA) and meets certain requirements. A WSA that is associated with a project must include a discussion of the availability of an identified water supply under normal-year, single-dry-year, and multiple-dry-year conditions over a 20-year projection, accounting for the projected water demand of the project in addition to other existing and planned future uses of the identified water supply.

Kern County, acting as lead agency, has determined that the proposed project is subject to CEQA. Following this determination, a public water supplier is required to demonstrate adequate water supply for the proposed project. The proposed project is not located within the service area of a public water supplier; however, it is located within the service area of a local water wholesaler, Antelope Valley–East Kern Water Agency (AVEK), upon whom the Mojave Public Utilities District (MPUD) can rely for adequate water to supply the proposed project. Therefore, this WSA will be included in the CEQA documentation and will be reviewed by the lead agency, who will make an independent determination as to whether there is adequate water supply for the proposed project. This report provides information on the proposed project's potential water supplies and provides data to support the sufficiency of supply.

1.2 Project Location and Description

The proposed project will be located on the northwestern portion of Edwards Air Force Base (EAFB) in southeastern Kern County (Figure 1, Project Vicinity). The proposed project site is approximately 0.5 miles east of Sierra Highway on an undeveloped portion of EAFB. The site is relatively flat and covered by low-lying desert vegetation. There are no natural or man-made surface water features on the proposed project site.

The proposed project is a solar photovoltaic facility that will be developed on up to 4,000 acres of non-excess land at EAFB (Figure 2, Project Area). The proposed project is anticipated to include a photovoltaic facility with a capacity of up to 600 megawatts (MW). Construction of the facility will take up to 2 years, with operations and maintenance (O&M) for the useful life of the facility not to exceed the lease term of 50 years.

1.3 Water Supply Assessment Applicability

A project that is subject to CEQA requires preparation of a WSA if it is a proposed industrial facility occupying more than 40 acres of land (CWC Section 10912(a)). The proposed project area encompasses approximately 4,000 acres. SB 610 amended Water Code Sections 10910 and 10912 to create a direct relationship between water supply and land use. Based on this amendment to the CWC, the proposed project is subject to SB 610 and therefore requires the preparation of a WSA.

The CWC, as amended by SB 610, requires that a WSA address the following questions:

- Is there a public water system that will service the project?
- Is there a current UWMP [urban water management plan] that accounts for the project demand?
- Is groundwater a component of the supplies for the project?
- Are there sufficient supplies to serve the project over the next 20 years?

The primary question to be answered in a WSA per the requirements of SB 610 is:

> Will the total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection meet the projected water demand of the proposed project, in addition to existing and planned future uses of the identified water supplies, including agricultural and manufacturing uses?

Sections 1.3.1 through 1.3.4 address the SB 610 WSA questions as they relate to the proposed project.

1.3.1 Public Water Systems and/or Local Water Agencies and Service Areas

This WSA analyzes a number of water sources that are available to meet the project's anticipated water demand, which for O&M may include on-site groundwater, either wholly or in part. To maximize the flexibility and reliability of water sources available for the project, this WSA also identifies a number of local water agencies that have indicated their willingness to supply the project with water for its construction and/or operational needs, consisting of MPUD and California City. MPUD has provided will-serve letters indicating its ability to supply the entire project's water demand, whereas California City has indicated it is willing to supply water for construction-related demands only (Appendix A; Appendix B;

California City, pers. comm. 2018). The project may indirectly use water provided by AVEK, because AVEK has indicated to MPUD that it can provide MPUD with enough water to serve the project's water demands (AVEK 2018).

CWC Section 10912 defines a "public water system" as a system that has 3,000 or more service connections and provides piped water to the public for human consumption. Under this definition, and based on the number of service connections, MPUD is not a public water system, whereas California City is a public water system. AVEK is a water wholesaler that delivers water to local water agencies, but does not operate a municipal water distribution system or serve individual water customers with water for human consumption. Should the applicant choose to develop on-site groundwater to serve its O&M demands by installing or redeveloping on-site groundwater wells, the facilities would be private and would not consist of a public water system.

Water resources in the vicinity of the proposed project consist of local groundwater supplies, which since 1962 have been supplemented by State Water Project (SWP) surface water imports delivered to the area via the East Branch of the California Aqueduct. The closest water agency to the project site is MPUD, which has connections to water sources within 1.25 to 4.5 miles of the proposed project site (Figure 3, Water Agencies and Groundwater Basins). MPUD recently joined the Fremont Valley Integrated Regional Water Management Group with AVEK and California City. The closest part of California City's service area to the project site is 8 miles to the north-northeast (Figure 3). The Rosamond Community Services District is located southwest of the project site, but it is not considered as a potential water source in this WSA. The location of water agencies relative to the project site is shown on Figure 3.

1.3.2 Urban Water Management Plan Coverage

The project area is located within AVEK's service area, which is a wholesale water supplier to utilities and local government agencies, including MPUD. Therefore, the project area is addressed in the UWMP of the wholesaler. In addition, the Fremont Valley Integrated Regional Water Management Group is currently preparing an Integrated Regional Water Management Plan (IRWMP), which will be submitted to the state once complete. Accordingly, to the extent that AVEK's UWMP includes MPUD as a wholesale water customer, AVEK's UWMP provides information relevant to water supply for the project.

The project could also receive construction water from the California City, which has an adopted 2015 UWMP. California City's service area does not encompass the project site; however, its UWMP contains information regarding water recharge and sustainable yield relevant to the local groundwater basin as a whole, and thus is used as an important source of information regarding the existing and projected future demands on the basin, whose boundaries extend outside California City's service area and encompass the project site.

1.3.3 Groundwater as a Component of Project Water Supplies

The water demands will be met by developing on-site groundwater wells that would draw from the Fremont Valley Groundwater Basin (FVGB), or by importing water from MPUD or California City, each of whom derives all or most of its supply from the FVGB. If the project is supplied by MPUD, the water delivered may be sourced from treated surface water and/or banked groundwater purchased from AVEK (up to 200 AFY during construction); treated groundwater from within MPUD's service area; and/or untreated groundwater from MPUD's Well 30, prior to its anticipated conversion to a potable supply well by 2020. Construction water could also be supplied to the proposed project by California City. In all of these cases, groundwater will be wholly or partially used to supply the project's demands. Sufficiency of groundwater resources is addressed in Section 3.1.2, Groundwater, and Section 3.3, Water Supply Availability.

1.3.4 Sufficiency of Supplies over the Next 20 Years

As described in Sections 2.1, Project Construction Water Demand, 2.2, Project Operational Water Demand, and 3.3, Water Supply Availability, there is adequate water available to supply the proposed project through construction and O&M.

2 PROJECT WATER DEMAND

The proposed project would require 400 AF of water to support construction over a 24-month period (Blattner, pers. comm. 2018). Thereafter, the project would require up to 30 AFY to support O&M activities. The water demands for each phase of the proposed project are described in detail in Sections 2.1 and 2.2.

2.1 Project Construction Water Demand

During project construction, water will be used for common construction-related activities. These activities include concrete manufacturing, dust control, sanitation, and other miscellaneous purposes.

The proposed project will use water-efficient construction techniques, including a “mow and roll” technique for site preparation and maintaining native vegetation on the site where possible, including areas of solar panel construction and placement. Construction water demands have been estimated by the Engineering, Procurement and Construction Contractor for the project using a water use factor that is based on the known water demand of other solar projects that have been completed in the area using similar construction techniques.

2.2 Project Operational Water Demand

During project O&M, the primary water use at the site will be panel washing, with additional small quantities of water used for dust mitigation. It is expected that panel washing will occur up to four times per year. Similar solar photovoltaic operations use approximately 0.28 gallons of water per square yard of panel. Based on the planned 600 MW capacity of the proposed project, it is estimated that up to 30 AFY of water will be required for site O&M. This water demand assumes that four rounds of panel washing are required each year. However, it is anticipated that the actual number of wash cycles needed in any given year will vary based on site conditions and that the panels may only need to be washed once per year. Decisions about when panel washing is needed will be based on real-time conditions; there may be years in which no panel washing is required.

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3 WATER SUPPLY ASSESSMENT

A WSA is required to identify and describe the water supply sources of the public water supplier that will serve the proposed project. CWC Section 10910(d) requires a WSA to include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water supplier.

3.1 Water Resources

3.1.1 Surface Water

The Antelope–Fremont Valleys Watershed is a large, closed basin in the western Mojave Desert, with no outlet to the ocean. This watershed straddles the Los Angeles–Kern County line and drains a total of 3,387 square miles. Approximately 80% of the watershed is characterized by a low to moderate slope (0%–7%). The remaining 20% consists of foothills and rugged mountains, some of which reach up to 3,600 feet in elevation. The floor of the Antelope–Fremont Valleys Watershed generally lacks defined natural channels outside of the foothills and consequently is subject to unpredictable sheet flow patterns (RWMG 2013).

All water that enters the Antelope–Fremont Valleys Watershed either infiltrates into the underlying groundwater basin or flows toward three playa lakes located near the center of the watershed—Rogers, Rosamond, and Buckhorn Dry Lakes. All three playa lakes (also known as "dry lakes") are located within Edwards Air Force Base. A playa lake is formed when rain fills a playa, or small, round depression in the surface of the ground. Playa lakes are usually endorheic, which means they have no outflow of water. These playa lakes are usually dry, and they only receive water following intense and/or prolonged rainfall. Surface runoff that collects in the dry lakes quickly evaporates from the surface, and only a small quantity of water infiltrates to the groundwater due to the nearly impermeable nature of the playa soils (RWMG 2013).

Natural surface water features in the project area are ephemeral, meaning that they only convey flows in direct response to precipitation events. Man-made surface water features in the area are limited to the California Aqueduct, located northwest of the project site, and several water storage ponds located immediately northwest of the project site. The California Aqueduct is part of the SWP, which is the nation's largest state-built water and power development and conveyance system that includes pumping and power plants, reservoirs, lakes, storage tanks, canals, tunnels and pipelines that capture, store, and convey water to 29 contract water agencies.

The project site does not currently receive surface water deliveries from a local water agency.

3.1.2 Groundwater

Basin Boundaries and Characteristics

This project is located in eastern Kern County at the southern end of the FVGB in the Gloster Subunit (Figure 3). As defined by the California Department of Water Resources (DWR Basin No. 6-46), the FVGB covers an estimated 335,000 acres (523 square miles) and is bounded to the southwest, south, and southeast by the Antelope Valley Groundwater Basin (AVGB; DWR Basin No. 6-44); to the east by the crystalline rocks of Red Mountain, the Rand Mountains, Castle Butte, the Bissell Hills, and the Rosamond Hills; and to the west and north by the Sierra Nevada, the Tehachapi Mountains, and the El Paso Mountains (DWR 2004). The boundary between the FVGB and the AVGB occurs along a groundwater divide approximated by a line connecting the mouth of Oak Creek through Middle Butte to the exposed basement rock near Gem Hill and to the southeast of California City (DWR 2004).

The U.S. Geological Survey has divided the FVGB into six subunits that are generally defined by groundwater flow patterns, recharge characteristics, geographic location, and controlling geologic structures such as faults or intruding bedrock features (USGS 1967). Various strands of the Garlock Fault Zone (which includes the El Paso Fault) and the Muroc Fault represent partial barriers to groundwater flow and generally define the boundaries between the Chaffee, California City, Oak Creek, and Koehn Subunits.[1] The boundary between the Chaffee and Gloster Subunits is defined by the consolidated rock of the northern part of the Bissell Hills and the general east–west line of scattered hills trending through Elephant Butte westward to the Garlock Fault Zone (USGS 1967). Basin-wide, alluvial deposits are thought to be in excess of 1,000 feet thick, thinning toward the bed of Koehn Lake, where alluvium is interbedded with lacustrine deposits that result in locally confined conditions. Average well yield (for municipal and agricultural wells) reported by DWR within the FVGB is approximately 530 gallons per minute (gpm), with a maximum yield of 2,580 gpm (DWR 2004).

Natural recharge of the basin includes percolation of ephemeral streams that flow in from the Sierra Nevada. The general groundwater flow direction is toward Koehn Lake at the center of the valley, with no appreciable quantity of groundwater flowing out of the basin (DWR 2004). Within the project area, the general pattern of groundwater flow was not well defined in the first comprehensive study of the basin by the U.S. Geological Survey (USGS 1967). DWR notes

[1] Various descriptions and depictions of the local groundwater basin area, specifically within the Antelope Valley Integrated Regional Water Management Plan, indicate that the Chaffee and Gloster Subunits are part of the Antelope Valley Groundwater Basin (AVGB). Further research, however, shows that the project site is not located within the specific jurisdictional boundary that has been legally established for the AVGB adjudication and that the site is located in the FVGB according to DWR Bulletin 118 (DWR 2004), the best available and most authoritative source of basin boundaries in California.

historical groundwater level declines in some parts of the basin and stabilization of groundwater levels in others (DWR 2004). The total storage capacity of the basin is approximately 4,800,000 AF, although the current amount of groundwater in storage is unknown (DWR 2004).

Basin Adjudication and Prioritization

The FVGB is not subject to a court adjudication, although the AVGB, whose boundary is located west, south, and east of the project site, is subject to a stipulated judgment approved in December 2015, i.e., the Antelope Valley Groundwater Adjudication (AVEK 2016) (see Figure 3). Water supplies in the AVGB have been stressed by agricultural practices and population growth combined with limited sources of surface water. Due to existing overdraft conditions, groundwater rights within the AVGB have been restricted, and will continue to be incrementally curtailed pursuant to the recent water basin adjudication judgment. The FVGB is not within the boundaries of the adjudication; however, one method MPUD may use to provide the project proponent with water is by purchasing it from AVEK. Although most of AVEK's supply is from surface water delivered by the California Aqueduct, it does operate groundwater wells, and it is possible that some water may come from AVEK's banked groundwater supplies within the AVGB.

In contrast to the AVGB, the FVGB is not in or projected to be in a state of overdraft (DWR 2017). Based on low population density, negative growth projections, low numbers of private and public supply wells, and the lack of irrigated agriculture within the FVGB, it is designated as a low-priority basin by DWR (DWR 2014). As a low-priority basin, the FVGB is not required to develop a groundwater sustainability plan in accordance with the Sustainable Groundwater Management Act, and there is currently no existing groundwater management plan (e.g., SB 1938 or Assembly Bill 359) applicable to the basin. Groundwater pumping within the FVGB peaked in the 1950s with the cultivation of agricultural crops such as alfalfa, pasture, and field crops, then declined as greater pumping lifts and increasing energy costs made the use of groundwater in the area less economical for agricultural uses (USGS 2003). The delivery of SWP water to the region starting in 1972 also decreased farmers' reliance on groundwater for irrigation (USGS 2003). Agriculture within the FVGB largely ceased by the late 1970s (USGS 2003). Groundwater within the FVGB is currently extracted to support domestic, industrial, renewable energy, and limited municipal demands.

Groundwater Quality

Groundwater in parts of the basin has high concentrations of fluoride and sodium. Groundwater near Koehn Lake has sodium and chloride concentrations of 10,000 and 14,000 milligrams per liter (mg/L) respectively (DWR 1964). Total dissolved solids content ranges from 400 to 700 mg/L in the southeastern part of the basin, 800 to 1,000 mg/L in the southwest part of the basin, and 350 to 1,100 mg/L in the northern part of the basin (DWR 1964).

On-Site Groundwater Resources

Data available from U.S. Geological Survey publications, the DWR Sustainable Groundwater Management Act viewer, and the U.S. Geological Survey National Water Information System were reviewed to characterize historic and current groundwater levels in the vicinity of the project site (USGS 2018). In addition, the DWR database of well completion reports was reviewed to summarize existing well depths and yields on and within a 2-mile radius of the project site.

Figure 4, Groundwater Level Monitoring Wells, shows the location and the State Well Identification Number (SWID) of the active and inactive groundwater level monitoring sites within and surrounding the project site, as well as township and range sections that contain well completion reports on file with DWR. There are three monitoring wells located on the site itself, and six monitoring wells located to the north and west of the project site. In addition, several township and range sections within 2 miles of the project boundary show that domestic, municipal, and agricultural wells have historically been drilled within, as well as to the north and west of, the project site (Figure 4).

The monitoring wells were reviewed for the quality and completeness of their water level records. Four wells were found to have a complete and recent record of groundwater levels, and these wells are called out in Figure 4 by exhibit. Two of the wells are on the project site, and two are to the north and west of the project site. The other groundwater level monitoring sites near the project site have periods of record that are too old, are too brief, or contain insufficient data points to establish a trend. Groundwater level trends are described for each monitoring well below:

- **SWID 10N12W22J001S**: The groundwater level record for SWID 10N12W22J001S, which is located within the southern part of the project site, indicates that the groundwater table is currently about 50 feet below the ground surface (bgs), or about 2,480 feet above mean sea level (amsl). The depth to water in this well has declined from a high of 37 feet bgs in 1967 to a low of 49 feet bgs in 2015 (USGS 2018). The average annual rate of decline for the period of record is 0.25 feet per year. Since 2015, the water level has stabilized and rebounded slightly. This groundwater level record is shown in Exhibit 1.
- **SWID 10N12W13H001S**: The groundwater level record for SWID 10N12W13H001S, which is located within the north-central part of the project site, indicates that the groundwater table is currently slightly under 66 feet bgs, or about 2,439 amsl. The depth to water in this well has declined from a high of 57 feet bgs in 1967 to a low of more than 66 feet bgs in 2014 (USGS 2018). The average annual rate of decline for the period of

record is 0.22 feet per year. Since 2014, the water level has stabilized and is currently slightly above 66 feet bgs. This groundwater level record is shown in Exhibit 2.

- **SWID 10N12W12K001S**: The groundwater level record for SWID 10N12W12K001S, which is located about 0.5 miles north of the project site, indicates that the groundwater table in 2012 was slightly under 89 feet bgs, or about 2,431 amsl. The depth to water in this well has declined from a high of 82 feet bgs in 1978 to a low of under 89 feet bgs in 2014 (USGS 2018). The average annual rate of decline for the period of record is 0.21 feet per year. This groundwater level record is shown in Exhibit 3.
- **SWID 10N12W20C006S**: The groundwater level record for SWID 10N12W20C006S, which is located about 2 miles west of the project site, indicates that the groundwater table is currently about 123 feet bgs, or about 2,532 amsl. The depth to water in this well has declined from a high of 109 feet bgs in 1973 to a low of about 123 feet bgs in 2018 (USGS 2018). Two water level readings, one in 2013 and one in 2016, were assumed to be recording a pumping water level rather than a static water level and thus were excluded from the trend analysis. This groundwater level record is shown in Exhibit 4. The average annual rate of decline for the period of record is 0.31 feet per year.

Based on the absolute elevation (in feet amsl) of groundwater levels of these four monitoring wells, the groundwater gradient is in the northerly and/or northeasterly direction. In addition, the historic rate of groundwater decline appears to increase toward the west, which is consistent with a higher concentration of domestic well users west of the project site. Although the long-term trend is generally a decline, the two monitoring wells on the project site show a flattening or slight recovery of groundwater levels in the past 5 years, which spans the latest drought period. Furthermore, the magnitude of the decline (i.e., between 0.21 and 0.31 feet per year) is not substantial, when considering that the wetted depths of wells in the area generally exceed 150 feet, based on the compilation of well completion reports described below.

The number and type of wells occurring in and within 2 miles of the project site were compiled based on data from DWR well completion reports. Table 1 is a summary table showing that the vast majority of wells in the vicinity of the project site are domestic wells, although it is unknown which are actively being used, which are periodically used, and which are inactive. A total of 186 well completion reports were located within 2 miles of the project boundary, most of which are to the north and west of the project site, as shown on Figure 4. Collectively, the average well depth in the area is 237 feet, and the average well yield is 29 gpm. The average depth and yield of wells is higher when isolating public and irrigation wells. This reflects the tendency to construct wells for their intended purpose. Given the age and the domestic purpose of the surrounding wells, Table 1 is considered to reflect a low estimate of the yield that can be achieved within the local aquifer (i.e., the Gloster Subunit of FVGB). Careful siting and drilling techniques by knowledgeable and local drilling contractors is likely to achieve a yield, if necessary, that is on the high end of the ranges in Table 1 (i.e., 300 gpm). However, for the purpose of estimating the amount of water that one drilled well can produce on the project site, this WSA conservatively assumes it can produce no more than the total average yield of all 186 wells in the local vicinity, or 29 gpm. Such a well could produce up to 46 AFY.

Table 1
Well Completion Report Database Statistics for Water Supply Wells within 2 Miles of the Project Site

Well Type[a]	Number	Completion Depth (Feet)			Well Yield (gpm)			
		Minimum	*Maximum*	*Average*	*Sample Size[b]*	*Minimum*	*Maximum*	*Average*
Domestic	172	105	500	236	154	1	300	29
Irrigation/Agricultural	5	200	426	266	2	40	40	40
Public	2	300	420	360	2	4	80	42
Unknown	7	160	300	210	6	10	40	26
Total	**186**	**105**	**500**	**237**	**164**	**1**	**300**	**29**

gpm = gallons per minute.
[a] Records for test wells, cathodic wells, and destruction/abandonments were excluded for the purpose of summary statistics.
[b] While completion depth data is complete, data for well yield were not available for all wells included in database, so the sample size is given in this column.

Because the groundwater level on the project site appears to be stabilizing or recovering, historical groundwater declines in the immediate vicinity are not substantial, and well yields in the vicinity are adequate, there do not appear to be any limitations to developing on-site groundwater resources for the O&M demands of the project. Because the project site is outside the adjudicated AVGB, it is not subject to court-ordered pumping limitations.

Exhibit 1. Water Level Record for SWID 10N12W22J001S

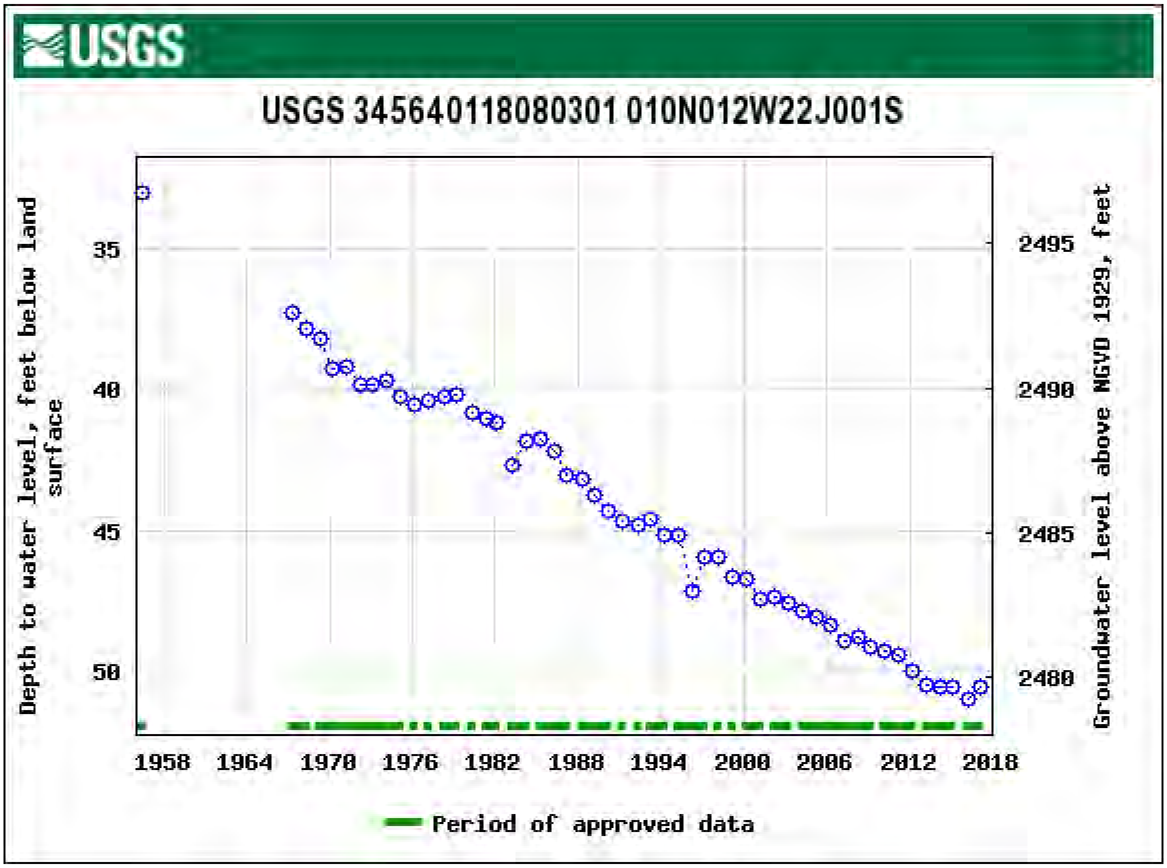


Exhibit 2. Water Level Record for SWID 10N12W13H001S

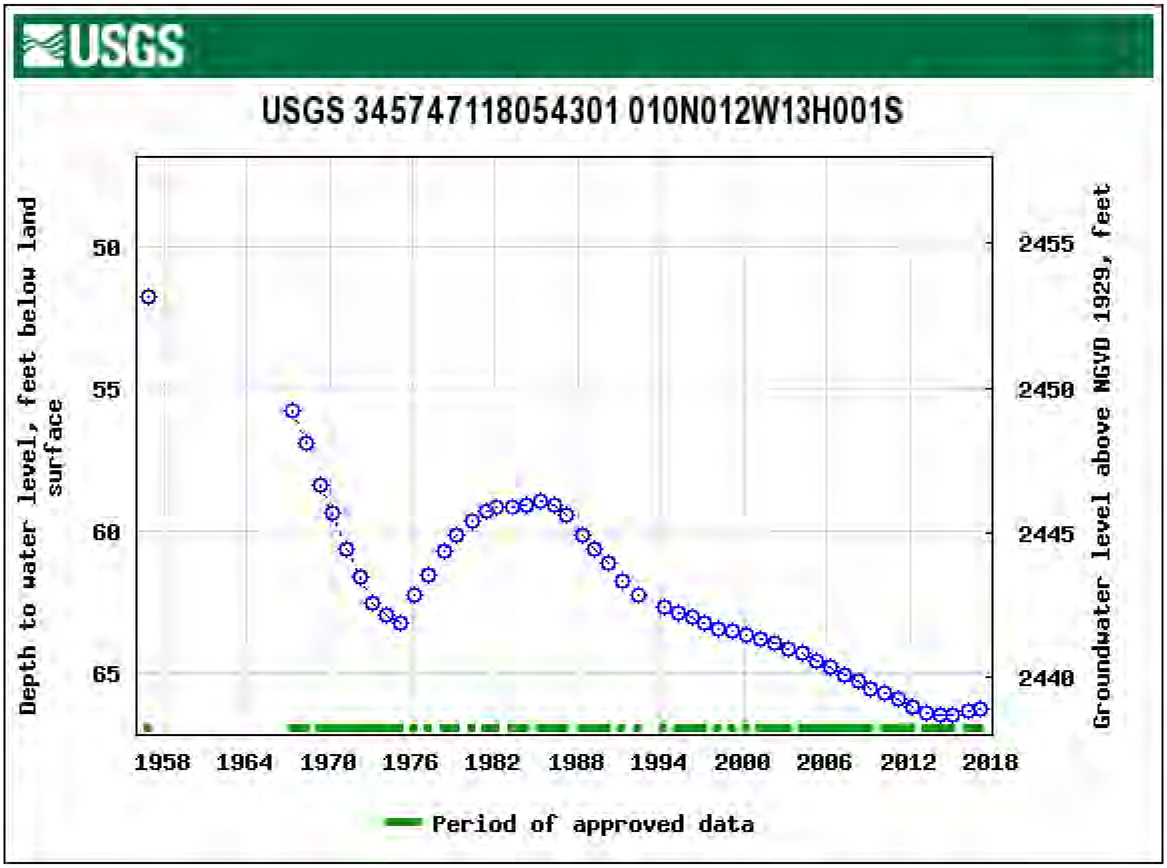


Exhibit 3. Water Level Record for SWID 10N12W12K001S

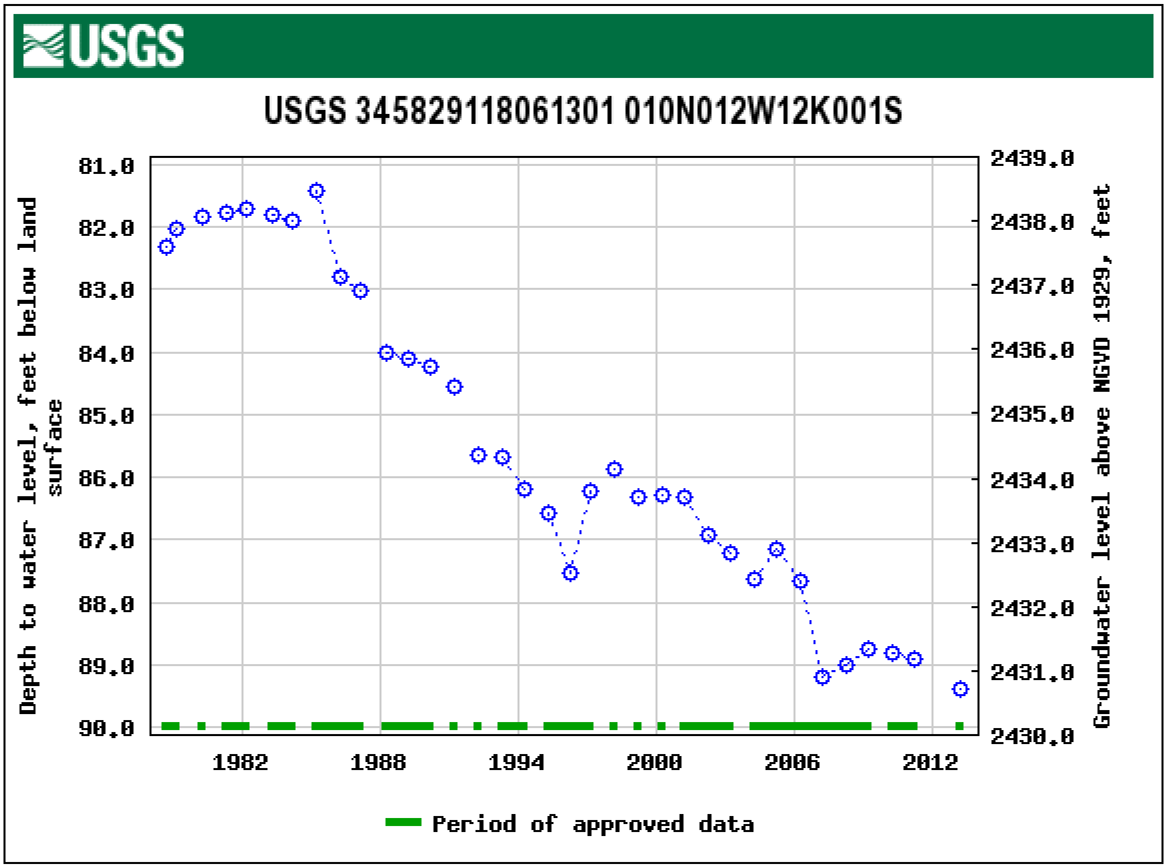
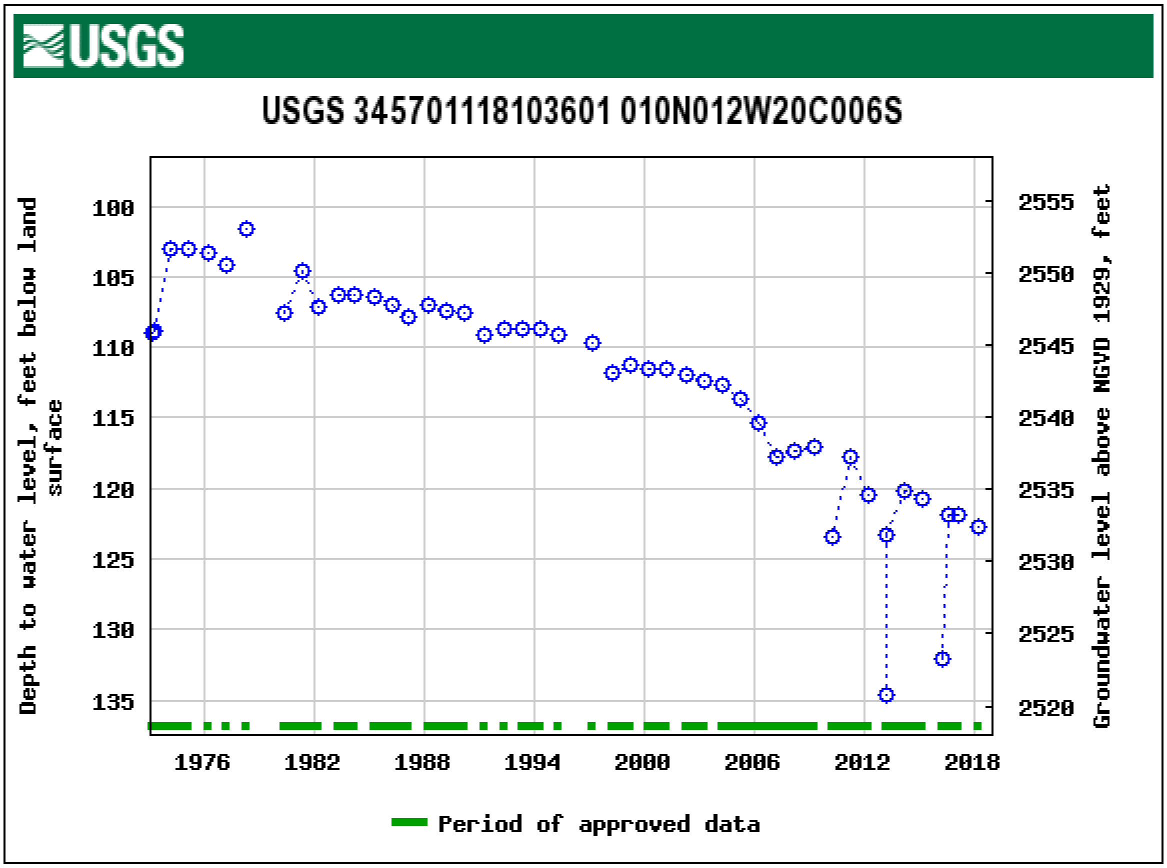


Exhibit 4. Water Level Record for SWID 10N12W20C006S



3.1.3 Imported Water

Regionally imported water comes from the SWP, which derives its water from reservoirs in Northern California and the Sacramento–San Joaquin River Delta. The project site has no direct connection to imported water. MPUD has a connection to AVEK, which delivers SWP water to local retail agencies. MPUD is able to serve its customers from the FVGB, with backup and emergency supply available from AVEK, as indicated in Section 3.3.3.

3.1.4 Recycled Water

Recycled water is not currently a viable source of supply for the proposed project. Recycled water and stormwater are secondary sources of water supply, and this is only applicable to areas well south of the proposed project, near Lancaster and Palmdale (RWMG 2013). A portion of the recycled water from the Antelope Valley Region's two large water reclamation plants, consisting of Los Angeles County Sanitation Districts' plants in Palmdale and Lancaster, are used for maintenance of Piute Ponds wetlands, agricultural irrigation, landscape irrigation, and a recreational lake at Apollo Park. The expansion of recycled water use continues in the region but is concentrated in the southern portion of the Antelope Valley (RWMG 2013).

3.2 Water Resources Plans and Programs

The project area is located within AVEK's service area, which is a wholesale water supplier to utilities and local government agencies, including MPUD and California City. Therefore, the project area is addressed in the UWMP of the wholesaler. MPUD is included in the 2015 AVEK UWMP, and was given an expected future allocation from AVEK of 90 AFY through 2035 (AVEK 2016). Because MPUD receives up to 90 AFY from AVEK, this WSA notes that this 90 AFY may be subject to reduction due to SWP curtailments during dry and multiple dry year scenarios.

In addition, MPUD recently joined the Fremont Valley Integrated Regional Water Management Group, which is currently in the process of preparing an IRWMP.

3.3 Water Supply Availability

3.3.1 Water Demand Projections

It is anticipated that a total of 400 AF of water will be used during the 2-year construction period for the proposed project. During O&M of the project, up to 30 AFY of water will be required for panel washing and dust mitigation. Accordingly, over 20 years the project is expected to require 940 AF of water.

3.3.2 Wholesale Water Supply Projections

AVEK is the primary water wholesaler in the region, serving an area of nearly 2,400 square miles in northern Los Angeles and eastern Kern Counties as well as a small portion of Ventura County. AVEK uses groundwater banking programs to store excess water available from the SWP during wet periods and then recovers it for delivery to customers when AVEK's SWP allotment is curtailed by droughts or disruptions (AVEK 2016). However, as a wholesale water sales agency, AVEK is not able to directly provide water to the project, or any individual water customers (AVEK, pers. comm. 2017).

Each year, DWR calculates the total amount of water available for delivery in the system, accounting for the hydrologic cycle, regulatory restrictions on Bay-Delta exports, and in-stream environmental water needs, and apportions the remaining available water proportionally to each of the SWP contractors according to their maximum allotment, also referred to as "Table A" water. AVEK's maximum allotment is 144,844 AF, although SWP contractors on average, over all water year types, receive about 62% of their Table A water (DWR 2017). The long-term average Table A allocation for AVEK specifically is 59%, or 85,460 AFY (AVEK 2016). SWP contractors, including AVEK, use other types of SWP water such as Article 21 water, turnback pool water, and carry-over water to increase or decrease the amount of water available under SWP Table A (DWR 2017). AVEK uses groundwater banking programs to store excess water available from the SWP during wet periods and recovers it for delivery to customers when AVEK's SWP allotment is curtailed by droughts or disruptions (AVEK 2016). AVEK's current estimated groundwater banking recovery capacity is 36,000 AFY (AVEK 2016). The combination of AVEK's large SWP water allotment, its use of groundwater banking programs, and the use of inter-agency exchange agreements provides AVEK with a high degree of flexibility in meeting the region's water demands across all water-year types.

In its 2015 UWMP, AVEK used the assumption of 5% SWP Table A water allotment for the characterization of a single dry year as the worst case scenario and a three-year dry period SWP allocations of 12%, 14% and 24% in its assessment of water supply reliability. The historic dry year of 2014 was used as the basis of the single dry year. In addition to SWP deliveries, AVEK's groundwater supplies are governed by the groundwater adjudication for the Antelope Valley Basin and by the amount of groundwater stored in its groundwater bank accounts. AVEK's overlying groundwater production right from the AVGB will be 3,550 AFY, and it has the ability to recover up to an estimated 36,000 AFY from banked groundwater. AVEK produced 17,066 AF of groundwater in 2015, but this number will be substantially decreased over the next 7 years to 3,550 AFY, in accordance with the terms of the groundwater adjudication for the AVGB (AVEK 2016).

In its analysis of water demand and availability, AVEK determined that sufficient supplies would be available to meet demands through 2035 under normal water year conditions (AVEK 2016). For the average year condition, AVEK is projected to have a surplus of between 2,750 and 5,330 AFY (AVEK 2016). For the single dry year scenario, AVEK's UWMP indicates a water deficit of between 36,930 AF and 39,510 AF, depending on the year (calculated in 5-year increments) (AVEK 2016). For the multiple dry year scenario, AVEK's UWMP indicates a water deficit of between 9,330 AF and 29,310, depending on the year (calculated for three consecutive years in 5-year increments) (AVEK 2016). The water supply scenarios are based on current usage patterns by the retail water purveyors and agricultural users only. They do not take in to account other potential water sources available to the purveyors (such as groundwater pumping, recovery from groundwater banking programs, or the use of recycled water) or reductions in demand due to water conservation efforts. It also does not include the effects of planned future water projects, which for the region, include a number of new and expanded water banks, groundwater recharge and recovery facilities, and interties to increase regional water system flexibility (e.g., Westside Water Bank Expansion, Enterprise Bank, Southern Antelope Valley Intertie, and North Feeder Pump

Station) (AVEK 2016; RWMG 2013). Collectively, these facilities are expected to add up to 123,300 AF of available dry-year groundwater recovery available to AVEK, based on an assumption that one-third banking capacity would be available (AVEK 2016). It is expected that the retail water agencies that AVEK serves will address this shortage through increases in groundwater pumping (recovery of banked supplies or return flows) and/or reductions in demand.

3.3.3 Retail Water Supply and Demand Projections

3.3.3.1 MPUD

MPUD has an approximately 20-square-mile service area covering the town of Mojave and surrounding areas (Figure 3). Its service area consists of approximately 1,320 connections to primarily residential customers (MPUD, pers. comm. 2018). MPUD's potable water system consists of seven active supply wells, treatment systems to address pathogens and bacteria (chlorination) and arsenic (through blending), and a distribution network to reach customers (SWRCB 2018). MPUD also has a connection to AVEK through a turnout located at the intersection of Highway 14 and Camelot Boulevard (Figure 5, Mojave Public Utilities District Water Sources). MPUD's connection to AVEK is not always required to service MPUD's customers, but is available as an additional source of backup or emergency supply. The *County of Kern 2015-2023 Housing Element Update* indicates that in combination, local groundwater wells and contract supply through AVEK provide up to 1,600 AF of water available to MPUD (Kern County 2016, pg. 7-24). In addition, it reports that the 10-year growth rate for all unincorporated areas of the County is 15.5%, or a 0.015% annual growth rate.

MPUD has means of providing renewable energy projects with groundwater for construction purposes. MPUD's Well 30 is currently capable of providing up to 350 gpm of non-potable water and is the closest source of non-potable public groundwater to the proposed project site (MPUD, pers. comm. 2017). It is located approximately 4.5 miles north of the site's northern border along Lone Butte Road. Due to high nitrate levels, Well 30 is not suitable for potable use and is available for non-potable purposes only (MPUD, pers. comm. 2017). Well 30 was drilled in 1968, is 381 feet deep, and was pump tested at 500 gpm with a 15-foot drawdown response (corresponding to a transmissivity of 67,000) (Ishibashi 1990). Based on communication with MPUD on June 4, 2018, a $200,000 grant has been obtained to convert Well 30 into a potable well by 2020 (MPUD, pers. comm. 2018). Well 30 is expected to become a part of MPUD's potable water supply system at that time. In addition, MPUD has a hydrant located along United Street at the southern end of its service area, approximately 1.25 miles northwest of the site adjacent to PPG Industries, and it has made this hydrant available for water truck filling for the proposed project (Figure 5). The water from this hydrant includes treated groundwater from within MPUD’s service area, supplemented by treated water purchased from AVEK.

Table 2 shows past and projected water supply and demand for MPUD’s service area through 2040. Based on communication with MPUD, overall demand has not been established in any official plan for wells within their system over the next 20 years. However, MPUD as well as the California Statewide Groundwater Elevation Monitoring basin prioritization conducted by DWR for the FVGB both indicate that the growth rate for MPUD’s service area is expected to be 0% or less (MPUD, pers. comm. 2018; DWR 2014). However, for the purpose of projecting future water demand, the County’s unincorporated annual growth rate of 0.155% was applied to the average water demand for the past 5 years to project future water demands. This is a conservative approach because MPUD’s service area is not expected to experience growth, and because water demands are not expected to increase linearly with population. In fact, the water demand reduction of 25% that was mandated by the Governor’s Executive Order are expected to be permanent, and the general trend of rising water rates in the state, particularly for small rural water districts, has also resulted in curtailment of customers’ average water use. Therefore, its capacity of 508 AFY (564 AFY and assuming 10% downtime due to maintenance) was added to the existing potable water capacity of 1,600 AFY starting in 2020.

Table 2
Mojave Public Utilities District Past and Projected Water Supply and Demand for Service Area (Acre-Feet)

Sources	2012	2013	2014	2015	2016	2017	2018	2020	2025	2030	2035	2040[a]
Service Area Water Supply												
Treated/Potable Groundwater Capacity[b]	1,510	1,510	1,510	1,510	1,510	1,510	1,510	2,018[c]	2,018[c]	2,018[c]	2,018[c]	2,018[c]
AVEK Import[b]	90	90	90	90	90	90	90	90	90	90	90	90
Total Supply[b]	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**1,600**	**2,108**	**2,108**	**2,108**	**2,108**	**2,108**
Service Area Water Demand												
Treated/Potable Groundwater Produced	1,253	1,336	1,307	983	976	1,054	*Future demand for treated/potable water is reported as a total only. All or a majority of service area demands will come from MPUD's groundwater wells, though MPUD has the option to utilize AVEK imports as needed for operational flexibility (e.g., well maintenance/downtime, peak summer demands, etc).*					
AVEK Imports	0	0	0	63	50	2						
Total Demand[e]	**1,253**	**1,336**	**1,307**	**1,046**	**1,026**	**1,055**	**1,172[d]**	**1,208[d]**	**1,305[d]**	**1,409[d]**	**1,522[d]**	**1,644[d]**
Surplus	**347**	**264**	**293**	**554**	**574**	**545**	**428**	**900**	**803**	**699**	**586**	**464**

Source: MPUD, pers. comm. 2018; AVEK, pers. comm. 2018; AVEK 2016; Kern County 2016.

Notes:

[a] The current Urban Water Management Plan for AVEK (AVEK 2016) projects water supply and demand through 2035. It is reasonable to assume that AVEK can and will continue to provide 90 AFY to MPUD through 2040.

[b] The Kern County Housing Element Update (Kern County 2016, pg. 7-24) indicates that in combination, local groundwater wells and contract supply through AVEK provide up to 1,600 acre-feet of water available to MPUD. Available supply from AVEK is assumed to be 90 AFY AFY based on AVEK's 2015 Urban Water Management Plan (AVEK 2016). However, MPUD has the option to utilize AVEK imports on an as needed basis (i.e., not limited to 90 AFY) for operational flexibility (e.g., well maintenance/downtime, peak summer demands, etc.). Also note that groundwater is only produced in the amount necessary to serve demand.

[c] Based on communication with MPUD (2018), a $200,000 grant has been obtained to convert non-potable Well 30 into a potable well by 2020. Therefore, its capacity (508 AFY) is added to existing capacity. The capacity is based on the current verified sustainable pumping rate of 350 gpm, minus and assumed down time of 10% for periodic maintenance.

[d] Future service area demand is based on applying a 1.55% annual growth rate for unincorporated areas of the County, as reported the Kern County Housing Element Update (Kern County 2016, pg. 2–3).

Based on the comparison of available supplies and demand, MPUD is expected to have an available potable water surplus of between 428 and 900 AFY between now and 2040. Table 2 provides an accounting of water demand and supply for permanent connections within MPUD's service area, and for potable water only. MPUD also has the ability to provide non-potable water from Well 30 until it is converted to a potable water well, and to request additional water imports (beyond those listed in Table 2) from AVEK, as available. MPUD has used a hydrant located along United Street at the southern end of its service area, as well as a non-potable supply well (Well 30), to provide for the construction-related demands of renewable energy projects in the region, such as wind energy projects in the area being constructed by Blattner, the Engineering, Procurement, and Construction Contractor for the project. MPUD is currently supplying up to approximately 200,000 gallons per day of water for construction of wind energy projects in the area being constructed by Blattner.

MPUD has provided two will-serve letters for the proposed project, one for 200 AFY for construction (Appendix A) and another for up to 30 AFY for O&M (Appendix B). AVEK has committed to providing MPUD with up to 200 AF of water per year for 2 years for construction of the project (Blattner, pers. comm. 2018). This means that, should the applicant utilize this source, AVEK water will be "wheeled" through MPUD's system to serve the construction demands of the Project. AVEK's 2015 UWMP has planned for the supply of up to 90 AFY to MPUD through 2035 (AVEK 2016), and it is reasonable to assume that the same 90 AFY provided each year can and will continue to be provided through 2040. AVEK's projections for MPUD's future water purchases are based on a 25% reduction in the projected demands[2] for 2015 from the AVEK's 2010 UWMP and projected growth rates from the IRWMP. This amount (90 AFY) is an estimate for the purpose of AVEK's 2015 UWMP; it represents neither a minimum commitment nor a maximum ceiling on the amount of water that MPUD can obtain from AVEK. AVEK has specifically committed to providing up to 200 AFY for the next 2 years to MPUD to support construction for the proposed project, stating that it has sufficient water supplies available and/or banked to meet the construction demand (AVEK, pers. comm. 2018).

It is anticipated that MPUD will be the main water supplier for construction of the project, and if on-site groundwater is not developed, it will also supply the O&M demand of the project (Appendices A and B). In the event of a dry or multiple dry year during construction, the proposed project may instead obtain water from MPUD Well 30 (until converted to potable supply well in 2020), or California City. MPUD uses treated groundwater from wells to supply its service area, with the option to supplement its supplies with purchase of water from AVEK,

[2] The reduction in projected demands for 2015 is due to the Governor's Executive Order mandating a 25% reduction in potable water demands from 2013 demands. It is anticipated that many of the water conservation measures enacted within the service area will result in permanent reductions in demand for potable water within AVEK's service area.

which provides a combination of treated surface water from the California Aqueduct and groundwater from sources such as AVEK's Westside Water Bank (AVEK 2016).

AVEK treats the imported water from the SWP with chemical addition at the Rosamond Treatment Plant for the area around Rosamond, including MPUD.

3.3.3.2 California City

The project could also receive construction water, if needed, from California City. California City has historically used mostly groundwater to meet its water demands. Groundwater supplies are not immediately impacted by droughts, and, as a result, there is no history of any water supply deficiencies for the water system. Even during the 1976–1977 droughts, records indicate a sufficient supply of water (California City 2017). California City currently uses six groundwater wells located within the California City subunit of the FVGB, as well as surface water purchased from AVEK, for its water supply. Groundwater currently makes up approximately 75% of California City's water supply. Based on the 2015 UWMP, system groundwater wells have the capability to produce 5,100 gpm and a total of 8,228 AF (2,680.56 million gallons) on an annual basis. By 2020, the total amount of groundwater will be increased to 5,950 gpm, giving an annual maximum well production capacity of 9,598 AFY. In addition, California City has an annual water right of 32,000 AF (California City 2017).

The source of AVEK water is the SWP, with the water delivered through the California Aqueduct. The AVEK water is thus subject to variability in supply and in reliability. The supply variability for surface water is a function of hydrologic conditions in northern California. The reliability is a function of environmental conditions in the Sacramento–San Joaquin River Delta. The Delta is extremely vulnerable to earthquakes, rising sea levels and droughts. If there is a water shortage, all AVEK customers will receive a smaller allocation of water. California City currently utilizes less than one-tenth of its existing water right of 32,000 AFY (California City 2017). At the current maximum pumping capacity of 2680.56 MG, they could utilize only 25.7% of the owned water right. When this occurs, California City will utilize more groundwater.

Based on the water demand projections, in 2040 the total demand for California City is projected to be 6,755 AF and the City will have 59.2% excess pumping capacity (California City 2017). Based on this data, the city has surplus groundwater pumping capacity and water rights through 2040. The 2015 UWMP concludes that the City has surplus water available to it through 2040 in normal year, single dry year, and multiple dry year scenarios. While the UWMP does not include demand from the proposed project, the City has available sufficient surplus water supply. Normal year, single dry water year, and multiple dry year supply is shown in Table 3. The supply total (8,750 AF) is based on 80% (7,679 AF) of California City's maximum well production capacity (9,597 AF) plus the AVEK supply (1,071 AF).

Table 3
Water Budget Comparison for a Normal Water Year, Single Dry Water Year, and Multiple Dry Water Year – California City

Groundwater Storage	2020	2025	2030	2035	2040
	Acre-Feet				
Recharge + Return Flows	7,679	7,679	7,679	7,679	7,679
Subsurface Flow Loss	0	0	0	0	0
Recycle/Reuse[a]	0	0	0	0	0
Surface Storage Deliveries[b]	1,071	1,071	1,071	1,071	1,071
Total Supply	**8,750**	**8,750**	**8,750**	**8,750**	**8,750**
Demands[c]					
Urban Demand	3,661	3,815	3,975	4,134	4,628
Losses	1,682	1,756	1,826	1,900	2,127
Total Demand	**5,343**	**5,571**	**5,801**	**6,034**	**6,755**
Surplus	**3,407**	**3,719**	**2,949**	**2,716**	**1,995**

Source: CCWD 2017.
Notes:
a Recycled water demands for 2010–2040 reflect existing 2013 municipal and industrial demands.
b Surface water supplied from AVEK
c Demand includes groundwater extractions.

For the single dry year and multiple dry year water budget projections, only surface water supplies would be immediately affected by drought conditions. Because the volume of supply is based on 80% of the maximum pumping capacity and on surface water deliveries by AVEK (1,071 AF per year), any shortfall would be made up by the remaining 20% of pumping capacity. Therefore, water volume available for California City would not change.

3.3.4 Groundwater Resource Availability

Based on low population density, negative growth projections, low numbers of private and public supply wells, and the lack of irrigated agriculture within the FVGB, it is designated as a low-priority basin by DWR (DWR 2014). DWR has not identified the FVGB as being in, or projected to be in, an overdraft condition, nor is it subject to a court adjudication (DWR 2017). In general, groundwater resources available to overlying pumpers is limited only by the production capacity of their wells and by the amount needed to support beneficial uses. Pursuant to California Water Code, Section 10910(f), this subsection evaluates the potential sources of groundwater identified, including on-site groundwater.

The following is California City's basin-wide analysis of overall groundwater resource availability, indicating the FVGB's ability to support current and future cumulative demands (California City 2017):

> Currently California City, Mojave, and Cantil are the only major entities drawing significant quantities of water from the basin and California City is by far the largest. In 2016 California City pumped 1,179.89 MG (3620 acre-feet), Mojave pumped 152.20 MG (467 acre-feet), and Cantil pumped 2.43 MG (7.46 acre-feet). Basin Total 1,334.5 MG (4095 acre-feet) being extracted from the basin annually. The basin (Number 6-64) is approximately 523 square miles (334,720 acres) per the DWR Bulletin 118. Based on basin area (4,095 acre-feet/334,720 acres) X (12in/1ft) = 0.1468 inches (2.5%) of the 5.93 inches of the average rain fall each year would need to make it into the basin aquifer to maintain recharge. The Western Regional Climate Center; Mojave, CA Station 045756 indicates an annual total average rainfall of 5.93 inches. This along with the fact that the basin sustained 32,000 acre-feet, over 5 times more extraction, for 10 to 15 years during the 1960s early 1970s when the area was predominantly agricultural substantiate the fact that the current rate of extraction definitely does not exceed the rate of recharge.

Estimates of recharge to the California City subunit of the FVGB have historically ranged greatly, with the most recent estimate by Stetson Engineering of 13,100 AFY (California City 2017). Given this is only one of the FVGB's five subunits, the FVGB as a whole would not have a problem supplying the area's current and future demands. Given the project site is located within the Gloster Subunit, which is a similar size as the California City Subunit, though somewhat smaller, the project's water demand of 400 AFY over 2 years for construction and 30 AFY thereafter for O&M would be well within the amount expected to be recharged on an annual basis over the long term.

3.3.5 Water Supply and Demand Comparison

MPUD has two options to supply the proposed project with water for both its construction demand (400 AF) and operational demand (30 AFY). It can either purchase water, as available, from AVEK and sell it to the project proponent through a hydrant, or make non-potable MPUD Well 30 available for use during the construction phase. MPUD has indicated it is willing and able to sell water to the proposed project from MPUD Well 30 during construction (MPUD 2017). Based on personal communication with MPUD, Well 30 is expected to be converted to a potable supply well in 2020 and become part of MPUD's treated water supply at that time. AVEK has committed to supply MPUD with up to 200 AFY of water in the next 2 years during project construction and 30 AFY during O&M. For single dry years, and for multiple dry years, it is assumed that MPUD would not be able to purchase water from AVEK, based on the shortage identified in AVEK's 2015 UWMP.

California City, as discussed in Section 3.3.3, has a large surplus of available groundwater, and could make that water available for project construction, if needed.

Finally, on-site groundwater resources could be developed as well, and could conservatively provide up to 46 AFY per well. As discussed in Section 3.1.2, the provision of 30 AFY would have a minimal impact on the volume of groundwater in storage. Given that groundwater level trends are reflective of cumulative pumping conditions in the local area, the project's contribution to pumping influence would be minimal. However, given that there are numerous domestic wells beyond the northern and western border of the project site, it is recommended that if the project proponent opts to develop on-site groundwater for its O&M needs, it should locate the well(s) at least 0.5 miles from the northern or western border of the site to avoid any potential for well interference.

Table 4 compares the available supply for construction and operation for average, single dry, and multiple dry water years to the project demand. Even if on-site groundwater is not developed, MPUD would have sufficient water supplies to support the proposed project on its own, without use of the AVEK connection because the FVGB is not currently in overdraft and recharge estimates of 2.5% of average rainfall into the upper aquifer are sufficient to meet groundwater demand. Extraction of groundwater from the FVGB is currently 4,095 AFY, with MPUD extracting 467 AFY. Current and projected extraction is well below the high pumping volume of 32,000 AFY in the 1960s and 1970s, which was sustainable and occurred for 10 to 15 years when the area was predominantly agriculture (California City 2017). In addition, MPUD Well 30 can provide a sustainable yield of non-potable groundwater resources until 2020. Well 30 is currently inactive; however, MPUD plans to convert Well 30 to a potable well in 2020 and it will be incorporated into MPUD's treated supply system at that time.

Table 4
Water Supply and Demand Comparison for Present through 2040

Available Sources	Construction (2019–2020)			Operation and Maintenance (2020–2040)		
	Average Water Year	*Single Dry Year*	*3rd Year of Drought*	*Average Water Year*	*Single Dry Year*	*3rd Year of Drought*
Projected Available Supply (Acre-Feet)						
MPUD Surplus Treated Water Supply	410[a]	410[a]	410[a]	690[b]	690[b]	690[b]
California City Surplus Groundwater	3,407[c]	3,407[c]	3,407[c]	0	0	0
AVEK Agreement[d]	200	0	0	30	0	0

Table 4
Water Supply and Demand Comparison for Present through 2040

Available Sources	Construction (2019–2020)			Operation and Maintenance (2020–2040)		
	Average Water Year	*Single Dry Year*	*3rd Year of Drought*	*Average Water Year*	*Single Dry Year*	*3rd Year of Drought*
MPUD Well 30[e]	254	254	254	0	0	0
On-Site Groundwater	0	0	0	46	46	46
Total	**4,271**	**4,071**	**4,071**	**766**	**736**	**736**
Projected Demand (acre-feet)						
Proposed Project	200	200	200	30	30	30
Sanborn Solar Project[f]	133	133	133	30	30	30
Total	**333**	**333**	**333**	**60**	**60**	**60**
Surplus/Deficit	**+3,938**	**+3,738**	**+3,738**	**+706**	**+676**	**+676**

[a] Based on average surplus from Table 2 for 2018 and 2020. The production rate of groundwater wells is not climate-dependent.
[b] Based on average surplus from Table 2 for 2020 through 2040.
[c] Based on surplus from Table 3. California City has indicated its willingness to supply construction water demands for the project, but will not supply operational demands.
[d] Based on MPUD will-serve letters. AVEK projects a deficit for dry and single dry years, so is assumed not to be an available source.
[e] Since MPUD Well 30 is anticipated to be converted into a potable supply well in 2020, which has been accounted for in Table 2, it is assumed that half of its capacity will be available to the project as a source of non-potable supply for construction.
[f] The Sanborn Solar Project is expected to utilize its on-site groundwater rights for construction and operation, but has been added to this Table in case it needs to rely on the sources identified herein.

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4 CONCLUSIONS

MPUD has provided will-serve letters to provide 200 AFY (400 AF total) of water for construction of the project and for the 30 AFY demand for the O&M phase of the proposed project (Appendices A and B). It is anticipated that MPUD will provide water for the proposed project via imported treated surface water, groundwater and/or banked groundwater from local wholesaler AVEK, treated groundwater from wells located within MPUD's water system, and untreated non-potable groundwater from MPUD's Well 30 (during construction phase only).

AVEK has agreed to provide MPUD with up to 200 AFY during the 2-year construction phase and 90 AFY as future allocation during O&M. AVEK has the third-largest allotment of the 29 SWP contractors, after The Metropolitan Water District of Southern California and the Kern County Water Agency (AVEK 2016), and also has groundwater banking reserves to supplement imported water deliveries. In addition, MPUD's Well 30 can provide up to 350 gpm (564 AFY) of non-potable water until 2020, at which point it is projected to become converted to a potable well and part of MPUD's system. Well 30 is located 4.5 miles north of the proposed project's northern border.

Groundwater supplies in the FVGB are adequate to supply the project over a 20-year period. The FVGB is a low priority basin, is not currently in overdraft and recharge estimates of 2.5% of average rainfall into the upper aquifer are sufficient to meet the overall groundwater demand within the groundwater basin through 2040. Extraction of groundwater from the FVGB is currently 4,095 AFY, with MPUD extracting 467 AFY, which is well below the high pumping volume of 32,000 AF in the 1960s and 1970s that was considered to be sustainable. Therefore, no additional resources will be needed to supply the project.

In addition, California City is an additional source of water available during the construction phase of the proposed project. As described in its adopted 2015 UWMP, California City has surplus water supplies available that could serve the project under all planning scenarios.

Based on this assessment, it is determined that long-term water demands for the proposed project are relatively minor and can be met by available wholesale, retail and/or groundwater sources within the FVGB during normal, single dry, and multiple dry years (Table 4).

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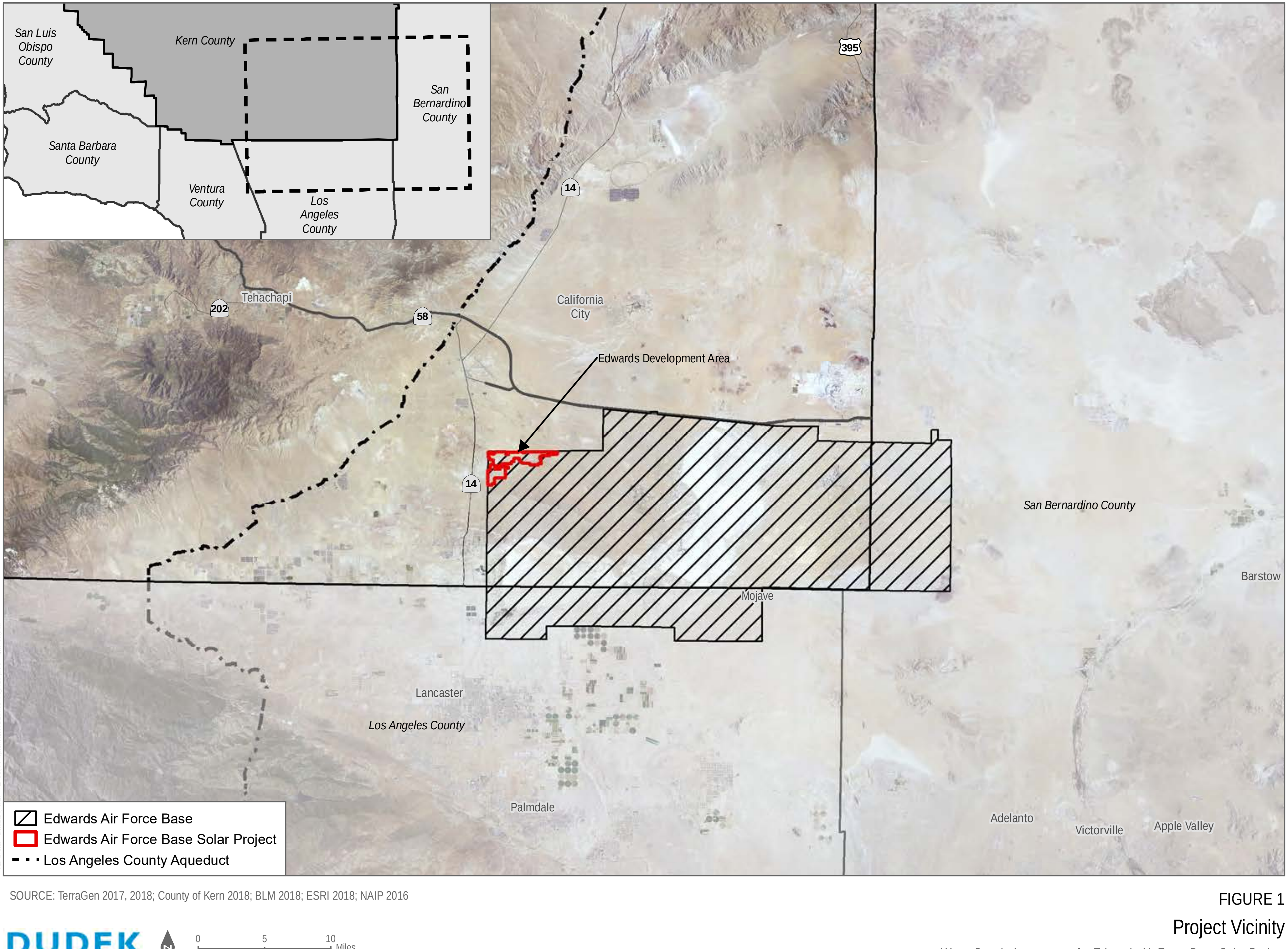

SOURCE: TerraGen 2017, 2018; County of Kern 2018; BLM 2018; ESRI 2018; NAIP 2016

DUDEK

FIGURE 1

Project Vicinity

Water Supply Assessment for Edwards Air Force Base Solar Project

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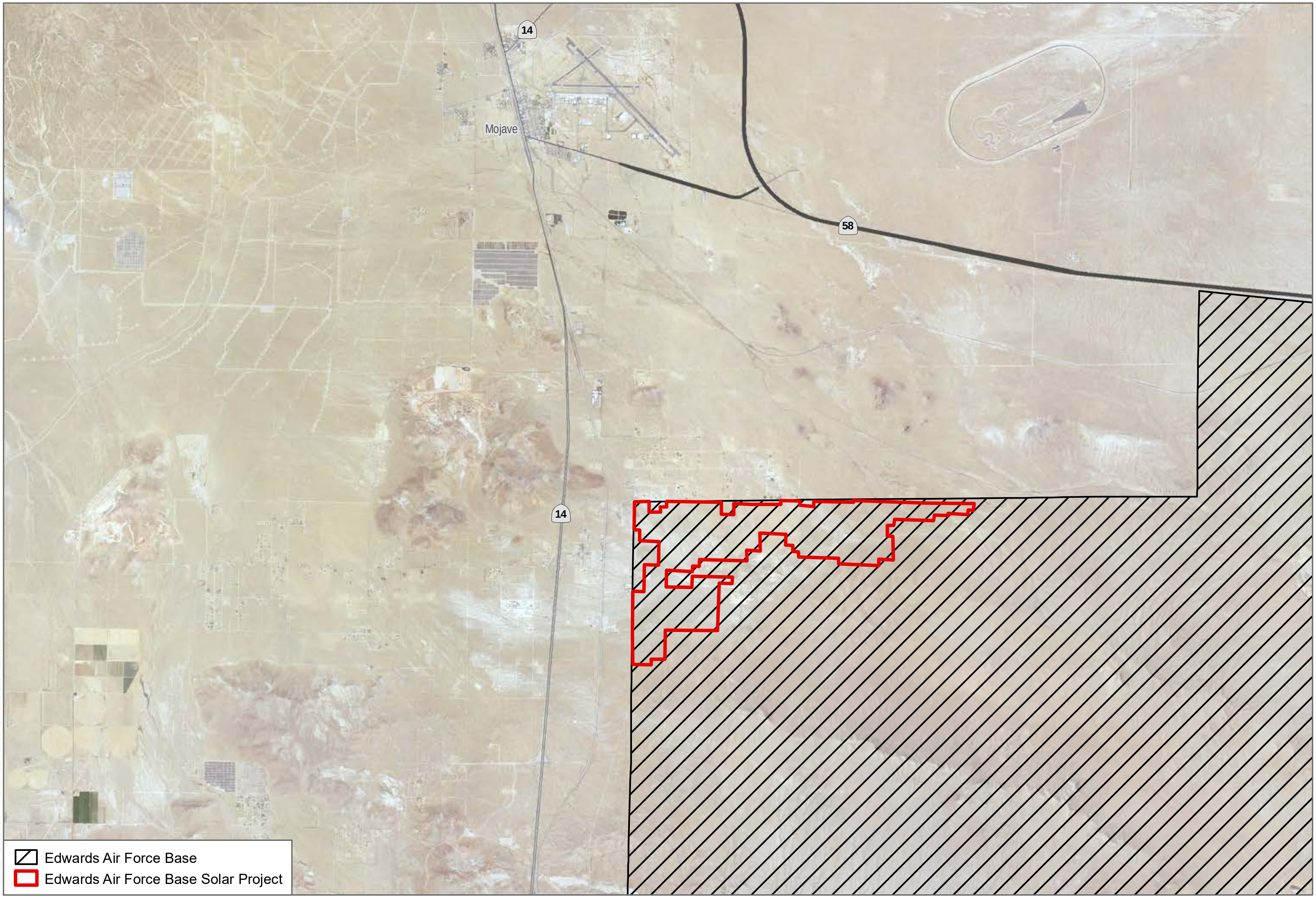

SOURCE: TerraGen 2017, 2018; County of Kern 2018; BLM 2018; ESRI 2018; NAIP 2016

DUDEK

0 2.5 5 Miles

FIGURE 2

Project Area

Water Supply Assessment for Edwards Air Force Base Solar Project

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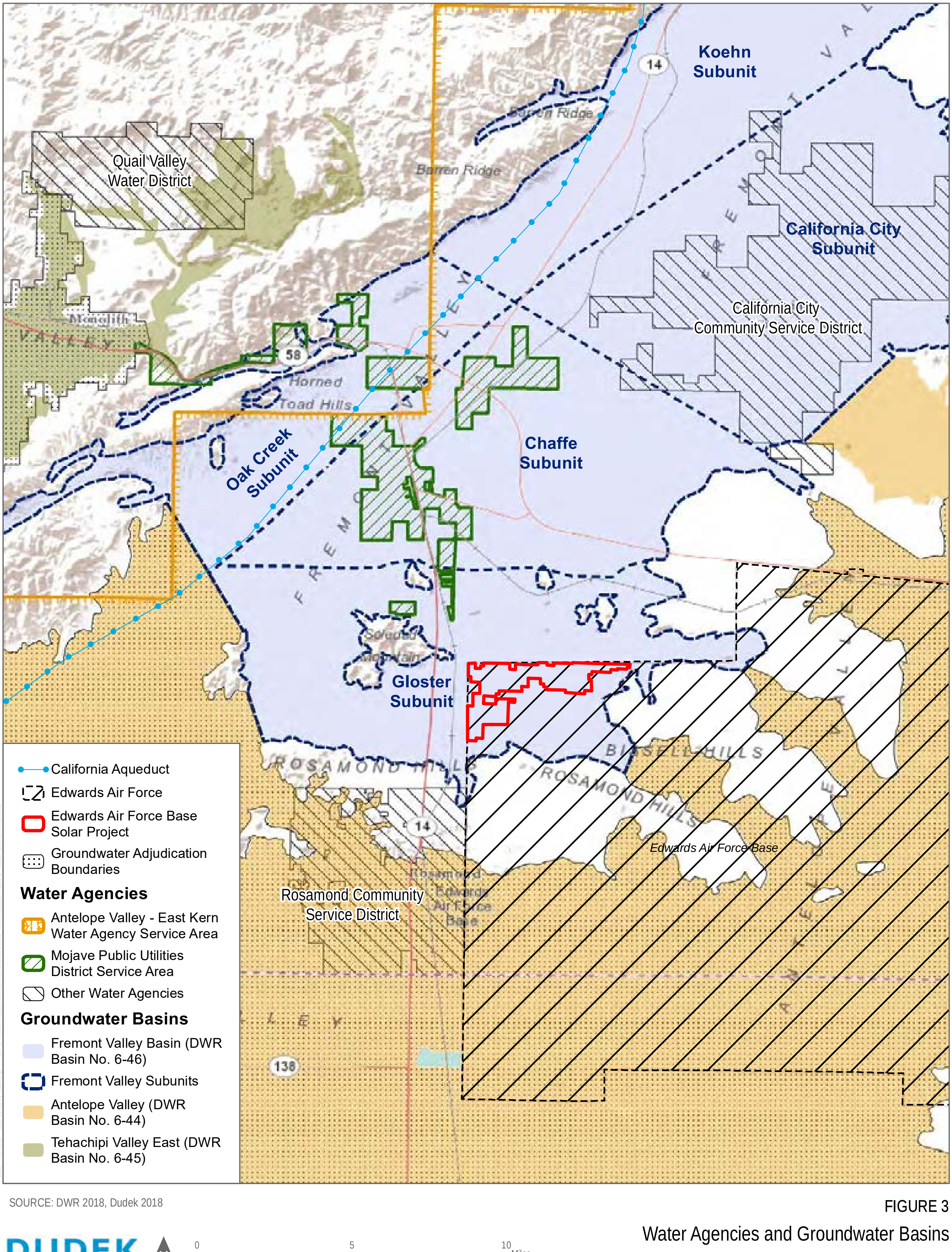

SOURCE: DWR 2018, Dudek 2018

DUDEK

FIGURE 3

Water Agencies and Groundwater Basins

Water Supply Asssessment for Edwards Air Force Base Solar Project

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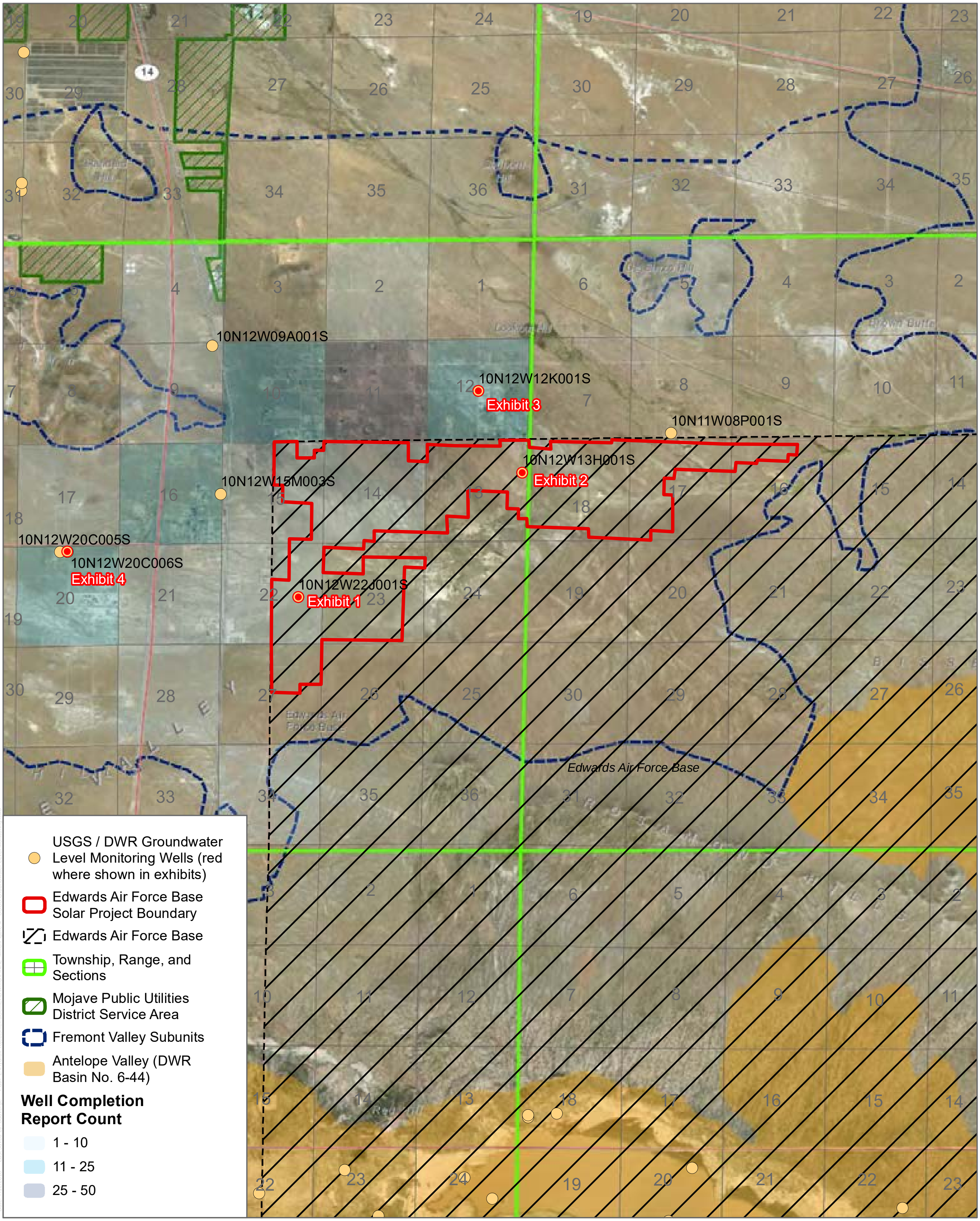

SOURCE: USGS 2018, DWR 2018

DUDEK

0 1 2 Miles

FIGURE 4

U.S. Geological Survey Groundwater Level Monitoring

Water Supply Assessment for Edwards Air Force Base Solar Project

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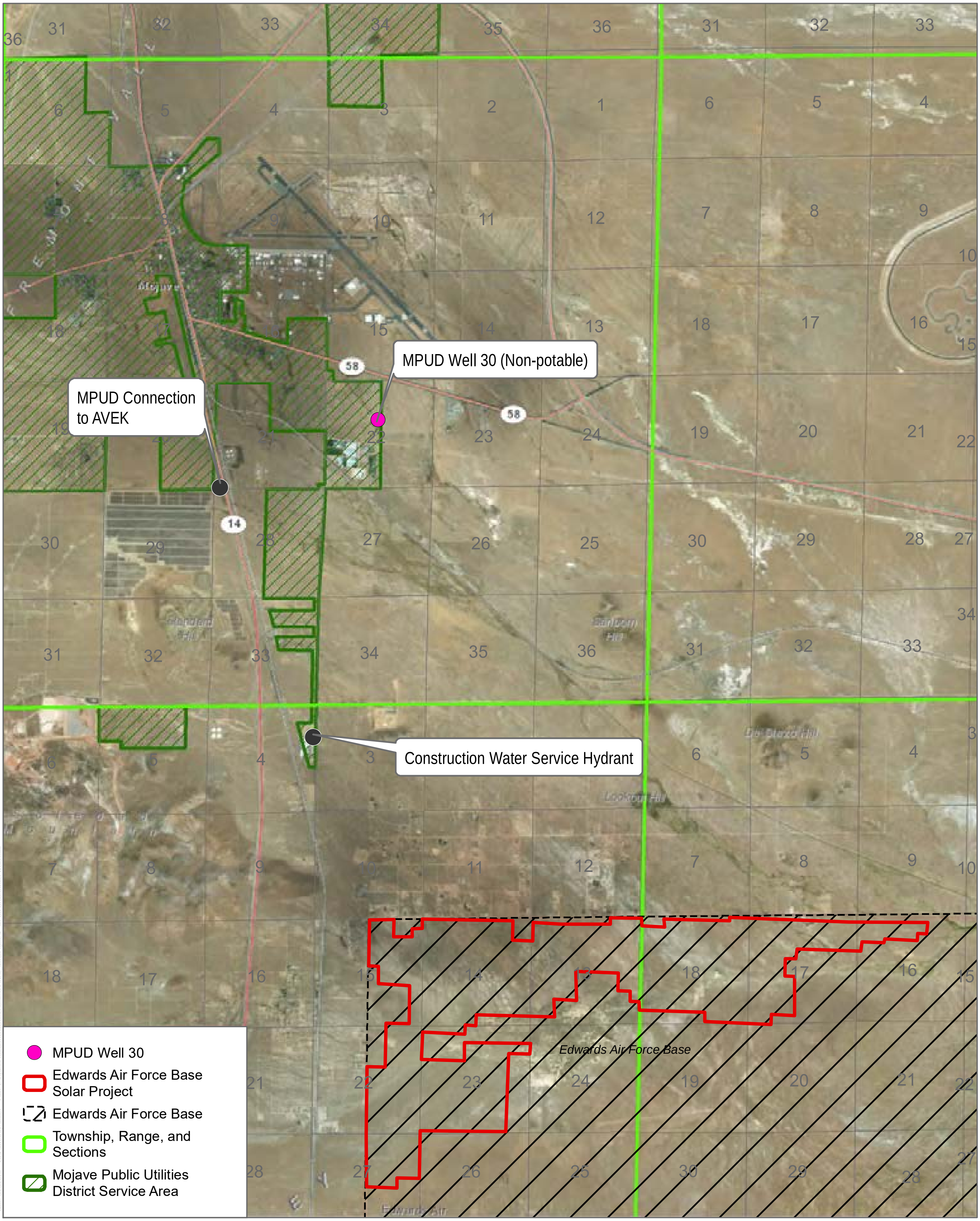

SOURCE: Ishibashi 1990, Wellenco 2014, USGS 2017, MPUD 2018

DUDEK

FIGURE 5

Mojave Public Utilities District Water Sources

Water Supply Assessment for Edwards Air Force Base Solar Project

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APPENDIX A

MPUD Will-Serve Letter

Mojave Public Utility District
* * *
Phone (661) 824-4161 15844 K Street
Mojave, CA 93501

February 9, 2018

TERRA-GEN
Simon Day
11512 El Camino Real, Suite 370
San Diego, CA 92130

Dear Mr. Day:

RE: Will serve letter for Construction water

Mojave Public Utility District will provide construction water for Edwards AFB, LLC Solar project. A total of 200 acre feet for construction will be provided, per year for two years

Kern County has requested that Mojave Public Utility District provide this will serve letter.

A. An approved Back Flow Preventer needs to be installed at your connection to our system.

B. Any and all off-site facilities required by the project will be furnished at no cost to the District. The facilities required may include, but not limited to: Storage reservoirs, booster pump stations, pressure reducing stations, turnouts, or pipelines.

C. The conditions of this letter are in effect for one year from the date indicated on this letter, after which the letter becomes void. The letter holder may renew prior to the expiration date. No notice will be sent to alert the letter holder that an expiration date is approached. If a letter is allowed to expire, the applicant may re-apply pursuant to District rules and regulations. However, a renewed will serve letter may have conditions that differ from the original letter.

THIS WILL SERVE LETTER IS SUBJECT TO TERMINATION AT ANYTIME

Please contact me with any questions regarding this letter at 661-824-4161.

Bee Coy Jr.

General Manger

APPENDIX B

MPUD Project Operations Will-Serve Letter

Mojave Public Utility District
* * *
Phone (661) 824-4161
15844 K Street
Mojave, CA 93501

December 6, 2017

RE: Terra-Gen, Edwards AFB Solar Operational Water Supply Needs

To whom it may concern:

Mojave Public Utility District can provide the annual operations water of up to 30 acre feet a year.

Please contact me with any questions regarding this letter at 661-824-4161.

Bee Coy Jr.

General Manger
Mojave Public Utility District

B20 Conceptual Hydro and Water Quality Assessment

BLUE OAK ENERGY®

Oro Verde Solar Project

Conceptual Hydrology and Water Quality Assessment

Samuel Laughlin, PE

Prepared for:

SunEdison
simplifying solar

Revision	Date	Description
1(Final)	June 27, 2014	Conceptual Hyd. Analysis

Table of Contents

1560 Drew Avenue • Davis, CA 95618 • P: (530)747-2026 • F: (530)747-0311

www.blueoakenergy.com

1.0 Introduction

1.1 Project Description

The proposed project will consist of a 450 MW-AC solar photovoltaic (PV) energy-generating facility across approximately 3,460 acres on Edwards Air Force Base land. The building of the facility will be in three phases of approximately 175 MW-AC built in phase one and two, and 100 MW-AC built in phase three. The site will interconnect with Southern California Edison's Windhub Substation loacted 13.5 miles northwest of the site.

The site will consist of PV modules supported by single axis tracking systems on foundations. Typical foundation types are driven piles or drilled shafts with the occasional ballast foundation type utilized. Concrete slabs on grade or skids will be placed for equipment holding inverters, transformers, and data acquisition system enclosures, at various locations designed on site. There will be three (3) Operations and Maintenance (O&M) buildings and three (3) substations or switchyards located on site for each potential phase. These will be designed to avoid existing flows so as not to alter drainage patterns on site, and will be elevated above existing grade. On-site access ways will circulate the site for O&M needs, as well as potential fire department and other access. Preliminary engineering plans have been developed and should be referenced as needed.

1.2 Purpose and Scope of Study

Blue Oak Energy has undertaken this study to asess the potential pre- vs post-construction on-site hydrologic and water quality conditions that would result from the proposed PV System project. This study will also discuss recommendations for potential stormwater mitigations with a likely retention storage volume and design. Also this study was performed to ascertain the water quality conditions and the likely erosion and sedimentation mitigations (Best Management Practices). These Best Management Practices (BMP) address water quality control for construction and post construction purposes.

If stormwater is not mitigated potential impacts include increases in downstream storm water flows, erosion, loss of vegetation, sedimentation of downstream watercourses, and alterations to the historic drainage patterns and watershed boundaries. All impacts potentially effect water quality and ecology of the local area.

This study also serves to support the California Environmental Quality Act (CEQA) hydrology and water quality impact assessments provided in the Environmental Impact Report (EIR). This study is alos supported by information in the preliminary flood hazard assessment report.

1.3 Project Location

The proposed Oro Verde solar project is located on the northwest corner of Edwards Air Force Base 6 miles south of Mojave and 6 miles northeast of Roseamond, in Kern County, California. While the entire proposed site is near 6,000 acres, construction is planned to occur on 4,000 acres maximum. The site is bounded by Trotter Avenue on the north and Lone Butte Road on the west. The site is located at 34°57’27.33” N and 118°06’16.03” W as seen in on *Figure 1: Vacinity Map* and *Figure 2: Aerial Map* located in Appendix A.

2.0 Existing Conditions (Pre Developed)

2.1 Geology and Soils

The site is located within the Mojave Desert. This area consists of broad interior isolated mountain ranges separated by desert plains and basins. The western Mojave Desert is bounded on the north by the Garlock fault and along the southwest by the San Andreas fault. North of the Garlock fault lies the Sierra Nevada and Tehachapi Mountian Ranges while to the southwest past the San Andreas fault are the Transverse Ranges and costal basins. The site consists of silty sands but finer grained soils may exist in flater portions of the site.

The U.S. Department of Agriculture, National Resource Conservation Service (NRCS) has designated the soils on the site as: DeStazo complex on the north of the site, Cajon loamy sand on the southern portion of the site, Leuhman complex on the west-central portion of the site, and Helendale-Cajon complex in the southwestern corner of the site. All soil types are lower than 5% slopes causing negligible to low runoff. The majority of the site is classified in Hydrologic Soil Group "A" and "B" with the Leuhman complex part of the site classified in Hydrologic Soil Group "D". There are also Hydrologic Soil Group "C" on parts of the site which area is minimal so they weren't considered. "A" and "B" Hydrologic Soil Groups mean the soil has low and moderatly low runoff potential when thouroughly wet. Category D Hydrologic Soil Group has high runoff potential when thoughoughly wet. See *Figure 2: Soils Map* in Appendix A for locations of soil groups. Due to the low slopes and soil type low runoff can be assumed throughout the site.

2.2 Topography

The site is gently sloping to the east and elevations range from 2550 feet above mean sea level on the western edge of the project site to 2450 feet above mean seal level at the northeast corner. Local topography shows ephemeral stream channels and washes conveying surface runoff away from the foothills of the Tehachapi Mountians towards the Rosamona and Rogers Dry Lakes on Edwards AFB. A topographic map was developed using Light Detection And Ranging (LIDAR). Based on the map results it was determined most of the drainage from the project site is likely lost through evavporation, evapotranspiration, or percoalation before reaching a Rosamona or Rogers Dry Lakes. The preliminary flood hazard assessment will go into more detail regarding drainage of the project site.

2.3 Soil Erosion Potential

Soil Erodibility Factor (K factor) for the project site is 0.15. This is calculated using the NRCS Google Application SoilWeb. The K factor determines susceptibility of soil or surface material to erosion, and transportability of the sediment. The K factor for our site indicates a low potential for erosion. A K factor map is found in Appendix B.

2.4 Environmental Setting

The project site is a section of Edwards Air Force Base and is considered undeveloped. Before it was an air force base it was probably used for mining when gold was discovered in Kern County in 1851. Local hydrology shows direct precipitation percolating into valley groundwater if not lost through evaporation or evapotranspiration. The rainfall erosivity factor (R factor) for the area is estimated to be 10.00. The R factor was estimated using the United States Environmental Protection Agency (U.S. EPA) Rainfall Erosivity Factor Calculator.

The project site is located in the South Lahontan Hydrologic Region. This region covers 21.2 million acres in eastern California. This region in categorized by groundwater basins which cover about 55 percent of the hydrologic region. Within this hydrologic region Oro Verde project site is located in the Antelope Valley Groundwater Basin. This is located in the western Mojave Desert and is characterized by runoff that flows towards Rosamond and Rogers dry lakes.

2.5 Climate

The project area climate varies throughout the year due to its desert location. The warmest month for the area is July with an average high temperature of 99.1°F. The coldest month for the area is December with an overnight average of 31.2°F. The night time temperature drops below freezing about 60 days per year. Average rainfall is about 5-10 inches yearly. See Appendix A *Figure 3: NOAA Atlas 14* for precipitation frequency estimates for the region.

2.6 Surface Water

The watershed area lacks defined natural and improved channels and is subject to unpredicatable sheet flow. Surface water flows are carried by small ephemeral streams. The contributing water to the area is primarily precipitation runoff from the uphill watershed. Surface flow velocities and depths into project area is discussed in more detail in the preliminary flood hazard assessment done in conjunction with this report.

2.7 Flooding

Flooding problems throughout Kern County are aggravated by undersized or insufficient drainage facilities. Most flooding in Kern County comprises of flooding from washes, creeks, and rivers. Due to our site being far from main water sources the project site is subject to flooding from flows by alluvial fans. Alluvial fans are known for typically high sediment loads which is why water quality must be monitored thoroughly. Flooding related to the project site can be referenced in the preliminary flood hazard assessment, done in conjunction with this report.

The project site is designated as Flood Zone D with the surrounding area as Floodzone X and small amouts of Flood Zone A as given by GIS data obtained from the FEMA website (msc.fema.gov). Zone D is designated as “Areas in which flood hazards are undetermined, but possible.” Zone X is designated as “Areas determined to be outside the 0.2% annual chance floodplain.” Zone A is designated as “areas subject to inundation by the 1-percent-annual-chance flood event”. It has been assumed that no special consideration needs to be included in the site designing to meet FEMA flood mitigation requirements. For FEMA Flood Maps refer to preliminary flood hazard assessment reports.

2.8 Groundwater

The site is located in the Gloster Subbasin of the Antelope Valley Groundwater Basin. This subbasin is seperated from the larger portions of the Antelope Valley Groundwater Basin by bedrock highs which cause groundwater to be at shallower depths than in the subbasin. The Department of Water Resources measured a well on the western portion of the site in 2010, and groundwater depth is approximately 49 feet below the surface. Groundwater quality is typically sodium bicarbonate or sodium sulfate in character. TDS content in the basin averages 300mg/L.

3.0 Regulatory Setting

3.1 Federal

The Clean Water Act is used to protect the water quality of the nation's waters. The Clean Water Act is used to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The Clean Water Act regulates the discharge of pollution including erosion into waters of the United States (WOUS). There are no jurisdictional Waters of the United States present on Edwards AFB.

The National Flood Insurance Act lead to the National Flood Insurance Program (NFIP), which makes federally backed flood insurance available to communities that adopt and enforce floodplain management ordinances. These ordinances include minimum floodplain management standards, including restrictions on new development in designated floodplains, requirement of new structures in 100-year flood zone be elevated to, or above, the 100 year base flood elevation, and for subdivisions to be designed to minimize exposure to flood hazards.

3.2 State

Stormwater Implementation Requirements:

1. All surface or ground waters within State boundaries are waters of the State subject to regulation by the Water Board under the California Water Code.
2. For areas with surface waters that are not WOUS, certain requirements may apply for proposed construction or industrial activities.
3. Where, as a result of any type of construction or industrial activity, surface waters that are not WOUS exit a property and enter waters of the state, responsible parties shall ensure exiting waters do not contain contaminants which may affect surface or groundwater quality.

Recommendations to Implement Projects where there are No Waters of the United States:

- Construction projects should implement the principles of Low Impact Development (LID) to minimize adverse effects of Hydromodification.
- Parties should prepare and implement an effective site-specific Stormwater Pollution Prevention Plan (SWPPP) to ensure that:
  - Best Management Practices (BMPs) for construction and post-construction periods implemented,
  - Where stormwater leaves the property its volume and velocity meet natural, pre-project conditions,
  - The quality of any stormwater discharged does not contain unauthorized wastes,
  - Stormwater is treated and infiltrated on site to the maximum extent practicable,
  - Workers are trained to protect water quality, and
  - Records are maintained documenting efforts to protect water quality.

CEQA requires an EIR to be drafted where project information and its environmental relationship is described. This report will be considered by public agency prior to approval or disapproval of the project.

3.3 Local

The County of Kern, Department of Planning provides consolidated land use which fosters economic vitality with an emphasis on resource conservation. The Department of Planning also regulates and prepares environmental documents in accordance with CEQA.

Edwards Air Force Base (EAFB) will review grading and other proposed improvements on the project site.

4.0 Hydrology

4.1 Criteria

The County of Kern uses a CEQA checklist to assess impacts to hydrology and water quality and determine the significant environmental effects. This checklist evaluates whether construction and operations would:

- violate water quality standards or waste discharge requirements,
- substantially deplete groundwater supplies,
- substantially alter existing drainage patterns of the site or area, and create or contribute runoff water that exceeds capacity of existing or planned stormwater drainage systems or provide additional sources of polluted runoff,
- substantially degrade water quality,
- place housing and structures within a 100-year flood hazard area that would impede or redirect flood flows,
- expose people or structures to a significant risk of loss, injury, or death because of flooding, and inundation by seiche, tsunami, or mudflow.

4.2 Methodology

During construction, management of site construction and protection surface water quality should be regulated through the enforcement of water quality standards and waste discharge requirements. To protect water quality Best Management Practices (BMP's) will be used pre-construction to post-construction.

The Kern County Hydrology Manual and Development standards provide guidelines for storm water design and properly designing drainage mitigation features. Division 4 of the Kern County Development Standards defined the design volume for basins as runoff from the Intermediate Storm Design Discharge (ISDD) 5-day rainfall event from the impervious area. The California SWRCB proposes the use of a "Post-Construction Water Balance Calculator," for determining the project related volume increase and associated required retention. The ultimate retention basins will be designed by calculating the required volumes for state and local methods, while the governing design will be based upon the larger calculated volume.

4.3 Water Quality

During construction activities to manage discharge stormwater runoff from the construction site BMP's will be used. To select appropriate BMP's for the project site a risk level defined upon the amount of risk of having pollutants discharge from the site. This takes into account many factors which were explored in our calculations.

The project site is a risk level 1 or low risk as determined from calculations in Appendix B. To determine the risk level of our site an estimated construction schedule was set determining one year of construction, which would result in an 'R' factor of 10. The risk factor was also determined by Google Application SoilWeb, and Length Slope (LS) Factor to find the K factor and LS-factor. These were 0.15 and 0.81 respectively. After the risk calculations, a sediment yield for our project site was determined to be 1.215 tons/acre which results in a low risk factor rating. Also to determine risk level, receiving waters were taken into account. It was determined the receiving waters were not on 303(d) list for water bodies impaired by sediment. Also the site does not discharge into a water body that would upset the balance of wildlife. Sediment and receiving water risk factors were both low so the project was determined to be a risk level 1.

Risk level information will help establish appropriate construction BMPs ensuring controls on source pollutants, erosion, sediment and non-stormwater discharges. The BMP's will serve to prevent stormwater pollution and minimize water quality impacts during wet and dry seasons.

Erosion and sedimentation will be accounted for and controlled using a variety of BMPs. The BMPs recommended are Project Management, Non-stormwater, Erosion Control, and Sediment Control BMPs. Erosion Control BMP's will implement wind erosion controls, provide effective soil cover for inactive areas, limiting use of plastics, and ensuring soil loss during each construction phase is equivalent or less than preconstruction losses. Sediment Control BMP's will implement perimeter controls, stabilized construction entrances and exits, comply with sediment basin guidelines, linear slope controls, and access roads onsite. Both BMP controls will implement appropriate controls in conjunction with each other in order to protect local water quality from decreasing.

4.4 Retention Basins

Retention basins will be designed and located on site to mitigate runoff increase from the proposed development. Retention basins are used to attenuate peak runoff to downstream areas, to reduce transport of sediments carried in floodwaters, and provide location for groundwater recharge. The main consideration in placement of retention basins will be protection of environmentally sensitive areas (ESA). The design will be in accordance with Kern County Development Standards.

The final storm water retention volume is anticipated to be between 30-50 acre-feet. This is based on Kern County standards for analyzing pre vs. post construction runoff conditions. Kern County requires minimum retention volume to be calculated for local and state water board requirements, and design for whichever results in the greatest change in volume. Local requirements calculated pre vs. post runoff difference by using 10 year 5 day rainfall and is based on impervious areas. State requirements calculated pre vs. post runoff difference by using a water balance calculator. The water balance calculator takes into account NRCS/SRC Curve Numbers and runoff coefficient increases. Local pre vs. post construction runoff volume was calculated at 1.5 acre-ft while state runoff volume was 27.5 acre-ft. Therefore the state calculated amount of 27.5 acre-ft will be taken as the change in volume.

4.5 Impact Analysis and Mitigation Measures

Water quality standards and waste discharge requirements should not be violated during construction and operation through the use of inspections and proper BMP installation. The water used on site will be minimal and will be mainly used for panel washing after construction as well as concrete washout and dust mitigation during construction. This water is proposed to be tertiary treated water used for non-potable uses from the Rosamond Community Services District or Antelope Valley East Kern Water Agency. Landscape portions of the site may also need water but will be landscaped with drought tolerant vegetation. In addition water will be needed for buildings. To protect water quality standards and waste discharge requirements, sanitary waste will be handled on-site with a septic system. In addition the project will incorporate the necessary BMP’s to result in minimal impact on local water quality.

Most stormwater and other runoff will be collected via retention basins designed on site. Other planned storm water mitigations include BMP’s such as silt fences and fiber rolls. These BMPs will filter sediment from stormwater runoff, and will help mitigate particulate based pollutants from leaving the site. The historical drainage patterns will be maintained and the proposed site improvements will be as minimally invasive as possible. Grading for the site will be minimal and is only required in isolated areas across the site, to allow for PV System functionality.

The construction of the site will have minimal impact on groundwater effect. Construction of impervious areas will be minimal and should not have a large impact on existing groundwater levels. Detention basins designed on-site will allow for groundwater recharge as well.

Overland flow will still occur onsite after construction and will still remain as precipitation runoff from the uphill watershed. Changes to the site will minimally impact existing grade and drainage conditions. Due to minimal changes in the site the project is not expected to change flood hazard areas or restrict or impede current runoff flows. More information is discussed in the preliminary flood hazard assessment.

4.6 Summary

One of the design goals of the project is to minimize changes to the site including the increase of impervious surfaces. Onsite gravel access roads will be designed to remain pervious with the ability to percolate storm water. Impervious foundations from concrete pads and structures will be designed to minimize their impervious cross sectional area. The majority of the site will have embeded solar panel foundation piles which will have a neglibable effect on existing infiltration. The site will be designed to allow surface water to flow through with minimal grading, as not to effect existing drainage paterns. Water quality has been determined to be a risk level 1 which means low risk of erosion of the site. BMP's will be installed in order to keep erosion minimal and prevent sediment leave the site. Retention basins will be designed to decrease and attenuate peak runoff flows, reduce sedimentation flow offsite, and help recharge any groundwater lost by the slight increase in impervious areas. To control erosion and sedimentation BMPs are recommended and will be placed to ensure minimal changes to the site.

5.0 References

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- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) http://www.nrcs.usda.gov/wps/portal/nrcs/soilsurvey/soils/survey/state/

- Kern County Engineering Bulleting 11-02, dated December 21, 2011. Available at http://www.co.kern.ca.us/bid/pdfs/bulletin11-02finald3-sumpvolumerequirements.pdf

- CAWQCB Post Construction Water Balance Calculator. https://smarts.waterboards.ca.gov

- Department of Water Resources, California's Groundwater Bulletin 118, South Lahontan Hydrologic Region Antelope Valley Groundwater Basin, October 2003.

Appendix A: Figures

			CLIENT: SUNEDISON
			PROJECT: ORO VERDE
			PROJECT NO.:
			ENGINEER: SL
0	VACINITY MAP		DATE: 06/13/14
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FIGURE 1

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0	AERIAL MAP	

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PROJECT NO.:	
ENGINEER: SL	
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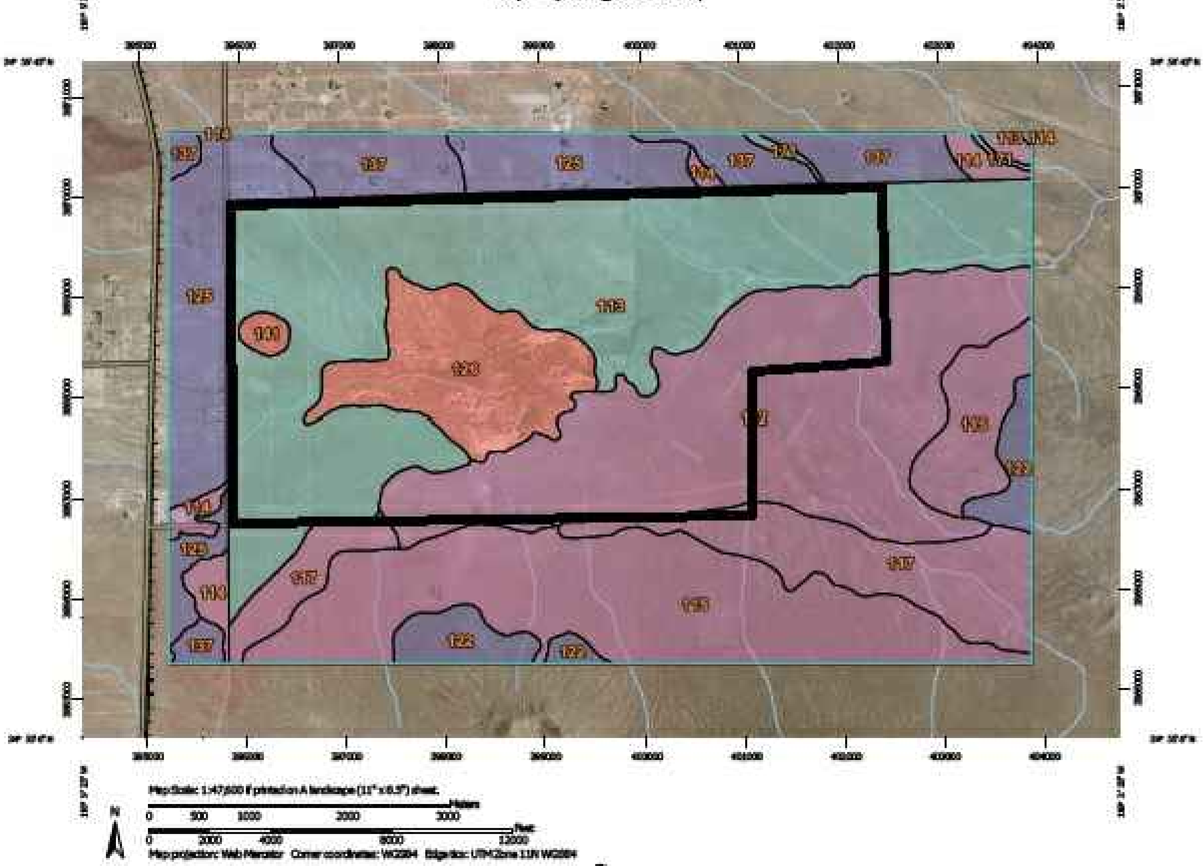
PAGE: OF	FIGURE 2

Custom Soil Resource Report
Map—Hydrologic Soil Group



7

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

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0	SOILS MAP	

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FIGURE 3

NOAA Atlas 14, Volume 6, Version 2
Location name: Mojave, California, US*
Latitude: 34.9576°, Longitude: -118.1045°
Elevation: 2508 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.067 (0.055-0.082)	0.088 (0.072-0.108)	0.119 (0.097-0.146)	0.146 (0.119-0.182)	0.189 (0.148-0.242)	0.225 (0.174-0.295)	0.266 (0.201-0.358)	0.313 (0.229-0.433)	0.385 (0.271-0.554)	0.490 (0.333-0.729)
10-min	0.096 (0.079-0.118)	0.126 (0.104-0.155)	0.170 (0.139-0.209)	0.210 (0.171-0.260)	0.270 (0.213-0.347)	0.323 (0.249-0.423)	0.382 (0.287-0.513)	0.449 (0.329-0.620)	0.552 (0.388-0.794)	0.703 (0.477-1.05)
15-min	0.116 (0.096-0.142)	0.152 (0.125-0.187)	0.205 (0.169-0.253)	0.254 (0.206-0.315)	0.327 (0.257-0.420)	0.391 (0.301-0.512)	0.462 (0.348-0.620)	0.543 (0.398-0.750)	0.668 (0.469-0.960)	0.850 (0.577-1.26)
30-min	0.157 (0.129-0.193)	0.206 (0.169-0.253)	0.278 (0.228-0.343)	0.343 (0.279-0.426)	0.443 (0.348-0.568)	0.529 (0.408-0.693)	0.625 (0.471-0.839)	0.735 (0.538-1.02)	0.904 (0.635-1.30)	1.15 (0.781-1.71)
60-min	0.221 (0.182-0.271)	0.290 (0.238-0.356)	0.391 (0.321-0.482)	0.483 (0.392-0.599)	0.622 (0.490-0.799)	0.743 (0.573-0.974)	0.879 (0.662-1.18)	1.03 (0.757-1.43)	1.27 (0.893-1.83)	1.62 (1.10-2.41)
2-hr	0.338 (0.279-0.415)	0.434 (0.357-0.533)	0.569 (0.467-0.701)	0.688 (0.559-0.854)	0.861 (0.678-1.11)	1.01 (0.775-1.32)	1.16 (0.874-1.56)	1.33 (0.976-1.84)	1.58 (1.11-2.28)	1.79 (1.22-2.67)
3-hr	0.421 (0.347-0.517)	0.540 (0.444-0.663)	0.704 (0.577-0.867)	0.845 (0.687-1.05)	1.05 (0.825-1.35)	1.22 (0.937-1.59)	1.39 (1.05-1.87)	1.58 (1.16-2.19)	1.86 (1.30-2.67)	2.08 (1.41-3.10)
6-hr	0.565 (0.465-0.694)	0.733 (0.603-0.901)	0.960 (0.788-1.18)	1.15 (0.936-1.43)	1.42 (1.12-1.82)	1.63 (1.26-2.14)	1.85 (1.39-2.49)	2.09 (1.53-2.88)	2.41 (1.69-3.47)	2.67 (1.81-3.97)
12-hr	0.692 (0.570-0.849)	0.955 (0.785-1.17)	1.30 (1.07-1.60)	1.59 (1.29-1.97)	1.97 (1.55-2.53)	2.27 (1.75-2.98)	2.57 (1.94-3.46)	2.89 (2.11-3.98)	3.31 (2.32-4.76)	3.64 (2.47-5.41)
24-hr	0.865 (0.768-0.995)	1.27 (1.13-1.46)	1.80 (1.59-2.08)	2.23 (1.96-2.60)	2.81 (2.39-3.39)	3.26 (2.70-4.01)	3.71 (3.00-4.67)	4.17 (3.28-5.41)	4.79 (3.62-6.48)	5.27 (3.84-7.38)
2-day	1.06 (0.940-1.22)	1.53 (1.36-1.76)	2.16 (1.91-2.50)	2.69 (2.36-3.13)	3.42 (2.90-4.12)	4.00 (3.32-4.91)	4.59 (3.72-5.78)	5.21 (4.10-6.76)	6.07 (4.58-8.21)	6.75 (4.92-9.45)
3-day	1.19 (1.05-1.37)	1.70 (1.50-1.95)	2.39 (2.11-2.76)	2.98 (2.61-3.46)	3.80 (3.22-4.57)	4.45 (3.69-5.47)	5.14 (4.16-6.47)	5.86 (4.61-7.60)	6.88 (5.19-9.31)	7.70 (5.61-10.8)
4-day	1.26 (1.12-1.45)	1.80 (1.59-2.07)	2.53 (2.24-2.92)	3.14 (2.76-3.66)	4.01 (3.40-4.83)	4.70 (3.90-5.78)	5.43 (4.40-6.84)	6.20 (4.88-8.04)	7.29 (5.50-9.85)	8.16 (5.94-11.4)
7-day	1.39 (1.24-1.60)	1.98 (1.75-2.27)	2.77 (2.45-3.19)	3.43 (3.01-3.99)	4.36 (3.69-5.24)	5.08 (4.22-6.25)	5.83 (4.72-7.35)	6.62 (5.21-8.59)	7.71 (5.82-10.4)	8.57 (6.25-12.0)
10-day	1.44 (1.27-1.65)	2.04 (1.81-2.35)	2.86 (2.53-3.30)	3.54 (3.11-4.12)	4.49 (3.80-5.40)	5.22 (4.34-6.42)	5.98 (4.84-7.54)	6.77 (5.33-8.77)	7.85 (5.92-10.6)	8.69 (6.33-12.2)
20-day	1.69 (1.50-1.94)	2.43 (2.15-2.79)	3.43 (3.03-3.96)	4.26 (3.73-4.96)	5.41 (4.59-6.52)	6.32 (5.24-7.77)	7.24 (5.86-9.13)	8.20 (6.45-10.6)	9.50 (7.16-12.8)	10.5 (7.65-14.7)
30-day	1.92 (1.70-2.20)	2.76 (2.45-3.18)	3.92 (3.47-4.53)	4.90 (4.29-5.70)	6.26 (5.31-7.53)	7.32 (6.08-9.01)	8.42 (6.81-10.6)	9.55 (7.52-12.4)	11.1 (8.37-15.0)	12.3 (8.94-17.2)
45-day	2.29 (2.03-2.63)	3.30 (2.93-3.80)	4.70 (4.16-5.43)	5.89 (5.16-6.85)	7.56 (6.41-9.10)	8.89 (7.38-10.9)	10.3 (8.31-12.9)	11.7 (9.19-15.1)	13.6 (10.3-18.4)	15.1 (11.0-21.2)
60-day	2.54 (2.26-2.92)	3.66 (3.25-4.22)	5.22 (4.62-6.03)	6.55 (5.75-7.63)	8.45 (7.16-10.2)	9.96 (8.26-12.2)	11.5 (9.33-14.5)	13.2 (10.4-17.1)	15.4 (11.6-20.8)	17.1 (12.5-24.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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CLIENT: SUNEDISON
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DRAWING NO. FIGURE 4

Appendix B: Calculations

ENGINEERING, SURVEYING & PERMIT SERVICES DEPARTMENT
CHARLES LACKEY, P.E., DIRECTOR
2700 M STREET, SUITE 570
BAKERSFIELD, CA 93301-2370
Phone: (661) 862-8603 Fax: (661) 862-5149
E-mail: esps@co.kern.ca.us
Website: www.co.kern.ca.us/ess

DEVELOPMENT SERVICES AGENCY
Engineering, Surveying and Permit Services Department
Planning and Community Development Department
Roads Department

Engineering Bulletin 11-02

Subject: Sump Volume Requirements **Date: December 21, 2011**
Application: Kern County Development Standards

Background: In 1995, Kern County revised the standard by which retention basin sizing is based, and published it in the latest edition of the Kern County Development Standards dated August 5, 2010. Division 4 of the Development Standards defined the design volume for basins as runoff from the Intermediate Storm Design Discharge (ISDD) 5-day rainfall event from the impervious area. The equation is;

Runoff Volume = 0.12 (D_{10}) (a_i) (Area) where:

D_{10} = 10 yr 24-hr. depth of rainfall (in.)
a_i = average percentage of impervious area
Area = Drainage area of total development
0.12 = 1.44 x 1/12
1.44 = 5 day mass ratio (KC Hydrology Manual, Table B-1)
1/12 = Conversion of rainfall depth in inches to feet

The revision to the standard was chosen for consistency with the newly created multi-day detention basin sizing standard and to approximate the sump sizing criteria used by the City of Bakersfield in their application of 100yr 24hr rainfall event. The new Development Standards also linked ISDD calculations to the application of rainfall/runoff methodology found in the Kern County Hydrology Manual. Since the Hydrology Manual had adopted rainfall data found in NOAA Atlas 2, Volume XI, retention basin sizing was also tied to that data base.

Data Update: In May of 2011 the National Weather Service published NOAA Atlas 14, Volume 6, Version 2.0 for California. As stated in the introduction of the publication, this document supersedes precipitation-frequency estimates found in NOAA Atlas 2, Volume 11 and NOAA Atlas 14 Volume 1, which covered Kern County's desert region. Gage data used in the precipitation-frequency analysis for NOAA Atlas 14, Volume 6 incorporates the latest, quality-verified rainfall information available up through June, 2010. The precipitation-frequency data is now available to the public, via a graphic interface, at the Hydrometeorological Design Studies Center's web site. (http://hdsc.nws.noaa.gov/hdsc/pfds/). It contains both short and long duration, including multi-day rainfall data in tabular and graphic formats.

Policy: Retention basin sizing shall continue to be based upon runoff from the ISDD 5 day storm event from impervious area. The equation is now;

Runoff Volume (cu.ft.) = [($D_{10yr\text{-}5day}$)/12] (a_i) (Area) where;

$D_{10\text{-}5day}$ = 10yr 5 day depth of rainfall (in.) obtained from NOAA Atlas 14, Vol 6, Ver. 2.0
a_i = average percentage of impervious area
Area = Drainage area of total development (sq.ft.)

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below	(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.	***KERN***
			(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recognize any of these locations, leave this drop-down menu at location. The average value for the County will be used.	**MOJAVE**

Project Information		***Runoff Calculations***		
Project Name:	***Oro Verde Solar Project***	(Step 2) Indicate the Soil Type (dropdown menu to right):	***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**
Waste Discharge Identification (WDID):	***Optional***	(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	***Natural Desert***	
Date:	***Optional***	(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	***Cultivated Agricultural crops row, tree, or vine)***	
Sub Drainage Area Name (from map):	***Optional***		**Complete Either**	

Runoff Curve Numbers			**Sq Ft**	**Acres**	**Acres**
Existing Pervious Runoff Curve Number	**85**	*(Step 5) Total Project Site Area:*		**5873.00**	**5873.00**
Proposed Development Pervious Runoff Curve Number	**90**	*(Step 6) Sub-watershed Area:*		**5873.00**	**5873.00**

Design Storm			*Percent of total project :*	**100%**
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.50**	**in**		
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.36**	**In**		
P used for calculations (in) (the greater of the above two criteria)	**0.50**	**In**		
^Available at www.cabmphandbooks.com				

(Step 7) Sub-watershed Conditions	**Complete Either**		**Calculated Acres**
Sub-watershed Area (acres)	**Sq Ft**	**Acres**	**5873.00**
Existing Rooftop Impervious Coverage	**0**	**0**	**0.00**
Existing Non-Rooftop Impervious Coverage	**0**	**0**	**0.00**
Proposed Rooftop Impervious Coverage	**0**	**0**	**0.00**
Proposed Non-Rooftop Impervious Coverage	**200000**	**0**	**4.59**

Credits	**Acres**	**Square Feet**
Porous Pavement	**0.00**	**0**
Tree Planting	**0.00**	**0**
Downspout Disconnection	**0.00**	**0**
Impervious Area Disconnection	**0.00**	**0**
Green Roof	**0.00**	**0**
Stream Buffer	**0.00**	**0**
Vegetated Swales	**0.00**	**0**
Subtotal	**0.00**	**0**
Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**	

Pre-Project Runoff Volume (cu ft)	**244,744**	**Cu.Ft.**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**1,198,278**	**Cu.Ft.**
Project-Related Volume Increase with Credits (cu ft)	**1,198,278**	**Cu.Ft.**

You need to do more impervious area reduction to meet minimum requirements

(Step 9) Impervious Volume Reduction Credits	**Volume (cubic feet)**
Rain Barrels/Cisterns	**0 Cu. Ft.**
Soil Quality	**0 Cu. Ft.**
Subtotal Runoff Volume Reduction	**0 Cu. Ft.**
Total Runoff Volume Reduction Credit	**0 Cu. Ft.**

BLUE OAK ENERGY®
1560 Drew Avenue, Davis, CA 95618
Phone: 530.747.2026 Fax: 530.747.0311

CLIENT Sun Edison

PROJECT Oro Verde | PROJECT NO.

ENGINEER | DATE 6/6/14 | PAGE of

Kern County Development Standards (Local Method)

Runoff Volume = $(D_{10yr\,5day}/12)(a_i)(Area)$

Imp A = $10' \times 50' \times (400) = 200{,}000\ ft^2$

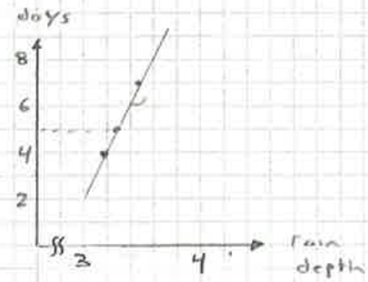
Total A = 5873 ac = $255827880\ ft^2$

$a_i = 200000\ ft^2 / 255827880\ ft^2 = 0.0008$

NOAA: 10yr 4day = 3.17 in

10yr 7day = 3.46 in

use 3.3 in



Runoff Volume = $(3.3/12)(0.0008)\,255827880 = 56282\ ft^3$

Runoff Volume = 1.3 ac ft

State Method - (Water Balance Calculator)

Runoff Volume = $1196076\ ft^3$ = 27.5 acft

State vs Local

27.5 ac ft > 1.3 ac ft

Use state level volume calcs.

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		10
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.15
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.81
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	1.215	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

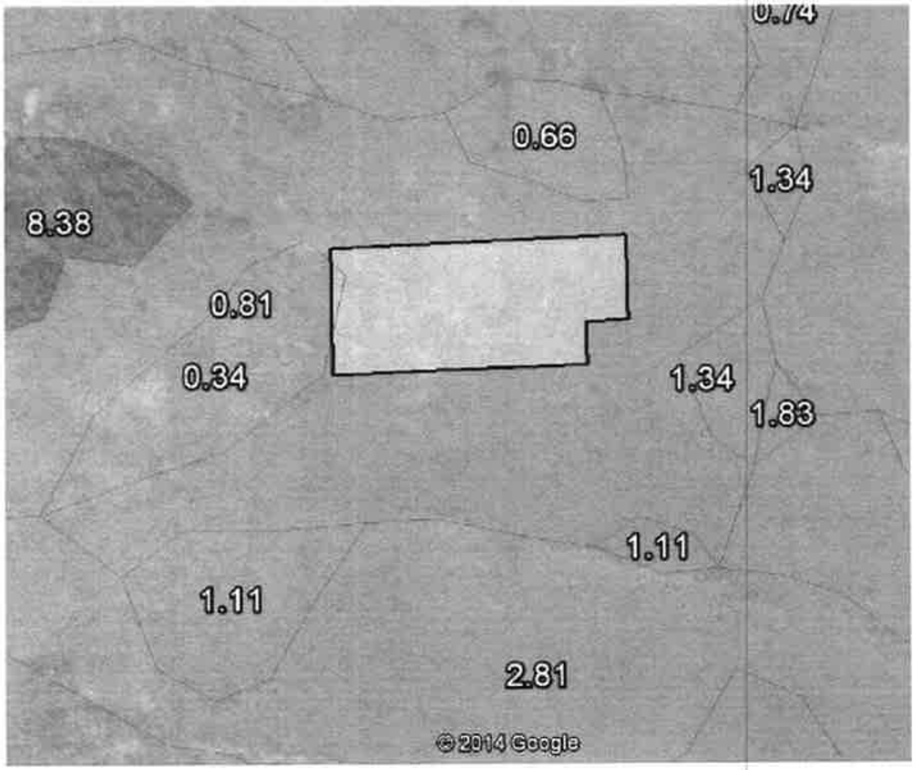
Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp	**No**	**Low**

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	Level 2
High	Level 2	Level 2	Level 3

Project Sediment Risk:	**Low**
Project RW Risk:	**Low**
Project Combined Risk:	**Level 1**

LS Factor



K Factor

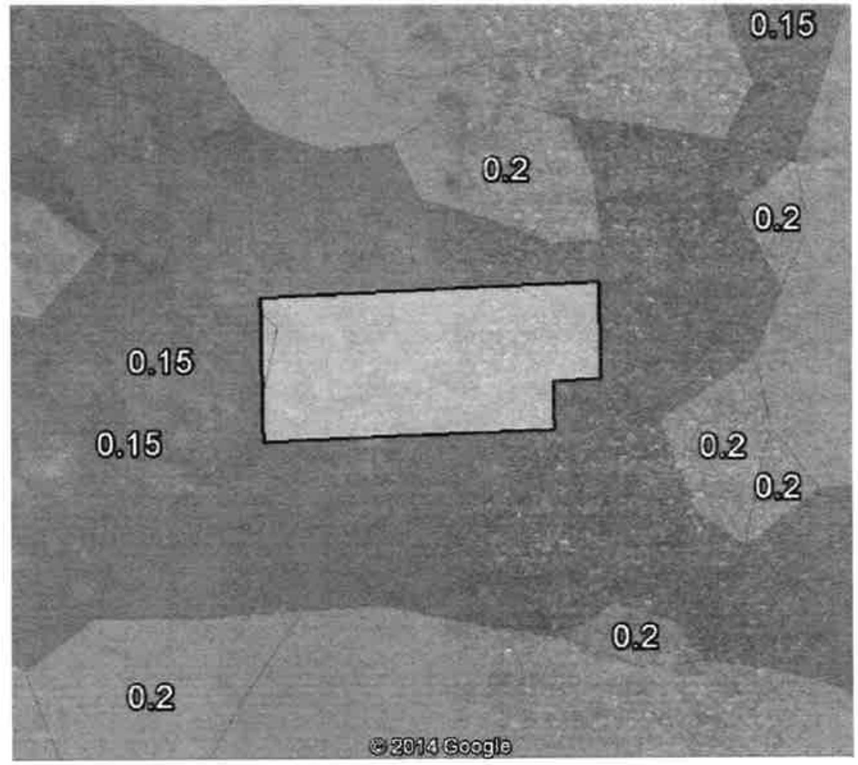


Figure 1. Erosivity Index Zone Map

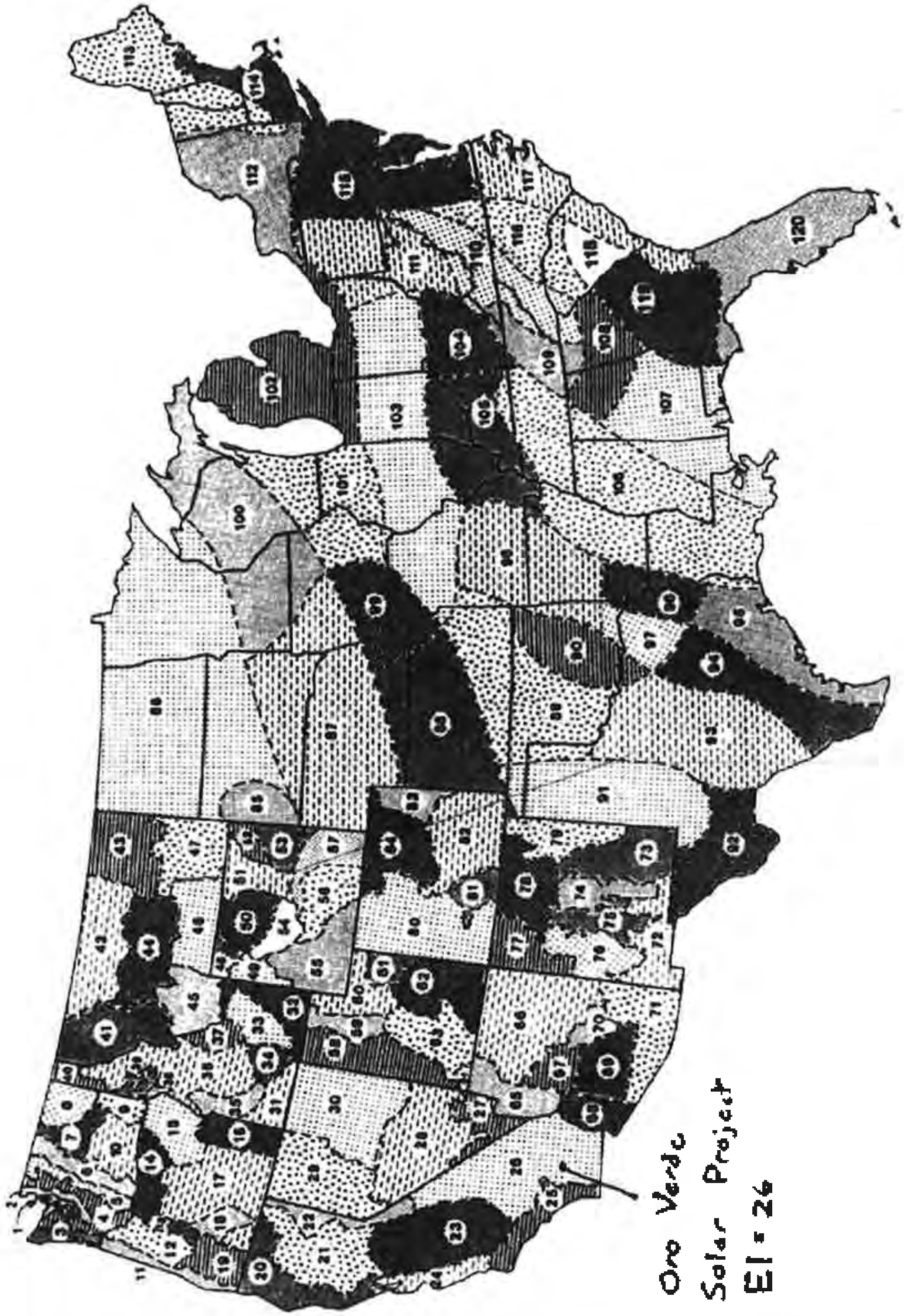
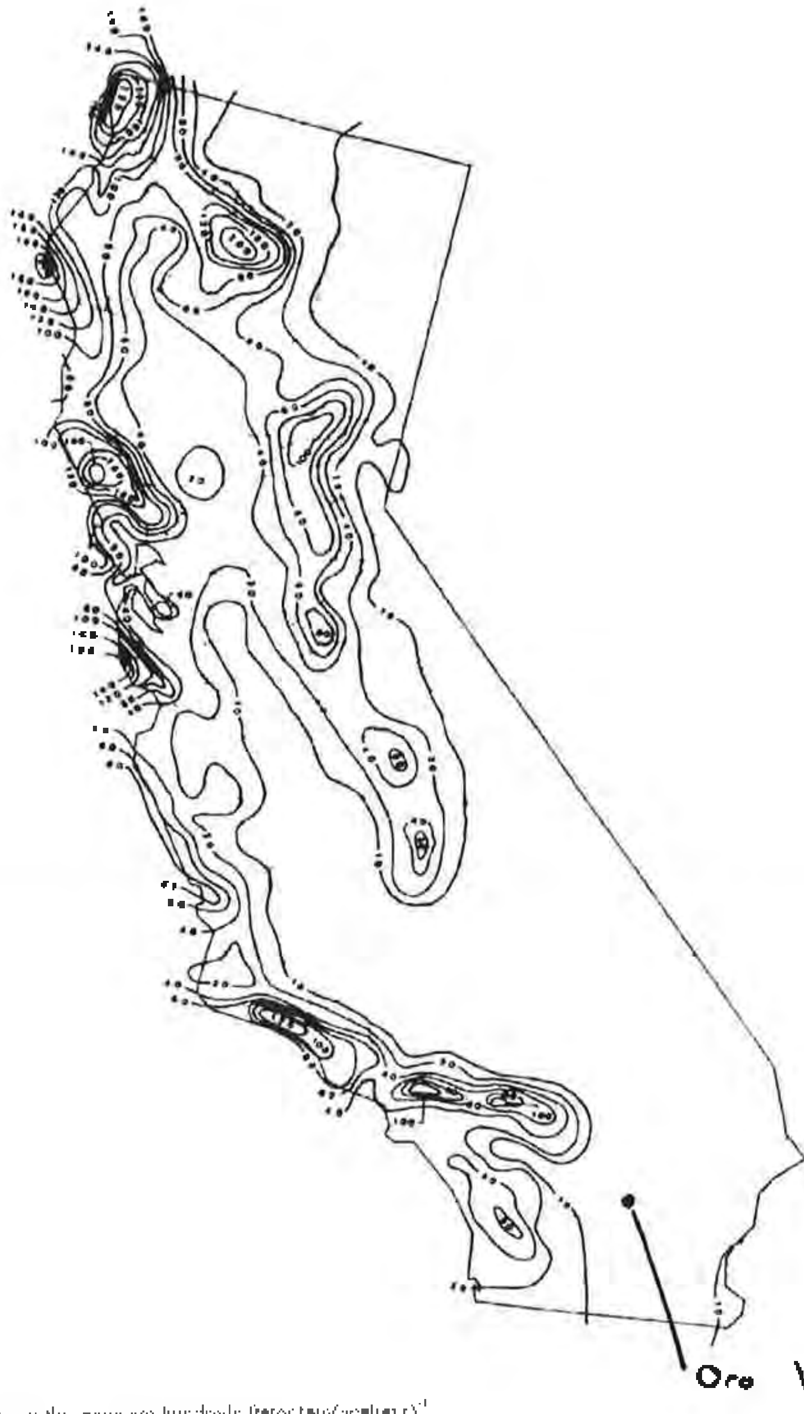


Figure 4. Isoerodent Map of California



Note: Units for all maps on this page are hundreds ft•ton•in(ac•hr•yr)$^{-1}$

Oro Verde
Solar Farm
I-15

R calculation (1yr of Construction

$R = [(100-0)/100] \times 10$

$R = 10$

Table 1. Erosivity Index (%EI Values extracted from USDA Manual 703)

All values are at the end of the day listed below - Linear interpolation between dates is acceptable
EI as a percentage of Average Annual R Value Computed for Geographic Areas Shown in Figure

Month	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	May	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Sep	[illegible]	[illegible]	[illegible]	[illegible]	Nov	[illegible]	[illegible]
Day	1	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
EI Zone																									
1	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	34.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	34.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	41.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	38.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	58.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100
35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100

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B21 Mohave Ground Squirrel Habitat Assessment

Mohave Ground Squirrel Habitat Assessment
Edwards Air Force Base Solar Project

1. Introduction

This report summarizes the results of a habitat assessment for the Mohave ground squirrel (MGS, *Xerospermophilus mohavensis*) on an approximately 3,032-acre site on Edwards Air Force Base (AFB; Base), Kern County. The project site is located in the northwestern corner of the Base. The Air Force is proposing to lease the land within the project site to a private renewable energy developer to install solar panels.

The Antelope Valley freeway (SR-14) runs in a north-south direction approximately 1 to 1.2 miles west of the Base border in the project vicinity. SR-14 connects the developed and expanding cities of Lancaster, Rosamond, and Mojave, located southwest, west, and northwest, respectively, of the study area. The Base is separated from private lands along its western boundary by a chain link fence. Figure 1, *Regional Location*, shows the project site within Edwards AFB and relative to surrounding communities. Figure 2, *Aerial Photo*, shows the project site on an aerial photo. Figure 3, *Topographic Map*, shows the survey area on U.S. Geological Survey 7.5' quadrangles. Table 1 lists the township, range, and section information for the survey area. Appendix 1 contains site photographs.

Table 1. USGS topographic quadrangles in project area

USGS 7.5' Quadrangle	Township	Range	Section(s)
Bissell	10N	11W	16, 17, 18
Bissell	10N	12W	13, 14, 15, 22, 23, 27
Soledad Mtn.	10N	12W	15, 22, 23

The study area covers approximately 3,032 acres in the northwestern corner of Edwards Air Force Base, extending approximately 5.2 miles along the northern boundary and 2.5 miles along the western boundary from the northwestern corner. The study area is vacant land with a network of dirt access roads and several low voltage power lines. Rural residential land uses adjoin the Base west and north of the study area. Major highways such as Sierra Highway (SR-395) and the Antelope freeway (SR-14) are located west of the survey area.

Background on the Mohave Ground Squirrel

MGS have been reported in a range of open desert habitats, which are discussed below (Gustavson, 1993). MGS typically occur in areas with open vegetative cover and small bushes (< 0.6 meter [2 feet] in height) spaced approximately 6 to 9 meters (20 to 30 feet) apart. MGS consume leaves, forbs, shrubs, and grasses of several species and genera, including creosote (*Larrea tridentata*), winter fat (*Krascheninnikovia lanata*), spiny hopsage (*Grayia spinosa*), saltbush (*Atriplex* spp.), golden linanthus (*Linanthus aureus*), Mediterranean grass (*Schismus arabicus*), Anderson's desert thorn (*Lycium andersonii*), and several other plant species (Best 1995). Winter fat, spiny hopsage, and saltbush are thought to make up approximately 60% of the species' shrub diet, indicating that these are important food sources when forbs are unavailable. These diet data are based on observations in the northern part of the species' range, and the extent that they are the same or differ in the southern part of the range has not been analyzed, apart from several observations (Leitner 2002).

2. METHODS

A field-based habitat assessment that examined soil, vegetation, topographic and disturbance features was carried out to assess the suitability of habitat for MGS in the study area. The field survey involved walking meandering transects in parts of the study area, noting plant species, plant communities, and soil/slope/disturbance factors that might affect MGS suitability. Survey reports for nearly all MGS studies on the Base were reviewed; no live trapping surveys were carried out. The field assessment was carried out on October 25, 26, and November 8, 2017 by Phil Brylski, Ph.D., who holds a California Department of Fish Wildlife (CDFW) Memorandum of Understanding (MOU) to trap and handle MGS.

The literature review included reports on the Edwards AFB population of MGS, including the following:

- Survey reports for MGS on Edwards AFB, including reports from 1989 to 2012. The Base MGS survey reports focused on live-trapping surveys, but in some cases also included incidental observations (sightings or sound). The sight/sound data were not included in this analysis;
- Regional MGS studies outside of Edwards AFB, such as Leitner's (2008, 2015) summary of MGS capture results across the species range for the period 1998-2007 and 2008-2012;
- Ecological studies on MGS; and
- Records in the California Natural Diversity Database (CNDDB, CDFW 2018) and the online database of museum mammal specimens (Vertnet.org).

The plant community maps are based on digital data obtained from the CDFW bios website for its desert vegetation mapping that was carried out in support of the Desert Renewable Energy Conservation Plan (DRECP; AIS 2013; CDFW 2013, 2018b). Dave Bramlet (botanist) prepared the plant community descriptions based on reference material collected during the habitat assessment. Plant community names follow Sawyer et al. (2009).

3. RESULTS

Site description

Topography

The survey area ranges in elevation from 2,470 to 2,550 feet above mean sea level. The site is relatively flat (<1% slope to the west in the northern part of the site and <1% slope to the east in the southern part of the site). Elevations on the Base range from approximately 2,270 to 3,404 feet above mean sea level with the lowest elevations found in the two major dry lakebeds, Rogers and Rosamond Dry Lakes (Edwards AFB 2008).

Vegetation

The dominant plant cover in the study area is saltbush scrub, which comprises arid-adapted plants dominated by one or more species of *Atriplex*. Data from the Desert Renewable Energy Conservation Plan (DRECP; AIS 2013, CDFW 2012, CDFW 2013) indicate that the dominant saltbush scrub in the study area is allscale (*Atriplex polycarpa*) scrub, a xerophytic saltbush scrub, which is consistent with the conditions found in the study area. Figure 4, *Plant Communities*, shows the distribution of the plant communities in the study area. Table 2 lists the acreages of the plant communities. Descriptions of the plant communities are as follows.

Saltbush Scrubs

<u>Allscale scrub</u>

Xerophytic saltbush scrub is the most common community in the study area with the dominant saltbush scrub being allscale scrub. In addition to allscale, other shrubs in this community include cheesebush (*Ambrosia salsola*), spiny hopsage, Nevada ephedra (*Ephedera nevadensis*), winter fat, Anderson's desert thorn, rubber rabbitbrush (*Ericameria nauseosa*), Cooper's goldenbush (*Ericameria cooperi*), rayless goldenhead (*Acamptopappus sphaerocephalus*), spiny horsebrush (*Tetradymia spinosa*), sticky snakeweed (*Gutierrezia microcephala*), and scattered creosote bush.

This community contains smaller numbers of other saltbush shrubs, including shadscale (*Atriplex confertifolia*) and four-wing saltbush (*Atriplex canescens*). A few areas contained scattered Joshua tree (*Yucca brevifolia*) in the overstory. The forb layer is highly variable, and can appear grassy, comprised of red brome (*Bromus madritensis* ssp. *rubens*), and schismus (*Schismus barbatus*), and may also include Devil's lettuce (*Amsinckia tessellata*), Booth's evening primrose (*Eremothera boothii*), desert candle (*Eriogonum inflatum*), valley lessingia (*Lessingia glandulifera*), and common phacelia (*Phacelia distans*).

Other saltbush scrub plant communities

Halophytic saltbush scrub communities occur on fine textured, poorly drained soils, often near playas or claypans. Three halophytic saltbush scrub communities that occur on Edwards AFB include:

Four-wing saltbrush scrub is characterized by stands of four-wing saltbush. Other shrubs in this community consist of shadscale, allscale, and cheesebush. This community occurs in the northeastern part of the survey area.

Mojave saltbush (*Atriplex spinifera*) scrub is characterized by stands of Mojave saltbush. This plant community often occurs around small claypans, which occur in the northwestern, west-central and northeastern parts of the study area.

Shadscale scrub is characterized by stands of shadscale shrubs, along with some Mojave saltbush and four-wing saltbush. Other species found in this community include cheesebush, spiny hopsage, and rubber rabbit brush. Grasses found in this community consisted of salt grass (*Distichlis spicata*), and alkali scanton (*Sporobolus airoides*). The DRECP plant communities map (CDFW 2013) does not show shadscale scrub in the study area. However, shadscale scrub exists in patches that are smaller than the mapping unit threshold adopted by the DRECP.

Creosote bush scrub

Creosote bush scrub occurs in a small patch in the northwestern corner of the survey area. This community generally consists of open stands of creosote bush that is associated with Cooper's goldenbush, rayless goldenhead, cheesebush, Nevada ephedra, winter fat, Anderson's desert thorn, rubber rabbitbrush, spiny horsebrush, and allscale. Grasses and forbs in this community are composed of schismus, Devil's lettuce, valley lessingia, Indian rice grass (*Stipa hymenoides*), red brome, and desert needle grass (*Stipa speciosa*). In general, white bursage (*Ambrosia dumosa*) is a co-dominant in this community

White bursage scrub

White bursage scrub occurs in the southwestern and northwestern corners of the survey area. White bursage is the characteristic species of this community and other shrubs would be similar to those noted for the Mixed Mojave scrub.

Joshua tree woodland

The Joshua tree woodland is characterized by a scattered overstory of Joshua trees and occurs in the southeastern part of the northern study area. The shrub community in this woodland in the study area tends to be composed of a mixed Mojave scrub or potentially allscale scrub.

Disturbed desert grassland

This community occurs in the northcentral part of the study areas, and consists of open grassy areas, lacking shrub cover and dominated by schismus. Other grasses and forbs include Russian thistle (*Salsola tragus*), cheat grass (*Bromus tectorum*), red brome, Devil's lettuce, red-stemmed filaree (*Erodium cicutarium*), valley lessingia, and dove weed (*Croton setiger*). These areas were apparently burned in the last decade (Ecorp 2013).

Playa

The Base Integrated Natural Resources Management Plan (INRMP; Edwards AFB 2008) defines playa as the three dry lake beds on the AFB (Rogers Dry Lake, Rosamond Dry Lake, and Buckthorn Dry Lake) and defines claypans for smaller unvegetated areas that may be seasonally inundated. The playa mapped in the study area does not include these large dry lakes and was mapped based on the definitions provided in the guidance documents for jurisdictional delineations; it is described in the *Jurisdictional Delineation Report for Edwards Air Force Base Solar Project* (Dudek 2017). Other claypans occur in the northwestern, west-central and northeastern parts of the survey area. The margin of claypans may contain some areas of saltgrass or alkali scanton. Mojave saltscale, shadscale, cheesebush, and Mojave indigo bush

(*Psorothamnus arborescens*) shrubs may also occur on the margins. There are several small claypans in the study area that are mapped as Mojave saltbush scrub.

Other – Other communities reported from the study area include creosote bush-white bursage (burrobush) scrub, rubber rabbit scrub, white bursage scrub (burrobush), salt grass flats, cheesebush scrub, green rabbitbush scrub, and tamarisk thickets.

At the time of the survey, forbs such as red-stemmed filaree, Booth's evening primrose (*Eremothera boothii*), Devil's lettuce (*Amsinckia tessellata*), and Valley lessingia were sparsely distributed, likely due to the time of year of the survey, and remnants of non-native grasses such as red brome (*Bromus madritensis* ssp. *rubens*), cheat grass, and schismus, as well as the native grass Indian rice grass (*Stipa hymenoides*), were common in many parts of the study area,

Table 1. Plant Community Acreages in Study Area

Plant Community	Acres
Allscale scrub	2221.1
Mojave saltbush scrub	110.8
Four-wing saltbush scrub	87.6
Joshua tree woodland	132.1
White bursage scrub	135.0
Creosote bush scrub	11.2
Disturbed desert grassland	334.2
Total	**3,032.0**

Soils

The soils on the project site include

- Sandy loams, mainly DeStanzo complex (85%)
- Fine sandy loams, Leuhman complex (8%); and
- Loamy sands: Cajon loamy sand (8%) and Helendale–Cajon complex (1%)

The Leuhman fine sandy loam and the Cajon loamy sand soils are considered hydric, which are soils "formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper" (Dudek 2017).

Project Site in Relation to MGS Historical Range

The project site is located in the southwestern part of the historical range of MGS. Numerous protocol surveys for MGS have been carried out in the region west of the western border of Edwards AFB between Rosamond and Mojave in the period 1998 to 2012, with no MGS occurrences reported (Leitner 2008, 2015). According to the CNDDB (CDFW 2018a), the nearest MGS record to the project site is as follows:

- Edwards AFB, 5 miles SE of Lookout Hill and 4.6 miles SSW of Brown Butte, between Bissell Hills and Rosamond Hills. This locality is approximately 3.8 miles southeast of the southern part of the study area and 2.5 miles southeast of the northern part of the study area. This record is from a 1994 MGS survey on Edward AFB. This and other

MGS survey records on Edwards AFB are examined in the subsection ‘MGS on Edwards AFB’ below.

Two CNDDB records outside of the Base in the vicinity of the study area are as follows:

- Rosamond, 100 meters east of Sierra Highway. Recht (1977) reported an unidentified number of MGS captures or sightings. This locality is approximately 4.9 miles south/southwest of the southern part of the study area.

- North side of Hwy 58, 0.6 mi. east of Rosamond Blvd (at Muroc Junction), west of North Edwards (town). 9 juveniles were captured in June 2010. This site is approximately 9.4 miles E/NE of the eastern boundary of the study area.

Project Site in Relation to MGS Habitat

The study site contains potentially suitable habitat for MGS. The soils on the site are sandy or loamy and the terrain is flat (<1 %), with elevations ranging from approximately 2,470 to 2,550 feet above mean sea level. MGS is known to occur in a number of habitat types throughout its range (Gustafson 1993), including the following:

- Joshua tree woodland, which includes Joshua trees scattered across the landscape at varying densities and in association with a variety of shrub species. This habitat, which is commonly known to support MGS, covers 132.1 acres in the study area.

- Mojave Creosote Scrub (dominated by creosote bush and burrobush. This habitat, which is known to support MGS on the Base, covers 11.2 acres in the survey area.

- Desert Saltbush Scrub: dominated by various species of saltbush (*Atriplex*). This is the dominant habitat on the project site. The saltbush scrub on the project site includes three species of saltbush: *Atriplex canescens*, *A. polycarpa*, and leafcover saltweed (*Stutzia covillei*). The dominant plant community in the study area is allscale scrub, which dominated by *A. polycarpa*.

- Desert Sink Scrub: similar to saltbush scrub, but sparser and growing on poorly drained soils with high alkalinity. This habitat does not occur on the study site.

- Desert Greasewood Scrub, with very sparse vegetation and generally located on valley bottoms and dry lake beds. This habitat does not occur on the study site; and

- Shadscale Scrub, which is dominated by *Atriplex confertifolia* and/or *A. spinescens.* The Mojave saltbush plant community, dominated by *A. spinescens*, covers 110.8 acres, located near the existing playa and smaller claypan areas. Shadscale (*A. confertifolia*) occurs as patches within the other saltbush scrub communities in the study area.

The site is located in an Off-Highway Vehicle (OHV) recreational zone on the Base. However, the habitats in the study area do not show heavy OHV-related impacts. OHV activity in the study area does not appear to have led to evidence of substantial disturbance.

MGS on Edwards

MGS survey efforts on Edwards AFB span nearly 40 years from 1973 (Recht 1977) to 2012 (Tetra Tech 2012). Before 2003, MGS surveys were carried out on individual sites to inform Base projects and as part of applied MGS ecological studies. In 2003, a standardized monitoring program for MGS and other species was initiated with Habitat Quality Assessment (HQA) grids established across the Base. There are currently 61 HQA stations where MGS populations are monitored (Tetra Tech 2010). The MGS surveys at the HQA and non-HQA sites involved surveys on five consecutive days using 100-trap rectangular grids with 35-meter spacing, or 96-trap 'web' grids in the spring when MGS were active. The 1994 MGS survey on the Base was carried out over two five-days sessions per grid, but all other surveys followed a single five-day survey duration.

Table 3 summarizes the results of MGS surveys that occurred between 1989 and 2012, separating the results from four nested areas within Edwards AFB in decreasing proximity to the solar project study area. MGS surveys for the period 1989 to 2012 yielded 200 MGS captures (excluding recaptures, as determined by the individual surveys). 98.5% of the MGS captures on Edwards AFB have occurred outside of the northwestern region of the Base, with the majority occurring south, southwest, and northeast of Rogers Dry Lake and locations in the eastern part of Edwards AFB. The history of MGS captures in the four nested areas is as follows:

- Within the boundary of the solar project study area (Figure 3, *Aerial Photo*) there have been two grid surveys (2008, 2011) with no MGS captures.

- Within 3.7 miles of the solar project survey area (and excluding the solar project study area), there have been two MGS captures on 19 grids in four survey years (1994, 2008, 2010, and 2011).

- Within the northwestern part of Edwards AFB, defined as the area north and west of Rosamond Blvd (and excluding the two previous areas) there was one MGS capture on 13 grids over four survey years (2005, 2008, 2010, 2012); and

- Within Edwards AFB, outside of the areas listed above, there were 197 MGS on 83 grids over 12 survey years (see Table 3 for years and other details).

Table 3. Summary of MGS Captures on Edwards Air Force Base								
Survey Year[1]	Total MGS Captures[2]	Grid[3]	Location	Project Survey Area[4]	Within 3.7 miles of survey area[5]	Northwest Edwards region[6]	RDL and other areas[7]	Habitats[8]
1988[9]	19	Pre-HQA (visual surveys by O'Farrell, CNDDB)	about 5 mi WSW of Boron, E of Rogers Dry Lake; northeast Rogers Dry Lake, 2 Mi ENE of North Base,	No grids in survey area	No grids within 3.7 miles of survey area	No grids in NW Edwards region	19 MGS 3 locations N and NE of RDL	White bursage scrub, possibly w/ Joshua tree woodland, Dunes, Mojave saltbush scrub, Shadscale scrub
1989	17	Pre-HQA, 3 grids	Northern edge of Rogers Dry Lake (RDL)	No grids	No grids	No grids	17 3 grids	Shadscale scrub, Mojave saltbush scrub, Joshua tree woodland, alkali sink scrub/alkali meadow (insufficient information to determine a plant community for sink scrub areas)
1992	9	Pre-HQA Number of grids unknown	Complex Charlie 1, south of Rogers Dry Lake (RDL)	No grids	No grids	No grids	9 11 grids[10]	Creosote bush/white bursage scrub
1994	20	Pre-HQA	5 northern grids: north of RDL; 10 southern grids: south of RDL; 10 western: grids: between Rosamond and Bissell Hills in northwest part of Base	No grids	10 grids 2 MGS in western grid W-6, approx. 2.6 miles south of eastern part of project site	No grids	14 15 grids Northern (N-2): 1 MGS Southern: 13 MGS	Northern grids: arid phase saltbush scrub Southern grids: mostly halophytic saltbush scrub, with some Joshua Tree woodland, dunes, claypans. Western grids: mostly creosote bush scrub
2000	4	Pre-QAC Single grid at OB/OD site, PIRA	Southeastern southern edge of RDL (no map, but 11S 426706E, 38544684N	No grids	No grids	No grids	4 1 grid	Joshua Tree woodland, understory of creosote bush
2002	7	Pre-HQA S-9 (7 MGS) "Vortac" (0 MGS)	S-9: southeast of RDL Vortac: northeast of RDL	No grids	No grids	No grids	7 2 grids	No data
2003	4	HQAs 17, 50, 59	east of RDL	No grids	No grids	No grids	4 3 grids	Joshua tree woodland, creosote (HQA 17) Creosote bush scrub/white bursage (HQA 50, 59)
2004	29	HQAs 5, 6, 18, 26, 30, 31, 37, 38, 44, 46, 47	east of RDL	No grids	No grids	No grids	29 11 grids	Joshua tree woodland with allscale scrub understory creosote bush/white bursage scrub, allscale scrub
2005	0	HQAs 9, 14, 22, 23,	11 grids west of RDL	No grids	No grids	0 MGS	0	Grids in the NW area of Base were mainly

Table 3. Summary of MGS Captures on Edwards Air Force Base								
Survey Year[1]	Total MGS Captures[2]	Grid[3]	Location	Project Survey Area[4]	Within 3.7 miles of survey area[5]	Northwest Edwards region[6]	RDL and other areas[7]	Habitats[8]
		29, 45, 48, 52, 54, 59, 60	and east of Rosamond Lake			grids 9, 14, 22, 23, 29	6 grids	creosote bush scrub with grid apparently a four-winged saltbush scrub
2008	0	HQAs 1, 7, 8, 12, 13, 16, 19, 20, 21, 27	Total of 10 grids in NW part of Base	0 MGS HQAs 7, 12	0 MGS grids 8, 13, 19, 20, 21 from 0.25 to 1.7 mi from site	0 MGS: grids 1, 16, 27	No grids	Grids north of Rosamond Lake and south of survey area are predominantly creosote bush scrub, or creosote bush/white bursage scrub.
2009	22	HQAs 2, 3, 4, 10, 11, 15, 17, 24, 25, 36, 41, 49, 50	13 grids, east of RDL	No grids	No grids	No grids	22 13 grids	Four-wing saltbush scrub (grid 11, 1 MGS) Creosote bush/white bursage scrub (grid 17, 9 MGS; grid 25, 6 MGS; grid 41, 3 MGS) Allscale scrub (grid 2, 2 MGS) Joshua tree woodland w/ understory of a cheesebush /Lycium scrub (grid 36, 1 MGS)
2010	4	Additional to HQAs 12 grids (S1-S12)	6 grids around RDL, 6 in NW part of Base	No grids	0 MGS S-7, S-8, approx. 0.75 and 0.5 miles from survey area	1 MGS in S10-12, 7 mi NE of survey area 0 MGS in S-1, S-5, S-11	3 6 grids	Four-wing saltbush scrub (halophytic saltbush scrub) with creosote bush scrub (S10-12) Creosote bush scrub (S 10-9, 1 MGS) Joshua tree woodland with understory of four-wing saltbush scrub (halophytic saltbush scrub (S 10-6, 1 MGS) Mojave saltbush scrub (probable) (S 10-10, 1 MGS)
2011	38	HQAs 8,12, 13,43,45,48,53,54,60, 61	3 grids in project region, 7 grids south of RDL	0 HQA 12	0 HQAs 8, 13 from 0.25 to 0.75 mi from survey area	0 No grids	38 7 grids	Four-wing saltbush scrub (halophytic saltbush scrub) w/ Joshua tree woodland (grid 61, 35 MGS) Mojave saltbush scrub (grid 43, 3 MGS)
2012	46	HQAs 1, 2, 10, 17, 24, 25	5 grids around RDL, 1 grid in NW part of Base	0 No grids	0 No grids	0 MGS grid 1, estimated 8.25 miles ENE of survey area	46 5 grids	Allscale scrub (grid 2, 17 MGS; grid 10, 3 MGS) Creosote bush/white bursage scrub (grid 17, 16 MGS; grid 25, 10 MGS)
Totals	**200**			**0 MGS** **3 grids: 2008 (2), 2011 (1)**	**2 MGS** **19 grids** **1994 (10), 2008 (5), 2010 (2) & 2011 (2)**	**1 MGS** **13 grids** **2005 (5), 2008 (3); 2010 (4); 2012 (1)**	**197 MGS** **83 grids** **1992 (9)** **1994 (18)** **2000 (4)** **2002 (7)**	

Table 3. Summary of MGS Captures on Edwards Air Force Base								
Survey Year[1]	**Total MGS Captures**[2]	**Grid**[3]	**Location**	**Project Survey Area**[4]	**Within 3.7 miles of survey area**[5]	**Northwest Edwards region**[6]	**RDL and other areas**[7]	**Habitats**[8]
							2002 (7 MGS), 2003 (4), 2004 (29), 2005 (6), 2009 (22), 2010 (3), 2011 (38), 2012 (46)	

1, year of MGS survey (may differ from year of report)
2, total unique MGS captures
3, locations of MGS occurrences, include Habitat Quality Assessment (HQAs) grids; "pre-HQA" refers to grids for surveys that pre-dated the HQA system. The 1989 occurrences are visual observations from the California Natural Diversity Database.
4, MGS surveys within the solar project site
5, MGS surveys outside of the project site but within the maximum known dispersal distance of MGS (6 km)
6, MGS surveys outside of the areas identified in 4 and 5, but within the northwestern region of Edwards AFB, defined as area north and west of Rosamond Blvd.
7, MGS surveys outside of areas defined in 4,5,6. Many of these are in the vicinity of Rogers Dry Lake (RDL), north of Rosamond Lake, and eastern Edwards AFB.
8, plant communities of recorded MGS occurrences, based on plant species identified in the MGS survey report and location of grids relative to Figure 4, *Plant Communities*.
9, Visual observations in 1998 from the CNDDB are not included in the Totals row at bottom of table
10, Number of grids for this survey was inferred from a figure in the report.

The MGS survey efforts summarized in Table 3 have occurred extensively across the Base, at the 61 HQAs shown in Figure 5, *MGS Survey/Monitoring Locations* and at 49 non-HQA locations. The northwestern part of the Base (defined in this report as the area north and west of Rosamond Blvd) received approximately 30% of the MGS live-trapping survey effort and yielded 1.5% of the MGS captures. The grids on the rest of the Base (south and east of Rosamond Blvd) received approximately 70% of the MGS survey effort and 98.5% of the MGS captures.

There are three MGS occurrences from live-trapping studies in the northwestern part of the Base described in Table 3: no MGS occurrences in the study area, two occurrences in the area within 3.7 miles of the study area and one occurrence within the northwestern part of the Base (north and west of Rosamond Blvd). The three MGS captures occurred in habitats dominated by creosote bush scrub and four-wing saltbush scrub (a halophytic saltbush scrub).

To assess the correlation between MGS capture rates in the northwestern part of the Base with MGS capture rates elsewhere on the Base, the data in Table 3 were compared for years when MGS were captured inside and outside the project region in the same year. The results show that when captures occurred inside and outside the project region in 1994, 2010, 2011, and 2012, 38% of the MGS survey effort occurred in the northwestern part of the Base and yielded 3% of the MGS captures; 62% of the survey effort occurred elsewhere on the Base and yielded 97% of the MGS captures. These results are consistent with the MGS occurrences across all survey years (see previous paragraph), and indicate that sparse MGS captures in the northwestern part of the Base and high MGS captures in the eastern part of the Base are consistent across years that show large differences in total MGS captures.

The survey data indicate that MGS occurs in at least part of the northwestern part of the Base, but is uncommon to rare there. The majority of MGS captures have occurred in the eastern part of the Base, from the vicinity of Rogers Dry Lake, areas east of the lake, including the Precision Impact Range Area (PIRA), the Air Force Research Laboratory (AFRL), and areas east of the AFRL.

Table 3 identifies the likely plant communities for the grids surveyed based on the dominant shrub species listed in the survey reports. The plant communities that support many of the MGS captures on Edwards AFB are Joshua tree woodland, four-wing saltbush scrub, and creosote bush scrub. MGS have also been recorded in cheesebush /Lycium scrub, shadscale scrub, Mojave saltbush scrub, and one location with apparent allscale scrub. The saltbush scrub habitats known to support MGS on Edwards AFB appear to be mainly the “halophytic saltbush scrub” rather than the “xerophytic saltbush scrub that typically dominates in the western part of the Base.

MGS Captures Outside Edwards AFB

Leitner (2008, 2015) summarized the results of regional and protocol MGS surveys throughout the species range for the periods 1998-2007 and 2008-2012. In the 1998-2007 period, four surveys were carried out immediately west of the Base, east and southeast of Rosamond. These protocol surveys (15 days of trapping distributed in three periods March 15-April 15, May 1-31, and June 15-July 15), yielded no MGS captures. More than 20 protocol surveys carried out south and southwest of Mojave also yielded no MGS captures. In the period 2008-2012, three protocol surveys outside the western border of the Base in the Rosamond vicinity and 12 protocol surveys south of Mojave yielded no MGS captures. Figure 6, *MGS survey results for the period 1998-2007*, and Figure 7, *MGS survey results for the period 2008-2012*, show the locations of these MGS surveys in the project region.

4. Discussion

Mohave ground squirrel habitat suitability

The study area is relatively flat with sandy and loamy soils where MGS are able to dig burrows. The vegetation in the study area is predominately allscale scrub (approximately 73% of the plant cover), a xerophytic saltbush community. The plant species in the study area comprise perennial plants such as saltbush species, winter fat, hop-sage, Anderson's desert thorn, rubber rabbitbrush, rayless goldenhead, cheesebush, Nevada ephedra, and forbs such as red-stemmed filaree, golden linanthus, and introduced and native grasses. Taken together, the allscale scrub and associated understory of shrubs and forbs potentially provide suitable forage for MGS. The study area contains only small areas of the preferred MGS habitats that support the core population of MGS on Edwards AFB around Rogers Dry Lake and the eastern part of the Base. These include Joshua Tree woodland (132.1 acres in the study area), creosote bush scrub (11.2 acres), and four-wing saltbush scrub (87.6 acres). Nonetheless, the study area is considered potentially suitable habitat for MGS, but of low quality. The acreage of suitable habitat in the solar project study area would exclude the disturbed desert grassland habitat (334.2 acres) and the large playa on the site (8.56 acres), bringing the area of suitable habitat to 2,689.2 acres.

The review of MGS live-trapping results (summarized in Table 3) found that the northwestern part of the Base accounted for 1.5% of the MGS captures despite receiving 30% of the trap effort. There have been no MGS captures in the three HQA grids that occur in the solar project study area. These trapping data indicate that MGS are either absent from the HQAs within the study area or that they occur there in low numbers. The rarity of MGS captures in the northwestern part of the Base reflects the low probability of MGS occurrence there, which has been acknowledged in reports of previous MGS surveys there (Tetra Tech 2010, 2012). The rarity of MGS occurrences there, and in Rosamond/Mojave areas outside the Base, is probably related to the location on the extreme western edge of the species' range.

Habitat Corridors

The MGS population around Rogers Dry Lake and the eastern part of Edwards AFB show potential connections to areas north of the Base that could function as an important wildlife movement/landscape corridor for the species. Leitner (2008) concluded that connectivity between the Edwards AFB core population around Rogers Dry Lake and core populations north of the Base would likely occur in the high quality habitat along SR-395 that includes the eastern side of the Base. The study area is located in the northwestern part of Edwards AFB, and is not located within or near an area that would serve as a linkage corridor for MGS.

Mitigation Measures

The habitat in the solar project study area is potentially suitable for MGS but the occurrence records in the project region inside and outside the Base support the conclusion that there is low potential for MGS in these areas. Protocol surveys would confirm presence or absence, but would be costly to implement. If MGS presence is assumed on the project site, the project would be required to obtain an Incidental Take Permit from the CDFW and mitigate the potential impact to MGS, a state-threatened species. The mitigation would likely occur through payment of fees for the purchase and management of occupied MGS habitat in the Edwards AFB region. The replacement ratio would be determined in consultation with CDFW. The low number of MGS occurrences in the study area and the opportunity to conserve high quality MGS habitat offsite would be considerations in an agreement on the replacement ratio.

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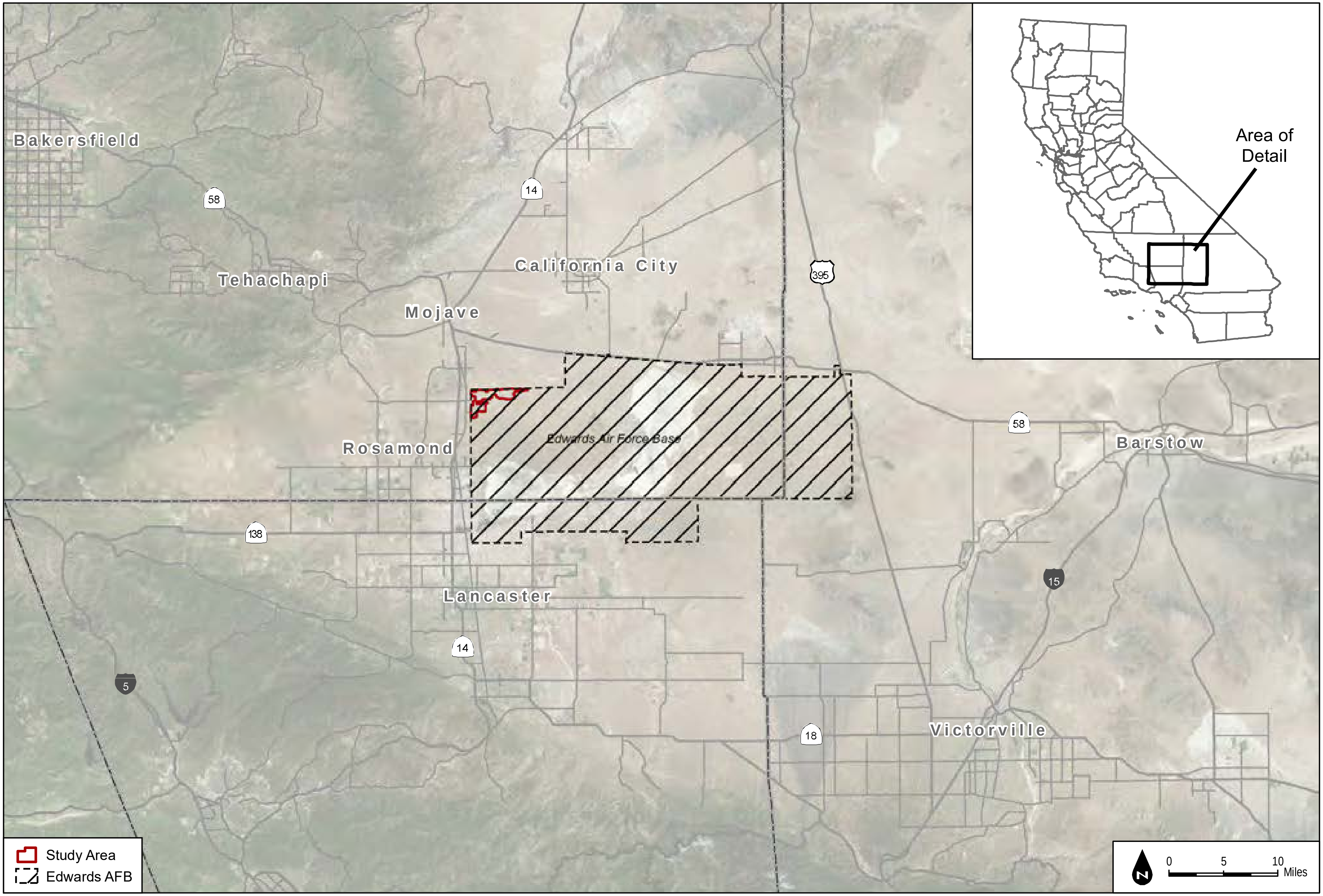
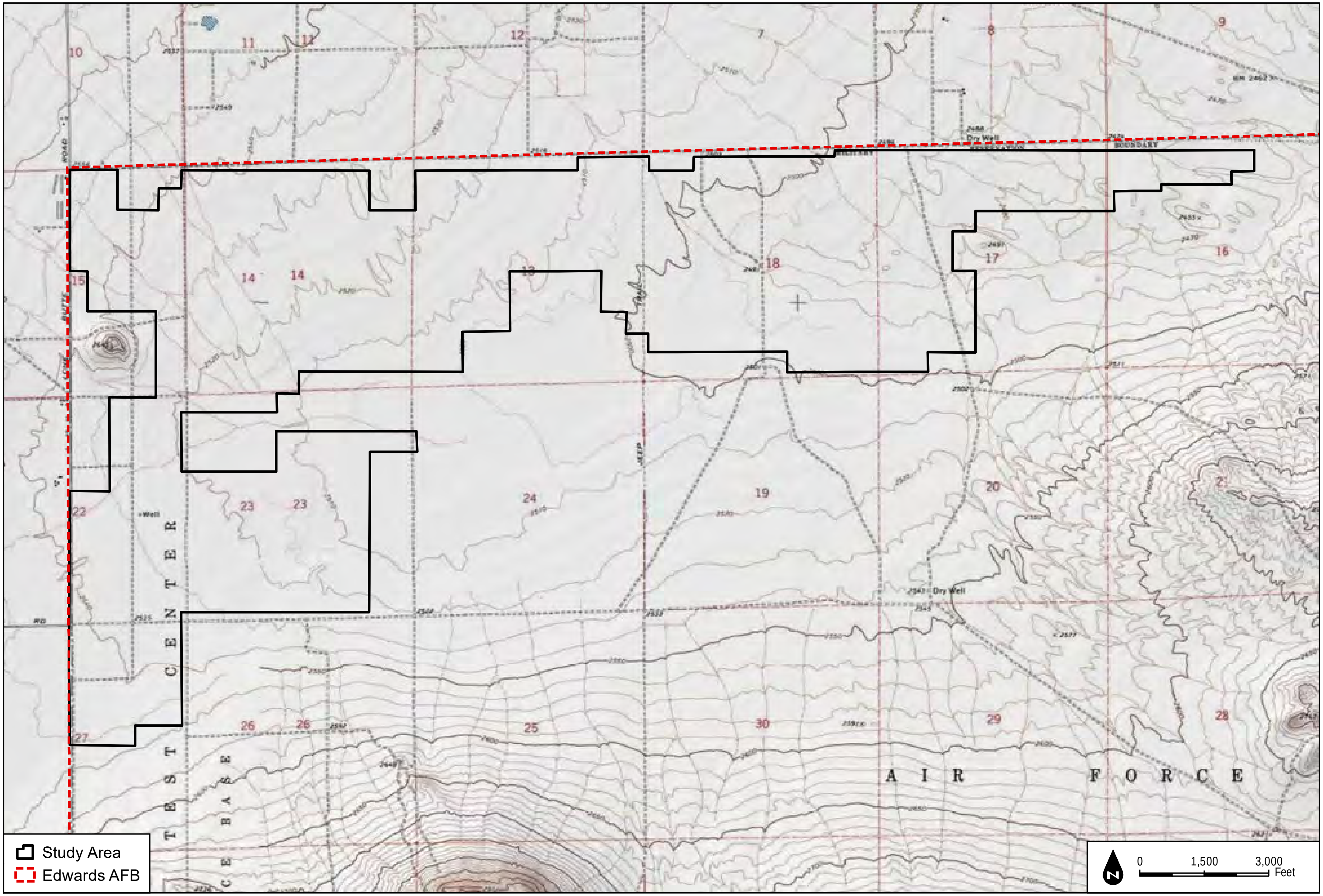
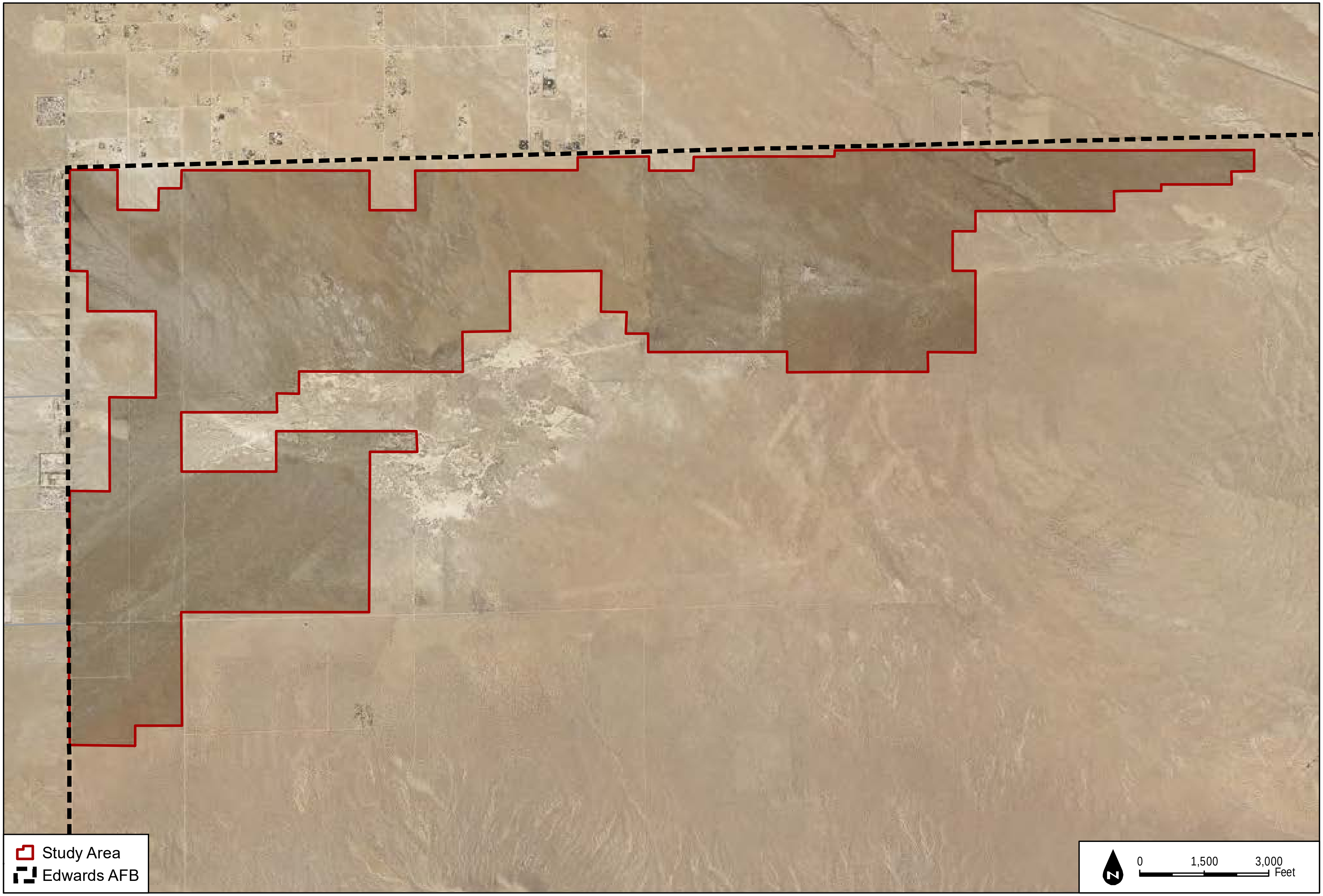


Figure 1: REGIONAL LOCATION



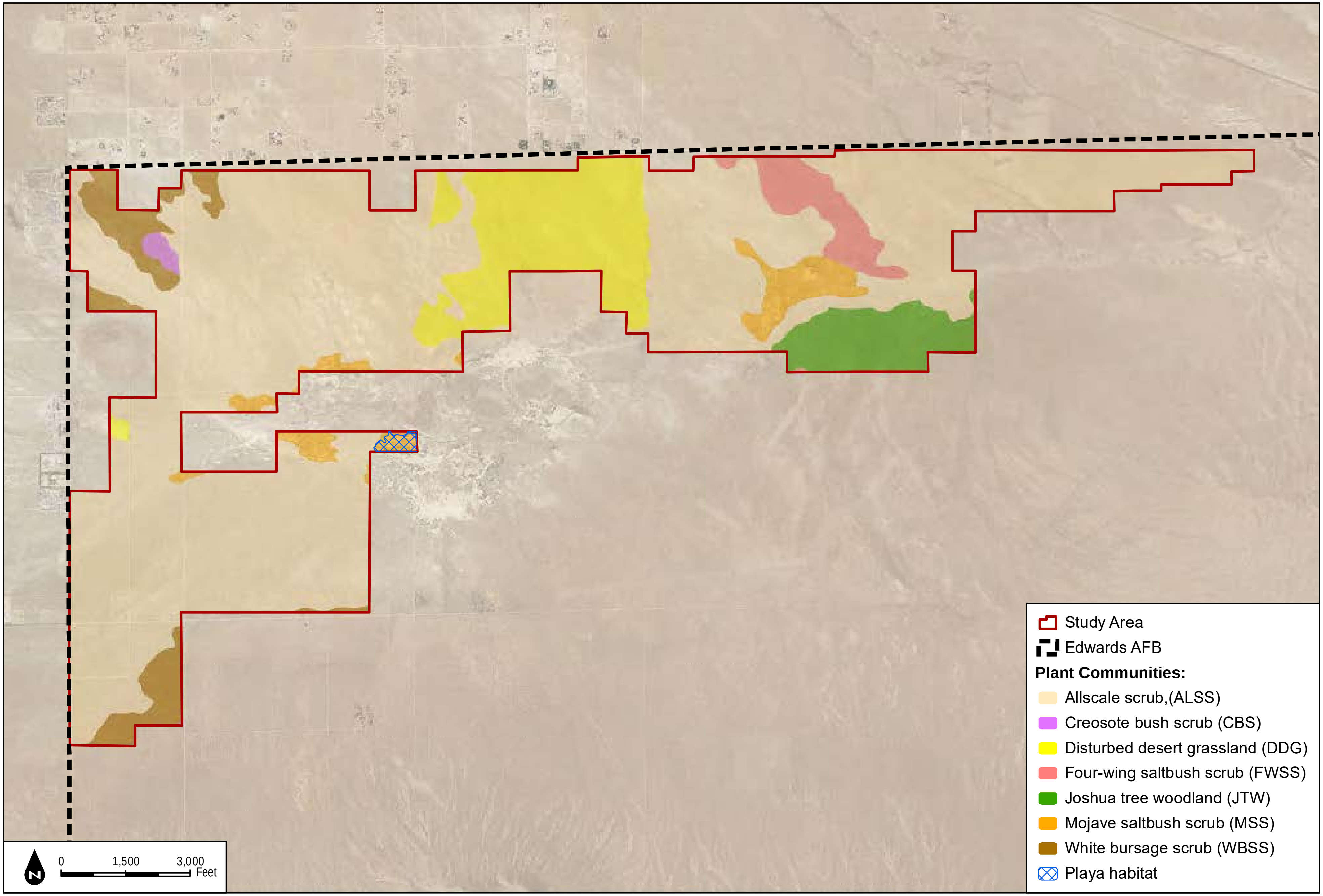
SOURCE: USGS 7.5-Minute Series Bissell, Soledad Mountain Series Quadrangles.

Figure 2: TOPOGRAPHIC MAP



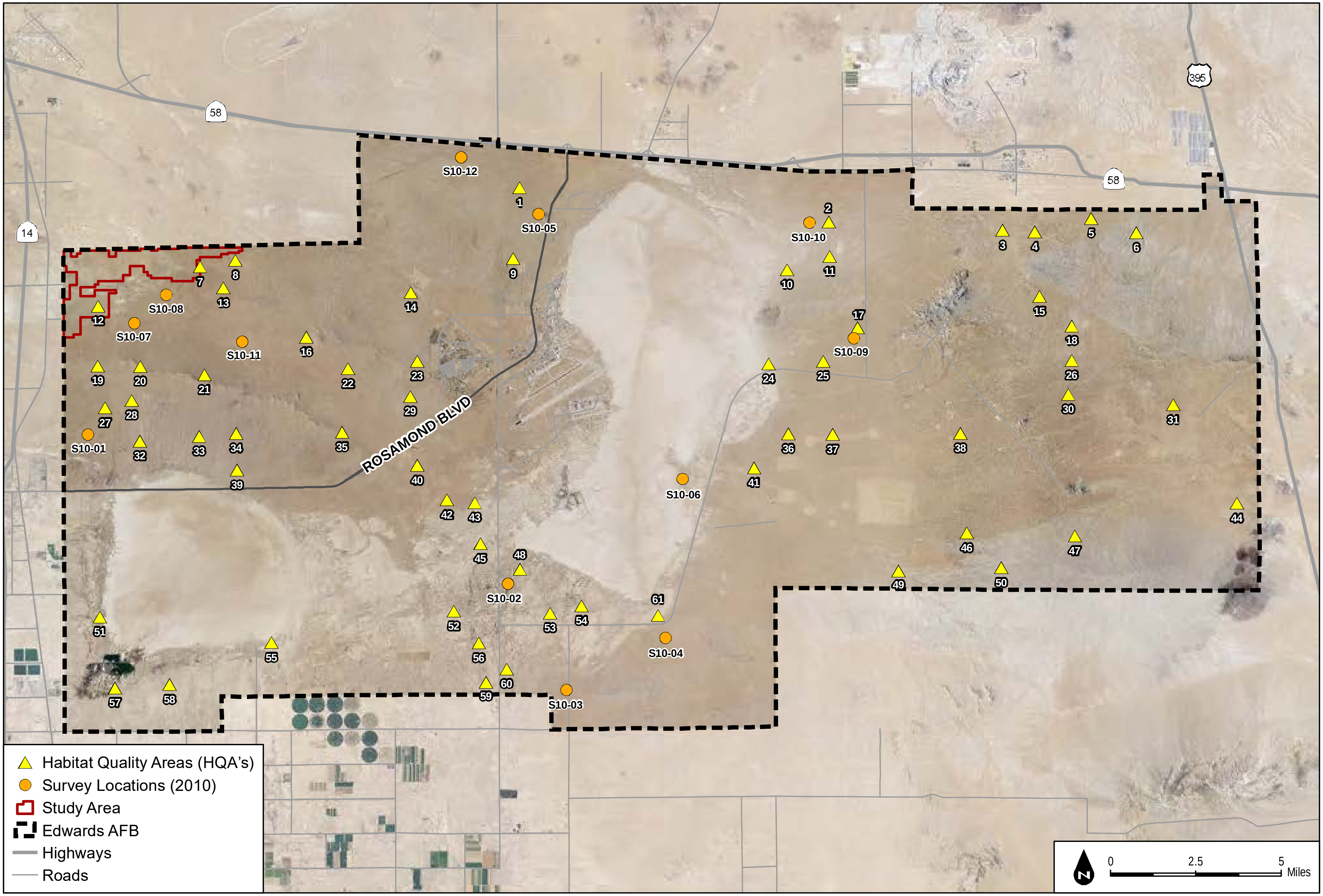
SOURCE: BLM; NAIP, 2016

Figure 3: AERIAL PHOTO



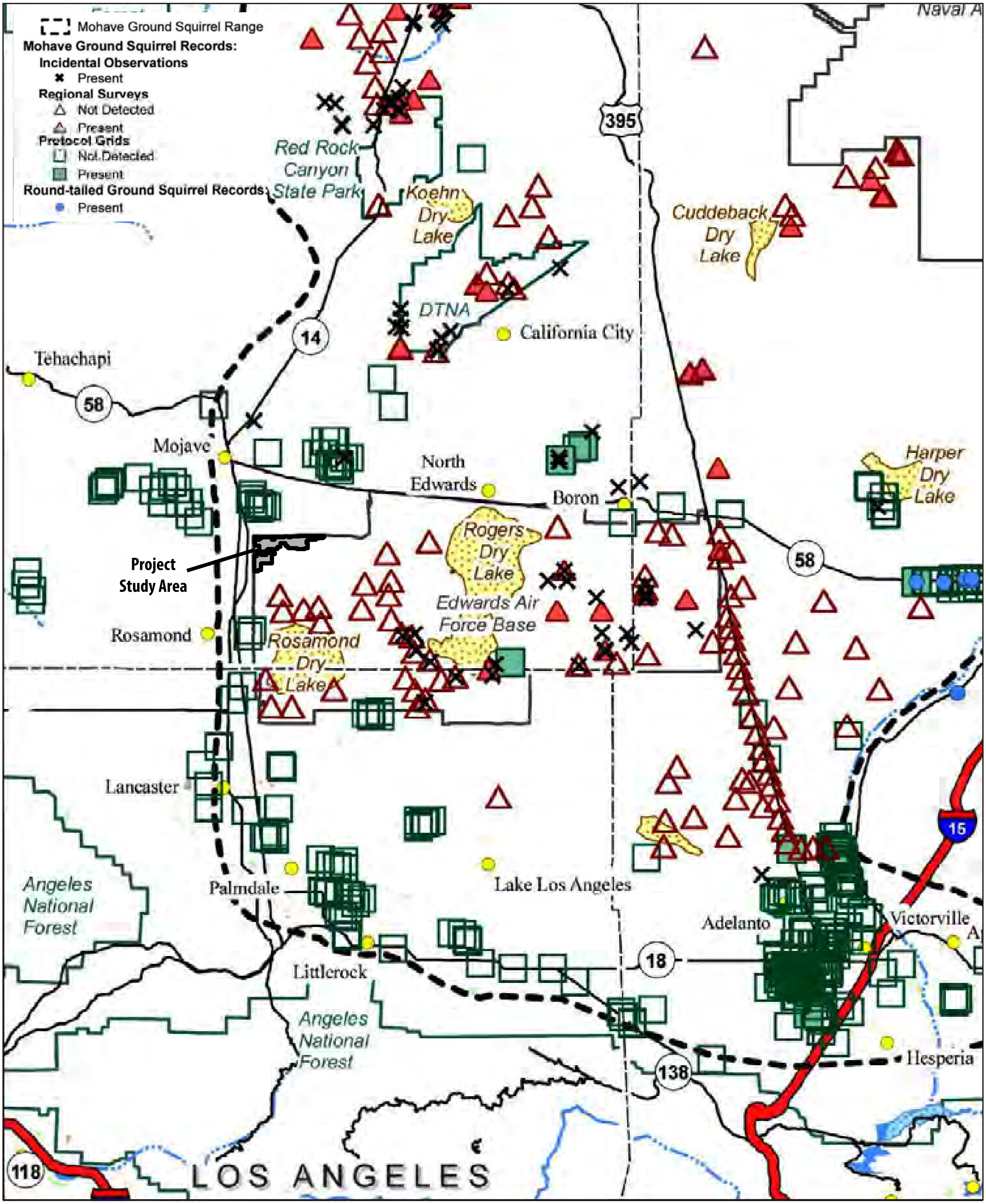
SOURCE: Plant Communities - DRECP/CDFW, 2013; Disturbed desert annual grassland - ECORP, Dec. 2013; BLM; NAIP, 2016

Figure 4: PLANT COMMUNITIES



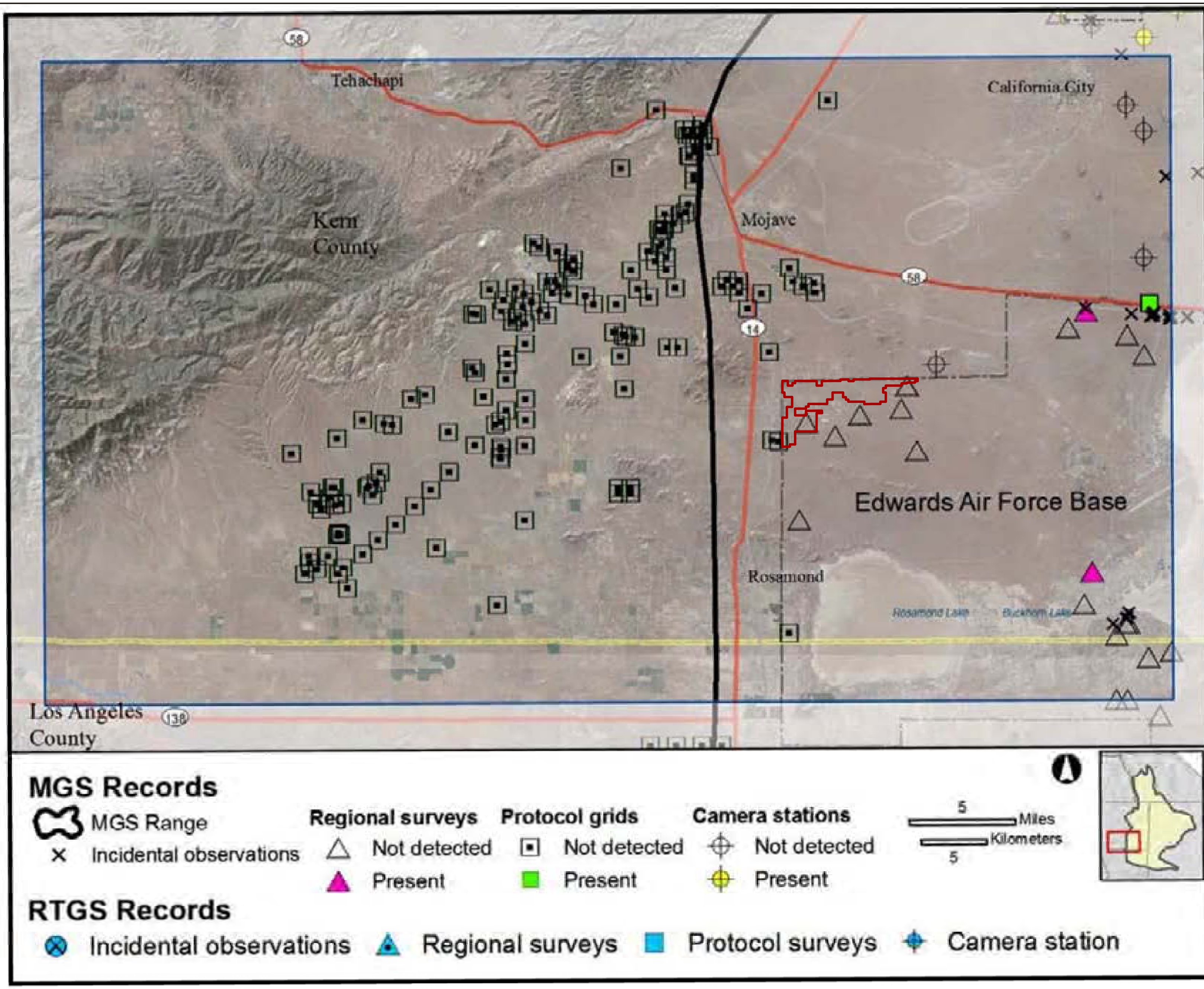
SOURCE:L Tetra Tech, 2010, 2011; BLM; NAIP, 2016

Figure 5: MOHAVE GROUND SQUIRREL SURVEY/MONITORING LOCATIONS



SOURCE: Lietner (2008)

Figure 6: MGS Survey Results for the Period 1998-2007



SOURCE: Lietner (2015)

Figure 7: MGS Survey Results for the Period 2008-2012

Appendix 1. Site photos

Photo 1. Allscale scrub habitat, view looking northwest

Photo 2. Allscale scrub habitat, view looking west/northwest


Photo 3. Mohave saltbush scrub habitat, view looking west


Photo 4. Burrowbush scrub (foreground), creosote bush scrub (background), view looking west


Photo 5. Mixed Mojave scrub, view looking west


Photo 6. Joshua tree woodland, view looking west


Photo 7. Disturbed desert grassland, view looking northeast


Photo 8. Claypan area in northwestern corner of southern study area, view looking west


Photo 9. Claypan area in northeastern part of northern study area, view looking northeast