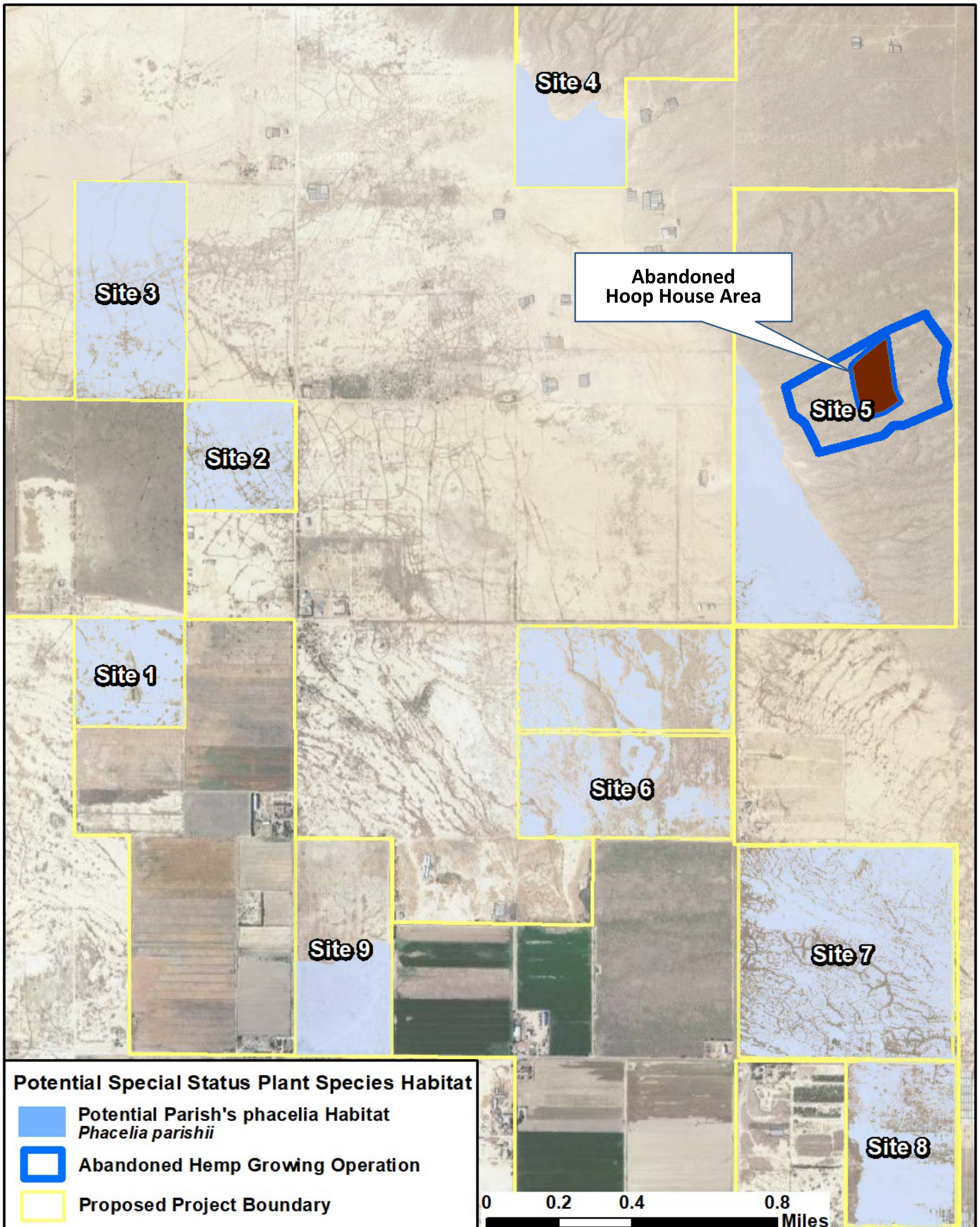

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8MINUTE SOLAR ENERGY

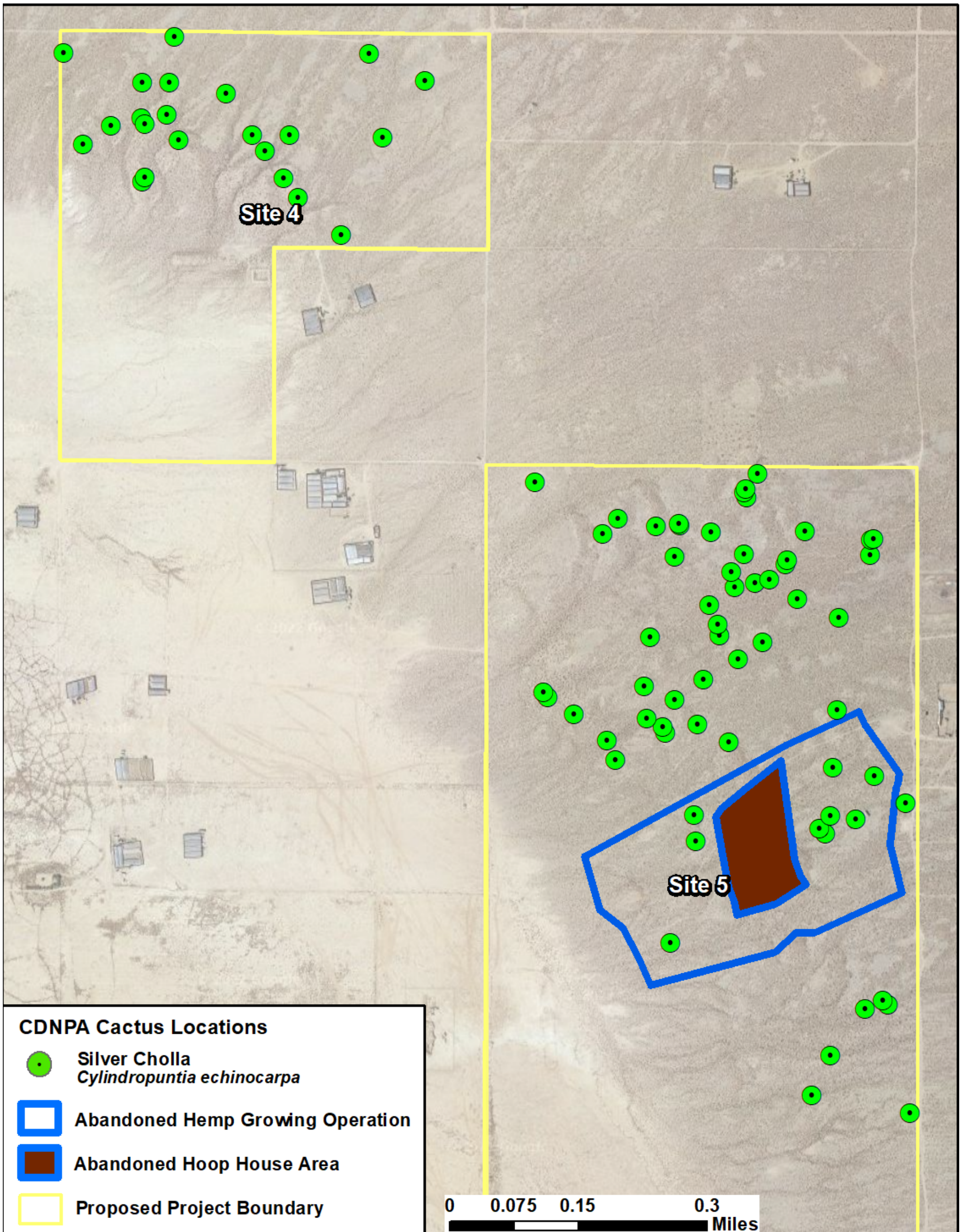
Figure 8

Proposed Sienna Solar and Storage Project
Potential Parish's phacelia Habitat
Location Map

Aerial Background: 1 October 2020 WV04 Vivid DigitalGlobe/Google Earth Imagery ESRI ArcGIS Basemap Layer

Appendix G

CDNPA Cactus Location Map
Proposed Sienna Solar and Storage Project



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8MINUTE SOLAR ENERGY

Figure 9

Proposed Sienna Solar and Storage Project
CDNPA Cactus Location Map

Aerial Background: 1 October 2020 WV04 Vivid DigitalGlobe/Google Earth Imagery ESRI ArcGIS Basemap Layer

Table 11 CDNPA Species –Silver Cholla (*Cylindropuntia echinocarpa*) Locations

Name	Zone	Easting	Northing	Elevation		Name	Zone	Easting	Northing	Elevation
S4-CE-001	11 N	509537	3819869	2872 ft		S5-CE-021	11 N	510145	3818936	2906 ft
S4-CE-002	11 N	509615	3820051	2879 ft		S5-CE-022	11 N	510141	3818946	2906 ft
S4-CE-003	11 N	509695	3820158	2888 ft		S5-CE-023	11 N	510206	3818951	2902 ft
S4-CE-004	11 N	509589	3820208	2902 ft		S5-CE-024	11 N	510110	3818962	2867 ft
S4-CE-005	11 N	509457	3819938	2867 ft		S5-CE-025	11 N	510163	3818997	2902 ft
S4-CE-006	11 N	509429	3819975	2866 ft		S5-CE-026	11 N	509974	3818971	2862 ft
S4-CE-007	11 N	509395	3820026	2898 ft		S5-CE-027	11 N	509925	3819002	2860 ft
S4-CE-008	11 N	509440	3820056	2870 ft		S5-CE-028	11 N	509916	3819011	2861 ft
S4-CE-009	11 N	509371	3820056	2870 ft		S5-CE-029	11 N	510105	3819023	2871 ft
S4-CE-010	11 N	509322	3820134	2862 ft		S5-CE-030	11 N	510217	3819036	2871 ft
S4-CE-011	11 N	509164	3819969	2883 ft		S5-CE-031	11 N	510282	3819073	2891 ft
S4-CE-012	11 N	509169	3819976	2883 ft		S5-CE-032	11 N	510328	3819105	2873 ft
S4-CE-013	11 N	509232	3820047	2876 ft		S5-CE-033	11 N	510471	3819152	2879 ft
S4-CE-014	11 N	509210	3820094	2875 ft		S5-CE-034	11 N	510247	3819118	2882 ft
S4-CE-015	11 N	509215	3820154	2864 ft		S5-CE-035	11 N	510244	3819138	2881 ft
S4-CE-016	11 N	509225	3820240	2874 ft		S5-CE-036	11 N	510117	3819114	2880 ft
S4-CE-017	11 N	509164	3820154	2891 ft		S5-CE-037	11 N	510228	3819175	2888 ft
S4-CE-018	11 N	509163	3820088	2877 ft		S5-CE-038	11 N	510275	3819209	2861 ft
S4-CE-019	11 N	509169	3820077	2888 ft		S5-CE-039	11 N	510314	3819216	2862 ft
S4-CE-020	11 N	509105	3820073	2864 ft		S5-CE-040	11 N	510341	3819222	2862 ft
S4-CE-021	11 N	509053	3820039	2887 ft		S5-CE-041	11 N	510393	3819187	2886 ft
S4-CE-022	11 N	509017	3820210	2865 ft		S5-CE-042	11 N	510530	3819269	2823 ft
S5-CE-001	11 N	510604	3818222	2884 ft		S5-CE-043	11 N	510531	3819297	2884 ft
S5-CE-002	11 N	510419	3818256	2885 ft		S5-CE-044	11 N	510535	3819299	2908 ft
S5-CE-003	11 N	510455	3818331	2874 ft		S5-CE-045	11 N	510371	3819252	2834 ft
S5-CE-004	11 N	510519	3818418	2878 ft		S5-CE-046	11 N	510374	3819259	2834 ft
S5-CE-005	11 N	510562	3818426	2911 ft		S5-CE-047	11 N	510407	3819313	2803 ft
S5-CE-006	11 N	510553	3818434	2905 ft		S5-CE-048	11 N	510293	3819271	2842 ft
S5-CE-007	11 N	510154	3818542	2863 ft		S5-CE-049	11 N	510269	3819237	2877 ft
S5-CE-008	11 N	510203	3818732	2873 ft		S5-CE-050	11 N	510163	3819266	2837 ft
S5-CE-009	11 N	510199	3818782	2875 ft		S5-CE-051	11 N	510028	3819309	2758 ft
S5-CE-010	11 N	510445	3818747	2872 ft		S5-CE-052	11 N	510057	3819337	2874 ft
S5-CE-011	11 N	510434	3818756	2873 ft		S5-CE-053	11 N	510128	3819322	2767 ft
S5-CE-012	11 N	510454	3818780	2878 ft		S5-CE-054	11 N	510172	3819325	2778 ft
S5-CE-013	11 N	510503	3818774	2866 ft		S5-CE-055	11 N	510170	3819327	2777 ft
S5-CE-014	11 N	510596	3818804	2884 ft		S5-CE-056	11 N	510231	3819312	2880 ft
S5-CE-015	11 N	510537	3818855	2885 ft		S5-CE-057	11 N	510298	3819376	2727 ft
S5-CE-016	11 N	510459	3818871	2881 ft		S5-CE-058	11 N	510293	3819386	2726 ft
S5-CE-017	11 N	510467	3818979	2915 ft		S5-CE-059	11 N	510296	3819393	2722 ft
S5-CE-018	11 N	510265	3818918	2923 ft		S5-CE-060	11 N	510318	3819421	2870 ft
S5-CE-019	11 N	510052	3818885	2911 ft		S5-CE-061	11 N	509901	3819405	2871 ft
S5-CE-020	11 N	510035	3818921	2904 ft						

Datum: WGS 84 UTM 11N

Appendix H

Invasive Weed Repository Tables and Location Map
Proposed Sienna Solar and Storage Project

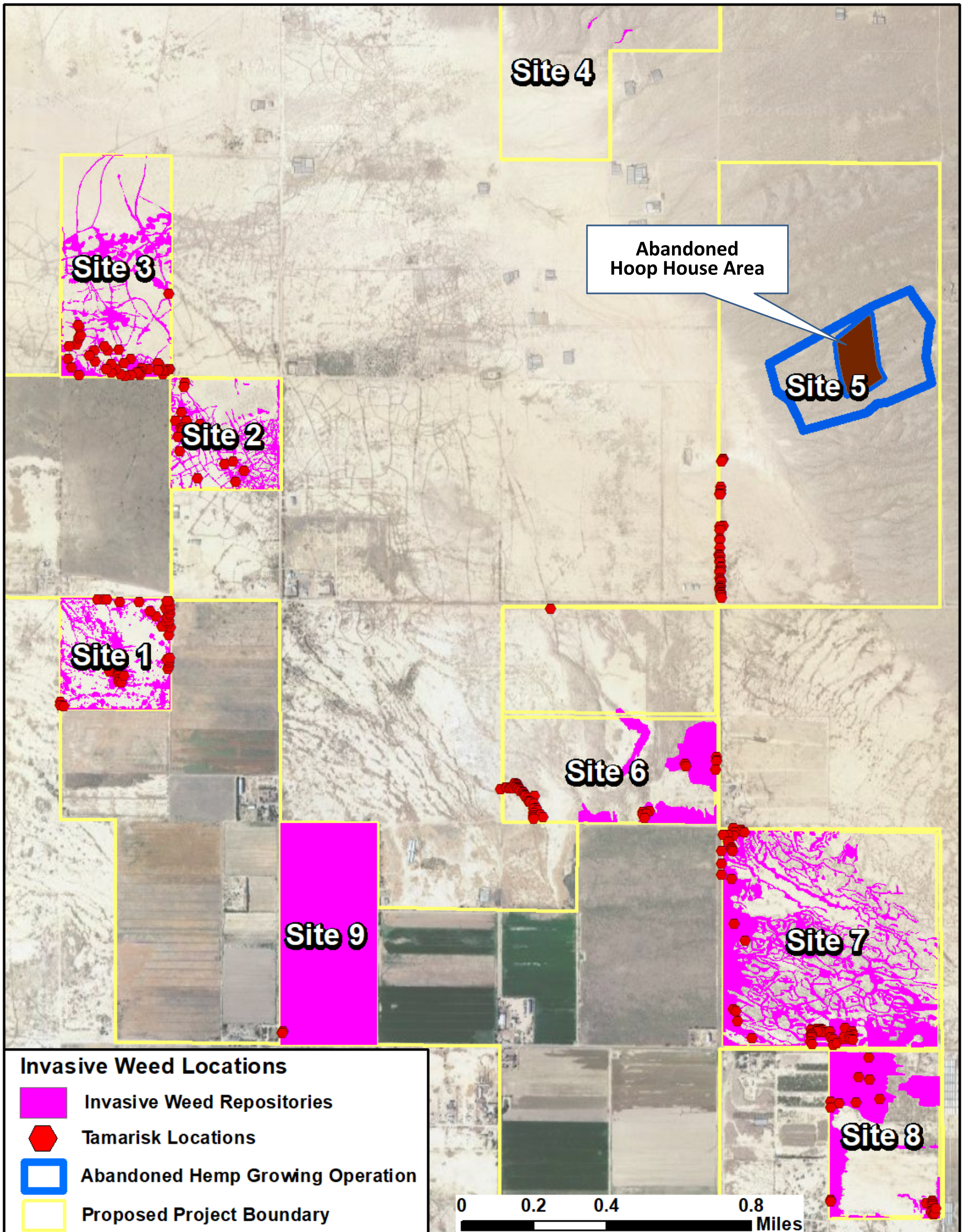

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Figure 10
Proposed Sienna Solar and Storage Project
Invasive Weed Repository and
Tamarisk Location Map

Aerial Background: 1 October 2020 WV04 Vivid DigitalGlobe/Google Earth Imagery ESRI ArcGIS Basemap Layer

Appendix E. Jurisdictional Delineation Report

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Sienna Solar and Storage Project

Jurisdictional Waters and Wetlands Delineation Report

prepared for

99MT 8me, LLC
211 Sutter Street, 6th Floor
San Francisco, California 94108
Contact: Erec DeVost
Via email: edevost@8minutenergy.com

prepared by

Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, California 93001

March 2023

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Appendices

Executive Summary

Rincon Consultants, Inc. (Rincon) conducted a jurisdictional delineation for the proposed Sienna Solar and Storage Project (Project) located approximately 3.5 miles north of the unincorporated community of Lucerne Valley in San Bernardino County, California. The delineation was conducted to determine the location and extent of resources potentially subject to the jurisdiction of the California Department of Fish and Wildlife (CDFW) and Regional Water Quality Control Board (RWQCB). Proposed impacts to potential CDFW and RWQCB jurisdictional features may be subject to the notification and permit requirements of the CDFW pursuant to Sections 1600 *et seq.* of the California Fish and Game Code (CFGC) and Porter-Cologne Act for the RWQCB.

Under Section 1602 of the CFGC, the CDFW regulates activities impacting the bed, bank or channel of any river, stream, or lake system that supports fish or wildlife. As part of Project scoping, planning, and design, this report was prepared to support CDFW consultation, notification, and permitting, as needed. The State Water Resources Control Board (SWRCB) and local RWQCB have jurisdiction over “waters of the State,” which are defined as any surface water or groundwater, including saline waters, within the boundaries of the state. The Porter-Cologne Act provides the State with very broad authority to regulate “waters of the State.” The Porter-Cologne Act has become an important tool with respect to the State’s authority over isolated waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file a dredge/fill application when there is no federal nexus, such as under Section 401 of the Clean Water Act (CWA).

The Project area drains to inland areas of California, specifically Lucerne Dry Lake, for which the U.S. Army Corps of Engineers (USACE) previously issued an Approved Jurisdictional Determination (AJD) stating that the tributaries and dry lake are not waters of the United States regulated under the CWA. Based on this determination, the USACE is not expected to assert jurisdiction over Lucerne Dry Lake and tributaries.

The majority of the Project area is situated within the historic bed of Lucerne Dry Lake. The lake is an area of low relief that is typically dry and only collects water in its lowest points during above average precipitation events. Based on review of current and historical aerial imagery and field observations, including recent Project-specific high-resolution aerial drone imagery, the dry lakebed is not ponded frequently, or for long durations. As noted above, the USACE assessed Lucerne Dry Lake in an AJD and found that it is a dry lake, not a traditional lake, due to the general lack of surface water precluding use for recreation or other purposes, including harvesting fish or shellfish. Due to major hydromodification in the watershed, primarily from road construction and maintenance, which completely block or severely restrict the flow of tributary ephemeral streams toward the lake, hydrologic inputs to the dry lake are very low. Any low-volume, short-duration ponding in the dry lakebed appears to primarily originate from onsite direct rainfall. Much of the dry lakebed is topographically planar and unvegetated and provides extremely limited value for wildlife. The dry lake does not support fish or other aquatic life.

The dry lakebed also contains numerous large polygonal cracks associated with geologic phenomena called desiccation polygons (fractures or fissures). These fissures commonly develop in clay playas/dry lakebeds in the arid west, including California and the Mojave Desert, and are attributed to water table retreat. These features have not been created by the flow of water, and do not exhibit characteristics typical of CDFW streams with typical bed and bank and channel features or indicators of fluvial activity. The fissures typically retain water in the low elevations of the fracture channels during periods of above average precipitation.

Based on the factors presented above, three retention basins and one seep within the dry lakebed were delineated as CDFW and RWQCB jurisdictional resources. The retention basins are used for agricultural runoff and the seep is likely a result of a broken agricultural pipe. To the north and west of the dry lakebed, 33 ephemeral streams are potentially under jurisdiction of the CDFW and RWQCB.

A total 8.34 acres and 91,251 linear feet of ephemeral streams were delineated in the Project area. Four retention basins were mapped, with three collectively containing 0.26 acre wetland waters of the state and one containing 0.14 acre non-wetland waters of the state. A small (40 square feet) isolated wetland containing cattails (*Typha domingensis*) was observed on site, originating near an assumed agricultural pipe leak.

Introduction

This report details the findings of the jurisdictional delineation conducted by Rincon Consultants, Inc. (Rincon) for the 1,854-acre Sienna Solar and Storage Project (Project) located in the Lucerne Valley, San Bernardino County, California. The delineation was conducted on July 20-22, 2021, to determine the location and extent of waters and/or wetlands within the Project area that are potentially subject to the permit requirements of the U.S. Army Corps of Engineers (USACE), under Section 404 of the Clean Water Act (CWA), Colorado River Regional Water Quality Control Board (RWQCB) under Section 401 of the CWA and Porter-Cologne Water Quality Act, and a Streambed Alteration Agreement from the California Department of Fish and Wildlife (CDFW) pursuant to Section 1600 et. seq. of the California Fish and Game Code (CFGC). Actual jurisdictional areas are confirmed by the state and federal authorities at the time that permits are requested.

Project Location

The 1,854-acre Project area is located in the southwestern portion of the Mojave Desert in and near Lucerne Dry Lake, in unincorporated San Bernardino County, California. The Project is predominately located east of State Route 247 (Barstow Road), north of the unincorporated community of Lucerne Valley, with portions of the gen-tie alternative corridors that include possible connections along Haynes Road, Huff Road, and Northside Road to the east of Barstow Road. The site is generally located approximately 35 miles south of the City of Barstow, 45 miles northwest of the town of Yucca Valley, 15 miles southeast of the town of Apple Valley, and 20 miles north of the City of Big Bear Lake. Barstow Road would provide primary access to the Project area. Land uses in the area are primarily rural residential, recreation, farmland, open space, and transportation corridors.

Figure 1 shows the regional location of the Project area. Figure 2 shows the 27 parcels that comprise the site, and Table 1 lists the parcels and the acreage of each. Figures are provided in Appendix D. The site is depicted on the *White Horse Mountain, California* and *Lucerne Valley, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangle maps (Figure 3).

Table 1 Parcels Within the Project Area

APN	Acreage (per Assessor's Map)	APN	Acreage (per Assessor's Map)
45207120	40.201988	45211217	8.8374063
45207119	40.21116	45211317	151.40044
45207111	154.92994	45212112	80.724638
45207125	40.206093	45212142	70.847518
45207110	80.411658	45212138	5.0164927
45206223	80.447237	45212139	12.554045
45206221	40.207435	45212148	33.286326
45206222	76.437885	45212152	10.188996
45206224	84.470432	45237101	161.27385
45211220	70.208881	45236147	80.707295
45211224	89.9045	45236146	80.667639
45211225	103.44547	45239109	39.915267
45211219	73.471912	45239108	80.023993
45211218	64.725183		

Project Description

The proposed Sienna Solar and Storage Project is a 525-megawatt (MW) utility-scale solar farm with 525-MW battery storage located in unincorporated San Bernardino County. The site is located east of Barstow Road/State Route (SR) 247 roughly between Northside Road and Wilshire Road, northeast of the community of Lucerne Valley.

The Project consists of the installation of a photovoltaic (PV) solar facility, Battery Energy Storage System (BESS), project substation, Operations and Maintenance building(s), underground collection system, 230 kV generation-interconnect (gen-tie) line. The Sienna Project will interconnect at the SCE Calcite Substation (currently pending environmental clearance and construction) via a proposed overhead and/or underground 230-kV gen-tie line in addition to other ancillary facilities utilizing private and potentially public ROWs. The Project area encompasses 1,854 acres with an additional 77-acre substation site. Approximately 39 miles of collector lines and gen-tie alternatives will be analyzed in this assessment, although not all routes will be developed.

The Project area is characterized by a mixture of residential properties, undeveloped playa and desert scrub communities, and agricultural land that includes alfalfa and jojoba farms and large-scale hemp growing operations. Small-scale abandoned and operational hemp and/or marijuana growing operations were present throughout the playa region of the Project area.

Environmental Setting

The Project area is located in the southwestern portion of Mojave Desert in and near Lucerne Dry Lake. The area is in a rain shadow formed by the adjacent mountains and features alkaline soils. This high desert ecological subregion is characterized by arid scrub, creosote bush scrub, playas, and desert washes. The site is primarily located on the floor of the Lucerne Dry Lake, and along its eastern and northern margins. Topography is mostly flat to gently sloped along the dry lake margins. The Granite Mountains and White Horse Mountain are west of the site, and Peterman Hill is within the gen-tie matrix, east of Barstow Road. Elevation at the site ranges between 2,850 and 2,910 feet above mean sea level.

The dry lakebed is heavily used for recreational activities, including off highway vehicle (OHV) travel (including racing) and assorted day use and camping activities. The Rocketry Organization of California (ROC) uses the dry lake as one of its designated launch sites, with scheduled launches occurring monthly throughout the year. Additionally, areas outside the dry lake within the Project area are also subject to various ongoing disturbances related to road maintenance, utility activities (electrical transmission towers and lines; underground gas pipeline), recreation, OHV travel, and illegal dumping.

Methodology

Federal Clean Water Act Jurisdiction

Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into waters of the United States (WOUS), including wetlands (Appendix B). Section 404 requires a permit before dredged or fill material may be discharged into WOUS, unless the activity is exempt from Section 404 regulation. The USACE, under provisions of Section 404 of the CWA and USACE implementing regulations, has jurisdiction over WOUS.

The USACE previously evaluated Lucerne Dry Lake as the lowest point in the Lucerne Valley watershed to determine if the dry lakebed and washes terminating there constitute WOUS that would be regulated under Section 404 of the CWA. The USACE considered Lucerne Dry Lake in an approved jurisdictional determination (AJD) dated November 16, 2010, for the Granite Mountain Wind Project (USACE File No. SPL-2010-00791-SLP, JD-2). In this determination, the USACE found that it is a dry lake, and surface flows that enter the dry lakebed percolate into the groundwater table. The determination concluded that Lucerne Dry Lake is not a Traditional Navigable Water (TNW) and is not an "other" water. It does not have use for surface water used for recreation or other purposes by foreign or interstate travelers, it does not support harvesting activities of fish or shellfish that may be sold in interstate or foreign commerce, and it does not support surface water industrial usage by industries in interstate commerce. Additionally, the current definition of WOUS under the Navigable Water Protection Rule excludes dry lakebeds that do not contribute surface water flow to a TNW or territorial sea in a typical year. Therefore, the Lucerne Dry Lake would not be considered a WOUS under the Navigable Waters Protection Rule.

As part of a determination regarding ephemeral washes within the Lucerne Valley watershed, the USACE stated that the Lucerne Valley basin is a closed basin with no external surface water flows leaving the basin, with Lucerne Dry Lake as the low point. The USACE concluded that ephemeral washes flowing toward Lucerne Dry Lake are isolated and not under federal jurisdiction (Approved Jurisdictional Determination for Agincourt Solar Project, USACE File No. SPL-2012-00498 [JD-BEM], May 29, 2013).

Based on these determinations, the USACE is not expected to assert jurisdiction over Lucerne Dry Lake and tributaries. These features are hydrologically isolated from TNWs or interstate waters and do not have the potential to directly or indirectly affect interstate or foreign commerce (33 CFR 3.28.3(a)(3)). Therefore, federal CWA jurisdiction and USACE delineation methods are not considered further in this report.

Literature Review

Pre-field investigations generally consisted of reviewing existing background literature, data, and information to identify areas of potential CDFW and RWQCB jurisdiction and prepare for delineation field surveys. Rincon reviewed existing resource information related to the Project area and vicinity. Pertinent sources reviewed include the *General Biological Resources Assessment* (Rincon 2021); recent and historical aerial photography; *White Horse Mountain, California* and *Lucerne Valley, California* quads; *Soil Survey of San Bernardino County, California, Mojave River Area*; Web Soil Survey (U.S. Department of Agriculture Natural Resources Conservation Service

[USDA NRCS] 2021); San Bernardino County General Plan (SBC 2017); Lucerne Valley Community Plan (SBC 2018); and Desert Renewable Energy Conservation Plan (DRECP). The National Wetland Inventory (NWI) (USFWS 2021) and National Hydrography Dataset (NHD) (U.S. Geological Survey [USGS] 2021) were reviewed to determine if any wetland and/or other jurisdictional waters had been previously documented and mapped on or in the vicinity of the site. The *National Hydric Soils List* (USDA NRCS 2021b) was reviewed to determine if any soil map unit types mapped on or in the vicinity of the site were classified as hydric. Other data sources reviewed included geologic maps, climate and hydrology data, and previous studies for similar or nearby solar projects. Additionally, a detailed review of the Lucerne Dry Lake and its unique geomorphic characteristics was completed and is summarized above in Environmental Setting.

Field Survey

After completing the initial literature review, Rincon conducted a reconnaissance-level field survey on July 20-22, 2021, to determine the general presence and locations of ephemeral streams and isolated wetlands potentially under CDFW and RWQCB jurisdiction onsite. Current USACE delineation procedures and guidance were used to identify and delineate any wetlands and/or waters of the State potentially subject to RWQCB jurisdiction (Lichvar et al. 2016; USACE 1987, 2008a, 2008b). Likewise, current CDFW procedures and guidance were considered to identify and delineate any streambeds, rivers, or associated riparian habitat potentially subject to CDFW jurisdiction (CFGC 2017, Brady and Vyverberg 2013, Vyverberg 2010). Wetland Determination Data Forms and Ordinary High Water Mark (OHWM) Data Forms for determining jurisdiction are presented in Appendix A.

Rincon imported the locations of potential jurisdictional features into a global positioning system (GPS)-enabled tablet displayed over high resolution aerial imagery to allow for evaluation of those features in the field. These features, and any other potential jurisdictional features that were encountered during the survey, were examined for the presence of defined channels with characteristic bed and bank features and indicators of water flow. Potential jurisdictional streams were mapped on recent aerial imagery. The landforms, vegetation, hydrology, and soil conditions were noted where these characteristics were relevant to identification of the feature. A handheld GPS unit with sub-meter horizontal accuracy was also used to record locations and collect general data, and to guide digitization of features with a geographic information system (GIS) software package. Representative photographs of potential jurisdictional features were recorded to document their physical characteristics in the context of the site (Appendix C).

Results

Vegetation

Vegetation types in the Mojave Desert are strongly influenced by arid climatic conditions and desert soils. Vegetation in the region includes a predominance of plant morphological adaptations to extreme aridity and saline alkali soils. Vegetation structure is generally characterized by short-statured and widely-spaced shrubs, and arborescent shrubs resulting from a competition for soil water resources (Baldwin, et al. 2012). Three vegetation types contribute to 75 percent of the land cover in the Mojave Desert region: Mojave creosote bush (*Larrea tridentata*) scrub (16,398 square miles), Mojave mixed woody scrub (Joshua tree woodland; 3,646 square miles), and desert saltbush (*Atriplex* spp.) scrub (1,510 square miles) (Davis et al., 1998). Other common vegetation types occurring in the region include desert and valley sink scrub, Mojave Desert wash scrub, and Mojave mixed steppe (Holland 1986, CDFW 2010). The primary disturbed or nonnative vegetation/land cover types within the Mojave Desert include annual grasslands, agricultural lands, and developed areas.

Rincon prepared a Jurisdictional Delineation Report (Rincon 2017a) and Biological Resource Assessment (BRA) (Rincon 2017b) for an alternative alignment for the Project. Rincon had determined at the time that jurisdictional features were limited to ephemeral washes that drained into the dry lake. The alignment has since shifted, thereby requiring a new delineation to be conducted. In June 2017 for the BRA, Rincon conducted vegetation mapping consisting of a windshield survey and meandering pedestrian transects to generally characterize the distribution of natural vegetation communities, habitats, residential development, and other disturbed areas in the general area. Meandering pedestrian transects were conducted in areas containing natural habitat, which allowed for a more thorough assessment to distinguish vegetation communities and identify approximate community boundaries within natural areas. Natural vegetation communities identified in the BRA were generally classified based on the classification system presented in *A Manual of California Vegetation, Second Edition* (MCV) (Sawyer et al. 2009).

Three natural vegetation communities were mapped in the general setting: creosote bush scrub (*Larrea tridentata* Shrubland Alliance), allscale scrub (*Atriplex polycarpa* Shrubland Alliance, and fourwing saltbush scrub (*Atriplex canescens* Shrubland Alliance). Two additional land cover types that did not meet the membership rules for classification as one of the recognized vegetation types in the MCV were also identified and mapped at the site. These land cover types include rock outcrop and dry lakebed.

The majority of the general area consists of the dry lakebed, which is largely unvegetated. This is the dominant land cover type at the site; it exceeds all other land cover types and vegetation communities combined.

Hydrology

Hydrology of the site and vicinity was evaluated through review of topographic maps, aerial photos, the NHD (USGS 2021), and the NWI (USFWS 2021), in conjunction with field survey data.

The site is located within the central portion of the Lucerne Lake watershed, Hydrologic Unit Code [HUC] 181001000404. It is located within the Este hydrologic groundwater sub-basin, a hydrologic subarea of the Mojave Groundwater Basin which contains two primary groundwater basins separated by a fault (Mojave Water Agency [MWA] 2005). The groundwater below the site is stored in an aquifer within the Lucerne Valley Groundwater Basin (LVGB). The northern portion of the site extends slightly outside of the LVGB. Water is provided to the residents of Lucerne Valley from groundwater pumping (MWA 2005).

The majority of the site is mostly level and slope gradients across the site are extremely low. Thirty-nine (39) small, shallow, ephemeral streams drain generally to the west and southwest in the direction of the dry lakebed. The streams convey water flows only during and immediately after high precipitation events. Hydromodification, primarily from roads, has fragmented stream flow in areas north and west of the dry lakebed. Road maintenance activities include clearing and blading, which create large soil berms on each side of the roads, blocking flow in most of the drainages at the road edge. Additionally, OHV tracks interrupt the flow of small shallow channels.

Climate data for the Lucerne Valley obtained from four sources, including the Western Regional Climate Center (WRCC 2021), WeatherBase (WeatherBase 2021), Climate-Data (Climate-Data 2021), and Intellicast (Intellicast 2021), indicate that average annual rainfall in the vicinity is approximately 6.04 inches.

Soils

The USDA NRCS (2021) has mapped and inventoried soils at both landscape (coarse) scales and detailed (fine) scales. These data are catalogued in previously published soil surveys, the Soil Survey Geographic Database, and the U.S. General Soil Map. These data were accessed through the Web Soil Survey Application (USDA NRCS 2021). This subsection summarizes soil resources as mapped by the NRCS that overlap the site at the landscape level.

The site is covered by the *Soil Survey of San Bernardino County, California, Mojave River Area*. The soil survey indicates that soils in the Lucerne Valley floor are primarily derived from alluvium parent materials from granitic sources and other mixed sources. Within the Project area, soils are associated with alluvial fans, toe slopes, playas, and other gently sloped landforms. Based on Web Soil Survey data, the site contains 19 soil map units, which are briefly described below. Soil map units across the site are shown on Figure 4 (Appendix D).

Hydric soils are defined by the National Technical Committee for Hydric Soils as soils that in their undrained condition, are saturated, flooded, or ponded long enough during a growing season to develop anaerobic conditions that support the growth and regeneration of hydrophytic vegetation (59 Federal Register 16835). Soils that are sufficiently wet to support the growth and regeneration of hydrophytic vegetation due to artificial measures are included in the concept of hydric soils on the list "Hydric Soils of the United States" (National List) (USDA NRCS 2021b). Soils are identified for inclusion on the list based on specific criteria established by law (67 Federal Register 58756). The National List is "a compilation of all map units with either a major or minor component that is at least in part hydric. …Because the list includes both major and minor (small) percentages for map units, in some cases most of the map unit may not be hydric… Some components may be phases of soil series that have a range of characteristics… therefore, only a portion of that component's concept (or range in characteristics) may in fact be hydric. The list is useful in identifying map units that may contain hydric soils."

Of the soils mapped in the Project area, further discussed below, at least one minor component of the following soil map units have been identified as hydric when they occur in depressions or playas that are during the growing season:

- Bousic Clay; Cajon Sand
- Cave Loam, Dry, 0 to 2 Percent Slopes
- Lavic Loamy Fine Sand
- Peterman clay
- Playas

Of these units, only Playas has a major component identified as hydric on the National List. The majority of the dry lakebed is mapped as Playas. However, the dry lakebed is not frequently ponded for long or very long durations. During and immediately after infrequent heavy rainfall, low volumes of water appear to collect in the lowest elevations for brief durations. The dry lakebed contains a dense, hardpan layer of clay soil. The soils contain a high alkaline pH, and high levels of salts. These soils often do not form hydric soil indicators even when saturated for extended periods.

The following soil units identified in the Web Soil Survey (USDA NRCS 2021) are summarized below.

Bousic Clay

This soil map unit typically occurs on toeslopes of lake plains and talfs (geomorphic components of an essentially flat and broad area dominated by closed depressions) in low areas with very little slope. The dominant soil series, Bousic clay, is formed in alluvium from mixed sources. A typical soil profile consists of clay horizons to at least 60 inches of depth. This soil is well drained, alkaline, and strongly saline. Minor components within this map unit are Peterman soils. This soil map unit is considered hydric.

Bryman Loamy Fine Sand, 2 to 5 Percent Slopes

This granitic soil map unit usually occurs on terraces and older alluvial fans, at elevations from 2,800 to 3,800 feet. A typical soil profile consists of a pale topsoil layer that is loamy or sandy. The second horizon is usually pink to reddish brown and is generally sandy clay loam, loam or gravelly sandy loam. The third horizon is pale yellowish brown to strong brown, is usually alkaline, and may be loamy coarse sand to sand. This soil map unit is not considered hydric.

Cajon Sand, 0 to 2 Percent Slopes

This soil map unit typically occurs on alluvial fans on gentle slopes. The dominant soil series, Cajon sand, is formed in alluvium from granitic sources. A typical soil profile consists of sandy topsoil, underlain by a second sand horizon to approximately 25 inches, with layers of gravelly sand, stratified sand and loamy fine sand below to at least 60 inches of depth. This soil is somewhat excessively drained. Minor components within this map unit are Manet, Kimberlina, and Helendale soils. This soil map unit is not considered hydric.

Cajon Sand, 2 to 9 Percent Slopes

This soil map unit is similar to the Cajon map unit except it occurs on slightly greater slopes (2 to 9 percent) and may have more layers of stratified gravelly sand in the subsoil. This soil map unit is not considered hydric.

Cajon Gravelly Sand, 2 to 15 Percent Slopes

This soil map unit is similar to the previous two Cajon map units except it occurs on slightly greater slopes (2 to 15 percent) and the topsoil and subsoil horizons have increased gravel content. This soil map unit is not considered hydric.

Cave Loam, Dry, 0 to 2 Percent Slopes

This soil map unit typically occurs on alluvial fan remnants on gentle slopes. The dominant soil series, Cave loam, is formed in alluvium from granitic sources. A typical soil profile consists of loam topsoil, underlain by stratified sandy loam to loam subsoil between 21 and at least 66 inches of depth. This soil is well drained, and very slightly to slightly saline. Minor components within this map unit are a Cave soil with clayey subsoil, Kimberlina, and Lavic soils. This soil map unit is considered hydric.

Dune Sand

This soil map unit consists of unstable hills and ridges of loose, wind-deposited sand that is excessively drained and barren. Dunes are typically less than 15 feet high and slopes are between 5 to 15 percent. Minor components within this map unit are Cajon sand, Riverwash and Villa loamy sand along the Mojave River, and Halloran soils. This soil map unit is not considered hydric.

Glendale Variant Silt Loam, Saline-Alkali

This soil map unit occurs on basin rims and lower margins of narrow alluvial fans with slopes ranging from 0 to 2 percent with vegetation consisting of salt-tolerant shrubs, grasses, and forbs. Soil profiles are very pale brown silt loam down to 11 inches with underlying material consisting of light yellowish brown and pale brown silty clay loam. Surface layer and underlying layers are moderately or strongly alkaline. Minor components within this map unit are small areas of Lavic soils. This soil is suited for irrigated crops in areas where they are reclaimed. This soil map unit is not considered hydric.

Helendale Loamy Sand, 0 to 2 Percent Slopes

This soil map unit typically occurs on alluvial fan remnants on gentle slopes. The dominant soil series, Helendale loamy sand, is formed in alluvium from granitic sources. A typical soil profile consists of loamy sand topsoil topsoil, underlain by sandy loam subsoil between 4 and at least 66 inches of depth. This soil is well drained, and nonsaline to very slightly saline. Minor components within this map unit are Bryman, Kimberlina, and Cajon soils. This soil map unit is not considered hydric.

Helendale Loamy Sand, 2 to 5 Percent Slopes

This soil map unit occurs on alluvial fans and terraces and is derived primarily from granitic material. Slopes are broad and nearly level with many areas dissected by shallow intermittent drainageways. Vegetation is primarily yucca, desert shrubs, grasses, and forbs. The surface layer is very pale brown loamy sand about 4 inches thick with subsoil and the upper part of the substratum are brown, yellowish brown, and light yellowish brown sandy loam about 62 inches thick. Clay content decreases below a depth of 30 inches. Minor components include Bryman, Kimberlina, and Cajon soils. This soil map unit is not considered hydric.

Joshua Loam, 2 to 5 Percent Slopes

This soil map unit occurs on old stable terraces that have desert pavement. It formed in alluvium derived from mixed sources with broad, slightly convex slopes. Most areas are dissected by moderately deep intermittent drainageways. Typically, 70-90 percent of the surface layer is covered by desert pavement with a light yellowish-brown loam about 3 inches thick. Subsoils are brown and reddish brown gravelly sandy clay loam around 17 inches thick. These soils are often strongly alkali. Minor components within this map unit are Cajon soils. This soil map unit is not considered hydric.

Kimberlina Loamy Fine Sand, Cool, 0 to 2 Percent Slopes

This soil map unit typically occurs on skirts and aprons of alluvial fans on gentle slopes. The dominant soil series, Kimberlina loamy fine sand, is formed in alluvium from mixed sources. A typical soil profile consists of loamy fine sand topsoil, underlain by sandy loam, fine sandy loam, and loam subsoil between 7 and at least 60 inches of depth. This soil is well drained, and nonsaline to very slightly saline. Minor components within this map unit are Helendale and Cajon soils. This soil map unit is not considered hydric.

Kimberlina Loamy Fine Sand, Cool, 2 to 5 Percent Slopes

This soil map unit is similar to the Kimberlina map unit except it occurs on slightly greater slopes (2 to 5 percent) and may have more layers of stratified gravelly sand in the subsoil. This soil map unit is not considered hydric.

Lavic Loamy Fine Sand

This soil map unit typically occurs on skirts and aprons of alluvial fans on gentle slopes. The dominant soil series, Lavic loamy fine sand, is formed in alluvium from granitic sources. A typical soil profile consists of loamy fine sand topsoil, underlain by multiple layers of sandy loam, loamy fine sand, loamy sand and loam subsoil between 10 and at least 49 inches of depth. This soil is well drained, and slightly to moderately saline. Minor components within this map unit are unnamed soils. This soil map unit is considered hydric.

Peterman Clay

This soil map unit typically occurs on skirts of alluvial fans on gentle slopes. The dominant soil series, Peterman clay, is formed in fine-textured alluvium from mixed sources. A typical soil profile consists of clay topsoil, underlain by clay and gravelly clay subsoil to at least 60 inches of depth. This soil is moderately well drained, alkaline, and strongly saline. Minor components within this map unit are unnamed soils. This soil map unit is considered hydric.

Playas

This soil map unit consists of playa areas consisting of lacustrine deposits derived from mixed sources. Minor components within this map unit are Bousic, Norob, and Halloran soils. This soil map unit is considered hydric.

Rock Outcrop – Lithic Torriorthents Complex, 15 to 50 Percent Slopes

This soil map unit typically occurs on summits, backslopes and flanks of mountains on moderate to steep slopes. This map unit does not contain named soils. Rock outcrops, typically granitic, are interspersed with minimally developed soil underlain by bedrock within 8 to 20 inches of the soil surface. Minor components within this map unit are Sparkhule, and Trigger soils. This soil map unit is not considered hydric.

Wasco Sandy Loam, Cool, 0 to 2 Percent Slopes

This soil map unit typically occurs on aprons of alluvial fans on gentle slopes. The dominant soil series, Wasco sandy loam, is formed in alluvium derived from granite. A typical soil profile consists of sandy loam topsoil, underlain by additional sandy loam horizons to at least 60 inches of depth. This soil is well drained, and nonsaline to very slightly saline. Minor components within this map unit are Cajon, Lucerne and Bryman soils. This soil map unit is not considered hydric.

Sample Points

Based on soil pit data from the field survey, hydric soils occur in at least one retention basin and potentially two others that were inaccessible at the time of the survey. All three wetland parameters were observed at a location where an irrigation pipe likely has a leak. These all occur within the dry lake portion of the Project, and hydric soils were not observed outside of the dry lake. Therefore, hydric soils are considered present within retention basins in the Project area. Please refer to Table 2 below for a summary of data collected at the soil pits, Appendix A for completed datasheets, and Appendix D Figures 5a-d for soil pit locations. Vegetation at retention basins primarily consisted of alfalfa (*Medicago sativa*), common purslane (*Portulaca oleracea*), narrowleaf plantain (*Plantago lanceolata*), knotgrass (*Paspalum distichum*), and salt heliotrope (*Heliotropium curassavicum*) (Appendix A).

Table 2 Summary of Hydrophytic Vegetation, Hydric Soils, and Wetlands Hydrology Wetlands Indicator Status by Soil Test Pit Location

Sampling Point	Plant Species Scientific Name	Plant Species Common Name	Absolute Percent Cover	Wetland Indicator Status[1]	Passed Dominance Test	Passed Prevalence Index	Meets Hydrophytic Vegetation Criterion	Meets Hydric Soils Criterion	Meets Wetlands Hydrology Criterion
1	*N/A*	N/A	N/A	N/A	N/A	N/A	Yes	No	Yes
2	*Bromus catharticus*	rescuegrass	30	UPL	No	No	No	No	Yes
	Plantago lanceolata	ribwort plantain	20	FAC					
	Medicago sativa	alfalfa	48	UPL					
3	*Ulmus pumila*	Siberian elm	20	UPL	Yes	Yes	Yes	Yes	Yes
	Paspalum distichum	knotgrass	60	FACW					
4	*Medicago sativa*	Alfalfa	100	UPL	No	No	No	No	No
5	*Panicum miliaceum*	proto millet	60	UPL	No	No	No	No	Yes
	Portulaca oleracea	common purslane	10	FAC					
	Cynodon dactylon	Bermuda grass	5	FACU					
6	*Suaeda nigra*	bush seepweed	15	OBL	No	No	No	No	Yes
	Atriplex confertifolia	shadscale	5	UPL					
	Atriplex canscens	fourwing saltbush	5	UPL					
7	*Typha domingensis*	southern cattail	40	OBL	Yes	Yes	Yes	Yes	Yes
	Kali tragus ssp. *Tragus*	tumbleweed	5	UPL					
8	*Kali tragus* ssp. *Tragus*	tumbleweed	40	UPL	No	No	No	No	No

[1] OBL=obligate wetland species; FACW=facultative wetland species; FAC=facultative species; FACU=facultative upland species; UPL=obligate upland species (See Appendix A for full data detailed in datasheets).

Lucerne Dry Lake

The majority of the Project area consists of Lucerne Dry Lake. Southeastern California deserts, including the Mojave Desert where the Project area is located, contain a number of lakebeds that were filled with water during the Pleistocene Epoch (approximately 2,600,000 to 11,700 years ago) under a cooler and wetter climate regime than currently exists. The regional climate has since changed, and the extremely arid climate and low precipitation (less than 8 inches) conditions of the Mojave Desert have replaced the Pleistocene lakes with dry beds and native desert vegetation (Vyverberg 2010). They are characterized by accumulations of stratified fine textured soil materials and a number of evaporite minerals, and large polygonal desiccation fractures.

The Lucerne Dry Lake is a large Pleistocene lakebed, approximately 3 km by 7 km in size (El-Maarry 2015). It is now typically dry in most years and only collects water in its lowest points during extreme precipitation events (MWA 2005, Stoffer 2004).

Visual evidence of previous inundation and/or saturation (e.g., cracked soils, salt crusts) was observed in the dry lakebed during the field surveys. However, these features are not indicative of the lake's present hydrology. Indicators such as cracked soils can occur readily as the result of repeated intervals of short-term wetting and drying of areas dominated almost entirely by clay soils. Salt crusts often form on the surface in dry desert conditions where salts are abundant in the soils and precipitate out onto the soil surface when sporadic rainfall quickly evaporates.

In the vicinity of the site, no large tributaries directly enter the dry lake from adjacent areas. Small, shallow ephemeral streams originate in the Granite Mountains, Whitehorse Mountain, and near Peterman Hill to the northwest and north of the site, but due to significant hydromodification, primarily from road construction and maintenance, the infrequent, low-volume, short-duration surface flow in these features does not reach the dry lakebed. A main utility access road and other minor roads are present along the north and west sides of the dry lakebed. During regular road maintenance, large berms of dirt up to 3 feet high are formed on each side of the roads as a result of clearing and blading. Overall, these berms completely block or severely restrict ephemeral stream flows south and east of the roads toward the lake. Some streams do flow across the roads and continue toward the lake. As the slope gradient nears zero in areas adjacent to the dry lakebed, any infrequent, low-volume, short-duration water flows in these very small and shallow streams disperse, dissipate, and percolate into the mostly level ground before reaching the dry lake. They lack a clear surface connection, via defined channels with bed and bank, to the dry lakebed. Any low-volume, short-duration ponding in the dry lakebed appears to primarily originate from onsite direct rainfall, since outside hydrologic inputs have been significantly decreased by the presence of the roads.

As noted in the Methodology Section, in 2010, the USACE considered Lucerne Dry Lake in an AJD for the Granite Mountain Wind Project. The USACE found that it is a dry lake, not a traditional lake, due to the general lack of surface water precluding use for harvesting fish or shellfish.

CFGC Sections 1600 *et seq.* were enacted to conserve wildlife associated with lake and stream ecosystems. The vast majority of the dry lakebed is topographically planar and unvegetated and provides extremely limited, low-quality value for wildlife. Soils are highly alkaline and lack nutrients due to repeated inundation and evaporation events, and high and low temperatures are extreme. What little vegetation is present is primarily concentrated within larger fractures at the edges of the dry lakebed. Riparian habitat is limited to retention basins and sporadic pipeline leakages, and the dry lake does not support fish or other aquatic life.

The dry lakebed contains numerous large polygonal cracks, oriented in every direction. Based on background research and field observations, these fractures are not formed by fluvial processes typical to streams regulated by CDFW and RWQCB but are in fact geologic phenomena called desiccation polygons (fractures or fissures) which are associated with the clayey soils comprised largely of smectites or vermiculites sedimentary deposits (El-Maarry, et al. 2015, USDA NRCS 2021). Published studies, as recent as December 2015 (El-Maarry, et al. 2015), show that these fissures commonly develop in clay playas/dry lakebeds in the arid west including California and Mojave Desert, and are attributed to desiccation phenomena and water table retreat. The fractures are generally created by smectites that undergo a reversible expansion on absorbing water and are found at the lower elevations of the lakebed. The large desiccation polygons occur through lowering of the water table rather than surface evaporation (El-Maarry, et al. 2012). As dehydration proceeds from the surface downward and penetrates the capillary fringe above the water table, shrinkage occurs, which ultimately results in rupture at depth that extends upward to the surface. The mineral constituents of sediments in both the fissured and nonfissured areas are predominantly clay minerals, carbonates, salines, and analcite, with fine grains of quartz, feldspar, and ferro-magnesian silicates. Fissured lakebeds possess significantly greater quantities of clay and carbonate minerals as compared to nonfissured playas. The clay minerals, carbonates, and analcite are primarily present in <2 micron size fraction. This colloidal aggregate is believed to exert a major influence on the physical behavior of the sediments which contain the large polygons. In particular, the dehydration to an almost dry condition of a clay mass, in which the water content may exceed the mineral content, results in a major loss of volume. The shrinkage leads to rupture with the formation of fissures. The fissures form orthogonal polygons characteristic of volume change in a largely uniform horizontal mass with one surface exposed (Neal, et al. 1968). In summary, the polygonal cracks on the surface of Lucerne Dry Lake are the result of geologic processes and were not carved by the flow of water.

The conclusion that Lucerne Lake’s polygonal fractures are not streambeds is supported by the fact that these features do not exhibit typical characteristics of streambeds such as bed, bank, and channel features and indicators of fluvial activity. The lakebed is generally very flat, with elevation change in the lower levels near zero. The fractures do not convey water flow from higher elevations to lower elevations as in a typical stream and lack an origin and terminus or a discernable direction of flow. They appear to simply retain water in the low elevations of the fracture channels during periods of extreme precipitation, which appears to primarily originate from onsite direct rainfall, as discussed above. Most of the fractures are devoid of vegetation. Some of the fractures are vegetated with upland species that are also present outside of the lakebed, primarily allscale. The vegetation appears to occur in older fractures near the dry lakebed edges where enough time has passed for seeds to disperse into the fractures and vegetation to colonize and persist. This vegetation consists almost exclusively of upland species, primarily allscale.

Based on the factors presented above, only the retention basins and leaked pipe within the dry lakebed were delineated as CDFW/RWQCB-jurisdictional features. All other features under the jurisdiction of CDFW/RWQCB are the 33 ephemeral streams outside of the lakebed.

Fish and Wildlife Resources

Rincon conducted biological surveys across the site in July 2021 and documented onsite biological resources and the site’s potential to support special status species. The BRA (Rincon 2021) assesses potential Project impacts to biological resources at the site. The majority of the site is located in the dry lakebed, which provides extremely limited value for wildlife. No substantial aquatic or riparian habitat is present, and the site does not support fish or other aquatic life. Project impacts in the dry lakebed would not be expected to adversely affect fish and wildlife resources.

The ephemeral streams present at the site outside of the dry lakebed are small and water flows are low in volume and short in duration. The streams do not contain habitat characteristics that differentiate them from the surrounding landscape, including riparian or other vegetation that is distinct from adjacent areas or known to support special status species. Common and special status wildlife species expected to utilize the site are wide-ranging and are not specifically dependent on these streams; in other words, the streams don't provide any additional resources that may benefit wildlife that are not present in the adjacent areas.

Assessment of Jurisdictional Waters and Wetlands

Delineation of Potential CDFW and RWQCB Jurisdiction

This section presents the results of the delineation of ephemeral streams and retention basins/leaked pipes that are potentially under the jurisdiction of the CDFW and RWQCB at the 1,854-acre Project area. A total 8.34 acres/91,251 linear feet of retention basins, leaked pipeline, and ephemeral streams were delineated onsite. Riparian habitat is limited to the small (less than 0.01 acres), isolated wetland at what is likely a leaked pipeline.

Figure 5a through Figure 5d depict the location and extent of delineated stream segments and retention basins. Table 3 lists the delineated segment ID, type, hydroperiod, average top of bank width (in feet), and potential CDFW and RWQCB jurisdiction in linear feet and acreage. A discussion of delineated streams and retention basins is provided below.

Indicators of fluvial activity, such as sediment transport and deposition, shelving, and the presence of litter and debris, were observed in the ephemeral streams. Soils in these channels include smaller particle sizes such as silt and clay. Indicators of fluvial activity were often absent or severely obscured where a stream is present on roads. Stream segments were only delineated where at least faint evidence of flow was present.

As noted before, the slope gradient nears zero in areas adjacent to the dry lakebed, and any infrequent, low-volume, short-duration water flows in the shallow delineated streams disperse, dissipate, and percolate into the mostly-level ground before reaching the dry lake. The streams lack a clear surface connection, via defined channels with bed and bank, to the dry lakebed, and there is no discernible distinction with adjacent uplands.

Table 3 Summary of Delineated Features Onsite

				RWQCB/CDFW Jurisdiction		
Segment ID	Feature Type	Hydroperiod	Average Top of Bank Width (feet)	Non-wetland Waters of the State/ Streambed (linear feet)	Non-wetland Waters of the State/ Streambed (acres)	Wetland Waters of the State/ Streambed (acres)
1	Stream	Ephemeral	4	967.35	0.0858	–
2	Stream	Ephemeral	4	1,360.57	0.1161	–
3	Stream	Ephemeral	4	647.26	0.0597	–
4	Stream	Ephemeral	4	726.08	0.0669	–
5	Stream	Ephemeral	4	2,354.16	0.2143	–
6	Stream	Ephemeral	4	1,940.81	0.1780	–
7	Stream	Ephemeral	4	2,962.53	0.2719	–
8	Stream	Ephemeral	4	1,418.10	0.1304	–
9	Stream	Ephemeral	4	3,211.51	0.2934	–
10	Stream	Ephemeral	4	1,967.58	0.1809	–

				RWQCB/CDFW Jurisdiction		
Segment ID	Feature Type	Hydroperiod	Average Top of Bank Width (feet)	Non-wetland Waters of the State/ Streambed (linear feet)	Non-wetland Waters of the State/ Streambed (acres)	Wetland Waters of the State/ Streambed (acres)
11	Stream	Ephemeral	4	3,206.66	0.2943	–
12	Stream	Ephemeral	4	1,226.67	0.1130	–
13	Stream	Ephemeral	4	6,039.18	0.5529	–
14	Stream	Ephemeral	4	6,956.78	0.6377	–
15	Stream	Ephemeral	4	1,931.45	0.1778	–
16	Stream	Ephemeral	4	2,432.64	0.2235	–
17	Stream	Ephemeral	4	3,130.30	0.2876	–
18	Stream	Ephemeral	4	3,591.80	0.3297	–
19	Stream	Ephemeral	4	8,533.16	0.7778	–
20	Stream	Ephemeral	4	6,689.50	0.6117	–
21	Stream	Ephemeral	4	2,225.19	0.2044	–
22	Stream	Ephemeral	4	411.54	0.0373	–
23	Stream	Ephemeral	4	1,506.97	0.1385	–
24	Stream	Ephemeral	4	3,434.12	0.3125	–
25	Stream	Ephemeral	4	2,251.03	0.2058	–
26	Stream	Ephemeral	4	6,254.48	0.5696	–
27	Stream	Ephemeral	4	1,287.97	0.1170	–
28	Stream	Ephemeral	4	3,128.29	0.2870	–
29	Stream	Ephemeral	4	2,878.73	0.2644	–
30	Stream	Ephemeral	4	2,217.85	0.2036	–
31	Stream	Ephemeral	4	3,438.34	0.3149	–
32	Stream	Ephemeral	4	921.60	0.0839	–
33	Stream	Ephemeral	4	0.91	0.0002	–
34	Retention Basin	N/A	N/A	N/A	–	0.10
35	Retention Basin	N/A	N/A	N/A	–	0.14
36	Retention Basin	N/A	N/A	N/A	–	0.12
37	Retention Basin	N/A	N/A	N/A	–	0.04
38	Isolated Wetland	N/A	N/A	N/A	–	0.001
Total				**101,985.00**	**9.29**	**0.401**

A total of 33 stream segments, four (4) retention basins, and one (1) isolated wetland were delineated at the Project area. Stream widths (from top of banks) ranged from 2 to 8 feet, and the average width was 4 feet. These streams convey flows only during and immediately after high precipitation events. Evidence of fluvial activity in the majority of the streams is faint, and primarily consists of weakly defined multiple-thread channels with very low banks, minor changes in soil character, and marginally decreased vegetative cover. The delineated streams were distinct and separated by local topography and elevations of land that confine them to a definite course when waters rise to their highest level. Vegetation species composition in the streams and stream margins does not differ from the surrounding areas, while vegetation density is generally slightly lower. Soils consist primarily of unconsolidated small particles including sand and gravel. No evidence of higher concentrations of suspended sediment or greater transport rates of bedload sediment was observed in these features. Infiltration rates are high. Overall, the movement of sediment, organic debris, and nutrients is extremely limited.

Based on a review of historical aerial photographs, it is likely that these streams conveyed higher volume flows and were more clearly defined prior to the construction of roads and increased human use and manipulation of the site. In their current condition, most streams have been fragmented or isolated by formal and informal roads and OHV tracks, which have greatly reduced fluvial activity. Many of these may be partially abandoned channels, based on the isolation from their source and very low fluvial activity.

A number of ephemeral streams surrounding the dry lakebed are mapped in the NWI. They are classified as riverine, intermittently flooded streambeds (Cowardin code R4SBJ). In these areas, most of the streambeds are depicted as connecting to the dry lakebed. However, as discussed above, field observations indicate that the streams onsite lack a clear surface connection via defined channels with bed and bank to the dry lakebed and flows dissipate to sheet flow before entering the lake. The NHD mapping data is similar to the NWI. Streambed features are depicted in approximately the same locations but fewer features are depicted. Similarly, some features are depicted connecting to the dry lakebed, and others are not.

The four retention basins on the Project area are man-made and associated with agricultural uses from surrounding farmlands. Of the four basins, one was determined to consist of wetland waters based on a sampling point examined in the bed (see Soils section above and Figure 5d in Appendix D). Two basins could not be accessed and were conservatively assumed to consist of wetland waters for the purposes of this report. The other basin did not contain hydric soils and is therefore not a wetland. According to the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (SWRCB 2019), artificially constructed lakes and ponds created in dry land such as settling basins are excluded from the definition of Waters of the State. Therefore, the four detention basins are not under jurisdiction of the RWQCB.

One isolated wetland was observed in the western portion of the Project area in a small puddle dominated by cattails. Ponding and a hydrogen sulfide odor were observed at the time of the survey.

Conclusion

It is anticipated that the proposed Project may proceed under the authorization of a Waste Discharge Requirements permit from the RWQCB and a Lake or Streambed Alteration Agreement from CDFW. A notice of intent to RWQCB and 1602 notification to CDFW would be required. A permit from USACE would not be required. However, the final design of the proposed Project is still in preparation. It is recommended that the final Project design implement avoidance of jurisdictional aquatic features to the maximum extent feasible to support the permit application process with RWQCB and CDFW.

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List of Preparers

Rincon Consultants, Inc.

Field Survey

Malek Al-Marayati, Associate Biologist/Project Manager

Christian Nordal, Associate Biologist

Primary Author

Christian Nordal, Associate Biologist

Technical Review

Thea Benson, Senior Biologist/Project Manager

Chris Julian, Principal Regulatory Specialist

Graphics

Tracy Popiel, GIS Analyst

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Appendix A

Wetland Determination Data Forms

Appendix B

Regulatory Overview and Definitions

USACE Jurisdiction

The USACE, under provisions of Section 404 of the Clean Water Act and USACE implementing regulations, has jurisdiction over the "waters of the United States." "Waters" include all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, seasonal drainage channels, etc.), all impoundments of waters otherwise defined as waters of the U.S., tributaries of waters otherwise defined as waters of the U.S., territorial seas, and wetlands adjacent to waters of the U.S. USACE jurisdictional limits are typically identified by the presence of an Ordinary High Water Mark (OHWM). The OHWM is the line on the shore or banks of a water course established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area. The USACE defines wetlands as containing three parameters: hydrophytic vegetation, hydric soils, and wetland hydrology.

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds excavated on dry land used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water filled depressions (51 Fed. Reg. 41, 217 1986). In addition, a Supreme Court ruling (Solid Waste Agency of Northern Cook Counties [SWANCC] vs. USACE, January 9, 2001) determined that the USACE exceeded its statutory authority by asserting Clean Water Act jurisdiction over "an abandoned sand and gravel pit in northern Illinois, which provides habitat for migratory birds." Based solely on the use of such waters by migratory birds, the Supreme Court's holding was strictly limited to waters that are "non-navigable, isolated, and intrastate."

The Supreme Court further addressed the extent of the USACE jurisdiction in Rapanos v. U.S. (June 19, 2006). There, a sharply divided Court issued multiple opinions, none of which garnered the support of a majority of Justices. This created substantial uncertainty as to which jurisdictional test should be used. The Ninth Circuit Court of Appeal, which encompasses California, answered this in Northern California River Watch v. City of Healdsburg (August 11, 2006). There, the Court held that Justice Kennedy's opinion in Rapanos provides the controlling rule of law. Under that rule, wetlands or other waters which are not navigable in fact are subject to USACE jurisdiction if they have a "significant nexus" to a navigable-in-fact waterway. As Justice Kennedy explained, whether a significant nexus exists in any given situation will have to be decided on a case-by-case basis, depending on site-specific circumstances.

USACE Headquarters in Washington, D.C. issued substantive guidance on June 5, 2007, to its District Offices as to how to apply these rulings. Based on this guidance, additional quantitative, qualitative, and other physical data is required for the USACE to make a determination of jurisdictional authority. This determination is reviewed by the United States Environmental Protection Agency (USEPA).

In accordance with the Rapanos guidance, the USACE will assert jurisdiction over traditional navigable waters (TNWs), non-navigable tributaries of TNWs that are relatively permanent waters (RPWs), and wetlands that directly abut such tributaries. TNWs include all of the "navigable waters of the U.S.," defined in 33 CFR Part 329 and by pertinent federal court decisions. RPWs convey water flow seasonally, typically for at least 3 months. In addition, non-navigable tributaries that are not relatively permanent (non-RPWs), wetlands adjacent to non-RPWs, and wetlands adjacent to but that do not directly abut a TNW will be found jurisdictional based on a fact-specific analysis that they have a significant nexus with a TNW. The significant nexus evaluation considers the volume, duration, and frequency of water flow in the tributary and the proximity of the tributary to a TNW, as well as the hydrologic, ecologic, and other functions performed by the tributary and all of its adjacent wetlands.

RWQCB Jurisdiction

The State Water Resources Control Board (SWRCB) and local RWQCB have jurisdiction over "waters of the State," which are defined as any surface water or groundwater, including saline waters, within the boundaries of the state. The SWRCB has issued general Waste Discharge Requirements (WDRs) regarding discharges to "isolated" waters of the State (Water Quality Order No. 2004-0004-DWQ, Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the USACE to be Outside of Federal Jurisdiction). The local RWQCB enforces actions under this general order, and is also responsible for Clean Water Act Section 401 certification determinations over USACE defined jurisdictional waters.

The Porter-Cologne Act provides the State with very broad authority to regulate "waters of the State" (which are defined as any surface water or groundwater, including saline waters). The Porter-Cologne Act has become an important tool in the post-SWANCC and Rapanos era with respect to the State's authority over isolated waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file a "Report of Waste Discharge" (ROWD) when there is no federal nexus, such as under Section 401of the CWA. Although "waste" is partially defined as any waste substance associated with human habitation, the RWQCB interprets this to include fill discharge into water bodies.

It should be noted that the RWQCB shares USACE jurisdiction unless isolated conditions are present. If isolated waters conditions are present, the RWQCB takes jurisdiction using the USACE's definition of the OHWM and/or the three-parameter wetlands methodology pursuant to the 1987 Wetlands Manual. The CDFW's jurisdiction is defined as the top of the bank to the top of the bank of the stream, channel, or basin or to the outer limit of riparian vegetation located within or immediately adjacent to the river, stream, creek, pond, or lake or other impoundment, whichever is greater.

CDFW Jurisdiction

The CDFW has regulatory authority over any work within rivers, streams, and lakes of the State of California (California Fish and Game Code Section 1600 et. seq.) on public, private, and agricultural lands. Water features that are regulated by CDFW include all rivers, streams, or lakes, including man-made watercourses with or without wetlands, if they contain a definable bed and bank and support a fish or wildlife resource.

Wetlands

The USACE defines wetlands as containing three parameters: hydrophytic vegetation, hydric soils, and wetland hydrology. The following is a discussion of each of these parameters.

Hydrophytic Vegetation

Hydrophytic vegetation dominates areas where frequency and duration of inundation or soil saturation exerts a controlling influence on the plant species present. Plant species are assigned wetland indicator status according to the probability of their occurring in wetlands. More than fifty percent of the dominant plant species must have a wetland indicator status to meet the hydrophytic vegetation criterion. The USFWS published the National List of Plant Species That Occur In Wetlands (Lichvar, 2013), which separates vascular plants into the following four basic categories based on plant species frequency of occurrence in wetlands:

- **Obligate Wetland (OBL).** Occur almost always (estimated probability >99%) under natural conditions in wetlands.
- **Facultative Wetland (FACW).** Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
- **Facultative (FAC).** Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
- **Facultative Upland (FACU).** Usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%).
- **Obligate Upland (UPL).** May occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in non-wetlands in the region specified.

The ACOE considers OBL, FACW and FAC species to be indicators of wetlands. An area is considered to have hydrophytic vegetation when greater than 50 percent of the dominant species in each vegetative stratum (tree, shrub, and herb) fall within these categories. Any species not appearing on the USFWS list is assumed to be an upland species, almost never occurring in wetlands. In addition, an area needs to contain at least 5% vegetative cover to be considered as a vegetated wetland.

Hydric Soils

Hydric soils are saturated or inundated for a sufficient duration during the growing season to develop anaerobic or reducing conditions that favor the growth and regeneration of hydrophytic vegetation. Field indicators of wetland soils include observations of ponding, inundation, or saturation, dark (low chroma) soil colors, bright mottles (concentrations of oxidized minerals such as iron), gleying, which indicates reducing conditions by a blue-grey color, or accumulation of organic material. Additional supporting information includes documentation of soil as hydric or reference to wet conditions in the local soils survey, both of which must be verified in the field.

Wetland Hydrology

Wetland hydrology is inundation or soil saturation with a frequency and duration long enough to cause the development of hydric soils and plant communities dominated by hydrophytic vegetation. If direct observation of wetland hydrology is not possible (as in seasonal wetlands), or records of wetland hydrology are not available (such as stream gauges), assessment of wetland hydrology is frequently supported by field indicators, such as water marks, drift lines, sediment deposits, or drainage patterns in wetlands.

Appendix C

Site Photographs

Appendix D

Figures

Appendix F. Cultural Resources Assessment

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Sienna Solar and Storage Project

Cultural Resources Study

prepared for

99MT 8me, LLC
211 Sutter Street, 6th Floor
San Francisco, California 94108
Contact: Erec DeVost
Via email: edevost@8minuteenergy.com

prepared by

Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, California 93001

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RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

Public Version

The following document has been redacted to exclude confidential archaeological site locational information

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Executive Summary

99MT 8me, LLC (applicant) retained Rincon Consultants, Inc. (Rincon) to conduct a Phase I Cultural Resources Study for the Sienna Solar and Storage Project (Project) located 3.5 miles north of the unincorporated community of Lucerne Valley in San Bernardino County, California. This Cultural Resources Study includes a cultural resources records search, a Sacred Lands File search conducted by the Native American Heritage Commission which produced negative results, field survey, and the preparation of this technical report that adheres to Archaeological Resources Management Report guidelines and follows the requirements of the California Environmental Quality Act (CEQA).

The cultural resource records search identified 40 previously recorded cultural resources within a 0.5-mile radius of the Project area, 11 of which are within the Project area. An additional 48 cultural resources were newly identified and recorded during the survey including 38 archaeological and 10 built-environment resources. The archaeological resources are comprised of 15 isolates (4 prehistoric, 11 historical) and 23 sites (1 prehistoric, 1 multicomponent, and 21 historical). Of the 59 resources within the Project area, 5 built-environment resources are recommended eligible for the National Register of Historical Places (NRHP) and California Register of Historical Resources (CRHR); the properties therefore qualify as historical resources as defined by Section 15064.5(a) of the CEQA Guidelines. The current project does not entail any alteration to or demolition of the five resources. It is presumed that the Project will not involve significant alteration to the historic transmission lines nor construction that will affect the historic-era road and its delineation; therefore, the Project would not result in a substantial adverse change to the significance of the historic resources and does not result in a significant impact to historical resources pursuant to Section 15064.5(b) of the CEQA Guidelines.

Rincon also recommends avoidance of two archaeological sites, prehistoric site Sienna-S-8 and multicomponent site Sienna-S-28, to reduce the potential for unintentional impacts. Avoidance of the resources is discussed in greater detail below. In the event that avoidance is infeasible, additional mitigation such as testing and data recovery may be required to reduce any impacts to less-than-significant levels. In addition to avoidance, Rincon recommends the preparation of a Cultural Resources Mitigation and Monitoring Program (CRMMP), archaeological and Native American monitoring of Project related ground disturbance within Project areas of moderate to high archaeological sensitivity as established in and defined by the CRMMP, and a cultural resources sensitivity training program to assist in identifying any unanticipated cultural resources that may be encountered during ground disturbing activities associated with Project construction.

Retain a Qualified Principal Investigator

Rincon recommends that the applicant retain a qualified archaeologist, defined as an archaeologist who meets the Secretary of the Interior's Professional Qualification Standards for archaeology (National Park Service 1983) to carry out all mitigation measures related to archaeological and historic resources.

Avoidance of Resources

Preservation in place (avoidance) is the preferred manner of mitigating impacts to archaeological sites. Preservation in place maintains the relationship between artifacts and the archaeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site (e.g., affiliated Native American tribes). If feasible, archaeological sites Sienna-S-8 and Sienna-S-28 identified within the Project area during the current study plus a 200-foot buffer should be avoided. The 200-foot buffer should be delineated using a high visibility barrier (i.e. Environmentally Sensitive Area [ESA] fencing). If avoidance is not feasible, additional mitigation such as Phase II testing and Phase III data recovery may be required to reduce any impacts to less-than-significant levels.

Phase II Testing

The project site contains two archaeological sites (Sienna-S-8 and Sienna-S-28) that may include a subsurface deposit with significant data potential. If avoidance of these sites is not feasible, Rincon recommends a Phase II study to determine whether a subsurface deposit with significant data potential exists at each of these sites and to establish the subsurface boundaries of the resource. The Phase II study should be conducted by a qualified archaeologist. The qualified archaeologist should prepare a subsurface testing plan for review and approval by San Bernardino County prior to execution. The Phase II testing plan should include, but is not limited to, a research design, testing methods, laboratory methods, and list any applicable special studies to be completed. The Phase II plan should also include testing locations proposed within the site. The Phase II study should comprise subsurface testing designed to establish the presence or absence and extent of intact archaeological deposits and to assess whether the site(s) retains enough data potential to be considered significant under CEQA. Rincon recommends that Phase II testing be observed by a Native American monitor. If avoidance remains infeasible after the Phase II investigation, additional measures may be recommended such as a Phase III data recovery and/or archaeological and Native American monitoring of project construction activity. These measures are discussed further below.

Phase III Data Recovery

If a Phase II investigation at sites Sienna-S-8 and/or Sienna-S-28 finds the resource(s) as eligible for listing in the NRHP and CRHR and avoidance is not feasible, a Phase III data recovery program (Phase III) should be undertaken to mitigate any significant impacts. Mitigation consists of obtaining sufficient cultural materials such that no further material recovery would result in additional knowledge regarding the site. A Phase III investigation should begin with the development of a data recovery plan prepared by a qualified archaeologist and reviewed and approved by San Bernardino County prior to execution. The data recovery plan should include, but is not limited to, an expanded research design, testing methods, proposed testing locations, laboratory methods and analyses, and special studies. A Phase III should include extensive subsurface testing and a full analysis of artifacts identified during each phase of subsurface investigation with the goal of exhausting the data potential of the site(s). Excavations under a Phase III program should be observed by a Native American monitor. These studies should include but not be limited to faunal analysis of any animal bones, radiocarbon dating where appropriate, and/or protein residue analysis of stone tools and groundstone. The results of the Phase III study should be presented in a technical report documenting the prehistoric and ethnographic background of the area, the field and laboratory methods used, results, and final deposition of the artifact collection. The data collected during the study may also be prepared for publication in a scientific journal as part of the data recovery mitigation.

Preparation of a Cultural Resources Mitigation and Monitoring Program

Prior to the start of any ground-disturbing activity for Project construction, including but not limited to site clearing, grubbing, trenching, and excavation, a qualified archaeologist who meets or exceeds the Secretary of Interior's Professional Qualifications Standards for archaeology should be retained to prepare a CRMMP for unanticipated discoveries during Project construction. The CRMMP should be prepared in consultation with Native American tribes who have participated in consultation for the Project. The CRMMP should include provisions for archaeological and Native American monitoring of all construction related ground disturbance within Project areas of moderate to high archaeological sensitivity as established in and defined by this study. The CRMMP should also include the Project construction schedule, procedures to be followed in the event of discovery of archaeological resources, and protocols for Native American coordination and input, including review of documents. The CRMMP should outline the role and responsibilities of both the archaeological and Native American monitor(s). It should include communication protocols and opportunity and timelines for review of cultural resources documents related to discoveries that are Native American in origin. The CRMMP should include provisions for Native American monitoring during testing or data recovery efforts for unknown resources that are Native American in origin.

Archaeological Sensitivity Training

Rincon recommends that the qualified archaeologist conduct a worker's environmental awareness program training for archaeological sensitivity for all construction personnel prior to the commencement of any ground disturbing activities in the Project area. Archaeological sensitivity training should include a description of the types of cultural material that may be encountered, cultural sensitivity issues, regulatory issues, and the proper protocol for treatment of the materials in the event of a find.

Archaeological and Native American Monitoring

The vicinities of newly recorded archaeological sites Sienna-S-8 and S-28 and isolates Sienna-Iso-87 and Iso-88 as well as previously recorded isolate 36-29899 should be considered to have high archaeological sensitivity. These resources are located on relatively sandy alluvial soils where there is an increased likelihood that erosional dynamics (e.g. from wind and/or intermittent drainages) have created subsurface deposits. A review of soils studies and historical aerial imagery indicate the presence of alluvial soils and minimal past ground disturbance within other portions of the Project area. Both factors increase the likelihood of encountering intact buried archaeological deposits during Project-related ground-disturbance. These areas should be considered moderately sensitive for archaeological resources. The soils within the southwestern portions of the Project area, however, are highly disturbed from agricultural use and primarily composed of Peterman and Bousic clays. Additionally, fluctuating exposure within and near the limits of Lucerne Lake during the Holocene would have discouraged long-term settlement during the pre-contact period, providing limited opportunities for prehistoric site accumulation. This is evidenced by a lack of observed prehistoric resources within the southwestern portions of the Project area. Collectively, these factors decrease the likelihood of encountering intact buried archaeological deposits that retain integrity during Project-related ground-disturbance. Due to dense agriculture and the resulting lack of ground visibility, 229 acres at the south-central extent of Project area were not surveyed. The archaeological sensitivity of this portion of the Project area is thus unknown.

Rincon recommends archaeological and Native American monitoring of Project-related ground-disturbing activities in areas of moderate to high archaeological sensitivity. Additionally, initial ground disturbing activities including grading, scraping and other clearing that causes ground disturbance within areas of unknown archaeological sensitivity should be monitored. Within areas of moderate to high archaeological sensitivity, archaeological monitoring should be performed under the direction of the qualified archaeologist. The qualified archaeologist, in consultation with the County of San Bernardino and the Native American monitor, should have the power to reduce or suspend monitoring depending upon observed conditions. If archaeological resources are encountered during ground-disturbing activities, work within the immediate area must halt and the find evaluated for significance under CEQA.

Unanticipated Discovery of Cultural Resources

If cultural resources are encountered during ground-disturbing activities, work in the immediate area must halt and an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (National Park Service 1983) must be contacted immediately to evaluate the find. If the discovery proves to be significant under CEQA, additional work such as testing and data recovery excavation may be warranted.

Unanticipated Discovery of Human Remains

The discovery of human remains is always a possibility during ground-disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission, which will determine and notify a Most Likely Descendant. The MLD has 48 hours from being granted site access to make recommendations for the disposition of the remains. If the MLD does not make recommendations within 48 hours, the landowner shall reinter the remains in an area of the property secure from subsequent disturbance.

1 Introduction

99MT 8me, LLC (applicant) retained Rincon Consultants, Inc. (Rincon) to conduct a Phase I Cultural Resources Study for the 1,854-acre Sienna Solar and Storage Project (Project) located 3.5 miles north of the unincorporated community of Lucerne Valley in San Bernardino County, California. The purpose of this report is to document the results of a cultural resources records search, Sacred Lands File (SLF) search conducted by the Native American Heritage Commission (NAHC), field survey, and an assessment of potential project-related impacts to cultural resources for the Project. The study was completed in accordance with the requirements of the California Environmental Quality Act (CEQA) and applicable state and local guidelines and regulations. The County of San Bernardino is the CEQA lead agency.

1.1 Project Location and Description

The proposed 1,854-acre Project area is in the southwestern portion of the Mojave Desert and includes the Lucerne Dry Lake, in unincorporated San Bernardino County, California. The Project is predominately located east of State Route 247 (Barstow Road/SR 247), north of the unincorporated community of Lucerne Valley, with portions of the generation-interconnect (gen-tie) alternative corridors that include possible connections along Haynes Road, Huff Road, and Northside Road to the east of Barstow Road. The site is generally located approximately 35 miles south of Barstow, 45 miles northwest of the town of Yucca Valley, 15 miles southeast of the town of Apple Valley, and 20 miles north of the city of Big Bear Lake. Barstow Road would provide primary access to the Project area. Land uses in the area are primarily rural residential, recreation, farmland, open space, and transportation corridors.

Figure 1 depicts the regional location of the Project area. Figure 2 depicts the 27 parcels that comprise the site, and Table 1 lists the parcels and the acreage of each. The Project area is depicted on the *White Horse Mountain, California and Lucerne Valley, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangle maps (Figure 3).

The Project consists of the installation of a photovoltaic (PV) solar facility, Battery Energy Storage System, Operations and Maintenance building(s), underground collection system, 230 kV gen-tie line, and other ancillary facilities. The Project will interconnect at the Southern California Edison (SCE) Calcite Substation (currently pending environmental clearance and construction) via a proposed overhead and/or underground 230-kV gen-tie line in addition to other ancillary facilities utilizing private and potentially public right-of-ways. The Project area encompasses approximately 1,854 acres with an additional proposed 77-acre SCE Calcite Substation. This cultural resources assessment includes analysis of the 1,854-acre Project area and the additional 77-acre proposed SCE Calcite Substation as well as 12.69 miles of collector lines and the preferred gen-tie alternative route over a 300-foot-wide corridor (Figure 4). The remaining gen-tie alternative routes over a 300-foot-wide corridor were visually inspected but as these are not the preferred routes, no formal cultural resources documentation occurred. If any of the remaining gen-tie alternative routes become part of the Project area, a supplemental report may be required to fully document cultural resources within these alternative areas.

The Project area is characterized by a mixture of residential properties, undeveloped playa and desert scrub communities, and agricultural land that includes alfalfa and jojoba farms and large-scale hemp-growing operations. Small-scale abandoned and operational hemp and/or marijuana-growing operations were present throughout the playa region of the Project area.

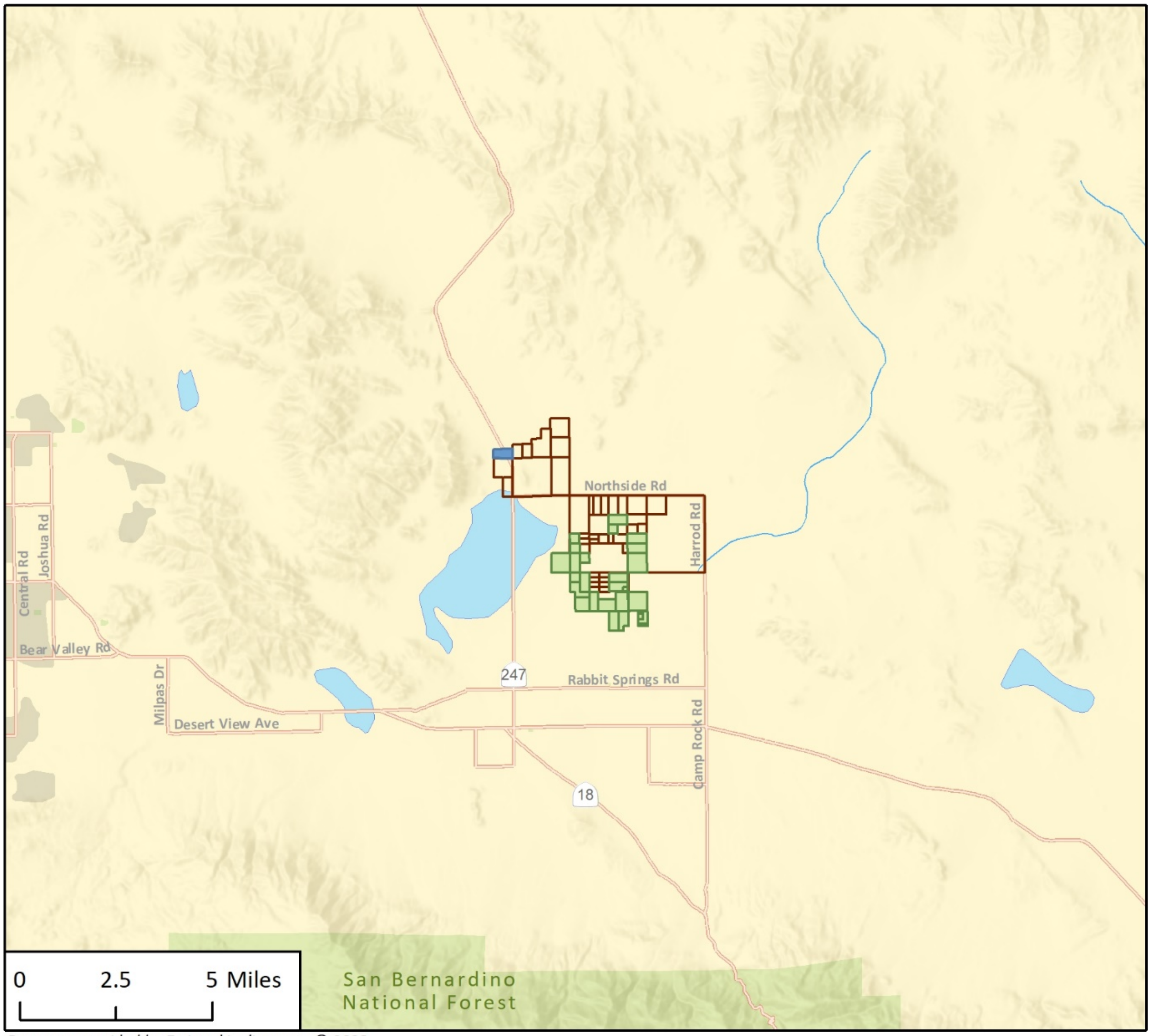
Table 1 Parcels within the Project Area

APN	Acreage (per Assessor's Map)	APN	Acreage (per Assessor's Map)
045212139	12.55404541	045212148	33.28632614
045239109	39.91526707	045212138	5.016492695
045211220	70.20888055	045236147	80.70729535
045211217	8.837406315	045207119	40.21115962
045211225	103.4454746	045211317	151.4004447
045239108	80.02399333	045212142	70.84751799
045207111	154.929939	045212112	80.72463791
045206221	40.20743454	045236146	80.66763908
045207110	80.41165783	045206222	76.4378852
045237101	161.2738532	045207120	40.20198758
045206223	80.44723722	045212152	10.18899555
045207125	40.20609255	045211218	64.7251832
045211219	73.47191205	045206224	84.47043199
045211224	89.90449969		

1.2 Personnel

Rincon Cultural Resources Principal Investigator Breana Campbell-King, MA, Registered Professional Archaeologist (RPA), served as principal investigator for the study and provided program-level oversight for this Project. Ms. Campbell-King meets the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeology (National Park Service [NPS] 1983). Rincon Principals Christopher Duran, MA, RPA, and David Daitch, PhD, and Rincon Architectural History Program Manager Steven Treffers, MHP, and Rincon Project Manager, Megan Jones and Technical Editor, Dario Campos provided quality control for this report. Rincon Archaeologist Mark Strother, MA, RPA, served as field director and is the primary author of this report. Rincon Archaeologist Derek Reaux, PhD, RPA, coauthored this report and participated in the field survey. Rincon Architectural Historian, Ashley Losco, MHP is also a contributing author of this report. Rincon Archaeologists Robert Guardado, Kyle Montgomery, Breanna Rotella, Juan Avilla, Jaime Wojak, Mary Pfeiffer, Rebecca Rutherford, Isaiah Moose, Danielle Stanzak, Alex Wechter, Adallana Sasone, and Sabdy Jimenez-Franco participated in the field survey. GIS Analysts Erik Holtz and Josh Patterson prepared the figures found in this report.

Figure 1 Regional Location Map



Basemap provided by Esri and its licensors © 2023.

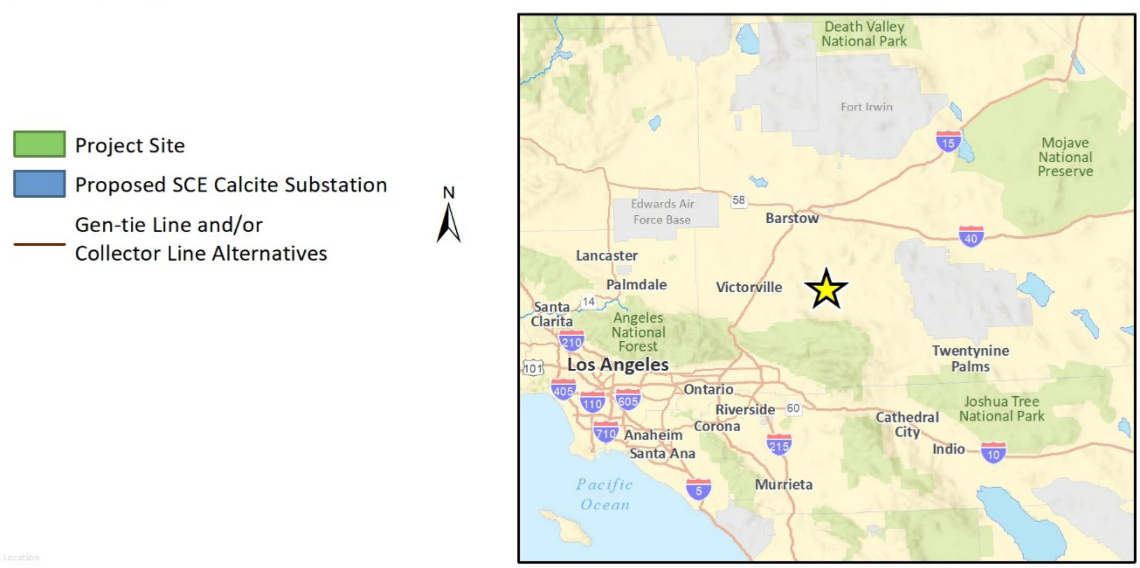


Figure 2 Project Location Map Depicting 27 Parcels that Comprise Project Area

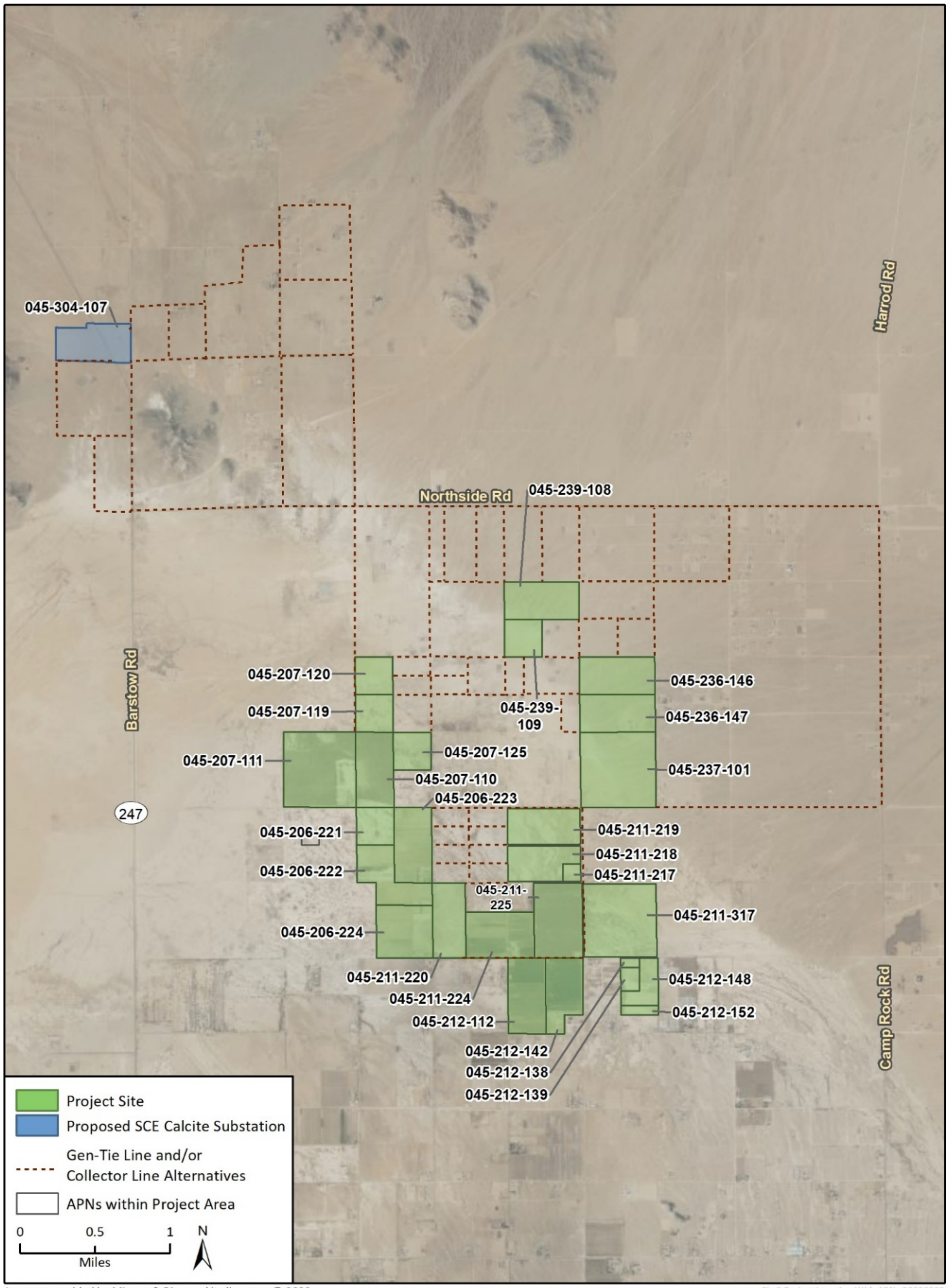


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Figure 3 Project Location Map with Topographic Background

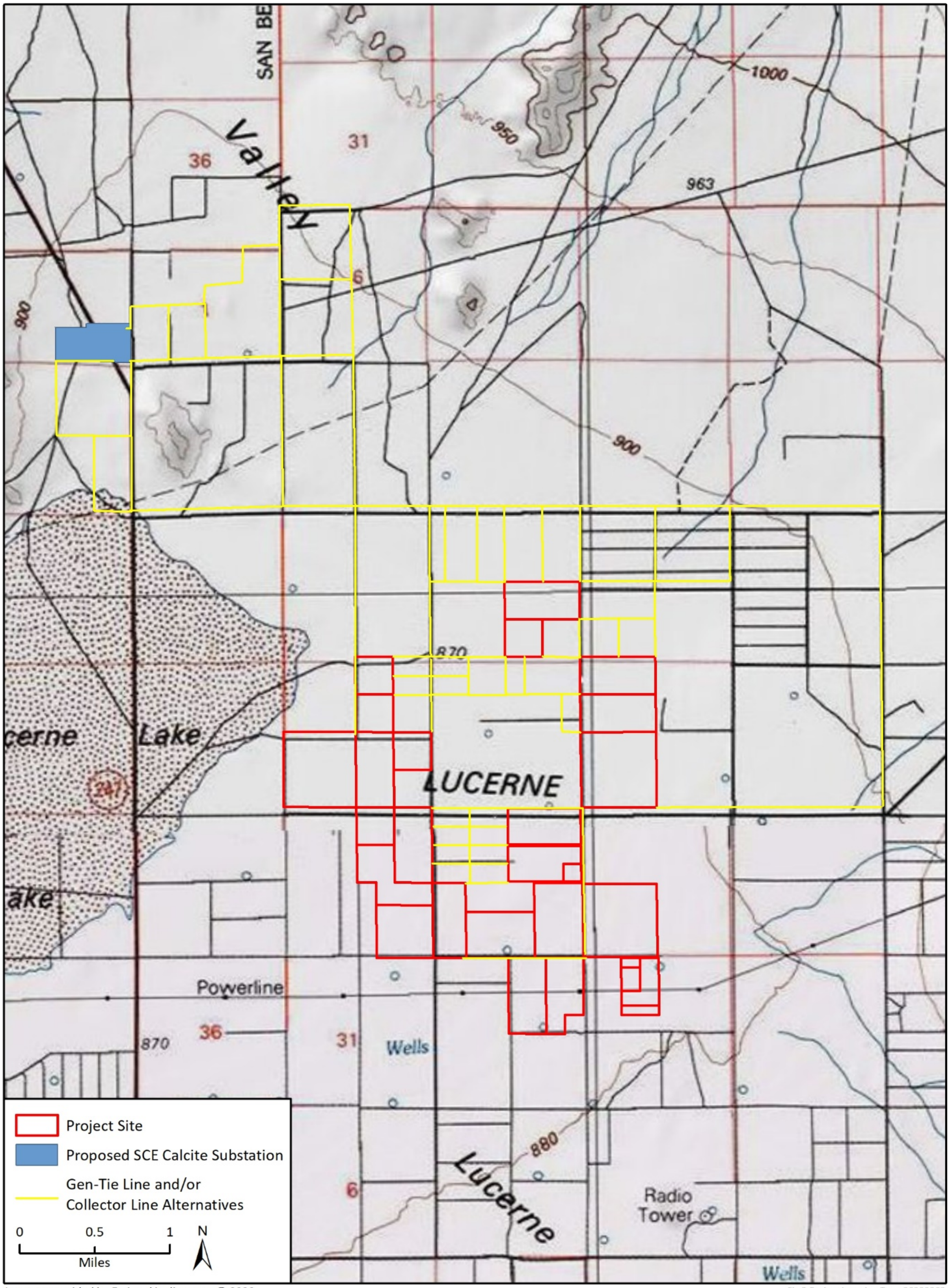

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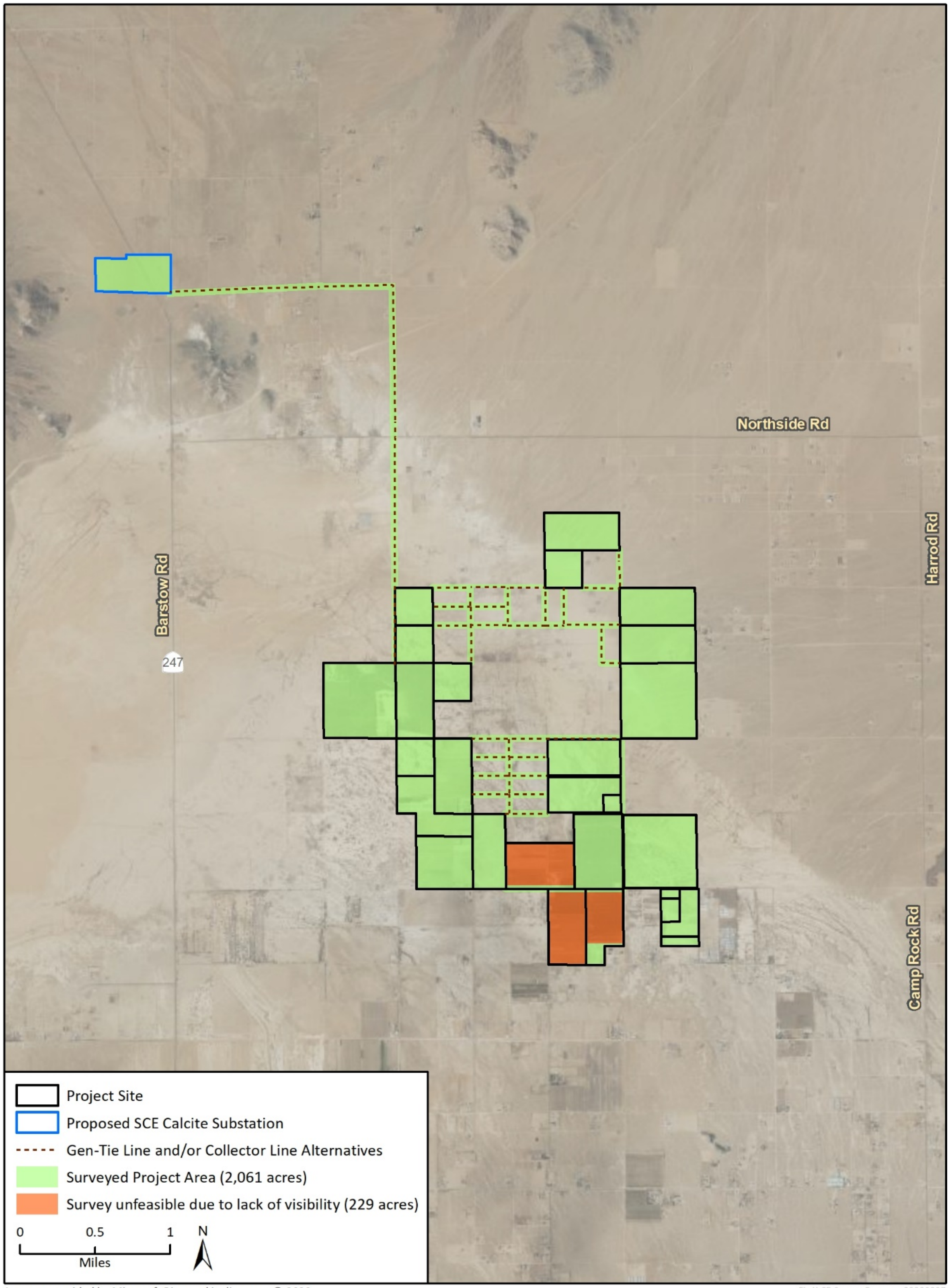
Figure 4 Portions of Project Area including Preferred Gen-Tie Corridor where Formal Cultural Resources Documentation Occurred



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2 Regulatory Setting

This section includes a discussion of the applicable state and local laws, ordinances, regulations, and standards governing cultural resources, which must be adhered to before and during implementation of the proposed project.

2.1 California Environmental Quality Act

California Public Resources Code (PRC) Section 21804.1 requires lead agencies determine if a project could have a significant impact on historical or unique archaeological resources. As defined in PRC Section 21084.1, a historical resource is a resource listed in, or determined eligible for listing in, the California Register of Historical Resources (CRHR), a resource included in a local register of historical resources or identified in a historical resources survey pursuant to PRC Section 5024.1(g), or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant. PRC Section 21084.1 also states resources meeting the above criteria are presumed to be historically or cultural significant unless the preponderance of evidence demonstrates otherwise. Resources listed in the National Register of Historic Places (NRHP) are automatically listed in the CRHR and are, therefore, historical resources under CEQA. Historical resources may include eligible built-environment resources and archaeological resources of the precontact or historic periods.

CEQA Guidelines Section 15064.5(c) provides further guidance on the consideration of archaeological resources. If an archaeological resource does not qualify as a historical resource, it may meet the definition of a “unique archaeological resource” as identified in PRC Section 21083.2. PRC Section 21083.2(g) defines a unique archaeological resource as an 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) it 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, or 3) is directly associated with a scientifically recognized important prehistoric or historic event or person.

If an archaeological resource does not qualify as a historical or unique archaeological resource, the impacts of a project on those resources will be less than significant and need not be considered further (CEQA Guidelines Section 15064.5[c][4]). CEQA Guidelines Section 15064.5 also provides guidance for addressing the potential presence of human remains, including those discovered during the implementation of a project.

According to CEQA, an impact that results in a substantial adverse change in the significance of a historical resource is considered a significant impact on the environment. A substantial adverse change could result from physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired (CEQA Guidelines Section 15064.5 [b][1]). Material impairment is defined as demolition or alteration in an adverse manner [of] those characteristics of a historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the CRHR or a local register (CEQA Guidelines Section 15064.5[b][2][A]).

If it can be demonstrated that a project will cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC Section21083.2[a][b]).

Section 15126.4 of the CEQA Guidelines stipulates an Environmental Impact Report shall describe feasible measures to minimize significant adverse impacts. In addition to being fully enforceable, mitigation measures must be completed within a defined time period and be proportional to the impacts of the project. Generally, a project which is found to comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (the Standards) is considered to be mitigated below a level of significance (CEQA Guidelines Section 15126.4 [b][1]). For historical resources of an archaeological nature, lead agencies should also seek to avoid damaging effects where feasible. Preservation in place is the preferred manner to mitigate impacts to archaeological sites; however, data recovery through excavation may be the only option in certain instances (CEQA Guidelines Section 15126.4[b][3]).

2.2 National Register of Historic Places

Although the project does not have a federal nexus, properties which are listed in or have been formally determined eligible for listing in the NRHP are automatically listed in the CRHR. The following is therefore presented to provide applicable regulatory context. The NRHP was authorized by Section 101 of the National Historic Preservation Act and is the nation's official list of cultural resources worthy of preservation. The NRHP recognizes the quality of significance in American, state, and local history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects. Per 36 CFR Part 60.4, a property is eligible for listing in the NRHP if it meets one or more of the following criteria:

Criterion A: Is associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: Is associated with the lives of persons significant in our past

Criterion C: Embodies the distinctive characteristics of a type, period, or method of installation, 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

Criterion D: Has yielded, or may be likely to yield, information important in prehistory or history

In addition to meeting at least one of the above designation criteria, resources must also retain integrity. The NPS recognizes seven aspects or qualities that, considered together, define historic integrity. To retain integrity, a property must possess several, if not all, of these seven qualities, defined as follows:

Location: The place where the historic property was constructed or the place where the historic event occurred

Design: The combination of elements that create the form, plan, space, structure, and style of a property

Setting: The physical environment of a historic property

Materials: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property

Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory

Feeling: A property's expression of the aesthetic or historic sense of a particular period of time

Association: The direct link between an important historic event or person and a historic property

Certain properties are generally considered ineligible for listing in the NRHP, including cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions, relocated structures, or commemorative properties. Additionally, a property must be at least 50 years of age to be eligible for listing in the NRHP. The NPS states that 50 years is the general estimate of the time needed to develop the necessary historical perspective to evaluate significance (NPS 1997: 41). Properties which are less than 50 years must be determined to have "exceptional importance" to be considered eligible for NRHP listing.

2.3 California Register of Historical Resources

The CRHR was established in 1992 and codified by PRC Sections 5024.1 and 4852. The CRHR is an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change (Public Resources Code, 5024.1(a)). The criteria for eligibility for the CRHR are consistent with the NRHP criteria but have been modified for state use in order to include a range of historical resources that better reflect the history of California (Public Resources Code, 5024.1(b)). Unlike the NRHP however, the CRHR does not have a defined age threshold for eligibility; rather, a resource may be eligible for the CRHR if it can be demonstrated sufficient time has passed to understand its historical or architectural significance (California Office of Historic Preservation 2006). Furthermore, resources may still be eligible for listing in the CRHR even if they do not retain sufficient integrity for NRHP eligibility (California Office of Historic Preservation 2006). Generally, the California Office of Historic Preservation recommends resources over 45 years of age be recorded and evaluated for historical resources eligibility (California Office of Historic Preservation 1995:2).

A property is eligible for listing in the CRHR if it meets one of more of the following criteria:

Criterion 1: Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage

Criterion 2: Is associated with the lives of persons important to our past

Criterion 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

Criterion 4: Has yielded, or may be likely to yield, information important in prehistory or history

2.4 California Assembly Bill 52 of 2014

As of July 1, 2015, Assembly Bill (AB) 52 was enacted and expands CEQA by defining a new resource category, "tribal cultural resources". AB 52 establishes, "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (PRC Section 21084.2). It further states the CEQA lead agency shall establish measures to avoid impacts that would alter the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3).

PRC Section 21074 (a)(1)(A) and (B) define tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and that meets at least one of the following criteria, as summarized in CEQA Guidelines Appendix G:

1) Listed or eligible for listing in the CRHR, or in a local register of historical resources as defined in PRC Section 5020.1(k)
1) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying these criteria, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52 also establishes a formal consultation process with California Native American tribes that must be completed before a CEQA document can be certified. Under AB 52, lead agencies are required to "begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." California Native American tribes to be included in the process are those that have requested notice of projects proposed within the jurisdiction of the lead agency.

3 Methods

3.1 Background and Archival Research

3.1.1 California Historical Resource Information System

Rincon requested a search of cultural resources records housed at the California Historical Resources Information System (CHRIS), South Central Coastal Information Center (SCCIC) located at the California State University, Fullerton on July 9, 2021. The search was conducted to identify previous cultural resources work and previously recorded cultural resources within a 0.5-mile radius of the Project area. The CHRIS search included a review of the NRHP, the CRHR, the California Points of Historical Interest list, the California Historical Landmarks list, the Archaeological Determinations of Eligibility list, and the California State Historic Resources Inventory list. The records search also included a review of available historic USGS 7.5-, 15-, and 30-minute quadrangle maps.

3.1.2 Archival Research

Rincon completed background and archival research in support of this assessment from August through October of 2021. A variety of primary and secondary source materials were consulted. Sources included, but were not limited to, historical maps, aerial photographs, and written histories of the area. The following sources were utilized to develop an understanding of the Project area and its context:

- San Bernardino County Assessor’s Office
- United States Department of the Interior Bureau of Land Management (BLM) General Land Office (GLO) Records
- Historical aerial photographs accessed via NETR Online
- Historical aerial photographs accessed via University of California, Santa Barbara Library FrameFinder
- Historical USGS topographic maps
- National Archives at Riverside, Riverside, California
- Historical newspaper clippings obtained from Newspapers.com, ProQuest Historical Newspapers.com, and the California Digital Newspaper Collection

3.1.3 Sacred Lands File Search

Rincon requested a review of the SLF by the NAHC on August 6, 2021. The NAHC sent a response on September 3, 2021, stating that a search of the SLF was completed with negative results (Appendix A).

3.2 Field Survey

3.2.1 Archaeological Resources Survey

Rincon archaeologists (see Section 1.2) conducted two field surveys of the Project area between July 21-30 and September 16-20, 2021. The archaeologists surveyed the Project area using transects spaced 15 meters apart. The archaeologists examined exposed ground surface for artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools, ceramics, fire-affected rock), ecofacts (marine shell and bone), soil discoloration that might indicate the presence of a cultural midden, soil depressions, and features indicative of the former presence of structures or buildings (e.g., standing exterior walls, postholes, foundations) or historic debris (e.g., metal, glass, ceramics). Ground disturbances, such as burrows and drainages, were visually inspected. Survey notes were prepared by the surveyor and are available upon request. Archaeological resources (isolates and sites) were recorded on California Department of Parks (DPR) 523 series forms.

3.2.2 Built Environment Survey

Under the direction of Rincon Architectural Historian Steven Treffers, MHP, Rincon cultural resources specialists (see Section 1.2) conducted a built environment survey of the Project area. The built environment resources within the Project area, including buildings and structures were visually inspected. Pursuant to California Office of Historic Preservation Guidelines (California OHP 1995:2), properties over 45 years of age were evaluated for inclusion in the NRHP, CRHR, and local listing and recorded on DPR 523 series forms. Overall condition and integrity of these resources were documented and assessed. Site characteristics and conditions were documented using notes and digital photographs which are maintained at the Rincon San Diego office. It should be noted that the roads within the Project area that were surveyed were not formally evaluated as the project does not include alterations to the roads or any substantial changes to their setting; therefore, there will be no significant impact.

4 Natural and Cultural Setting

4.1 Natural Setting

The Project area is located in the Lucerne Valley of County of San Bernardino, situated at an average elevation of 885 meters (2,900 feet [ft]) above mean sea level. Vegetation communities in the Project area consisted of Mojave Desert scrub communities including creosote bush scrub, allscale scrub, Russian thistle, and fourwing saltbush scrub.

4.1.1 Geology and Soils

The Project area includes four geologic units mapped at ground surface: Quaternary young (Holocene) alluvium (Qa), Quaternary young (Holocene) dune sand (Qs), Quaternary young (Holocene) playa deposits (Qc), and Quaternary old (Pleistocene) gravel deposits (Qog).

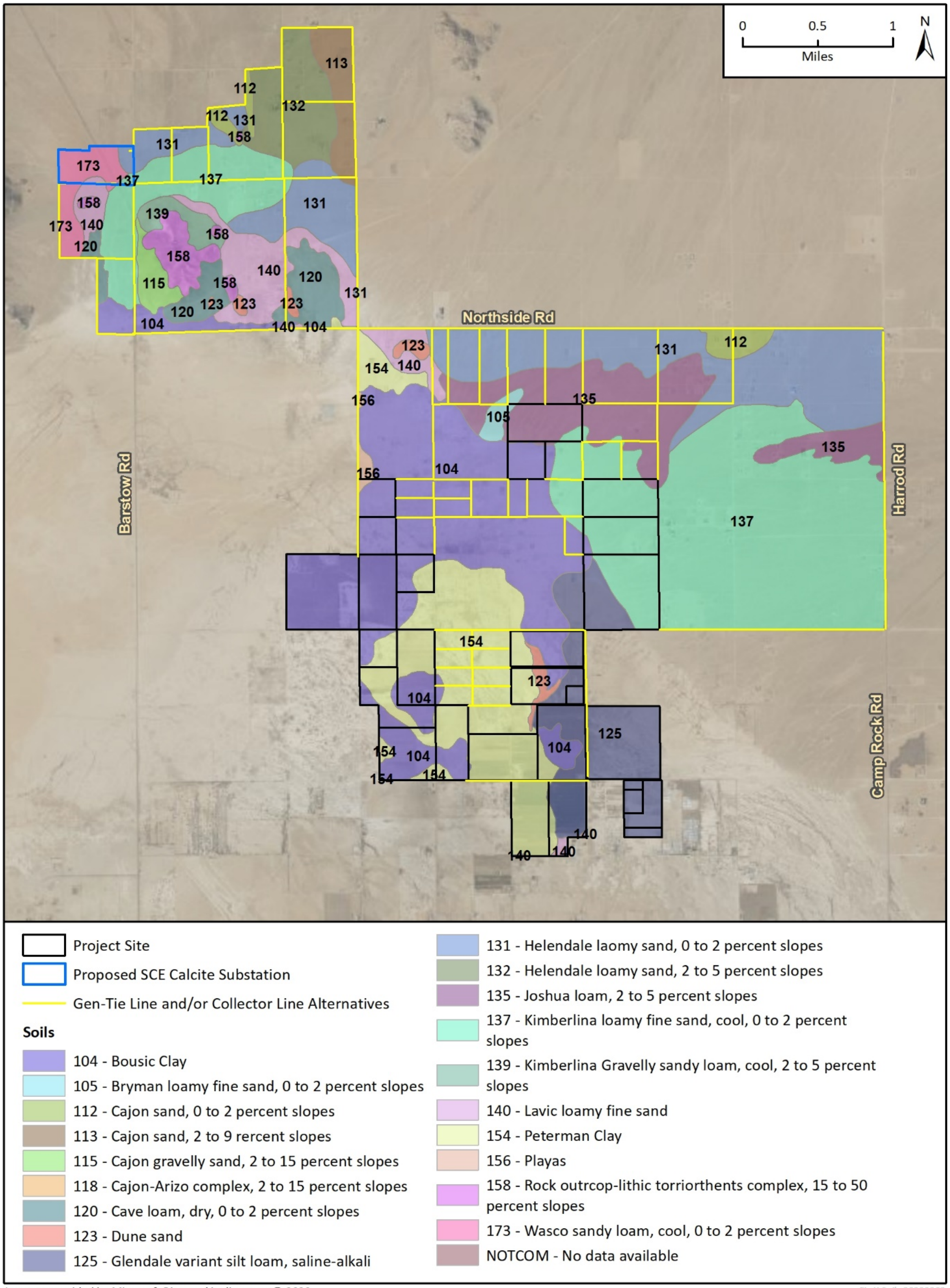
Quaternary young (Holocene) alluvium (Qa), derived from the Ord Mountains to the north, form an unconsolidated layer of alluvial sand, silt, and gravel across much of the Project area and Lucerne Valley. Mapped at the surface within the central portion of the Project area, the Quaternary young (Holocene) dune sand deposits (Qs) consist of loose, well-sorted, fine-grained sand deposited as dunes or thin veneers on alluvium and clay (Dibblee and Minch 2008a, b). Mapped simultaneously in several areas, the Quaternary young (Holocene) playa deposits (Qc) are composed of a layer of light gray, micaceous, clay and are formed from the lakebed of the Lucerne Dry Lake.

Quaternary old (Pleistocene) gravel deposits (Qog), mapped within portions of the gen-tie corridor, are composed gray gravel of rounded cobbles derived from the Ord and East Ord Mountains (Dibblee and Minch 2008a, b).

The U.S. Department of Agriculture (USDA) National Resource Conservation Service (NRCS) has mapped and inventoried soils at both landscape (coarse) scales and detailed (fine) scales. These data are catalogued in previously published soil surveys, the Soil Survey Geographic Database, and the U.S. General Soil Map. These can be accessed through the Web Soil Survey Application (USDA NRCS 2021). This subsection summarizes soil resources as mapped by the NRCS that overlap the Project area at the landscape level.

The Project area is covered by the *Soil Survey of San Bernardino County, California, Mojave River Area*. The soil survey indicates that soils in the Lucerne Valley floor are primarily derived from alluvium parent materials from granitic sources and other mixed sources. Within the Project area, soils are associated with alluvial fans, toe slopes, playas, and other gently sloped landforms. Based on Web Soil Survey data, the site contains 18 soil map units, which are briefly described below. Soil map units across the Project area are depicted in Figure 5, below.

Figure 5 Soils Map



Imagery provided by Microsoft Bing and its licensors © 2023.
Soil data provided by SSURGO, NRCS, USDA, 2021.

Fig X Soils 20230303

Bousic Clay

This soil map unit typically occurs on toeslopes of lake plains and talfs (geomorphic components of an essentially flat and broad area dominated by closed depressions) in low areas with very little slope. The dominant soil series, Bousic clay, is formed in alluvium from mixed sources. A typical soil profile consists of clay horizons to at least 60 inches of depth. This soil is well drained, alkaline, and strongly saline. Minor components within this map unit are Peterman soils. This soil covers approximately 19 percent of the Project area.

Bryman Loamy Fine Sand, 2 to 5 Percent Slopes

This granitic soil map unit usually occurs on terraces and older alluvial fans, at elevations from 2,800 to 3,800 ft. A typical soil profile consists of a pale topsoil layer that is loamy or sandy. The second horizon is usually pink to reddish brown and is generally sandy clay loam, loam or gravelly sandy loam. The third horizon is pale yellowish brown to strong brown, is usually alkaline, and may be loamy coarse sand to sand. This soil covers approximately 0.4 percent of the Project area.

Cajon Sand, 0 to 2 Percent Slopes

This soil map unit typically occurs on alluvial fans on gentle slopes. The dominant soil series, Cajon sand, is formed in alluvium from granitic sources. A typical soil profile consists of sandy topsoil, underlain by a second sand horizon to approximately 25 inches, with layers of gravelly sand, stratified sand and loamy fine sand below to at least 60 inches of depth. This soil is somewhat excessively drained. Minor components within this map unit are Manet, Kimberlina, and Helendale soils. This soil covers approximately 0.9 percent of the Project area.

Cajon Sand, 2 to 9 Percent Slopes

This soil map unit is similar to the Cajon map unit except it occurs on slightly greater slopes (2 to 9 percent) and may have more layers of stratified gravelly sand in the subsoil. This soil covers approximately 1.5 percent of the Project area.

Cajon Gravelly Sand, 2 to 15 Percent Slopes

This soil map unit is similar to the previous two Cajon map units except it occurs on slightly greater slopes (2 to 15 percent) and the topsoil and subsoil horizons have increased gravel content. This soil covers approximately 0.7 percent of the Project area.

Cave Loam, Dry, 0 to 2 Percent Slopes

This soil map unit typically occurs on alluvial fan remnants on gentle slopes. The dominant soil series, Cave loam, is formed in alluvium from granitic sources. A typical soil profile consists of loam topsoil, underlain by stratified sandy loam to loam subsoil between 21 and at least 66 inches of depth. This soil is well drained, and very slightly to slightly saline. Minor components within this map unit are a Cave soil with clayey subsoil, Kimberlina, and Lavic soils. This soil covers approximately 2.5 percent of the Project area.

Dune Sand

This soil map unit consists of unstable hills and ridges of loose, wind-deposited sand that is excessively drained and barren. Dunes are typically less than 15 feet high, and slopes are between 5 to 15 percent. Minor components within this map unit are Cajon sand, Riverwash and Villa loamy sand along the Mojave River, and Halloran soils. This soil covers approximately 6.5 percent of the Project area.

Glendale Variant Silt Loam, Saline-Alkali

This soil map unit occurs on basin rims and lower margins of narrow alluvial fans with slopes ranging from 0 to 2 percent with vegetation consisting of salt-tolerant shrubs, grasses, and forbs. Soil profiles are very pale brown silt loam down to 11 inches with underlying material consisting of light yellowish brown and pale brown silty clay loam. Surface layer and underlying layers are moderately or strongly alkaline. Minor components within this map unit are small areas of Lavic soils. This soil is suited for irrigated crops in areas where they are reclaimed. This soil covers approximately 6 percent of the Project area.

Helendale Loamy Sand, 0 to 2 Percent Slopes

This soil map unit typically occurs on alluvial fan remnants on gentle slopes. The dominant soil series, Helendale loamy sand, is formed in alluvium from granitic sources. A typical soil profile consists of loamy sand topsoil, underlain by sandy loam subsoil between 4 and at least 66 inches of depth. This soil is well drained, and non-saline to very slightly saline. Minor components within this map unit are Bryman, Kimberlina, and Cajon soils. This soil covers approximately 13 percent of the Project area.

Helendale Loamy Sand, 2 to 5 Percent Slopes

This soil map unit occurs on alluvial fans and terraces and is derived primarily from granitic material. Slopes are broad and nearly level with many areas dissected by shallow intermittent drainageways. Vegetation is primarily yucca, desert shrubs, grasses, and forbs. The surface layer is very pale brown loamy sand about 4 inches thick with subsoil and the upper part of the substratum are brown, yellowish brown, and light yellowish brown sandy loam about 62 inches thick. Clay content decreases below a depth of 30 inches. Minor components include Bryman, Kimberlina, and Cajon soils. This soil covers approximately 3.1 percent of the Project area.

Joshua Loam, 2 to 5 Percent Slopes

This soil map unit occurs on old stable terraces that have desert pavement. It formed in alluvium derived from mixed sources with broad, slightly convex slopes. Most areas are dissected by moderately deep intermittent drainageways. Typically, 70-90 percent of the surface layer is covered by desert pavement with a light yellowish-brown loam about 3 inches thick. Subsoils are brown and reddish brown gravelly sandy clay loam around 17 inches thick. These soils are often strongly alkali. Minor components within this map unit are Cajon soils. This soil covers approximately 7.4 percent of the Project area.

Kimberlina Loamy Fine Sand, Cool, 0 to 2 Percent Slopes

This soil map unit typically occurs on skirts and aprons of alluvial fans on gentle slopes. The dominant soil series, Kimberlina loamy fine sand, is formed in alluvium from mixed sources. A typical soil profile consists of loamy fine sand topsoil, underlain by sandy loam, fine sandy loam, and loam subsoil between 7 and at least 60 inches of depth. This soil is well drained, and non-saline to very slightly saline. Minor components within this map unit are Helendale and Cajon soils. This soil covers approximately 25 percent of the Project area.

Kimberlina Loamy Fine Sand, Cool, 2 to 5 Percent Slopes

This soil map unit is similar to the Kimberlina map unit except it occurs on slightly greater slopes (2 to 5 percent) and may have more layers of stratified gravelly sand in the subsoil. This soil covers approximately 0.7 percent of the Project area.

Lavic Loamy Fine Sand

This soil map unit typically occurs on skirts and aprons of alluvial fans on gentle slopes. The dominant soil series, Lavic loamy fine sand, is formed in alluvium from granitic sources. A typical soil profile consists of loamy fine sand topsoil, underlain by multiple layers of sandy loam, loamy fine sand, loamy sand and loam subsoil between 10 and at least 49 inches of depth. This soil is well drained, and slightly to moderately saline. Minor components within this map unit are unnamed soils. This soil covers approximately 4.1 percent of the Project area.

Peterman Clay

This soil map unit typically occurs on skirts of alluvial fans on gentle slopes. The dominant soil series, Peterman clay, is formed in fine-textured alluvium from mixed sources. A typical soil profile consists of clay topsoil, underlain by clay and gravelly clay subsoil to at least 60 inches of depth. This soil is moderately well drained, alkaline, and strongly saline. Minor components within this map unit are unnamed soils. This soil covers approximately 11 percent of the Project area.

Playas

This soil map unit consists of playa areas consisting of lacustrine deposits derived from mixed sources. Minor components within this map unit are Bousic, Norob, and Halloran soils. This soil covers approximately 0.2 percent of the Project area.

Rock Outcrop – Lithic Torriorthents Complex, 15 to 50 Percent Slopes

This soil map unit typically occurs on summits, backslopes and flanks of mountains on moderate to steep slopes. This map unit does not contain named soils. Rock outcrops, typically granitic, are interspersed with minimally developed soil underlain by bedrock within 8 to 20 inches of the soil surface. Minor components within this map unit are Sparkhule and Trigger soils. This soil covers approximately 1.4 percent of the Project area.

Wasco Sandy Loam, Cool, 0 to 2 Percent Slopes

This soil map unit typically occurs on aprons of alluvial fans on gentle slopes. The dominant soil series, Wasco sandy loam, is formed in alluvium derived from granite. A typical soil profile consists of sandy loam topsoil, underlain by additional sandy loam horizons to at least 60 inches of depth. This soil is well drained, and non-saline to very slightly saline. Minor components within this map unit are Cajon, Lucerne, and Bryman soils. This soil covers approximately 1.3 percent of the Project area.

A majority of the soils within the Project area are alluvial. Because of the episodic nature of alluvial sedimentation, the sudden burial of artifacts is possible, and alluvial soils have an increased likelihood of containing buried archaeological deposits (Waters 1992, Borejaza et al. 2014). Although derived from alluvium, Bousic and Peterman Clay are a micaceous clay formed from the lakebed of the Lucerne Dry Lake. These map units generally consist of clay to at least five feet below surface and are less likely to contain buried archaeological deposits as artifact intrusion and accumulation of soil overtime are less likely to occur.

4.2 Cultural Setting

4.2.1 Indigenous History

Several chronological sequences have been proposed by archaeologists to describe cultural change in Southern California (Jones and Klar 2007, Moratto 2004). Sutton et al. (2007) devised an updated Mojave Desert culture history, dividing it into four temporal periods: Pleistocene, Early Holocene, Middle Holocene, and Late Holocene. Here, we use a modified version from Sutton et al. (2007) Mojave Desert chronology that incorporates updated dates and information regarding the Terminal Pleistocene and Early Holocene Periods (i.e., Grayson 2011, Rosencrance 2019, Smith et al. 2020).

Terminal Pleistocene Period (ca. 14,000 to 11,600 cal BP)

The climate of the Terminal Pleistocene Period in the Mojave Desert is generally characterized as being much cooler and wetter that the periods that followed (Sutton et al. 2007). During this time, the Mojave Desert featured several pluvial lakes (Grayson 2011). Although pluvial lakes vary in size, depth, and productivity, many lakes in the region likely fostered shallow marshes and wetlands along their shores. These lacustrine wetland environments often contained a wide variety of plant (e.g., cattail, tule) and animal resources (e.g., waterfowl, fish, deer/antelope). Vegetation in the Mojave Desert was also much different during the Terminal Pleistocene than it is today. Shadscale communities dominated the valley floors and Utah Juniper grew thousands of feet lower in elevation than they do today (Grayson 2011). Common plants seen today such as creosote bush, brittlebush, and rabbitbrush would not arrive in the region for hundreds to thousands of years following the end of the period (ca. 11,600 cal BP [Grayson 2011]).

To date, there are no securely dated archaeological sites attributed to the Terminal Pleistocene Period (Rosencrance 2019, Smith et al. 2020) in the Mojave Desert or southern Great Basin. However, it is possible that groups associated with the Western Stemmed Tradition (WST) and Clovis technological complexes did occupy the region during this time. The WST is a Paleoindian technological complex found across the Intermountain West and California that is characterized by the use of large-stemmed-lanceolate projectile points, a mobile hunter-gatherer settlement-subsistence system, and a broad diet often dominated by lacustrine resources (Reaux 2020). Campbell and Campbell (1937) discovered the first WST points on the shores of Pleistocene Lake Mojave and suggested that they dated to the Terminal Pleistocene; however, they lacked a means to reliably date the sites at the time. Although, there are no currently well-dated Terminal Pleistocene WST sites in the Mojave Desert or southern Great Basin, recent discoveries at the Paisley Caves, Oregon and Cooper’s Ferry, Idaho indicate that WST groups have been in the Intermountain West since at least 14,000 cal BP, making it the oldest well-defined technological complex in North America (Davis et al. 2019, Jenkins et al. 2012, Smith et al. 2020). Current evidence suggests that WST groups may not have occupied the Mojave Desert region until the Early Holocene period (Rosencrance 2019).

Fluted lanceolate points, often attributed to the Clovis Paleoindian Complex, have also been found in the Mojave Desert and southern Great Basin (Grayson 2011). The Clovis Complex, once thought to be the oldest Paleoindian technological complex in the Americas (Jenkins et al. 2012) is generally defined by the presence of fluted lanceolate concave-based bifaces and the use of blades derived from prepared cores (Justice 2002). Clovis groups are often described as being highly mobile, megafauna hunting specialists based on their large toolstone conveyance patterns and the relatively common occurrence of Pleistocene megafauna kill sites associated with Clovis material (Grayson 2011). However, this was likely not the case in the Mojave Desert and Great Basin given the limited amount of Pleistocene megafauna that occupied the desert region due to limited grassland availability (Grayson 2016). Instead, Clovis points in the Mojave Desert and Great Basin tend to be found along the shores of relict pluvial lakes and/or drainages that fed pluvial lakes, often overlapping with WST sites. It is likely that groups using fluted-point technology practiced a similar wetland-focused lifestyle as WST groups. Unfortunately, no well-stratified or dated Clovis sites exist in the Mojave Desert and Great Basin, and little else is known about their existence in the region or their relationship to the WST. Some researchers believe that fluted-point groups in the Great Basin and California may have arrived sometime during the late Paleoindian period (i.e., the Early Holocene) given the age and dominance the WST in the region and differences in the morphology of fluted points in the west compared to traditional Clovis points found in the eastern United States. (Rosencrance 2019, Smith et al. 2020).

Early Holocene Period (ca.11,600 to 8,000 cal BP)

The Pleistocene-Holocene transition began at approximately 11,600 cal BP following the termination of the Younger Dryas climatic event. The onset of the Early Holocene Period was marked by warmer temperatures, reduced precipitation, and the eventual desiccation of many of the region’s Pleistocene pluvial lakes. During this period, we see a shift to more modern vegetation distributions with the arrivals of white bursage and creosote bush and the retreat of Utah Juniper to higher elevations (Grayson 2011). Although very few dated sites exist for this period, both fluted and WST technologies are associated with the Early Holocene in the Mojave Desert and southern Great Basin. WST sites, sometimes associated with the Lake Mojave Complex (Sutton et al., 2007), are the most common Early Holocene archaeological tradition in the region. These sites are often found near relict pluvial lake shores and generally contain the Lake Mojave and Silver Lake type WST points (Rosencrance 2019). Other Lake Mojave Complex tools include bifaces, steep-edged unifaces, crescents, the occasional cobble-core tool, and, infrequently, ground stone implements (Justice 2002). Based on large toolstone-conveyance zones, small site sizes, and the lack of evidence for long-term occupations (e.g., house features, middens), researchers believe WST groups in the region continued to practice a highly mobile, wetland-focused settlement-subsistence strategy (Basgall and Hall 1993, Grayson 2011) during this period.

Unlike the Terminal Pleistocene Period, a small number of sites have been securely dated to the Early Holocene in the Mojave Desert region. For example, the Roger’s Ridge Site contained Lake Mojave WST points associated with a date range of 11,095-10,200 cal BP (Jenkins 1991) and the Awl Site possessed Parman and Silver Lake WST points dating between 10,125-8,655 cal BP (Basgall and Hall 1993). Finally, the China Lake Site contains both WST and fluted points argued to date to the Terminal Pleistocene and Early Holocene periods (Basgall and Overly 2004, Sutton 2007); however, these dates are associated with relict landforms and cannot be directly associated with those artifacts or occupations (Rosencrance 2019).

Middle Holocene Period (8,000 to 5,000 cal BP)

The Middle Holocene climate was generally more arid than periods before and after but experienced multiple oscillations between wetter and drier conditions throughout the period. The nearly complete desiccation of the Early Holocene lakes and marshes required the region’s inhabitants to rely on streams and springs for water, likely resulting in lower occupational densities (Aikens 1978, Basgall 2000, Cleland and Spaulding 1992, Sutton 1996, Warren 1984). Average temperatures and aridity increased, peaking between 8,000 and 6,000 cal BP. Settlement patterns appear to change during this time, including a shift to upland settings where reliable waters could still be found. The onset of the Middle Holocene Period also saw dramatic shifts in the archaeological record with the gradual replacement of WST spear-point technology by dart points of the Pinto Complex, marking the onset of the Early Archaic period (Grayson 2011).

The Pinto Complex was defined by Campbell and Campbell (1935) based on their work at the Pinto Basin site, but it has a wider distribution throughout the Mojave Desert than previous complexes. During the latter part of the Early Holocene, archaeological data indicate that the Pinto Complex overlaps the WST Lake Mojave Complex (Sutton et al., 2007). The Pinto Complex reflects shifts in subsistence patterns and adaptation to the shrinking of the Pleistocene lakes, including a greater emphasis on the exploitation of plants, with the continued pursuit of artiodactyls and smaller game. The broad distribution of this complex implies a high degree of mobility. The hallmarks of the Pinto Complex tool assemblage include concave base and bifurcate base projectile points with strong basal ears and more gradual shoulders (Jenkins 1991). Other diagnostic artifacts of this complex include domed and keeled scrapers, large and small leaf-shaped bifaces, core/cobble tools, large metates and milling slabs, and shaped and unshaped handstones.

Near the end of the Middle Holocene, approximately 5,000 to 4,000 cal BP, the climate became increasingly hotter and more arid. Very few sites date to this time period, suggesting that populations were very low. It is possible that some areas were abandoned during this increasing hot and dry period (Sutton et al. 2007).

Late Holocene Period (5,000 cal BP to European Contact)

The climate of the Late Holocene was similar to current conditions: cooler and more mesic than the Middle Holocene but not as cool and moist as the Terminal Pleistocene or Early Holocene. The climate remained highly variable with periods that included the Mojave lakes refilling to levels of earlier high stands, contrasted with at least two major droughts, ca. 1,124 to 904 cal BP, and ca. 807 to 660 cal BP (Stine 1994). A cooler and wetter period occurred between 550 and 100 cal BP (Cleland and Spaulding 1992). These climatic changes at the onset of the late Holocene once again resulted in modified subsistence strategies and a number of new cultural complexes developed during this time including the: Middle Archaic Complex, Gypsum Complex, Rose Spring Complex/Late Archaic Period, and the Late Prehistoric Complex (or period).

Dart-point-size projectile points such as Elko and Humboldt series points appear in the region during the early-Late Holocene and are often attributed to the Middle Archaic cultural complex found across the Great Basin region (Grayson 2011), although they are sometimes included as a part of the Gypsum Complex. This period saw a boom in population densities and shift towards a more residentially stable lifestyle that included an increased reliance on low-ranked plant resources and a dramatic rise in the use of groundstone implements such as manos and metates (Grayson 2011). Around 4,000 cal BP, the Gypsum Complex emerged in the Mojave Desert region. Gypsum Complex sites are generally characterized by small-stemmed and leaf-shaped points, rectangular-based knives, flake scrapers, drills, and occasionally, large scraper planes, choppers, and hammerstones (Warren 1984). Other artifacts found at Gypsum Complex sites include split-twig animal figurines, Olivella shell beads, and Haliotis spp. beads and ornaments, which are indicative of trade with people from the Southern California coast and southern Great Basin.

By 1,750 cal BP, a slightly cooler climate further increased population growth as seen by the higher frequency of Late Archaic archaeological sites found throughout the region. The Rose Spring Complex dominated the Late Archaic period and was present from approximately 1,815 to 915 cal BP, with regional temporal variations known as the Saratoga Springs, Haiwee, or Amargosa periods (Sutton 1996, Sutton et al. 2007). The smaller Rose Spring projectile points replaced the dart-size points of previous complexes and marked the introduction of the bow and arrow (Yohe 1998). The bow and arrow provided its user a way to rapidly fire multiple projectiles during hunting or warfare and from a position of relative security compared to the atlatl or spear. Bedrock milling features supplement portable milling stones in villages and ancillary sites within the California deserts.

The Late Prehistoric period (ca. 900–250 cal BP) corresponds to the introduction of ceramic artifacts in the Mojave Desert region as well as replacement of Rose Spring projectile points with even smaller Desert Side-notched points and Cottonwood series arrow points. The use of the mortar and pestle became more widespread during this period and evidence of food storage facilities becomes increasingly common in the archaeological record. In the central Mojave Desert, the Mojave River became a primary focus of occupation, and trade networks increased along the Mojave River and over the San Gabriel Mountains (Sutton 1996). Archaeological evidence left by highly mobile hunter-gatherers in the Mojave Desert during the Late Prehistoric period is typified by sparse scatters of flaked stone, groundstone, and ceramic artifacts and features such as hearths, rock rings, and trails.

4.2.2 Ethnographic Overview

The Serrano occupied an area in and around the San Bernardino Mountains between approximately 450 and 3,350 meters (1,500-11,000 ft) above mean sea level. Their territory extended west of the Cajon Pass, east past Twentynine Palms, north of Victorville, and south to Yucaipa Valley. The Serrano language is part of the Serran division of a branch of the Takic family of the Uto-Aztecan linguistic stock (Mithun 2006: 539, 543). The two Serran languages, Kitanemuk and Serrano, are closely related. Kitanemuk lands were northwest of Serrano lands.

Serrano was originally spoken by a relatively small group located within the San Bernardino and Sierra Madre mountains, and the term “Serrano” has come to be ethnically defined as the name of the people in the San Bernardino Mountains (Kroeber 1925:611). The Vanyume, who lived along the Mojave River and associated Mojave Desert areas and are also referred to as the Desert Serrano, spoke either a dialect of Serrano or a closely related language (Mithun 2006: 543). Year-round habitation tended to be located on the desert floor, at the base of the mountains, and up into the foothills, with all habitation areas requiring year-round water sources (Bean and Smith 1978, Kroeber 1908).

Most Serrano lived in small villages located near water sources (Bean and Smith 1978: 571). Houses measuring 12 to 14 ft in diameter were domed and constructed of willow branches and tule thatching and occupied by a single extended family. Many of the villages had a ceremonial house, used both as a religious center and the residence of the lineage leaders. Additional structures within a village might include granaries and a large circular subterranean sweathouse. The sweathouses were typically built along streams or pools. A village was usually composed of at least two lineages. The Serrano were loosely organized along patrilineal lines and associated themselves with one of two exogamous moieties or “clans”—the Wahiyam (coyote) or the Tukum (wildcat) moiety.

The subsistence economy of the Serrano was one of hunting and collecting plant goods, with occasional fishing (Bean and Smith 1978: 571). They hunted large and small animals, including mountain sheep, deer, antelope, rabbits, small rodents, and various birds, particularly quail. Plant staples consisted of seeds, acorn nuts of the black oak, piñon nuts, bulbs and tubers, and shoots, blooms, and roots of various plants, including yucca, berries, barrel cacti, and mesquite. The Serrano used fire as a management tool to increase yields of specific plants, particularly chía.

Trade and exchange was an important aspect of the Serrano economy. Those living in the lower-elevation, desert-floor villages traded foodstuffs with people living in the foothill villages who had access to a different variety of edible resources. In addition to inter-village trade, ritualized communal food procurement events, such as rabbit and deer hunts and piñon, acorn, and mesquite nut-gathering events, integrated the economy and helped distribute resources that were available in different ecozones.

Contact between Serrano and Europeans was relatively minimal prior to the early 1800s. As early as 1790, however, Serrano were forcibly moved to missions (Bean and Vane 2002). More Serrano were relocated to Mission San Gabriel in 1811 after a failed indigenous attack on that mission. Most of the remaining western Serrano were moved to an asistencia built near Redlands in 1819 (Bean and Smith 1978: 573).

A smallpox epidemic in the 1860s killed many indigenous Southern Californians, including many Serrano (Bean and Vane 2002). Oral history accounts of a massacre in the 1860s at Twentynine Palms may have been part of a larger American military campaign that lasted 32 days (Bean and Vane 2002: 10). Surviving Serrano sought shelter at Morongo with their Cahuilla neighbors. Morongo later became a reservation (Bean and Vane 2002). Other survivors followed the Serrano leader Santos Manuel down from the mountains and toward the valley floors and eventually settled what later became the San Manuel Band of Mission Indians Reservation, formally established in 1891.

Today, many Serrano live either on the Morongo or San Manuel reservations (California Indian Assistance Program 2003). The Morongo Band of Mission Indians of the Morongo Reservation, established through presidential executive orders in 1877 and 1889, includes both Cahuilla and Serrano members. Established in 1893, the San Manuel Band of Mission Indians Reservation included 84 Serrano tribal members in 2004. Both Morongo and San Manuel are federally recognized tribes. People of both reservations participate in cultural programs to revitalize traditional languages, knowledge, and practices.

4.2.3 Post-Contact Overview

The post-Contact history of California is generally divided into three periods: the Spanish period (1769-1822), the Mexican period (1822-1848), and the American period (1848-present). Each of these periods is briefly described below.

Spanish Period (1769–1822)

In 1542, Juan Rodriguez Cabrillo led the first European expedition to observe what is now called Southern California. For more than 200 years, Cabrillo and other Spanish, Portuguese, British, and Russian explorers sailed the Alta (upper) California coast and made limited inland expeditions, but they did not establish permanent settlements (Bean 1968, Rolle 2003).

Gaspar de Portolá and Franciscan Father Junípero Serra established the first Spanish settlement in Alta California at Mission San Diego de Alcalá in 1769. This was the first of 21 missions erected by the Spanish between 1769 and 1823. While Spanish missions were established in San Bernardino

County, Native Americans in the region were influenced by other Native Americans migrating to the area, driven from their homelands by encroachment of the Spanish.

During this period, Spain also deeded ranchos to prominent citizens and soldiers, though very few in comparison to the following Mexican Period. To manage and expand herds of cattle on these large ranchos, colonists enlisted the labor of the surrounding Native American population (Engelhardt 1927a). The missions were responsible for administrating the local people as well as converting the population to Christianity (Engelhardt 1927b). Inevitably, this increased local population density and contact with diseases brought by Europeans greatly reduced the Native American population (McCawley 1996). Native American populations in San Bernardino County were less affected by the missions. However, in some cases, individuals were taken from their tribes to be educated at one of the missions before being sent back (Morgan 1914).

The first known Spanish explorers to enter the Mojave Desert were a group of soldiers led by Pedro Fages in 1772. In 1776, Friar Francisco Garcés, traveled through the area coming from the Colorado River (Hoover et al. 2002: 321). Friar Garcés traveled as far as the Pacific coast along an ancient trade route, known as the Mojave Trail, and he named the Mojave River *Arroyo de los Mártires* (Stream of the Martyrs). The river was later named *Rio de las Animas* (River of Souls) by Fr. Joaquín Pasqual Nuez, who accompanied the 1819 expedition of Lt. Gabriel Moraga.

Mexican Period (1822–1848)

The Mexican period commenced when news of the success of the Mexican Revolution (1810-1821) against the Spanish crown reached California in 1822. This period saw extensive interior land grant development as well as exploration west of the Sierra Nevada Mountains by American fur trappers. The California missions declined in power and were ultimately secularized in 1834. The hallmark of the Mexican period was large ranchos deeded to prominent Mexican citizens, frequently soldiers, by the governor. These ranchos became important economic and social centers. However, no ranchos were claimed in the arid Mojave Desert. Rancho San Bernardino, situated in the southwestern corner of San Bernardino County, was the closest land grant to the current APE, located approximately 160 kilometers (100 miles) to the west. Governor Pío Pico and his predecessors made more than 600 rancho grants between 1833 and 1846, putting most of the state's lands into private ownership for the first time (Gumprecht 1999). During the Mexican period, trappers and explorers from the eastern United States repeatedly journeyed westward. Jedidiah Strong Smith, one of these early American adventurers, traveled through the Mojave Desert in 1826 and 1827 and nicknamed the Mojave River the "Inconstant River" because of its frequent disappearance beneath the ground surface.

American Period (1848–Present)

The American period officially began with the signing of the Treaty of Guadalupe Hidalgo in 1848, in which the United States agreed to pay Mexico $15 million for the conquered territory, including California, Nevada, Utah, and parts of Colorado, Arizona, New Mexico, and Wyoming. In 1850, California was admitted to the Union as the 31st state.

The discovery of gold in Northern California in 1848 led to the California Gold Rush and subsequent farming and city/town development in the northern/central portions of California, but Southern California remained dominated by cattle ranches in the early American period, though droughts and increasing population resulted in farming and more urban professions increasingly supplanting ranching through the late nineteenth century. By 1853, the population of California exceeded

300,000. Thousands of settlers and immigrants continued to immigrate into the state, particularly after the completion of the transcontinental railroad in 1869.

During the Gold Rush, thousands of people traveled the Mojave River Trail from points east, attempting to reach the fabled goldfields of California. The Mojave River Trail was called the Old Spanish Trail by Captain John C. Frémont until he met a group of Native Americans northeast of Victorville who told Frémont they had lived along the Mojave River and the mountains to the north and traded with other indigenous peoples in the region along the Mojave River Trail (Frémont 1845: 260).

Lucerne Valley

Euromericans began settling in the Lucerne Valley in the 1800s, pushing out the Native Americans who had previously used the area for its natural springs. In 1867, hostilities between Euromericans and Native Americans led to a massacre at Chimney Rock, causing the Native Americans to retreat. After that point, Euromerican settlement increased leading to large ranching developments including Box S Ranch and Old Woman Springs Ranch. James Goulding, the owner of Box S Ranch, is considered the Euromerican “founder” of Lucerne Valley. He established the Lucerne Valley School District and donated land to establish a church. The first Lucerne Valley Library was started in the front room of the Box S ranch house. The Lucerne Valley Post Office was established in 1912. The settlement continued to develop into a small town with a volunteer fire department and a number of small businesses such as a general store, bakery, gift shop, and beauty shop (Owen 1988). The Lucerne Valley remains a small unincorporated rural community with an economy driven by agriculture.

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5 Findings

5.1 Known Cultural Resources Studies

The SCCIC records search identified 12 cultural resources studies that have been conducted within a 0.5-mile radius of the Project area (Table 2 and Appendix B). Of these studies, six were within the Project area. Brief descriptions of cultural resource studies within the Project area that resulted in the recordation of cultural resources relevant to this study are provided below.

Table 2 Known Cultural Resource Studies within a 0.5-Mile Radius of the Project Site

Report Number	Author	Year	Title	Relationship to Project Area
SB-00871	Leonard, Joanne	1979	*An Archaeological Assessment of the Properties in the Lucerne Valley*	**Within**
SB-02689	Brown, Joan	1992	*Archaeological Literature and Records Review for the Rancho Lucerne Planned Development Project in the County of San Bernardino, California*	N/A
SB-02690	Brown, Joan	1992	*Addendum to: Archaeological Literature and Records Review for the Rancho…*	N/A
SB-02830	Brown, Joan and Tim Gregory	1992	*Archaeological Literature and Records Review for the Rancho Lucerne Planned Development Project in the County of San Bernardino, California*	N/A
SB-04027	Love, Bruce	1998	*Cultural Resources Report: Ranch Lucerne Development, Lucerne Valley, San Bernardino County*	N/A
SB-04028	Urbas, Andrea	1998	*Adaptive Use Report: The Oasis/Rabbit Springs Ranch Historic Buildings, Rancho Lucerne Valley Development, Lucerne Valley, San Bernardino County, CA*	N/A
SB-05158	Ahmet, Koral, and Michael Lerch	2005	*Deteriorated Pole Replacement Project Archaeological Survey of Ten Pole Locations on the Poco 33KV, Cement 33KV, Rabbit 12KV, Sky HI 12KV, and Cushenbury 33KV Transmission Lines, San Bernardino County, California*	**Within**
SB-06512	Backes, Clarus, Jessica DeBusk, and John Dietler	2009	*Cultural Resources Survey for the Lucerne Valley PV Solar Project, San Bernardino County, California*	**Within**
SB-07020	Woodman, Craig	2011	*Supplemental Class III Archaeological Survey of a Redundant Fiber Optic Line for the Granite Mountain Wind Energy Project, San Bernardino County, CA*	N/A

Report Number	Author	Year	Title	Relationship to Project Area
SB-07273	Orfila, Rebecca	2011	*Archaeological Survey for the Southern California Edison Company: GRM Project in Lucerne, CA*	**Within**
SB-07366	Winslow, Diane and Sherri Andrews	2013	*Class III Inventory for the Granite Wind Energy Telecommunication Lines Granite Mountain, Gentie Line and Jasper Substation Interconnection Projects, San Bernardino County, California*	**Within**
SB-07984	Stanton, Patrick, Kenneth Becker, Mark Sutton, and Karen Swope	2015	*Class III Cultural Resource Inventory of the Line 4000 Anomaly Digs Project, San Bernardino County, California*	**Within**

Source: South Central Coastal Information Center, September 2021

SB-06512

SWCA Environmental Consultants prepared SB-06512, Cultural Resources Survey, for the Lucerne Valley PV Solar Project, San Bernardino County, California, in 2009. The study included a records search, Native American consultation, and pedestrian survey of a 440-acre project area that includes most of the northwestern parcels that Rincon covered during this study. This study identified nine cultural resources, including three historical archaeological sites and six prehistoric isolates. The three historical sites (LV-S1, LV-S2, and LV-S3) were evaluated and found ineligible for inclusion in the CRHR. The six prehistoric isolates were also determined to be unlikely to be included in the CRHR due to limited data potential and lack of contextual integrity. This study did not recommend any mitigation for the resources found in the project area.

SB-07366

ASM Affiliates prepared SB-07366, Class III Inventory for the Granite Wind Energy Telecommunication Lines, Granite Mountain Gen-tie Line, and Jasper Substation Interconnection Projects, San Bernardino County, California, in 2013. This study included a Class III cultural resource inventory of a 3,633-acre study that encompassed portions of the current study's survey parcels and gen-tie lines. ASM Affiliates recorded 19 archaeological sites, including prehistoric lithic scatters, rock features, and numerous historic period refuse scatters. They also revisited and updated 15 previously recorded cultural resources. Five of the newly recorded sites were determined to be eligible for the NRHP and CRHR, and they concurred that five sites previously recommended eligible were correct. The study recommended that all sites found eligible for the NRHP and CRHR be avoided by development activities.

SB-07984

Statistical Research, Inc. prepared SB-07984, Class III Cultural Resource Inventory of the Line 400 Anomaly Digs Project, San Bernardino County, California, in 2015. This study included a Class III cultural resource inventory of a 488-acre project area for a natural gas-transmission line project. The study area crosses two gen-tie lines in the current project area. This study identified 24 new sites and 65 isolates; however, only one (P-36-028357), a small portion of Huff Road, falls within the current Project area. They did not evaluate the resource for its eligibility for the NRHP and CRHR.

5.2 Known Cultural Resources

Forty cultural resources have been recorded within a 0.5-mile radius of the Project area, 11 of which are located within the Project area. The results of the records search are summarized below in Table 3. The SCCIC results are also provided in Appendix B. Resources recorded within the Project area are discussed in further detail below.

Table 3 Known Cultural Resources within a 0.5-Mile Radius of the Project Site

Primary Number	Trinomial	Resource Type	Description	Recorder(s) and Year(s)	NRHP/CRHR Status	Relationship to Project Area
P-36-014876	CA-SBR-13115H	Historical site	SCE Lugo-Pisgah No. 1 220 kV Transmission Line	URS 2009 Urbana Preservation & Planning 2018 Kautz Environmental Consultants 2019	Recommended Eligible	**Within**
P-36-021160	CA-SBR-13657H	Historical site	Historic concrete foundations, pads, and steel pipes	SWCA 2009 Dudek 2016	Unevaluated	Outside
P-36-021161		Historical site	Wooden power poles	SWCA 2009 Dudek 2016	Unevaluated	Outside
P-36-021162	CA-SBR-13659	Historical site	Three concrete foundation pads	SWCA 2009 Dudek 2016	Unevaluated	Outside
P-36-021163	None	Prehistoric isolate	Granitic metate fragment	SWCA 2009	Not Eligible	Outside
P-36-021164		Prehistoric isolate	Chert flake	SWCA 2009	Not Eligible	Outside
P-36-021165		Prehistoric isolate	Basalt flake	SWCA 2009	Not Eligible	Outside
P-36-021166		Prehistoric isolate	Basalt flake	SWCA 2009	Not Eligible	Outside
P-36-021167		Prehistoric isolate	Granitic Metate	SWCA 2009	Not Eligible	Outside
P-36-021168		Prehistoric isolate	Chert flake	SWCA 2009	Not Eligible	Outside
P-36-021200	CA-SBR-13662H	Historical site	Prospecting pit and refuse scatter	URS 2010 ASM 2011 Pacific Legacy 2013 ASM 2018	Not Eligible	**Within**
P-36-024157	CA-SBR-15342H	Historical site	Fern Road	Kremkau 2011 Dudek 2018	Unevaluated	**Within**

Primary Number	Trinomial	Resource Type	Description	Recorder(s) and Year(s)	NRHP/CRHR Status	Relationship to Project Area
P-36-024158	CA-SBR-15343H	Historical site	Unnamed road	Kremkau 2011	Unknown	Outside
P-36-024224	CA-SBR-15409H	Historical site	Chuckwalla Road	Kremkau 2011 Dudek 2018	Not Eligible	**Within**
P-36-024225	CA-SBR-151410H	Historical site	Refuse scatter	Dudek 2018	Unevaluated	Outside
P-36-027410		Historical site	Barstow Road/ State Route 247	SRI 2014	Recommended Eligible	**Within**
P-36-027752		Historical site	Eldorado-Lugo 500kV Transmission Line	Kautz Environmental Consultants 2019	Recommended Eligible	**Within**
P-36-027757		Historical site	Lugo-Mojave 500kV Transmission Line	Kautz Environmental Consultants 2019	Recommended Eligible	**Within**
P-36-028149	CA-SBR-17557H	Historical site	Foundation and refuse scatter	Pacific Legacy 2012 ASM 2018	Not Eligible	Outside
P-36-028356	CA-SBR-28356H	Historical site	Unnamed road	SRI 2015	Unevaluated	Outside
P-36-028357	CA-SBR-28357H	Historical site	Huff Road	SRI 2015	Unevaluated	**Within**
P-36-028365	CA-SBR-28365H	Historical site	Meridian Road	SRI 2015 Dudek 2018	Unevaluated	**Within**
P-36-028417		Historical isolate	Refuse scatter	SRI 2015	Unevaluated	Outside
P-36-028418		Historical isolate	Refuse (AH4)	SRI 2015	Unevaluated	Outside
P-36-028424		Historical isolate	Church key-opened can	SRI 2015	Unevaluated	Outside
P-36-028438		Historical isolate	Sanitary food can	SRI 2015	Unevaluated	Outside
P-36-028439		Historical isolate	Two cans	SRI 2015	Unevaluated	Outside
P-36-028440		Prehistoric isolate	Granite metate	SRI 2015	Unevaluated	Outside
P-36-029774		Historical site	Historic residence	Dudek 2016	Not Eligible	Outside
P-36-029775	CA-SBR-29775H	Historical site	Concrete troughs, concrete wellhead, chain-linked fence	Dudek 2016	Unevaluated	Outside
P-36-029899		Prehistoric isolate	One obsidian flake	ICF International 2016	Unevaluated	**Within**

Primary Number	Trinomial	Resource Type	Description	Recorder(s) and Year(s)	NRHP/CRHR Status	Relationship to Project Area
P-36-031200		Historical site	Eldorado-Lugo 500 kV Transmission Line System	ASM 2017	Recommended Eligible	Outside
P-36-032690	CA-SBR-32690H	Historical site	Historic refuse scatter and concrete foundation	ASM 2017	Not Eligible	Outside
P-36-032691	CA-SBR-32691H	Historical site	Historic refuse scatter	ASM 2017	Not Eligible	Outside
P-36-032694	CA-SBR-32694H	Historical site	Historic refuse scatter	ASM 2017	Not Eligible	**Within**
P-36-033007		Historical site	Structure pads and refuse scatter	Dudek 2018	Not Eligible	Outside
P-36-033010	CA-SBR-33010H	Multi-component site	Historical refuse scatter and one prehistoric lithic flake	Dudek 2018	Not Eligible	Outside
P-36-033011	CA-SBR-33011H	Historical site	Steel well pipe	Dudek 2018	Not Eligible	Outside
P-36-033012	CA-SBR-33012H	Historical site	Refuse scatter	Dudek 2018	Not Eligible	Outside
P-36-033072	CA-SBR-33072	Prehistoric site	Rock mounds	ASM 2018	Unevaluated	Outside

P-36-014876

Resource P-36-014876 is a 663-meter section of the SCE Lugo-Pisgah No. 1 Transmission Lines constructed between 1938 and 1941. The towers are steel lattice suspension towers with concrete footings. The resource was recorded by Kautz Environmental Consultants in 2019 which found the resource eligible for the NRHP and CRHR under Criterion A/1 for its association with the early operation of the Hoover Dam and provision of electricity to Southern California's World War II industries.

P-36-021200

Resource P-36-021200 was initially recorded in 2010 by URS as a historic prospector's pit containing an open pit with dilapidated wooden shoring and a thick berm. Located within the pit was a historic hole-in-top can and other modern trash including plastic liter bottles, foil, cardboard, and modern cans. In 2011 the resource was re-evaluated by ASM Affiliates and determined to be a naturally formed drainage channel. Upon an additional site revisit, the resource was determined to be a possible mine shaft measuring approximately 12 ft in length by 12 ft in width and 10 ft in depth. This site was recommended as ineligible for the NRHP and CRHR in 2018 by ASM Affiliates.

P-36-024157

Resource P-36-024157 is a segment of historic period road alignment, referred to now as Fern Road. The road is visible on the 1955 Ord Mountains 15-minute USGS quad. The road is in good condition, and no cultural material is associated with it. This resource was previously recorded by Dudek in 2018 but was not evaluated for the NRHP or CRHR.

P-36-024224

Resource P-36-024224 is a historic road alignment referred to as Chuckwalla Road. The dirt road runs north-south along the eastern base of the White Horse Mountains in Lucerne Valley. This road was evaluated by Dudek in 2018 and was determined not eligible for listing in the NRHP or CRHR in 2011.

P-36-027410

Resource P-36-027410 (CA-SBR-017863H) is a segment of a historic road alignment known as SR 247 or Barstow Road. The highway is an asphalt, two-lane road that extends from Yucca Valley to Barstow, California. This resource was found eligible by Pacific Legacy, Inc. in 2013 for listing in the NRHP and CRHR under Criterion A/1 for its use as the main thoroughfare in the Mojave Desert Communities during the early to mid-twentieth century. The resource has been evaluated since 2014, all concurring with Pacific Legacy’s findings.

P-36-027752

Resource P-36-027752 is a 1,458-meter segment of the SCE Eldorado-Lugo 500 kV Transmission Line. The entire line spans 177 miles from the SCE Eldorado Substation near Boulder City, Nevada to the SCE Lugo Substation in Hesperia, California. The resource was fully recorded and evaluated for NRHP eligibility in 2016 by Urbana Preservation & Planning, LLC and was deemed eligible under Criterion A. The resources was reevaluated in 2019 by Kautz Environmental Consultants, which agreed with Urbana’s findings.

P-36-027757

Resource P-36-027757 consists of the SCE Lugo-Mohave 500kV Transmission Line installed in 1968. The towers were installed at regular intervals of approximately 1,500 ft. The towers convey electricity 176 miles between the SCE Lugo Substation in Hesperia, California to the Mohave Substation in Laughlin, Nevada. In 2016, this resource was recommended eligible by Urbana Preservation & Planning, LLC for listing in the NRHP/CRHR under Criterion A/1 for its association with SCE’s earliest 500kV transmission line systems in Southern California. The resources was reevaluated in 2019 by Kautz Environmental Consultants, which agreed with Urbana’s findings.

P-36-028357

Resource P-36-028357 is a segment of a north-south historic road alignment known as Huff Road. The road was identified on the Ord Mountains 1955 15-minute USGS topographic quad. No artifacts were found associated with this resource. This resource was recorded by SRI in 2015 but was not evaluated for the NRHP or CRHR.

P-36-028365

Resource P-36-028365 is a north-south oriented historic road alignment known as Meridian Road. The road was identified on the Ord Mountains 1955 15-minute USGS topographic quad. No artifacts are associated with this site. This resource was recorded by Dudek in 2018 but was not evaluated for the NRHP or CRHR.

P-36-029899

Resource P-36-029899 is a prehistoric isolate consisting of a single, gray-banded obsidian secondary flake. This resource was recorded in 2016 by ICF International but was not evaluated. In general, isolated resources are not eligible for the NRHP or CRHR, because their data potential is exhausted upon recording (Criterion 4/D).

P-36-032694

Resource P-36-032694 consists of a historic refuse scatter containing 115 cans, six glass bottles, a modified bucket, wire, and plywood. Can types include flat-top beverage, bi-metal pull tab, aerosol, vent hole, and sanitary. Most artifacts date between the 1930s to the 1960s and are likely associated with multiple trash dumping episodes along Barstow Road and Fern Road. This site was recommended as ineligible for the NRHP and CRHR in 2017 by ASM.

5.3 Survey Results

5.3.1 Built Environment Resources

The following section summarizes the results of all background research and fieldwork as they pertain to built environment resources that may qualify as historical resources. The field work and background research resulted in the identification of 10 historic-age (at least 45 years old) resources (five properties, four roads, and one transmission line) within the Project area (Table 4). Historic-age properties include 13324 Locust Avenue (Sienna-S-68, Figure 4), 12924 Locust Avenue (Sienna-S-69, Figure 8), 4900 Cambria Road (Sienna-S-72, Figure 6), 33383 Haynes Road (Sienna-S-85, Figure 13), and 33223 Haynes Road (Sienna-S-86, Figure 14). Historic-age roads include Northside Road (Sienna-S-60, Figure 6), Cove Road (Sienna-S-70, Figure 9), Cambria Road (Sienna-S-71, Figure 10), and Midway Avenue (Sienna-S-84, Figure 12), and the historic-age transmission line is the SCE Lugo-Pisgah No. 2 220 kV Transmission Line (Sienna-S-7, Figure 5), which is a distinct transmission line from the previously recorded SCE Lugo-Pisgah No. 1 220 kV Transmission Line (P-36-014876). The five properties, four roads, and one transmission line were recorded on DPR 523 series forms, which are included in Appendix C and summarized below. Only the properties and the transmission line were evaluated for historical resources eligibility. As the project does not entail alteration to the roads recorded in the project area and an impact will not occur, they were not evaluated as part of this project. Only the SCE Lugo-Pisgah No. 2 220 kV Transmission Line was found eligible for listing in the NRHP and CRHR.

Table 4 Newly Recorded Built Environment Resources

Site ID	Description	Address	APN	NRHP/CRHR Eligibility Recommendation
Sienna-S-7	SCE Lugo-Pisgah No. 2 220 kV Transmission Line	N/A	N/A	**Recommended Eligible**

Site ID	Description	Address	APN	NRHP/CRHR Eligibility Recommendation
Sienna-S-60	Northside Road	N/A	N/A	Unevaluated
Sienna-S-68	Single-family Dwelling, Garage, and Two Barns	13324 Locust Avenue	045206223	Recommended Ineligible
Sienna-S-69	Single-family Dwelling	12924 Locust Avenue	045206224	Recommended Ineligible
Sienna-S-70	Cove Road	N/A	N/A	Unevaluated
Sienna-S-71	Cambria Road	N/A	N/A	Unevaluated
Sienna-S-72	Single-family Dwelling, Barn, and Corral	4900 Cambria Road	045211224	Recommended Ineligible
Sienna-S-84	Midway Avenue	N/A	N/A	Unevaluated
Sienna-S-85	Single-family Dwelling and Barn	33383 Haynes Road	045306261	Recommended Ineligible
Sienna-S-86	Single-family Dwelling	33223 Haynes Road	045306209	Recommended Ineligible

SCE Lugo-Pisgah No. 2 220 kV Transmission Line (Sienna-S-7)

The Sienna-S-7 resource is known as SCE Lugo-Pisgah No. 2 220 kV Transmission Line, a 220 kV transmission line which runs for 1.05 miles within the Project area. The towers are steel lattice suspension towers with concrete footings. The transmission line runs through private parcels and is surrounded by open farmland.

Sienna-S-7 was constructed between 1938 and 1941 by SCE to bring power to Southern California from the Hoover Dam. The line, then referred to as the Boulder-Chino South 220 kV Transmission Line, extended 65 miles from the Hoover Dam to the Chino Substation via the Pisgah Substation. In 1973, 5 years after the Lugo Substation was put in service, this transmission line was renamed the Lugo-Pisgah No. 1 line. This transmission line is separate from the previously recorded SCE Lugo-Pisgah No. 1 220 kV Transmission Line (P-36-014876), which was then referred to as the Boulder-Chino North 220 kV Transmission Line. South of the Pisgah Substation and Highway 40, the North and South (now No.1 and No. 2) lines split and run separately until rejoining southwest of Lucerne Valley. Only segments of the Lugo-Pisgah No.1 and No. 2 lines have been previously recorded, not including this segment of Lugo-Pisgah No. 2. As part of the current study, Sienna-S-7 was evaluated for listing in the NRHP and the CRHR and was found eligible for the NRHP under Criterion A and the CRHR under Criterion 1 for its association with the early operation of Hoover Dam and the provision of electricity to Southern California's World War II industries. Lugo-Pisgah No. 2 appears to retain integrity of location, materials, design, workmanship, feeling, setting, and association. It is recommended as a contributing element of the overall transmission line.

Figure 6 Lugo-Pisgah No. 2 Transmission Line (Sienna-S-7)

Northside Road (Sienna-S-60)

Sienna-S-60 is a 250-foot segment of paved, historic-period road alignment located in northern Lucerne Valley referred to as Northside Road. Constructed circa 1952, the two-lane, paved, and maintained dirt road spans in its entirety approximately 10 miles east-west, initiating at Firethorn Road in eastern Lucerne Valley, running west unpaved to Harrod Road where it continues west paved to Barstow Road where it terminates. The road is approximately 25 feet in width and is located on a flat, valley floor containing low-density Mojave Desert scrub including creosote bush, Russian thistle, and saltbush.

The Project does not intend to alter the existing conditions of the road. Northside Road may be used during the course of project implementation, but such use would remain consistent with its original and intended purpose (transportation). Therefore, Sienna-S-60/Northside Road was not formally evaluated for listing in the NRHP nor the CRHR under the current study as the project will not result in any significant impacts to the resource.

Figure 7 Northside Road (Sienna-S-60)

13324 Locust Ave. (Sienna-S-68)

The Sienna-S-68 property addressed as 13324 Locust Avenue (APN 045206223) is approximately 4 miles north of the town of Lucerne Valley. The property is surrounded by open farmland and few single-family properties. The 80-acre parcel encompasses open farmland, which appears no longer in use, one vernacular-style dwelling and garage constructed in 1933, a barn from circa 1969, and four ancillary structures. The buildings and structures are sited at the southeast corner of the parcel.

The Sienna-S-68 property at 13324 Locust Avenue and all its respective buildings and structures were evaluated for listing in the NRHP and the CRHR and found ineligible for either under any designation criteria due to a lack of historical or architectural significance. Research did not indicate that the property is associated with any important events or individuals significant in the history of the city, region, state, or nation (Criteria A/1 and B/2). The buildings and structures are relatively ordinary and do not embody the distinctive characteristics of a type, period, or method of construction, nor represent the work of a master, nor possess high artistic values (Criteria C/3). A review of available evidence and records search results did not indicate that the property may yield important information about prehistory or history (Criteria D/4).

Figure 8 13324 Locust Avenue (Sienna-S-68)

12924 Locust Ave. (Sienna-S-69)

The Sienna-S-69 property addressed as 12924 Locust Avenue (APN 045206224) is approximately 4 miles north of the town of Lucerne Valley. The property is surrounded by open farmland and few single-family properties. The 80-acre parcel encompasses open farmland, which appears to be no longer used, one dwelling with an attached garage. The vernacular-style dwelling constructed in 1948 and attached garage are sited at the southeast corner of the parcel.

The Sienna-S-69 property at 12924 Locust Avenue was evaluated for listing in the NRHP and the CRHR and was found ineligible for either under any designation criteria due to a lack of historical or architectural significance. Research did not indicate that the property is associated with any important events or individuals significant in the history of the city, region, state, or nation (Criteria A/1 and B/2). The vernacular single-family dwelling is a relatively ordinary building and does not embody the distinctive characteristics of a type, period, or method of construction, nor represent the work of a master, or possess high artistic values (Criteria C/3). A review of available evidence and records search results did not indicate that the property may yield important information about prehistory or history (Criteria D/4).

Figure 9 12924 Locust Avenue (Sienna-S-69)

Cove Road (Sienna-S-70)

Sienna-S-70, is a segment of a maintained dirt road known as Cove Road, orientated east-west across the Lucerne Dry Lake playa between two large agricultural fields. Developed between 1945 and 1952, the road spans approximately 2 miles in its entirety between Locust Avenue and Meridian Avenue. The road section within the Project area measures 0.38 mile in length (east-west) by 25 feet in width and is located on a flat, silty playa surrounding by low-density Mojave Desert scrub (e.g., creosote bush, Russian thistle, and saltbush), alfalfa agricultural fields, and residential properties. Modern trash was present along the margins of the road.

The Project does not intend to alter the existing conditions of the road. Cove Road may be used during the course of project implementation, but such use would remain consistent with its original and intended purpose (transportation). Therefore, Sienna-S-70/Cove Road was not formally evaluated for listing in the NRHP nor the CRHR under the current study as the project will not result in any significant impacts to the resource.

Figure 10 Cove Road (Sienna-S-70)

Cambria Road (Sienna-S-71)

Sienna-S-71, is a segment of paved and dirt road known as Cambria Road, orientated east-west across the Lucerne Dry Lake playa between a series of large agricultural fields. Developed between 1945 and 1952, the road spans approximately 2 miles in its entirety between Locust Avenue and Fairlane Avenue. Lincoln Avenue, which runs north-south, intersects the road at its midway point. Most of the road is dirt and appears to be poorly maintained (numerous ruts and holes); however, a small, 0.5-mile portion between Midway Avenue and Lincoln Avenue has been paved. The road section within the project site, which measures 1.5 miles in length (east-west) by 25 feet in width, runs east from Locust Avenue and stops 0.5 mile east of Fairlane Avenue. Within the project site, 1.0-mile of road is unpaved between Locust Avenue and Midway Avenue and Lincoln Avenue and Fairlane Avenue, and 0.5-mile of the road is paved within the segment mentioned above. The road is located on a flat, silty playa surrounded by low-density Mojave Desert scrub (e.g., creosote bush, Russian thistle, and saltbush), alfalfa agricultural fields, and residential properties. Modern trash was present along the margins of the road.

The Project does not intend to alter the existing conditions of the road. Cambria Road may be used during the course of project implementation, but such use would remain consistent with its original and intended purpose (transportation). Therefore, Sienna-S-71/Cambria Road was not formally evaluated for listing in the NRHP nor the CRHR under the current study as the project will not result in any significant impacts to the resource.

Figure 11 Cambria Road (Sienna-S-71)

4900 Cambria Road (Sienna-S-72)

The Sienna-S-72 property addressed as 4900 Cambria Road (APN 045211224) is approximately 4 miles north of the town of Lucerne Valley and was developed circa 1973 with no discernable architectural style. The property is surrounded by open farmland and few single-family properties. The 90-acre parcel encompasses open farmland, one prefabricated dwelling, a barn, three structures and a large circular corral. The buildings and structures are sited at the southeast corner of the parcel.

The Sienna-S-72 property at 4900 Cambria Road and its respective buildings and structures were evaluated for listing in the NRHP and the CRHR and were found ineligible for either under any designation criteria due to a lack of historical or architectural significance. Research did not indicate that the property is associated with any important events or individuals significant in the history of the city, region, state, or nation (Criteria A/1 and B/2). The buildings are relatively ordinary buildings and do not embody the distinctive characteristics of a type, period, or method of construction, nor represent the work of a master, or possess high artistic values (Criteria C/3). A review of available evidence and records search results did not indicate that the property may yield important information about prehistory or history (Criteria D/4).

Figure 12 4900 Cambria Road (Sienna-S-72)

Midway Avenue (Sienna-S-84)

Sienna-S-84, is a segment of recently repaved road known as Midway Avenue orientated north-south across the Lucerne Dry Lake playa. The road was developed circa 1945 as an unpaved road and currently spans 5.3 miles in its entirety between Cambria Road and State Route 18. The road section within the project site, which measures 0.5 mile in length (north-south) by 25 feet in width, is situated between Cambria Road and Sherman Way. The road is located on a flat, silty playa surrounding by low density Mojave Desert scrub (e.g., creosote bush, Russian thistle, and saltbush), alfalfa agricultural fields, and residential properties. Modern trash was present along the margins of the road.

The Project does not intend to alter the existing conditions of the road. Midway Avenue may be used during the course of project implementation, but such use would remain consistent with its original and intended purpose (transportation). Therefore, Sienna-S-71/Midway Avenue was not formally evaluated for listing in the NRHP nor the CRHR under the current study as the project will not result in any significant impacts to the resource.

Figure 13 Midway Avenue (Sienna-S-84)

33383 Haynes Road (Sienna-S-85)

The Sienna-S-85 property addressed as 33383 Haynes Road (APN 045306261) is approximately 7 miles north of the town of Lucerne Valley. The property is surrounded by open farmland and few single-family properties. The 1.2-acre parcel encompasses one Minimal Traditional dwelling from 1967, a barn from ca. 2020, and a small outbuilding/shed from ca. 1983. The dwelling and shed are set back from the street with a white post fence separating the parcel from Haynes Road. A carport sits east of the dwelling, added to the property ca. 1983. The barn sits south of the dwelling and shed and is separated from the two buildings by a wood fence.

The Sienna-S-85 property at 33383 Haynes Road and its respective buildings and structures were evaluated for listing in the NRHP and the CRHR and were found ineligible for either under any designation criteria due to a lack of historical or architectural significance. Research did not indicate that the property is associated with any important events or individuals significant in the history of the city, region, state, or nation (Criteria A/1 and B/2). The buildings are relatively ordinary and do not embody the distinctive characteristics of a type, period, or method of construction, nor represent the work of a master, or possess high artistic values (Criteria C/3). A review of available evidence and records search results did not indicate that the property may yield important information about prehistory or history (Criteria D/4).

Figure 14 33383 Haynes (Sienna-S-85)

33223 Haynes Road (Sienna-S-86)

The Sienna-S-86 property addressed as 33223 Haynes Road (APN 045306209) is approximately 7 miles north of the town of Lucerne Valley. The property is surrounded by open farmland and few single-family properties. The 4.8-acre parcel encompasses one Minimal Traditional dwelling constructed sometime between 1960 and 1968. The dwelling is set back from the street with a curved driveway connecting the dwelling to Haynes Road.

The Sienna-S-86 property at 33223 Haynes Road was evaluated for listing in the NRHP and the CRHR and was found ineligible for either under any designation criteria due to a lack of historical or architectural significance. Research did not indicate that the property is associated with any important events or individuals significant in the history of the city, region, state, or nation (Criteria A/1 and B/2). The dwelling is a relatively ordinary example of the Minimal Traditional style and does not embody the distinctive characteristics of a type, period, or method of construction, nor represent the work of a master, or possess high artistic values (Criteria C/3). A review of available evidence and records search results did not indicate that the property may yield important information about prehistory or history (Criteria D/4).

Figure 15 33223 Haynes Road (Sienna-S-86)

5.3.2 Archaeological Resources

The following section summarizes the results of all background research and fieldwork as they pertain to archaeological resources that may qualify as historical resources and/or unique archaeological resources.

Ground visibility ranged from poor (0-35 percent) to very good (76-90 percent) throughout the Project area. A total of 229 acres could not surveyed due to dense agriculture (Figure 16). Vegetation in the remainder of the Project area primarily consisted of a low- to moderate-density Mojave Desert scrub community that included creosote, Russian thistle, brittlebush, rabbitbrush, and various perennial grasses. Much of the Project area has been heavily disturbed by agricultural operations. Large and small-scale hemp/marijuana growing operations were common throughout the Project area.

Figure 16 Dense Agriculture in Survey Parcels

5.3.3 Newly Recorded Archaeological Sites

Thirty-eight new archaeological resources were identified and recorded during the survey, including 15 isolates (4 prehistoric, 11 historical) and 23 sites (1 prehistoric, 1 multicomponent, and 21 historical). Table 5 lists all newly recorded archaeological sites and isolates and their NRHP and CRHR eligibility status. Resources are described in more detail below. DPR 523 series forms for each site and isolate are available in Appendix C.

Table 5 Newly Recorded Archaeological Sites

Site ID	Age	Description	NRHP/CRHR Eligibility Recommendation
Sienna-S-1	Historical	Refuse scatter	Recommended ineligible
Sienna-S-2	Historical	Granite Road and associated refuse	Unevaluated
Sienna-S-6	Historical	Refuse scatter	Recommended ineligible
Sienna-S-8	Prehistoric	Lithic scatter	**Potentially Significant**
Sienna-S-10	Historical	Refuse scatter	Recommended ineligible
Sienna-S-12	Historical	Chimney feature	Recommended ineligible
Sienna-S-13	Historical	Refuse scatter	Recommended ineligible
Sienna-S-14	Historical	Refuse scatter	Recommended ineligible
Sienna-S-15	Historical	Refuse scatter	Recommended ineligible
Sienna-S-16	Historical	Refuse scatter	Recommended ineligible

Site ID	Age	Description	NRHP/CRHR Eligibility Recommendation
Sienna-S-18	Historical	Foundation and refuse scatter	Recommended ineligible
Sienna-S-19	Historical	Refuse scatter	Recommended ineligible
Sienna-S-20	Historical	Refuse scatter	Recommended ineligible
Sienna-S-27	Historical	Refuse scatter	Recommended ineligible
Sienna-S-28	Multicomponent	Lithic and refuse scatter	**Potentially significant**
Sienna-S-32	Historical	Haynes Road and associated refuse	Unevaluated
Sienna-S-41	Historical	Locust Avenue and associated refuse	Unevaluated
Sienna-S-47	Historical	Refuse scatter	Recommended ineligible
Sienna-S-50	Historical	Smoke Bush Road and associated refuse	Unevaluated
Sienna-S-51	Historical	Foundation, well, refuse scatter	Recommended ineligible
Sienna-S-56	Historical	Lincoln Road and associated refuse	Unevaluated
Sienna-S-66	Historical	Refuse scatter	Recommended ineligible
Sienna-S-81	Historical	Earthen canal and retention Pond	Recommended ineligible

Lithic Scatters and Single-Activity Sites

This site type is defined by the presence of surface scatters of lithic debitage. Only one Lithic Scatter site type, Sienna-S-8, was identified during the survey. Sienna-S-8 is a large lithic scatter containing 65 cryptocrystalline silicate (CCS) tertiary flakes and 2 basalt tertiary flakes (Figure 17). This site likely represents a short-term occupation and single lithic-reduction event that involved the resharpening and/or rejuvenation of multiple chipped stone implements based on the variety of material types and dominance of biface thinning flakes at the site.

Because this resource is located on sandy valley floor with potential for buried deposits, Rincon recommends Sienna-S-8 as potentially significant and recommends avoidance of the resource. If avoidance is not feasible, a Phase II testing program would be needed to determine if the resource is significant under CEQA. Should the resource prove to be significant under CEQA and avoidance remains infeasible, a Phase III data recovery may be required to reduce Project related impacts to less-than-significant levels.

Figure 17 Overview Photo of Sienna-S-8

Multicomponent Sites

Multicomponent sites contain both historical and prehistoric components within the same site boundaries. Only one multicomponent site, Sienna-S-28, was recorded during the survey. Sienna-S-28 is a multicomponent site containing six prehistoric lithic flakes (materials include CCS, obsidian, and metavolcanic), a mid-stage rhyolite biface, a rhyolite Pinto Series projectile point, a basalt scraper, a granitic metate fragment, and a moderate-density historical refuse scatter. Flake types noted at the site appear to represent early to late-stage reduction. Some large metavolcanic flakes present at the site indicate core preparation while some late-stage CCS flakes (possible biface thinning flakes) indicates that late-stage biface reduction also occurred at the site. The presence of a Pinto Series point (Figure 18) indicates this site dates to the terminal Early Holocene or Middle Holocene between approximately 8,000 and 5,000 cal BP (Sutton et al. 2007). This prehistoric component of the resource likely represents a short-term camp site with an associated lithic reduction and rejuvenation event.

The historical component of the site includes 27 church key-opened sanitary cans, 7 bi-metal pull-tab cans, five knife-opened cans, a syrup can, and six glass bottle bases with diagnostic maker's marks that date to the mid-twentieth century. Based on the artifacts present, this component likely represents multiple mid-twentieth century dumping events along Barstow and Fern Roads.

Because this resource is located on sandy valley floor with potential for buried deposits and contains temporally diagnostic prehistoric tools, Rincon recommends Sienna-S-28 as potentially significant and recommends avoidance of the resource. If avoidance is not feasible, a Phase II testing program would be needed to determine if the resource is significant under CEQA. Should the resource prove to be significant under CEQA and avoidance remains infeasible, a Phase III data recovery may be required to reduce Project related impacts to less-than-significant levels.

Figure 18 Pinto Projectile Point from Sienna-S-28

Historical Refuse Scatters

These sites represent the most common historical site type found within the Project area. This site type was defined by the presence of diagnostic historic-era domestic and industrial refuse. Typical diagnostic artifacts present within the Project area include church key-opened beverage and sanitary cans, bi-metal pull-tab, hole-in-top, and cone-top cans, and glass bottle fragments of various color and density—some of which consist of date-stamped bottle bases. Based on the artifacts present, most of these sites likely date to the mid-twentieth century. Twelve newly recorded resources identified during the survey were assigned to this category, including Sienna-S-1, 6, 10, 13, 14, 15, 16, 19, 20, 27, 47, and 66.

Rincon reviewed the BLM's GLO records for the site locations and did not identify an association with significant persons or events (USDI 2021). No evidence is present to suggest resources are associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage (does not meet Criterion A/1) or that they are associated with the lives of persons important in our past (does not meet Criterion B/2). These resources do not embody any distinctive characteristics (does not meet Criterion C/3). Twentieth-century refuse scatters are ubiquitous throughout the Mojave Desert, particularly in rural areas where unregulated trash dumping is common. Because these resources primarily consist of cans, ceramics, and bottle glass dating to the mid-twentieth century, they likely represent single or multiple historic refuse-dumping episodes associated with the many roads, residential properties, and/or agricultural operations in the area. Lastly, these resources are all surface scatters of artifacts, and their data potential was exhausted during their recording (does not meet Criterion D/4). Thus, Rincon recommends these resources (Sienna S-1, 6, 10, 13, 14, 15, 16, 19, 20, 27, 47, and 66) ineligible for the NRHP/CRHR.

Homesteads and Agricultural Features

These sites consist of features such as foundations, structures, retention ponds, and wells indicative of long-term use and possible settlement/habitation. A total of four newly recorded sites identified during the survey were assigned to this category, including Sienna-S-12, 18, 51, and 81. Sienna-S-12 is a lone stone chimney feature surrounded by modern trash. A review of historic aerials (Historicaerials 2021) indicated that a homestead was present on the property in the 1940s but was demolished by 2012. Sienna-S-18 consists of the structural remains of a building and historical refuse. The structural remains include milled lumber and two features that include a concrete structural wall outline and a subterranean concrete structure with metal piping that may have served a water retention function. Historical refuse at the site included church key-opened cans, bi-metal pull-tab cans, hole-in-top cans, bottle glass and ceramic plate fragments, and multiple bottle bases with maker's marks that date to the mid-twentieth century. Historical aerial imagery indicates this structure was present sometime between 1952 and 1969 (Historicaerials 2021). Sienna-S-51 is a historic-era homestead consisting of two concrete foundations, a retention pond, portions of perimeter fencing, and associated sparse refuse scatter. The refuse scatter includes four diagnostic bottle bases, glass fragments, six church key-opened sanitary cans, and miscellaneous metal and construction debris fragments, including concrete rubble. Historic aerial imagery (Historicaerials 2021) indicate that this homestead was constructed sometime between 1952 and 1983 and was eventually demolished by 1995. Artifacts present at this site suggest a mid-twentieth century occupation. Sienna-S-81 consists of two large water retention ponds separated by a berm and lined with a barbed wire fence made of branches and milled wood beams. No artifacts were identified at the site. The retention ponds were constructed sometime between 1952 and 1969 based on a review of historic aerial imagery (Historicaerials 2021). This site likely represents a mid-twentieth century water retention location used to support the agricultural operations that bordered the site to the south and east.

Rincon reviewed the BLM's GLO records for the site locations and did not identify an association with significant persons or events (USDI 2021). No evidence is present that these resources are associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage (does not meet Criterion A/1) or that they are associated with the lives of persons important in our past (does not meet Criterion B/2). These resources do not embody any distinctive characteristics (does not meet Criterion C/3). Remnants of early to mid-twentieth century homesteads and agricultural features are common throughout the Mojave Desert region. Furthermore, these resources are in relatively in poor condition and, excluding Sienna-S-81, have been impacted by modern refuse dumping. Lastly, given the poor condition of these resources, their data potential was likely exhausted during their recording (does not meet Criterion D/4). Thus, Rincon recommends these resources (Sienna S-12, 18, 51, and 81) ineligible for the NRHP/CRHR.

Roads

These resources are linear resources consisting of historic-period road alignments with associated historical refuse scatters. These typically date to the mid-twentieth century and are in varying conditions and states of use. Five resources identified during the survey were assigned to this category. The five newly recorded historic-period road alignments include Sienna-S-2 (Granite Road), S-32 (Haynes Road), S-41 (Locust Avenue), S-50 (Smoke Bush Road), and S-56 (Lincoln Road).

The Project does not intend to alter the existing conditions of these roads. Granite Road, Haynes Road, Locust Avenue, Smoke Bush Road and Lincoln Road may be used during the course of project implementation, but such use would remain consistent with its original and intended purpose (transportation). Therefore, these resources (Sienna-S-2 [Granite Road], S-32 [Haynes Road], S-41 [Locust Avenue], S-50 [Smoke Bush Road] and S-56 [Lincoln Road] were not formally evaluated for listing in the NRHP nor the CRHR under the current study as the project will not result in any significant impacts to the resources.

Isolates

Isolates are generally defined as 1 to 3 artifacts of various time periods not in proximity or association to larger sites. Four prehistoric isolates and 11 historical isolates were identified during the survey (Table 6). The prehistoric isolates consist solely of CCS flakes. The historic-period isolates primarily include various cans such as church key-opened cans, bi-metal pull-tab cans, and tobacco tins and broken glass bottle bases. Because the data potential for isolates in generally exhausted upon recording, they are typically not eligible for listing on the NRHP/CRHR (Criterion 4/D). Given that the isolates recorded during this survey are all isolated flakes or mid-twentieth century refuse, **Rincon recommends all isolate resources ineligible for the NRHP/CRHR.**

Table 6 Newly Recorded Isolates

Site ID	Age	Description	Eligibility Recommendation
Sienna-Iso-4	Historical	Fragmented whisky bottle	Recommended ineligible
Sienna-Iso-5	Historical	Two church key-opened cans	Recommended ineligible
Sienna-Iso-11	Prehistoric	Lithic flake	Recommended ineligible
Sienna-Iso-17	Historical	Church key-opened can and bottle base	Recommended ineligible
Sienna-Iso-22	Historical	Bi-metal pull-tab can	Recommended ineligible
Sienna-Iso-42	Historical	Two church key-opened cans	Recommended ineligible
Sienna-Iso-54	Historical	Cone-top beer can	Recommended ineligible
Sienna-Iso-58	Historical	Church key-opened beverage can	Recommended ineligible
Sienna-Iso-59	Historical	Tobacco tin	Recommended ineligible
Sienna-Iso-61	Historical	Tobacco tin	Recommended ineligible
Sienna-Iso-62	Historical	Church key-opened can	Recommended ineligible
Sienna-Iso-64	Historical	Duraglass bottle base	Recommended ineligible
Sienna-Iso-65	Prehistoric	Lithic flake	Recommended ineligible
Sienna-Iso-87	Prehistoric	Two lithic flakes	Recommended ineligible
Sienna-Iso-88	Prehistoric	Lithic flake	Recommended ineligible

5.3.4 Known Archaeological Resources

Three previously known archaeological resources (one isolate and two sites) were present in the Project area. The two sites were relocated, but the isolate was not relocated during the survey. The two relocated sites were found to be in a similar condition as their previous recording. Table 7 lists all previously known resources and their updated NRHP and CRHR eligibility status.

Table 7 Known Archaeological Resources

Primary Number	Trinomial	Description	Previous Eligibility Recommendations	Rincon's Eligibility Recommendation
P-36-021200	CA-SBR-13662H	Historical site - prospecting pit and refuse scatter	Recommended ineligible	Recommended ineligible
P-36-029899	N/A	Prehistoric Isolate – lithic flake	Recommended ineligible	Recommended ineligible
P-36-032694	CA-SBR-32694H	Historical site - refuse scatter	Recommended ineligible	Recommended ineligible

5.3.5 Known Built Environment Resources

Eight previously recorded built environment resources (three transmission lines and five roads) are present in the Project area. The eight resources were relocated and found to be in a similar condition as their previous recording. Table 8 lists all previously known resources and their updated NRHP and CRHR eligibility status. Known resources recommended eligible for the NRHP/CRHR are described in further detail below.

Table 8 Known Built Environment Resources

Primary Number	Trinomial	Description	Previous Eligibility Recommendations	Rincon's Eligibility Recommendation
P-36-014876	CA-SBR-13115H	SCE Lugo-Pisgah No. 1 Transmission Line	Recommended Eligible	Recommended Eligible
P-36-024157	CA-SBR-15342H	Fern Road	Unevaluated	Unevaluated
P-36-024224	CA-SBR-15409H	Chuckwalla Road	Recommended Ineligible	Recommended Ineligible
P-36-027410	N/A	Barstow Road/ State Route 247	Recommended Eligible	Recommended Eligible
P-36-027752	N/A	SCE Eldorado-Lugo 500kV Transmission Line	Recommended Eligible	Recommended Eligible
P-36-027757	N/A	SCE Lugo-Mojave 500kV Transmission Line	Recommended Eligible	Recommended Eligible
P-36-028357	CA-SBR-28357H	Huff Road	Unevaluated	Unevaluated
P-36-028365	CA-SBR-28365H	Meridian Road	Unevaluated	Unevaluated

P-36-014876

Resource P-36-014876 (CA-SBR-13115H) is a section of the SCE Lugo-Pisgah No. 1 Transmission Line constructed between 1938 and 1941. This resource was previously found eligible for the NRHP and CRHR under Criterion A/1 for its association with the early operation of the Hoover Dam and provision of electricity to Southern California's World War II industries. Rincon agrees with this recommendation and finds the resource eligible for listing in the NRHP/CRHR.

P-36-027410

Resource P-36-027410 (CA-SBR-017863H) is a segment of a historic-road alignment known as SR 247 or Barstow Road. Segments of this resource have been previously recorded and evaluated in 2018 and found eligible for listing in the NRHP and CRHR under Criterion A/1 for its use as the main thoroughfare in the Mojave Desert Communities during the early to mid-twentieth century. The segment which runs through the project area is the same segment as recorded in 2018, and Rincon agrees with the previous recommendation and finds the resource eligible for listing in the NRHP/CRHR.

P-36-027752

Resource P-36-027752 is a 1,458-meter segment of the SCE Eldorado-Lugo 500kV Transmission Line. The entire line spans 177 miles from the SCE Eldorado Substation near Boulder City, Nevada to the SCE Lugo Substation in Hesperia, California. The resource was fully recorded and evaluated for the NRHP in 2016 and deemed eligible under Criterion A. Rincon agrees with this recommendation and finds the resource eligible for listing in the NRHP/CRHR.

P-36-027757

Resource P-36-027757 consists of the SCE Lugo-Mojave 500kV Transmission Line installed in 1968. The entire line, which spans 176 miles from the SCE Lugo Substation in Hesperia, California to the Mojave Substation in Laughlin, Nevada, was fully recorded and evaluated for NRHP eligibility in 2016 and was recommended eligible for listing in the NRHP/CRHR under Criterion A/1 for its association with SCE’s earliest 500kV transmission line systems in Southern California. An approximately 2-mile portion of the transmission line runs through the Project area, and for this segment Rincon agrees with previous evaluation and finds the resource eligible for listing in the NRHP/CRHR.

Figure 19 Newly Recorded Cultural Resources within the Project Area

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Figure 20 Known Cultural Resources within the Project Area

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6 Impact Analysis and Conclusions

The impact analysis included here is organized based on the cultural resources thresholds included in CEQA Guidelines Appendix G: Environmental Checklist Form:

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?
b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?
c) Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Threshold A broadly refers to historical resources. To more clearly differentiate between archaeological and built environment resources, we have chosen to limit analysis under Threshold A to built environment resources. Archaeological resources, including those that may be considered historical resources pursuant to Section 15064.5 and those that may be considered unique archaeological resources pursuant to Section 21083.2, are considered under Threshold B.

6.1 Historical Built Environment Resources

The field survey and background research identified 18 historic-age built environment resources within the Project area, including segments of five transmission lines, segments of eight roads, and five residential properties. Of these 18 resources, five are eligible for listing in the NRHP and/or CRHR and are therefore considered historical resources pursuant to Section 15064.5(a) of the CEQA Guidelines. The eligible five resources include: Barstow Road/SR 247 (P-36-027410), SCE Lugo-Pisgah No. 1 220 kV Transmission Line (P-36-014876), SCE Eldorado-Lugo 500kV Transmission Line (P-36-027752), SCE Lugo-Mojave 500kV Transmission Line (P-36-027757), and SCE Lugo-Pisgah No. 2 220 kV Transmission Line (Sienna S-7).

Barstow Road/SR 247 (P-36-027410) is eligible for listing in the NRHP and CRHR under Criterion A/1 for its use as the main thoroughfare in the Mojave Desert Communities during the early to mid-twentieth century. The project does not propose any direct modifications to the road and would not introduce any major visual changes to its setting which would impair its ability to convey its significance. As such, it would not result in a significant impact to this historical resource as defined by Section 15064.5(b) of the CEQA Guidelines.

In relation to the four historic transmission lines which traverse the Project area, it is presumed that the project would not entail the demolition or substantial alteration of any association utility towers. All of the four transmission lines extend upwards of 100 miles and the potential minor modification of some towers to accommodate new infrastructure from the proposed SCE Calcite substation would not affect the ability any of these resources to convey the reason for their significance. Therefore the proposed Project would not result in a significant impact to these four historical resource as defined by Section 15064.5(b) of the CEQA Guidelines.

6.2 Historical and Unique Archaeological Resources

This assessment includes recordation of 23 newly identified archaeological sites and 15 newly identified archaeological isolates as well as record updates to two known archaeological sites and one archaeological isolate in the Project area. Of these, two archaeological sites (prehistoric site Sienna-S-8 and multicomponent site Sienna-S-28) were found to be potentially eligible for listing in the NRHP and CRHR and Rincon recommends avoidance of the resources. If avoidance is not feasible, additional mitigation such as Phase II testing and Phase III data recovery may be required to reduce any impacts to less-than-significant levels.

6.3 Recommended Mitigation

Retain a Qualified Principal Investigator

Rincon recommends that the applicant retain a qualified archaeologist, defined as an archaeologist who meets the Secretary of the Interior's Professional Qualification Standards for archaeology (NPS 1983), to perform all mitigation measures related to archaeological and historic resources.

Avoidance of Resources

Preservation in place (avoidance) is the preferred manner of mitigating impacts to archaeological sites. Preservation in place maintains the relationship between artifacts and the archaeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site (e.g., affiliated Native American tribes). If feasible, archaeological sites Sienna-S-8 and Sienna-S-28 identified within the Project area during the current study plus a 200-foot buffer should be avoided. The 200-foot buffer should be delineated using a high visibility barrier (i.e. Environmentally Sensitive Area [ESA] fencing). If avoidance is not feasible, additional mitigation such as Phase II testing and Phase III data recovery may be required to reduce any impacts to less-than-significant levels.

Phase II Testing

The project site contains two archaeological sites (Sienna-S-8 and Sienna-S-28) that may include a subsurface deposit with significant data potential. If avoidance of these sites is not feasible, Rincon recommends a Phase II study to determine whether a subsurface deposit with significant data potential exists at each of these sites and to establish the subsurface boundaries of the resource. The Phase II study should be conducted by a qualified archaeologist. The qualified archaeologist should prepare a subsurface testing plan for review and approval by San Bernardino County prior to execution. The Phase II testing plan should include, but is not limited to, a research design, testing methods, laboratory methods, and list any applicable special studies to be completed. The Phase II plan should also include testing locations proposed within the site. The Phase II study should comprise subsurface testing designed to establish the presence or absence and extent of intact archaeological deposits and to assess whether the site(s) retains enough data potential to be considered significant under CEQA. Rincon recommends that Phase II testing be observed by a Native American monitor. If avoidance remains infeasible after the Phase II investigation, additional measures may be recommended such as a Phase III data recovery and/or archaeological and Native American monitoring of project construction activity. These measures are discussed further below.

Phase III Data Recovery

If a Phase II investigation at sites Sienna-S-8 and/or Sienna-S-28 finds the resource(s) as eligible for listing in the NRHP and CRHR and avoidance is not feasible, a Phase III data recovery program (Phase III) should be undertaken to mitigate any significant impacts. Mitigation consists of obtaining sufficient cultural materials such that no further material recovery would result in additional knowledge regarding the site. A Phase III investigation should begin with the development of a data recovery plan prepared by a qualified archaeologist and reviewed and approved by San Bernardino County prior to execution. The data recovery plan should include, but is not limited to, an expanded research design, testing methods, proposed testing locations, laboratory methods and analyses, and special studies. A Phase III should include extensive subsurface testing and a full analysis of artifacts identified during each phase of subsurface investigation with the goal of exhausting the data potential of the site(s). These studies should include but not be limited to faunal analysis of any animal bones, radiocarbon dating where appropriate, and/or protein residue analysis of stone tools and groundstone. The results of the Phase III study should be presented in a technical report documenting the prehistoric and ethnographic background of the area, the field and laboratory methods used, results, and final deposition of the artifact collection. The data collected during the study may also be prepared for publication in a scientific journal as part of the data recovery mitigation.

Preparation of a Cultural Resources Mitigation and Monitoring Program

Prior to the start of any ground-disturbing activity for Project construction, including but not limited to site clearing, grubbing, trenching, and excavation, a qualified archaeologist who meets or exceeds the Secretary of Interior's Professional Qualifications Standards for archaeology should be retained to prepare a CRMMP for unanticipated discoveries during Project construction. The CRMMP should be prepared in consultation with Native American tribes who have participated in consultation for the Project. The CRMMP should include provisions for archaeological and Native American monitoring of all construction related ground disturbance within Project areas of moderate to high archaeological sensitivity (Figure 21). The CRMMP should also include the Project construction schedule, procedures to be followed in the event of discovery of archaeological resources, and protocols for Native American coordination and input, including review of documents. The CRMMP should outline the role and responsibilities of both the archaeological and Native American monitor(s). It should include communication protocols and opportunity and timelines for review of cultural resources documents related to discoveries that are Native American in origin. The CRMMP should include provisions for Native American monitoring during testing or data recovery efforts for unknown resources that are Native American in origin.

Archaeological Sensitivity Training

Rincon recommends that the qualified archaeologist conduct a worker's environmental awareness program training for archaeological sensitivity for all construction personnel prior to the commencement of any ground disturbing activities. Archaeological sensitivity training should include a description of the types of cultural material that may be encountered, cultural sensitivity issues, regulatory issues, and the proper protocol for treatment of the materials in the event of a find.

Archaeological and Native American Monitoring

The vicinities of newly recorded archaeological sites Sienna-S-8 and S-28 and isolates Sienna-Iso-87 and Iso-88 as well as previously recorded isolate 36-29899 should be considered to have high archaeological sensitivity. These resources are located on relatively sandy alluvial soils where there is an increased likelihood that erosional dynamics (e.g., from wind and/or intermittent drainages) have created subsurface deposits. A review of soils studies and historical aerial imagery indicate the presence of alluvial soils and minimal past ground disturbance within other portions of the Project area. Both factors increase the likelihood of encountering intact buried archaeological deposits during Project-related ground-disturbance. These areas should be considered moderately sensitive for archaeological resources. The soils within the southwestern portions of the Project area, however, are highly disturbed from agricultural use and primarily composed of Peterman and Bousic clays. Additionally, fluctuating exposure within and near the limits of Lucerne Lake during the Holocene would have discouraged long-term settlement during the pre-contact period, providing limited opportunities for prehistoric site accumulation. This is evidenced by a lack of observed prehistoric resources within the southwestern portions of the Project area. Collectively, these factors decrease the likelihood of encountering intact buried archaeological deposits that retain integrity during Project-related ground-disturbance. Due to dense agriculture and the resulting lack of ground visibility, 229 acres at the south-central extent of Project area were not surveyed. The archaeological sensitivity of this portion of the Project area is thus unknown.

Rincon recommends archaeological and Native American monitoring of Project-related ground-disturbing activities in areas of moderate to high archaeological sensitivity (Figure 21). Additionally, initial ground disturbing activities including grading, scraping and other clearing that causes ground disturbance within areas of unknown archaeological sensitivity should be monitored. Within areas of moderate to high archaeological sensitivity, archaeological monitoring should be performed under the direction of the qualified archaeologist. The qualified archaeologist, in consultation with the County of San Bernardino and the Native American monitor, should have the power to reduce or suspend monitoring depending upon observed conditions. If archaeological resources are encountered during ground-disturbing activities, work within the immediate area must halt and the find evaluated for significance under CEQA.

Figure 21 Archaeological Sensitivity Map

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6.4 Unanticipated Discovery of Cultural Resources

If cultural resources are encountered during ground-disturbing activities, work in the immediate area must halt and an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (NPS 1983) must be contacted immediately to evaluate the find. If the discovery proves to be significant under CEQA, additional work such as data recovery excavation may be warranted.

6.5 Unanticipated Discovery of Human Remains

The discovery of human remains is always a possibility during ground-disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission, which will determine and notify a Most Likely Descendant. The MLD has 48 hours from being granted site access to make recommendations for the disposition of the remains. If the MLD does not make recommendations within 48 hours, the landowner shall reinter the remains in an area of the property secure from subsequent disturbance. With adherence to existing regulations, Rincon recommends a finding of less-than-significant impact to human remains under CEQA.

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United States Department of the Interior (USDI) Bureau of Land Management

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Appendix A

NAHC SLF Search Results

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

September 3, 2021

Mark Strother
Rincon Consultants, Inc.

Via Email to: mstrother@rinconconsultants.com

Re: Sienna Solar 2021 Project, San Bernardino County

Dear Mr. Strother:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Native American Contact List
San Bernardino County
9/3/2021

Agua Caliente Band of Cahuilla Indians
Patricia Garcia-Plotkin, Director
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264
Phone: (760) 699 - 6907
Fax: (760) 699-6924
ACBCI-THPO@aguacaliente.net

Agua Caliente Band of Cahuilla Indians
Jeff Grubbe, Chairperson
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264
Phone: (760) 699 - 6800
Fax: (760) 699-6919

Kern Valley Indian Community
Julie Turner, Secretary
P.O. Box 1010 — Kawaiisu
Lake Isabella, CA, 93240 — Tubatulabal
Phone: (661) 340 - 0032 — Koso

Kern Valley Indian Community
Brandy Kendricks,
30741 Foxridge Court — Kawaiisu
Tehachapi, CA, 93561 — Tubatulabal
Phone: (661) 821 - 1733 — Koso
krazykendricks@hotmail.com

Kern Valley Indian Community
Robert Robinson, Chairperson
P.O. Box 1010 — Kawaiisu
Lake Isabella, CA, 93283 — Tubatulabal
Phone: (760) 378 - 2915 — Koso
bbutterbredt@gmail.com

Morongo Band of Mission Indians
Ann Brierty, THPO
12700 Pumarra Road — Cahuilla
Banning, CA, 92220 — Serrano
Phone: (951) 755 - 5259
Fax: (951) 572-6004
abrierty@morongo-nsn.gov

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Road — Cahuilla
Banning, CA, 92220 — Serrano
Phone: (951) 755 - 5110
Fax: (951) 755-5177
abrierty@morongo-nsn.gov

Quechan Tribe of the Fort Yuma Reservation
Manfred Scott, Acting Chairman
Kw'ts'an Cultural Committee
P.O. Box 1899 — Quechan
Yuma, AZ, 85366
Phone: (928) 750 - 2516
scottmanfred@yahoo.com

Quechan Tribe of the Fort Yuma Reservation
Jill McCormick, Historic Preservation Officer
P.O. Box 1899 — Quechan
Yuma, AZ, 85366
Phone: (760) 572 - 2423
historicpreservation@quechantribe.com

San Fernando Band of Mission Indians
Donna Yocum, Chairperson
P.O. Box 221838 — Kitanemuk
Newhall, CA, 91322 — Vanyume
Phone: (503) 539 - 0933 — Tataviam
Fax: (503) 574-3308
ddyocum@comcast.net

San Manuel Band of Mission Indians
Jessica Mauck, Director of Cultural Resources
26569 Community Center Drive — Serrano
Highland, CA, 92346
Phone: (909) 864 - 8933
Jessica.Mauck@sanmanuel-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Sienna Solar 2021 Project, San Bernardino County.

Native American Heritage Commission
Native American Contact List
San Bernardino County
9/3/2021

Serrano Nation of Mission Indians Wayne Walker, Co-Chairperson P. O. Box 343 Patton, CA, 92369 Phone: (253) 370 - 0167 serranonation1@gmail.com	Serrano
Serrano Nation of Mission Indians Mark Cochrane, Co-Chairperson P. O. Box 343 Patton, CA, 92369 Phone: (909) 528 - 9032 serranonation1@gmail.com	Serrano
Twenty-Nine Palms Band of Mission Indians Darrell Mike, Chairperson 46-200 Harrison Place Coachella, CA, 92236 Phone: (760) 863 - 2444 Fax: (760) 863-2449 29chairman@29palmsbomi-nsn.gov	Chemehuevi
Twenty-Nine Palms Band of Mission Indians Anthony Madrigal, Tribal Historic Preservation Officer 46-200 Harrison Place Coachella, CA, 92236 Phone: (760) 775 - 3259 amadrigal@29palmsbomi-nsn.gov	Chemehuevi

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Sienna Solar 2021 Project, San Bernardino County.

Appendix B

SCCIC Records Search Results

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-00871	NADB-R - 1060871; Voided - 79-11.14	1979	LEONARD, JOANNE C.	AN ARCHAEOLOGICAL ASSESSMENT OF THE PROPERTIES IN THE LUCERNE VALLEY	SAN BERNARDINO COUNTY MUSEUM ASSOCIATION	
SB-02689	NADB-R - 1062689; Voided - 92-10.8	1992	BROWN, JOAN C.	ARCHAEOLOGICAL LITERATURE AND RECORDS REVIEW FOR THE RANCHO LUCERNE PLANNED DEVELOPMENT PROJECT IN THE COUNTY OF SAN BERNARDINO, CALIFORNIA	RMW PALEO	
SB-02690	NADB-R - 1062690; Voided - 92-10.9	1992	BROWN, JOAN C.	ADDENDUM TO: ARCHAEOLOGICAL LITERATURE AND RECORDS REVIEW FOR THE RANCHO	RMW PALEO	
SB-02830	NADB-R - 1062830	1992	BROWN, JOAN C. and TIM GREGORY	ARCHAEOLOGICAL LITERATURE REVIEW AND HISTORICAL RESOURCE EVALUATION FOR THE RANCHO LUCERNE PLANNED DEVELOPMENT PROJECT IN THE COUNTY OF SAN BERNARDINO, CA	RMW PALEO	
SB-04027	NADB-R - 1064027	1998	LOVE, BRUCE	CULTURAL RESOURCES REPORT RANCH LUCERNE DEVELOPMENT, LUCERNE VALLEY, SAN BERNARDINO COUNTY. 35PP	CRM TECH	36-020181, 36-020182
SB-04028	NADB-R - 1064028	1998	URBAS, ANDREA	ADAPTIVE USE REPORT: THE OASIS/RABBIT SPRINGS RANCH HISTORIC BUILDINGS, RANCHO LUCERNE VALLEY DEVELOPMENT, LUCERNE VALLEY, SAN BERNARDINO COUNTY, CA. 48PP		
SB-05158	NADB-R - 1065158	2005	AHMET, KORAL and LERCH, MICHAEL K.	DETERIORATED POLE REPLACEMENT PROJECT ARCHAEOLOGICAL SURVEY OF TEN POLE LOCATIONS ON THE POCO 33KV, CEMENT 33KV, RABBIT 12KV, SKY HI 12 KV, AND CUSHENBURY 33KV TRANSMISSION LINES, SAN BERNARDINO COUNTY, CALIFORNIA		
SB-06512	NADB-R - 1066512	2009	Backes, Clarus, Jessica DeBusk, and John Dietler	Cultural Resources Survey for the Lucerne Valley PV Solar Project, San Bernardino County, California.	SWCA	36-021161, 36-021162
SB-07020		2011	Woodman, Craig	Supplemental Class III Archaeological Survey of a Redundant Fiber Optic Line for the Granite Mountain Wind Energy Project, San Bernardino County, CA	URS	

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-07273	NADB-R - 1067273; Other - SCE	2011	Orfila, Rebecca S.	Archaeological Survey for the Southern California Edison Company: GRM Project in Lucerne, CA (2012 WCR Rabbit 12kV-BLF Addition: IO 319221/TD520570; RSOC CWA-210.	RSO Consulting	
SB-07366	NADB-R - 1067366	2013	Winslow, Diane and Sherri Andrews	Class III Inventory for the Granite Wind Energy Telecommunication Lines Granite Mountain, Gentie Line and Jasper Substation Interconnection Projects, San Bernardino County, California.	ASM Affiliates, Inc.	36-000317, 36-001908, 36-002910, 36-005598, 36-005599, 36-010508, 36-010535, 36-010538, 36-014632, 36-014875, 36-014876, 36-014877, 36-014878, 36-014879, 36-020872, 36-021200, 36-023975, 36-024155, 36-025636, 36-025637, 36-025638, 36-025639, 36-025640, 36-025641, 36-025642, 36-025643, 36-025644, 36-025645, 36-025646, 36-025647, 36-025648, 36-025649, 36-025650, 36-025668, 36-025669
SB-07482						

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
SB-07984		2015	Stanton, Patrick B., Kenneth M. Becker, Mark Q. Sutton, and Karen K. Swope	Class III Cultural Resource Inventory of the Line 4000 Anomaly Digs Project, San Bernardino County, California	Statistical Research, Inc.	36-012189, 36-023973, 36-024000, 36-024617, 36-024619, 36-027410, 36-028355, 36-028356, 36-028357, 36-028358, 36-028359, 36-028360, 36-028361, 36-028362, 36-028363, 36-028364, 36-028365, 36-028366, 36-028367, 36-028368, 36-028369, 36-028370, 36-028371, 36-028372, 36-028373, 36-028374, 36-028375, 36-028376, 36-028377, 36-028378, 36-028379, 36-028380, 36-028381, 36-028382, 36-028383, 36-028384, 36-028385, 36-028386, 36-028387, 36-028388, 36-028389, 36-028390, 36-028391, 36-028392, 36-028393, 36-028394, 36-028395, 36-028396, 36-028397, 36-028398, 36-028399, 36-028400, 36-028401, 36-028402, 36-028403, 36-028404, 36-028405, 36-028406, 36-028407, 36-028408, 36-028409, 36-028410, 36-028411, 36-028412, 36-028413, 36-028414, 36-028415, 36-028416, 36-028417, 36-028418, 36-028419, 36-028420, 36-028421, 36-028422, 36-028423, 36-028424, 36-028425, 36-028426, 36-028427, 36-028428, 36-028429, 36-028430, 36-028431, 36-028432, 36-028433, 36-028434, 36-028435, 36-028436, 36-028437, 36-028438, 36-028439, 36-028440, 36-028441

All resources are verified by SCCIC Staff

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-36-002145	CA-SBR-002145	Resource Name - Lucerne Dry Lake; Other - SBCM-261	Site	Prehistoric	AP02; AP04	1940 (SMITH); 2018 (Diane Winslow, ASM Affiliates)	
P-36-003750	CA-SBR-003750		Site	Prehistoric	AP04	1979 (Gerrit Fenega)	SB-00874
P-36-014876	CA-SBR-013115H	Resource Name - SCE 220-Kv North Transmission Line; Other - Pisgah Substation Triangle; Other - Lugo-Pisgah #1; Other - Hoover-Chino #1; Other - T-Mobile West LLC IE04970B/SB563 SCE Sultana High School; Other - SRI-65; Other - SRI-2012; Resource Name - Hoover-Chino No. 1; Other - SRI-1053, SRI-8; Voided - 36-024619	Structure, Site	Historic	AH16; HP11	2008 (K. Erickson, URS Corporation); 2010 (Kristen Erickson, URS); 2011 (Joshua Trampler, SRI); 2011 (J. Trampier, SRI); 2011 (J. Trampier, S. Kremkau, Statistical Research); 2011 (D. Winslow and S. Andrews, ASM Affiliates); 2012 (Wendy L. Tinsley, Pacific Legacy); 2013 (E. Gingerich, Far Western); 2014 (K. A. Crawford, Michael Brandman Associates); 2015 (Matthew Hyland, SRI); 2017 (Shannon Davis, ASM); 2018 (Shannon Davis, ASM); 2018; 2018; 2019 (J. Spidell, Kautz)	SB-07366, SB-07788, SB-07789, SB-07844, SB-08031
P-36-021160	CA-SBR-013657H	Resource Name - LV-S1	Object, Site	Historic	AH02	2009 (King Covert; Sherman Hares, SWCA); 2016	
P-36-021161	CA-SBR-013658H	Resource Name - LV-S2	Object	Prehistoric	AH16	2009 (King Covert; Sherman Hares, SWCA); 2016 (P. Sharp-Garcia, Dudek)	SB-06512
P-36-021162	CA-SBR-013659H	Resource Name - LV-S3	Object	Historic	AH02	2009 (King Covert; Sherman Hares, SWCA); 2016	SB-06512
P-36-021163			Other	Prehistoric	AP16	2009 (King Covert; Sherman Hares, SWCA)	
P-36-021164			Other	Prehistoric	AP16	2009 (King Covert; Sherman Hares, SWCA)	
P-36-021165			Other	Prehistoric	AP02	2009 (King Covert; Sherman Hares, SWCA)	
P-36-021166		Resource Name - LV-I4	Other	Prehistoric	AP02	2009 (Covert et al., SWCA Environemental Consultants)	

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-36-021167			Other	Prehistoric	AP04	2009 (King Covert; Sherman Hares, SWCA)	
P-36-021168			Other	Prehistoric	AP02	2009 (King Covert; Sherman Hares, SWCA)	
P-36-021200	CA-SBR-013662H	Resource Name - URS 1-B	Site	Historic	AH04; AH09	2010 (Whitney Wilkinson; Brent Leftwich, URS); 2011 (D. Winslow and S. Andrews, ASM Affiliates); 2013 (M. O'Neill, Pacific legacy); 2018 (Diane Winslow, ASM Affiliates)	SB-06320, SB-07366
P-36-021201	CA-SBR-013663H	Resource Name - URS-2B	Site	Historic	AH05	2010 (Whitney Wilkinson; Brent Leftwich, URS); 2012 (M. O'Neill, Pacific legacy, Inc); 2018	SB-06320
P-36-021202		Resource Name - ISO-1B	Other	Prehistoric	AP02	2010 (Whitney Wilkinson; Brent Leftwich, URS); 2018 (A. Pham, Dudek)	SB-06320
P-36-024156	CA-SBR-015341H	Resource Name - SRI-64	Site	Historic	AH07	2011 (S Kremkau, SRI); 2012 (L. Schrader, Pacific Legacy); 2016 (Nara Cox and Karolina Chmiel, ICF)	
P-36-024157	CA-SBR-015342H	Resource Name - SRI-67	Site	Historic	AH07; HP37	2011 (S Kremkau, SRI); 2018	
P-36-024158	CA-SBR-015343H		Site	Historic	AH07; HP37	2011 (S Kremkau, SRI)	
P-36-024190	CA-SBR-015375H	Resource Name - SRI-1072	Structure, Site	Historic	AH07; HP37	2011 (S Kremkau, SRI); 2013 (M. O'Neill, Pacific Legacy, Inc); 2018	
P-36-024204	CA-SBR-015389H	Resource Name - SRI-2047	Site	Historic	AH07; HP37	2011 (S. Kremkau, Statistical Research, Inc.); 2018	
P-36-024224	CA-SBR-015409H	Other - SRI-3022, SRI-3017, SRI-1006; Resource Name - Chuckwalla Road; Voided - 36-028361; Voided - 36-028369	Site	Historic	AH04; AH07; HP37	2011 (S Kremkau, SRI); 2012 (M. O'Neill, Pacific Legacy); 2015 (Patrick Stanton, SRI); 2016; 2018	

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-36-024225	CA-SBR-015410H	Resource Name - SRI-3024	Site	Historic	AH04	2011 (S Kremkau, SRI); 2018	
P-36-024245	CA-SBR-015430H	Resource Name - SRI-4676	Site	Historic	AH07; HP37	2011 (S Kremkau, SRI); 2018; 2018 (Shannon Davis, ASM)	
P-36-025638	CA-SBR-016179H		Site	Historic	AH04	2011 (S. Andrews et al., ASM Affiliates, Inc.)	SB-07366
P-36-025668	CA-SBR-025668		Site	Historic	AH16	2013 (D. Winslow and S. Andrews, ASM Affiliates, Inc.,)	SB-07366
P-36-025669	CA-SBR-016200H		Site	Historic	AH04; AH09	2013 (D. Winslow and S. Andrews, ASM Affiliates)	SB-07366
P-36-027410	CA-SBR-017863H	Resource Name - Barstow Road / State Route 247; SRI-1105; PL-LUGO-BRK-025; Other - SRI-3058, SRI-1516; Voided - 36-028005	Structure, Object, Site	Historic	AH04; AH07; AH15; HP37	2013 (M. O'Neill, Pacific Legacy, Inc.); 2014 (Justin Lev-Tov, SRI); 2015 (Patrick Stanton, SRI); 2018	SB-07984
P-36-027752		Resource Name - SCE Eldorado-Lugo 500 kV Transmission Line	Structure	Historic	HP11	2013 (Wendy Tinsley Becker, Urbana); 2016 (Christina Chiang, Urbana); 2017 (Shannon Davis, ASM); 2018; 2018; 2019 (J. Spidell, Kautz)	
P-36-027757		Resource Name - SCE Lugo-Mohave 500kV Transmission Line	Structure, Element of district	Historic	HP11	2013 (Wendy L. Tinsley Becker, Urbana); 2016 (Christine Chiang, Urbana); 2017 (Shannon Davis, ASM); 2018; 2019 (J. Spidell, Kautz)	
P-36-027880	CA-SBR-017374H	Resource Name - PL-CWLTP-MMO-086	Site	Historic	AH04	2014 (T. Fuerstenberg, Pacific Legacy, Inc.); 2018 (Diane Winslow, ASM)	
P-36-028149	CA-SBR-017557H	Resource Name - PL-SOK-LNS-027	Site	Historic	AH02; AH04	2012 (M. O'Neill, Pacific Legacy, Inc.); 2018 (Diane Winslow, ASM)	
P-36-028356	CA-SBR-028356H	Resource Name - SRI-21	Site	Historic	AH07	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028357	CA-SBR-028357H	Resource Name - SRI-22	Site, Other	Historic	AH07	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028362	CA-SBR-028362H	Resource Name - SRI-1010	Site, Other	Historic	AH07	2015 (Patrick B. Stanton, SRI)	SB-07984

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-36-028365	CA-SBR-028365H	Other - SRI-2025; Resource Name - Meridian Rd	Site, Other	Historic	AH07	2015 (Patrick B. Stanton, SRI); 2018	SB-07984
P-36-028371	CA-SBR-028371H	Resource Name - SRI-3024	Site, Other	Historic	AH07	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028372	CA-SBR-028372H	Resource Name - SRI-3025	Site	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028417		Resource Name - IO-19	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028418		Resource Name - IO-20	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028424		Resource Name - IO-1007	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028425		Resource Name - IO-1008	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028426		Resource Name - IO-1009	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028438		Resource Name - IO-3021	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028439		Resource Name - IO-3022	Other	Historic	AH04	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-028440		Resource Name - IO-3023	Other	Prehistoric	AP02	2015 (Patrick B. Stanton, SRI)	SB-07984
P-36-029774		Resource Name - OM-PK-004	Building, Site	Historic	HP02; HP22; HP33	2016 (PK Sharpe-Garcia, Dudek)	
P-36-029775	CA-SBR-029775H	Resource Name - OM-PK-009	Site	Historic	AH06	2016	
P-36-029899		Resource Name - ICF-CAL-001	Other	Prehistoric	AP02; AP16	2016 (N. Cox, ICF International)	
P-36-029901		Resource Name - ICF-CAL-02	Site	Historic	AH04	2016 (N. Cox, ICF International); 2018 (A. Pham, Dudek); 2018	
P-36-031200		Resource Name - Eldorado 500kV Transmission Line System	Structure, District	Historic	HP11	2016 (Christina Chiang, Urbana); 2017 (Shannon Davis, ASM)	
P-36-032690	CA-SBR-032690H	Resource Name - ELM-SJM-89	Site	Historic	AH02; AH04	2017 (S. Moore, ASM)	
P-36-032691	CA-SBR-032691H	Resource Name - ELM-SJM-90	Site	Historic	AH04	2017 (S. Moore, ASM)	
P-36-032692	CA-SBR-032692H	Resource Name - ELM-SJM-92	Site	Historic	AH04	2017 (S. Moore, ASM)	
P-36-032693	CA-SBR-032693H	Resource Name - ELM-SJM-93	Site	Historic	AH04	2017 (S. Moore, ASM)	
P-36-032694	CA-SBR-032694H	Resource Name - ELM-SJM-94	Site	Historic	AH04	2017 (S. Moore, ASM)	
P-36-033005	CA-SBR-033005H	Resource Name - CS-S-1	Site	Historic	AH04	2018 (A. Pham, Dudek)	
P-36-033006	CA-SBR-033006H	Resource Name - CS-S-2	Site	Historic	AH05; AH06	2018 (A. Pham, Dudek)	
P-36-033007	CA-SBR-033007H	Resource Name - CS-S-3	Site	Historic	AH02; AH04; AH05	2018 (A. Pham, Dudek)	
P-36-033008	CA-SBR-033008H	Resource Name - CS-S-4	Site	Historic	AH04; AH05	2018 (A. Pham, Dudek)	
P-36-033009	CA-SBR-033009H	Resource Name - CS-S-5	Site	Historic	AH04	2018 (A. Pham, Dudek)	

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-36-033010	CA-SBR-033010/H	Resource Name - CS-S-7	Site	Prehistoric, Historic	AH04; AP02	2018 (A. Pham, Dudek)	
P-36-033011	CA-SBR-033011H	Resource Name - CS-S-8	Site	Historic	AH05	2018 (A. Pham, Dudek)	
P-36-033012	CA-SBR-033012H	Resource Name - CS-S-9	Site	Historic	AH04; AH16	2018 (A. Pham, Dudek)	
P-36-033013		Resource Name - CS-I-1	Other	Prehistoric	AP02	2018 (A. Pham, Dudek)	
P-36-033014		Resource Name - CS-I-2	Other	Historic	AH16	2018 (A. Pham, Dudek)	
P-36-033015		Resource Name - CS-I-3	Other	Prehistoric	AP02	2018 (A. Pham, Dudek)	
P-36-033072	CA-SBR-033072	Resource Name - Rabbit Springs-1	Site	Prehistoric	AP08	2018 (S. Andrews, ASM)	
P-36-033074	CA-SBR-033074H	Resource Name - Rabbit Springs-3	Site	Historic	HP39	2018 (S. Andrews, ASM)	

Appendix C

Resource Records

Redacted for Confidentiality Purposes

Appendix G. Geotechnical Study

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CEQA Level Geotechnical Study

Sienna Solar
Lucerne Valley, San Bernardino County, California
July 29, 2022
Terracon Project No. LA225044

Prepared for:
8minute Energy
San Francisco, California

Prepared by:
Terracon Consultants, Inc.
Tustin, California

July 29, 2022

8minute Energy
1132 N 7th
San Francisco, California 95112

Attn: Mr. Kiran Tuniki
P: (415) 517-3034
E: KTuniki@8minute.com

Re: CEQA Level Geotechnical Study
Sienna Solar
Lucerne Valley, San Bernardino County, California
Terracon Project No. LA225044

Dear Mr. Tuniki:

We have prepared this California Environmental Quality Act (CEQA) Level Geotechnical Study to provide support documentation for the "Environmental Checklist Form" in accordance with the CEQA Guidelines for the proposed Sienna Solar development, located west of Barstow Road and North of Old Woman Springs Road in Lucerne Valley, San Bernardino County, California.

Our report includes data from the U.S. Department of Agriculture for the soils found on site Although the site is not within a state- or county-designated earthquake fault zone, the site is within a seismically active region. The report therefore summarizes important fault information in the area of your project and discusses potential geotechnical/geologic concerns, such as fault rupture, liquefaction and erosion. This report does not include specific mitigation recommendations other than those already stated in our prior geotechnical report.

Purpose and Scope of Work

Throughout April 2022, a geotechnical investigation for the proposed project was performed. The purpose of this investigation was to explore and evaluate the geotechnical engineering conditions at the subject site and to provide appropriate geotechnical engineering recommendations. The results of our geotechnical investigation and our geologic evaluation for CEQA study are presented in this report. Terracon's geotechnical engineering scope of work for this project included the following:

- Site reconnaissance and examination of existing conditions
- Marking exploration locations and notifying Underground Service Alert in accordance with State requirements
- Drilling and sampling of thirty-nine (39) soil test borings
- Excavation and logging of five (5) geologic trenches
- Laboratory testing of soil samples
- Evaluation of geotechnical properties of soils pertinent to the CEQA Guidelines

- Evaluation of geologic hazards typically addressed in CEQA documents, including seismic shaking, surface fault rupture, liquefaction, landslides, erosion, unstable geologic units (including evaluation of surface fissures), expansive soils, and capacity of native soils for wastewater/storm water infiltration
- Development of 2019 California Building Code (CBC) seismic design parameters
- Evaluation of the geotechnical engineering/geologic data to develop preliminary recommendations for site grading/preparation and mitigation of potential geologic and geotechnical constraints

Site Description

The proposed project site is located west of Barstow Road and North of Old Woman Springs Road in Lucerne Valley, San Bernardino County, California. The project site boundary is irregularly shaped and occupies an approximate area of 1,850 acres. The GPS coordinates for the approximate center of the project site are 34.50076°N, 116.90145°W. The proposed 200 MWAC photovoltaic solar farm is to be developed using single-axis tracker photovoltaic (PV) arrays and includes a substation in the northern most parcel. At the time of our investigation, the site generally consisted of undeveloped land with sparse to moderate desert vegetation.

Field Investigation

Terracon advanced hollow stem auger soil borings, test pits, and trenches as outlined in the table below:

Number of Explorations	Depth (feet)	Planned Location
37 borings	21½	Array areas
2 borings	51½	Substation Areas
37 test pits	10	Array Areas
5 trenches	5	Geologic Trenches

The test pits are redundant data for the purposes of this report. As such, logs of the test pits are not included.

Terracon personnel provided the layout of the explorations. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate elevations were obtained by interpolation from Google Earth.

We advanced the borings with a truck-mounted drill rig using continuous hollow stem flight augers. Four driven samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Soil sampling was performed using split-barrel sampling procedures. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 2.5-inch O.D. split-barrel Modified California sampling spoon with 2.0-inch I.D. tube lined sampler was also used for sampling. The Modified California split-barrel sampling procedures are similar to standard split spoon sampling procedure; however, blow counts are typically recorded for 6-inch intervals for a total of 12 inches of penetration. Groundwater was not encountered during the field exploration.

The test pits were excavated with a rubber-tire backhoe with a 3-foot-wide bucket. Bulk samples were obtained from the test pits.

For safety purposes, all borings and test pits were backfilled with soil cuttings after their completion. It is possible that some settlement of the backfilled material may occur. Our firm does not monitor boring locations for surface settlement. This is deemed to be and is accepted to be the responsibility of our client.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring and test pit logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring and test pit logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and excavation, and our interpretation of the subsurface conditions between samples. Final boring and test pit logs were prepared from the field logs. The final boring and test pit logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Soil Testing

The project engineer reviewed the field data and assigned various laboratory tests to better understand the engineering properties of the various soil strata as necessary for this project. The following laboratory tests were performed on samples collected at the site:

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D7263 Standard Test Methods for Laboratory Determination of Density (Unit Weight) of Soil Specimens
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing

- ASTM D2435 Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading
- ASTM D3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
- ASTM D698 Moisture Density Relationship using Standard Effort (Standard Proctor)

Summaries of laboratory test results are presented on the boring logs and in the attachments of this report. Atterberg limit test results indicate that the on-site soils generally are medium to high plasticity clayey soils. Laboratory Moisture-Density test (Modified Proctor) results indicate that the near surface sand materials have a maximum dry-density ranging between approximately 94.4 pcf and 127.2 pcf with a corresponding optimum moisture content ranging between 9.6% and 24%. Laboratory Moisture-Density test (Modified Proctor) results indicate that the near surface clay materials have a maximum dry-density ranging between approximately 95.3 pcf and 114.8 pcf with a corresponding optimum moisture content ranging between 13.8% and 25%. Direct Shear testing indicates the sand soil samples have an effective internal angle of friction of 30 to 42 degrees with an effective cohesion of 216 to 648 psf. Direct Shear testing indicates the clay soil samples have an effective internal angle of friction of 13 to 27 degrees with an effective cohesion of 564 to 1536 psf.

Site Geology and Subsurface Soil Conditions

The site is located within the Mojave Desert geomorphic province. The Mojave Desert province is bounded on the southwest by the San Andreas fault and the Transverse Ranges (locally San Bernardino Mountains) and on the northeast by the Garlock fault. The Mojave Desert is an ancient feature formed in response to the inception of movement on the San Andreas and Garlock faults. The region is characterized by broad alluviated basins that conceal the previously mountainous topography.

The Mojave Desert includes various closed basins, or basins with internal drainage, referred to as dry lakes. Lucerne Valley includes a large closed basin referred to as Lucerne Valley playa. It is normally dry but surface water perches on the playa after rain events. All of the subject property of this investigation is located east and southeast of the playa.

The westerly parcels are located immediately east of the playa and are mapped as Holocene-age (recent) “clay” by Dibblee (1964A, 1964B). A Geologic Index Map is attached. The ground surface tends to be light in color but the soils are mixtures of clay and silt.

Most of the easterly parcels are mapped as Holocene-age “alluvium” by Dibblee. Geologic mapping and trenching conducted during this investigation found that the “alluvium” in the northeasterly site parcels includes a degraded desert pavement of Pleistocene age, and so the northeasterly parcels are largely underlain by older alluvium.

The southerly parcels are all mapped by Dibblee as Holocene-age alluvium. Observations of soils within trenches in this area are consistent with a Holocene-age assignment.

Based on the results of the borings, onsite soils generally consist of medium stiff to very stiff lean clay/fat clay with varying amounts of silt and sand to the maximum depth explored of 51.5 feet bgs.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the attachments of this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Soils

Based on soils mapping published by the U.S. Department of Agriculture (2022), the project site is underlain by several USDA soils types including Bousic Clay, Dune Land, Glendale Variant Silt Loam, Joshua Loam, Kimberlina Loamy Fine Sand, Lavic Loamy Fine Sand, Peterman Clay, and Playas. These soils vary in depth, depending on slope aspect (with deeper soils occurring on areas of lower gradient), degree of permeability (with less permeable soils derived from parent materials/bedrock having clay-forming mineralogies) and susceptibility to erosion.

The following table summarizes the USDA properties for soils units identified on the site. The unit numbers correspond to the areas shown on the attached USDA Soils Map.

Summary of USDA Soil Properties					
Unit Name	**Map Unit**	**Acres % of Site**	**Surface Water Management**	**Subsurface Water Management**	**Erosion Hazard (Road, Trail)**
Bousic Clay	104	33.6	Not Rated	Not Rated	Slight
Dune Land	123	1.1	Not Rated	Not Rated	Not Rated
Glendale Variant Silt Loam, Saline-Alkali	125	25.2	Not Rated	Not Rated	Slight
Joshua Loam	135	0.3	Somewhat Limited	Very Limited	Moderate
Kimberlina Loamy Fine Sand	137	15.2	Not Rated	Not Rated	Slight
Lavic Loamy Fine Sand	140	0.3	Not Rated	Not Rated	Moderate
Peterman Clay	154	24.1	Not Rated	Not Rated	Slight
Playas	156	0.2	Not Rated	Not Rated	Not Rated

The rating for surface water management is based on the soil properties that affect the capacity of the soil to convey water across the landscape. The term "somewhat limited" for surface water management rating indicates that the soil has features that are moderately favorable for the specified use and that limitations can be overcome or minimized by planning, design or installation.

The rating for subsurface water management is based on the soil properties that affect the capacity of the soil to be drained. The term "very limited" for subsurface water management indicates that the soil has features that are unfavorable for the specified use. Poor performance can be expected.

The ratings for erosion hazard indicate the hazard of soil loss from unsurfaced roads and trails. The term "slight" indicates that the no erosion is likely. The term "moderate" indicates that some erosion is likely.

Erosional features related to subsidence cracking (fissures) occur across the site and these are discussed later.

Mineral Resources

The aggregate resource potential for the area of the site is addressed in a report titled, "Mineral Land Classification of Concrete Resources in the Barstow-Victorville Area" (CDMG, 1993). This report addresses the sand and gravel resource potential according to the presence or absence of significant sand and gravel deposits for use in construction-grade aggregate. The resource quality of surrounding lands was reported according to the following Mineral Resource Zone (MRZ) classification system:

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.

The site is situated in primarily alluvial terrain. No economically significant sources of aggregate material were observed within the site. The project site is placed within MRZ-3a defined as "may contain significant aggregate deposits". No aggregate mining currently occurs in similar geologic terrain in the immediate project vicinity. Our assessment of the geology and soils in trenches and borings is that no economically significant aggregate resources exist on the site currently and are not expected to be economical in the foreseeable future. Aggregates are commercially available from quarries along Meridian Road and along the front of the San Bernardino Mountains at a minimum..

The mineral resource potential for the area of the site is addressed in a report titled, "Mineral Land Classification of a Part of Southwestern San Bernardino County: The Big Bear Lake-Lucerne Valley Area, California" (CDMG, 1994). This report addresses the mineral resource potential according to the presence or absence of significant metallic or industrial mineral deposits. The resource quality of surrounding lands was reported according to the following MRZ classification system:

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.

No economically significant sources of metallic or industrial materials were observed within the site. The project site is placed within MRZ-4, defined as "unknown mineral resource significance". As the project area is not presently used for mineral resource extraction and does not contain identified mineral sources, the proposed project will not result in the loss of availability of any known mineral resources. Thus, no significant impacts are anticipated.

Regional Groundwater

According to the California Department of Water Resources, the site is located within the Lucerne Valley basin, part of the Colorado River Hydrologic Region. Large areas within the basin are irrigated for alfalfa (Schaefer, 1978) and cannabis. Irrigation of fields by groundwater extraction has occurred for greater than 100 years.

Significant declines in groundwater levels in wells were reported in the basin as early as 1917 (Schaefer, 1978). The reported decline was at least 40 feet as of 1954, and at least an additional 60 feet as of 1976, for a total of at least 100 feet of decline as of 1976 (Schaefer, 1978). Long-term hydrographs of wells in the basin in the general area of the site (Mojave Water Agency, 2005) for the years 1953 to 2003 show water level declines of approximately 80 feet during that period.

Declines in groundwater levels that have occurred in Lucerne Valley are considered sufficient to cause subsidence and associated subsidence fissuring. The hazards of subsidence and ground fissuring are addressed later in this report.

Local Groundwater

Groundwater was not observed in the borings while drilling or for the short duration they could remain open. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations.

In clayey soils with low permeability, the accurate determination of groundwater level may not be possible without long term observation. Long term observation after drilling could not be performed as borings were backfilled immediately upon completion due to safety concerns. Groundwater levels can best be determined by implementation of a groundwater monitoring plan.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Seismic Design Parameters

The 2019 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16 and 2019 CBC. The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." Based on our understanding of the proposed structures, it is our assumption that the exception in Section 11.4.8 applies to the proposed project. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations for the substation area presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

Description	Substation Area
2019 California Building Code Site Classification (CBC) [1]	D [2]
Site Latitude (°N)	34.5226
Site Longitude (°W)	116.8946

Description	Substation Area
S_s Spectral Acceleration for a 0.2-Second Period	1.179
S_1 Spectral Acceleration for a 1-Second Period	0.418
F_a Site Coefficient for a 0.2-Second Period	1.029
F_v Site Coefficient for a 1-Second Period	1.884
Project Site Mean Magnitude[4]	6.40
Modified Peak Ground Acceleration (PGA_m)[5]	0.547

1. Seismic site classification in general accordance with the *2019 California Building Code*.
2. The 2019 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Borings were extended to a maximum depth of 51½ feet, and this seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

Regional Seismicity

The site is located in the southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, an unnamed gridded point source that is considered to have the most significant effect at the site from a design standpoint has a maximum magnitude of 5.49 and is located approximately 6 kilometers from the site. Nearby USGS mapped faults include the Helendale fault at 10 kilometers and Lenwood-Lockhart at 12 kilometers distance from the site.

Based on the USGS Design Maps Summary Report, using the American Society of Civil Engineers (ASCE 7-16) standard, the design peak ground acceleration (PGA_M) for the project site is 0.547g. Based on the USGS Unified Hazard Tool, design ground motions are controlled by seismic sources with modal magnitudes between 5.5 and 7.4 .

Fault Rupture

The site is not located within an Alquist-Priolo Special Studies Fault Zone (CDMG, 2002b). As noted above, the nearest active fault (unnamed grid source) is located approximately 6 kilometers from the site. Based on the distance to the site from known (USGS) active faults at site, it is our opinion that the potential for surface fault rupture to occur on the project site is low.

Liquefaction

Liquefaction is a mode of ground failure that results when a saturated soil loses substantial strength in response to earthquake shaking. Liquefaction is typically a hazard where loose sand or non-plastic silt soils exist below groundwater but may also occur with sensitive plastic silt or clay below groundwater. The California Geological Survey (CGS) has designated certain areas within the state as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of relatively shallow groundwater. The project site is not mapped within a liquefaction hazard potential area as designated by the CGS, as their mapping efforts have not reached the region of the site. The site is not included within a liquefaction hazard zone designated by San Bernardino County on their Geologic Hazard Overlay Maps.

The substation portion of the proposed project is located on Pleistocene-age alluvium as evidenced by the petrocalcic layer observed in Geologic Trench 1, and the presence of the degraded desert pavement (geomorphic surface). Pleistocene-age alluvium is not considered to be susceptible to liquefaction due to its age and density. Based on the encountered subsurface conditions and depth of groundwater, we conclude that the potential for liquefaction at the proposed substation location is very low. Other geologic hazards related to liquefaction, such as lateral spreading, are also considered very low.

Strong Ground Shaking

The site could be subjected to strong ground shaking from earthquakes on local to distant sources during the life span of the project. Faulting and ground motion parameters for the site are addressed above. Mitigation of strong ground shaking is typically provided by designing structures in accordance with the latest addition of the California Building Code.

Ground Fissuring and Subsidence

Ground fissuring attributed to past groundwater withdrawal is apparent on many of the parcels. In areas where the slope of the ground surface is slight, including the project area, narrow ground cracks (less than 2 mm wide) can channel surface water for long distances. This channeling can erode the upper soils and create wider/deeper fissures. At the site, we observed fissures up to approximately 5 feet wide and 4 feet deep on parcels that have had no apparent agricultural use. Some parcels are in current or recent use for alfalfa production. These parcels have apparently been flattened to facilitate “flood” irrigation. Evidence for prior fissuring is not evident on the parcels in current use for agriculture.

As part of this investigation, we reviewed readily available aerial photographs (Fairchild Collection, US Department of Agriculture and hsitoricaerials.com). A list of these photographs is attached. These aerials cover large portions of the site and date back to 1945. Based on our review, the parcels that are currently in agricultural use generally exhibit fissuring prior to agricultural use, as observed on the 1945 range of available photography. Some parcels were in agricultural use prior to the 1945 aerial photography and so no inference can be made about fissuring relative to 1945 from the photography. It should be noted that some of the parcels along the northern, eastern and southern sides of the project do not exhibit fissuring visible on aerial photography but do exhibit incipient fissuring visible on the ground.

Subsurface Investigation of Fissuring

A subsurface investigation of ground fissuring was conducted to evaluate the presence or absence of subsurface voids. Significant voids in the subsurface could be expected to reduce the capacities of the driven solar piles.

Five geologic trenches were excavated with a rubber-tire backhoe. The trenches were limited to 5 feet in depth or less due to sidewall stability concerns. The trenches were placed at a high angle across fissures in various states of maturity, including incipient cracks, open (eroded) fissures, and one filled, mounded fissure. The trenches were extended laterally to traverse the entire width of cracking associated with each feature, so the trenches varied in length. The trenches were entered, the trench walls were cleaned with hand tools, and the walls were logged by a Certified Engineering Geologist (CEG). Observations made of each trench are discussed below. The trench logs are attached to this report. All trenches were placed across fissure features observed during prior geologic field reconnaissance by the CEG.

Geologic Trench 1 (GT-1) was placed across incipient, nearly east-west trending, cracking observed near the location of the proposed substation on the Luisa parcel (APN 045-239-108). This location is characterized by a degraded desert pavement (closely-packed pebbles on the ground surface) of suspected Pleistocene age. Desert pavements characteristically are ancient features (Pleistocene age). Observation of the soils in the trench confirmed the Pleistocene age, as a well-developed petrocalcic layer (abundant secondary carbonate accumulation) was present. The fissure at the surface was locally 3 to 4 inches wide and quickly narrowed downward to about 2mm within about 2 feet of the surface. This feature is referred to as incipient because very little erosion had occurred along it.

Geologic Trench 2 (GT-2) was placed across incipient, N69W-trending, cracking observed on a Luisa parcel (APN 045-239-109) adjacent to the substation parcel. This location is southwest of the limit of the degraded desert pavement (closely-packed pebbles on the ground surface) of suspected Pleistocene age. Observation of the soils in the trench confirmed the Pleistocene age, as a well-developed layer with carbonate nodules (abundant secondary carbonate accumulation) was present. The pavement at this location is apparently completely degraded. The fissure at the surface was locally 24 inches wide and quickly narrowed downward to about 1mm within about 2 feet of the surface. This feature is referred to as incipient because very little erosion had occurred along it, and it was not laterally extensive.

Geologic Trenches GT-1 and GT-2 exposed ancient soils (Pleistocene age). The cracking observed is minor and considered incipient, as little erosion had occurred. The cracking observed in these soils is characterized as subsidence cracking.

Geologic Trench 3 (GT-3) was placed across a mature N20W-trending filled fissure observed on the Dalugdugan parcel (APN 045-211-219), southwest of the intersection of Lincoln Road, south of Granite Road. Extensive mature (eroded) ground fissuring is prominent on both sides of Lincoln Road south of Granite Road. Fissuring up to approximately 4 feet deep was observed on both sides of the road. GT-3 was placed across a prominent filled fissure characterized by a vegetated ridge approximately 1 to 2 feet high and approximately 4 feet wide. The ridge is considered to be a result of windblown sand filling a prior fissure, allowing vegetation to establish, then collecting more windblown sand. The main fissure associated with the mound was a filled fissure approximately 1 ½ inches wide extending to about 3 feet below ground surface. A few other minor fissures of 1 inch to 1 mm wide were observed, all of which narrowed to 1 mm within 3 feet of the surface. Carbonate nodules (secondary carbonate accumulation) were observed in the lowermost layer but no confidence as to Pleistocene age could be made. This feature is referred to as mature because it is infilled. It extends at least 500 feet northward to Granite Road. It is one of a subparallel series of approximate N20W-trending fissures extending north and south of Granite Road.

Geologic Trench 4 (GT-4) was placed across a N70E-trending fissure observed on the Abel parcel (APN 045-211-317), northeast of the intersection of Lincoln Road and Cambria Road. This parcel is characterized by large, open fissures with moderate vegetation established in them. Fissuring up to approximately 4 feet deep was observed on this parcel. GT-4 was placed across a prominent vegetational lineament with no surface fissuring. This feature was selected for trenching based on the strong linearity and the observation that it crosses various open fissures to the northeast of the trench location. It was postulated to be a man-made trench based on its linearity. Only two narrow (1-2 mm) fissures were observed in the trench. No evidence of prior erosion was found at this location. This feature is not considered to be man-made (trench) because no backfill of any trench was observed. This feature appears to absent from 1952 imagery but is partially visible on 1969 imagery. The nature of this feature is unknown, but it is preliminarily considered to be subsidence cracking.

Geologic Trench 5 (GT-5) was placed across a N80W-trending fissure observed on the Young parcel (APN 045-212-148), south of Cambria Road. This parcel is characterized by some small open fissures and some incipient fissures with little to no vegetation established in them. This parcel has apparently been graded or plowed for past agricultural use, resulting in large areas with little to no vegetation. At GT-5, 2 sets of minor open fissures trending roughly N80W were observed. All but one fissure were logged as diminishing in width to 1-2 mm at a shallow depth. One wider fissure (1 inch) was observed to extend to about 4 feet deep, terminating at a sand bed.

Based on our subsurface observation of fissures using the geologic trenches, the fissuring is generally narrow (1 - 2 mm wide) at depths greater than approximately 2 to 3 feet. Significant fissures apparently do not extend deeper than 2 to 3 feet below the surface. Therefore, it does not appear that subsurface fissuring jeopardizes the stability of the proposed PV piles or substation structures, except where large open fissures exist. The large fissures are created by surficial erosion through an initially narrow fissure, creating the widened fissures that are common at the site. Where significant open fissures exist, we recommend grading including removal/excavations and backfill to provide suitable subsurface conditions to support the proposed element onsite. Grading and installation of surface drainage improvements is expected to mitigate erosion that previously caused enhancement of fissures.

Subsidence

It should be recognized that Lucerne Valley has experienced subsidence due to groundwater withdrawal. The presence or absence of subsidence has been investigated using standard survey methods, GPS data, and InSAR (Interferometric Synthetic Aperture Radar) (Sneed and others, 2003; Brandt and Sneed, 2021). The combined subsidence during the period from1992 to 2019 is estimated to be approximately 14 inches in parts of the Lucerne Valley basin (Brandt and Sneed, 2021). Since the available data may not capture all of the subsidence that has occurred, the actual subsidence may be greater.

Ground subsidence can occur when groundwater levels decline significantly. When the fluid pressure in an aquifer decreases due to groundwater withdrawal, the sediment can compact. This compaction is generally permanent; however, the compaction/subsidence may not occur contemporaneously with the decline in water levels – it may be delayed. Fissuring often is associated with localized differential compaction of unconsolidated sediment. Fissures formed by this mechanism are caused by the stretching of the aquifer-system structure owing to the bending of the overlying sediment of the differentially compacting zone (Sneed and others, 2003, citing Holzer, 1984).

The observed fissuring on the site parcels is considered to be the result of subsidence. Subsidence is expected to continue. The amount and location of expected subsidence cannot be reliably predicted with the information that is currently available. Future subsidence may negatively impact level-sensitive structures such as gravity flow pipelines but the proposed solar development is expected to have a low sensitivity to future subsidence. The approximate boundary of the US Geological Survey subsidence zone relative to the project area is shown on the Geologic Index Map attached. Based on our field observations, the extent of subsidence cracking is larger than shown by the US Geological Survey.

Most of the shallow site soils are cohesive, commonly with some expansion potential as shown by the laboratory testing. Some of the parcels in the western portion exhibit polygonal cracking consistent with expansive soils. Distinguishing shrink-swell polygonal cracking from subsidence cracking is problematic and was not attempted during this investigation. We acknowledge that some of the fissures observed on the site may result from erosion of polygonal-type cracking associated with expansive soils. For this project, this distinction is unimportant.

The existing eroded fissures present a hazard to site development. Mass grading of these erosional features will be needed at the site. Improvements to drainage such as detention basins, berms other measures will be required to improve and maintain adequate drainage for the project.

Slope Stability and Landslides

The site is relatively flat and there are no slopes near the site. According to the County of San Bernardino General Plan (2010), the site is not located within an area identified as having a potential for slope instability. The site is situated in relatively flat-lying terrain that lacks significant natural relief or slopes. Therefore, the potential for landslide or slope instability is considered low and it is not necessary to perform a slope stability analysis.

Erosion

The majority of the site contains fine grained soils which are potentially susceptible to erosion or the loss of topsoil where slopes are present. However, the site is relatively flat, and there are no slopes near the site vicinity; furthermore, the majority of the native soils at the site are considered slightly susceptible to erosion, based on data available from the USDA (2022) The existing eroded ground fissures across many of the parcels are related to subsidence cracking and are evidence that uncontrolled runoff across relatively flat terrain can create significant erosion. Improvements to drainage, such as detention basins and berms are likely needed to mitigate the future potential of erosion to the project.

Expansive Soil Potential

Atterberg limit test results indicate that the on-site soils are generally medium to high plasticity clayey soils. Therefore, expansive soils should be anticipated during construction. Polygonal cracking that is a characteristic of playa clays was observed on some of the westerly parcels, confirming the presence of expansive clays..Expansive soils can be mitigated by incorporating structural reinforcement in foundations and slabs, by avoidance, or by removal.

Wastewater and Infiltration

Due to the clayey nature of the onsite soils, the use of septic tanks or other wastewater disposal systems, as well as infiltration systems for stormwater management, may not be feasible to service the subject project. The capacity of site soils to infiltrate storm water flows will be addressed in project-specific investigations, if necessary.

Off-Site Impacts

Potential geotechnical impacts to off-site areas are not anticipated due to requirements regarding grading permitting, erosion control and avoidance of non-permitted disturbance to off-site areas required by local regulations. The flat-lying character of the site and adjacent topography precludes slope effects to off-site or adjacent properties.

Conclusions

Based on the findings of this CEQA Level Geotechnical Study, a completed CEQA questionnaire for the Geology and Soils Section has been included in the attachments.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Abigail K. McCranie, E.I.T.
Staff Engineer

Jay J. Martin, C.E.G
Principal Geologist

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AERIAL PHOTOGRAPHS REVIEWED

Fairchild Collection, Black and White Aerial Photograph, July 19, 1973, Flight No. 3358, Frame 61.

Fairchild Collection, Black and White Aerial Photograph, October 7, 1995, Flight No. 6877, Frame 23.

Fairchild Collection, Black and White Aerial Photograph, October 7, 1995, Flight No. 6877, Frame 23.

Fairchild Collection, Black and White Aerial Photograph, July 19, 1973, Flight No. 3358, Frame 61.

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U.S. Department of Agriculture, Black and White Aerial Photographs, June 22, 1959, Flight No. AXL-1W, Frames 26, 27, 28, 29, 56, 58, 59, 60.

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ATTACHMENTS

SITE LOCATION PLAN

Sienna Solar - CEQA Report ■ Lucerne Valley, CA

July 28, 2022 ■ Terracon Project No. LA225044

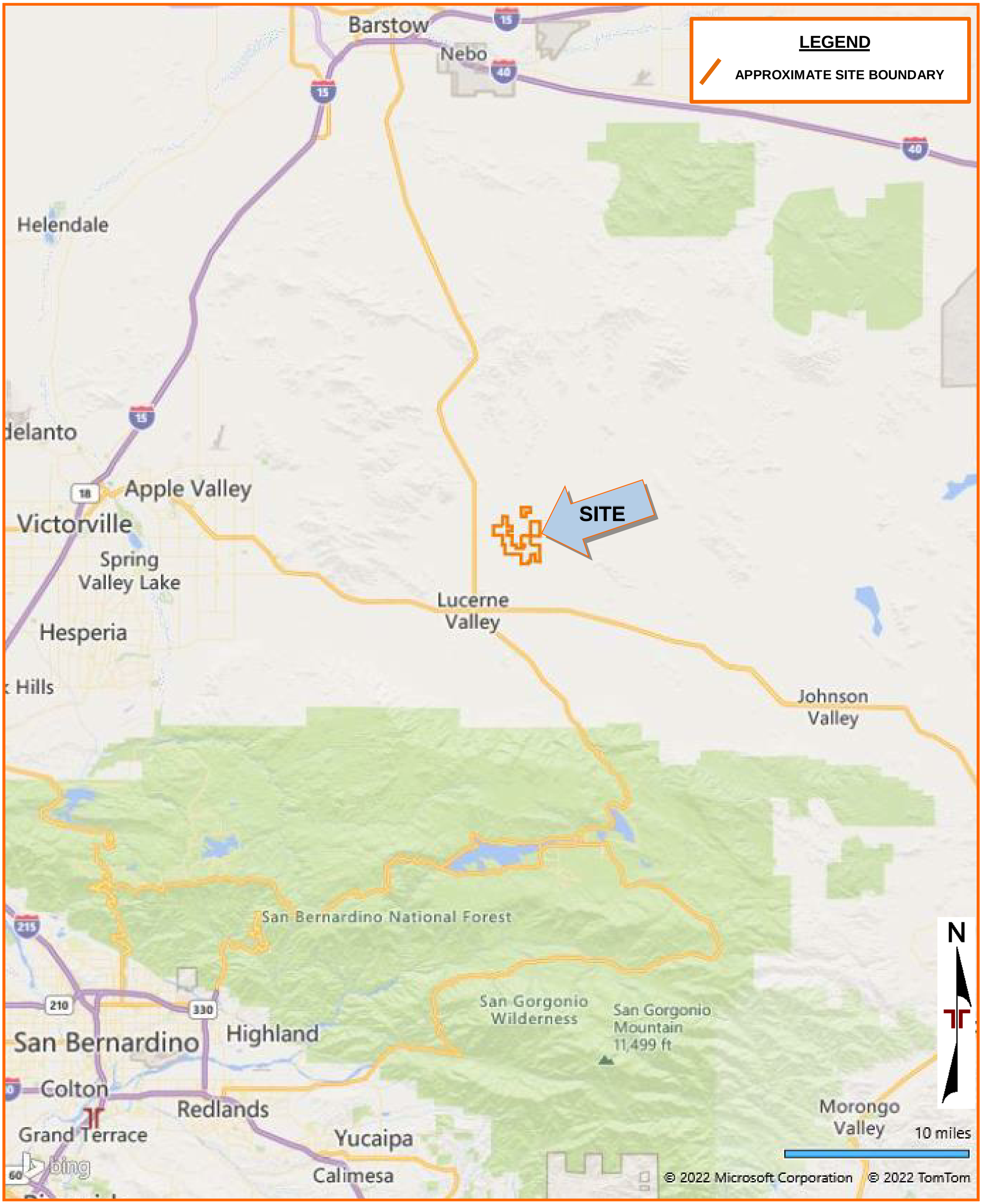


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

EXPLORATION PLAN

Sienna Solar - CEQA Report ■ Lucerne Valley, CA
July 28, 2022 ■ Terracon Project No. LA225044

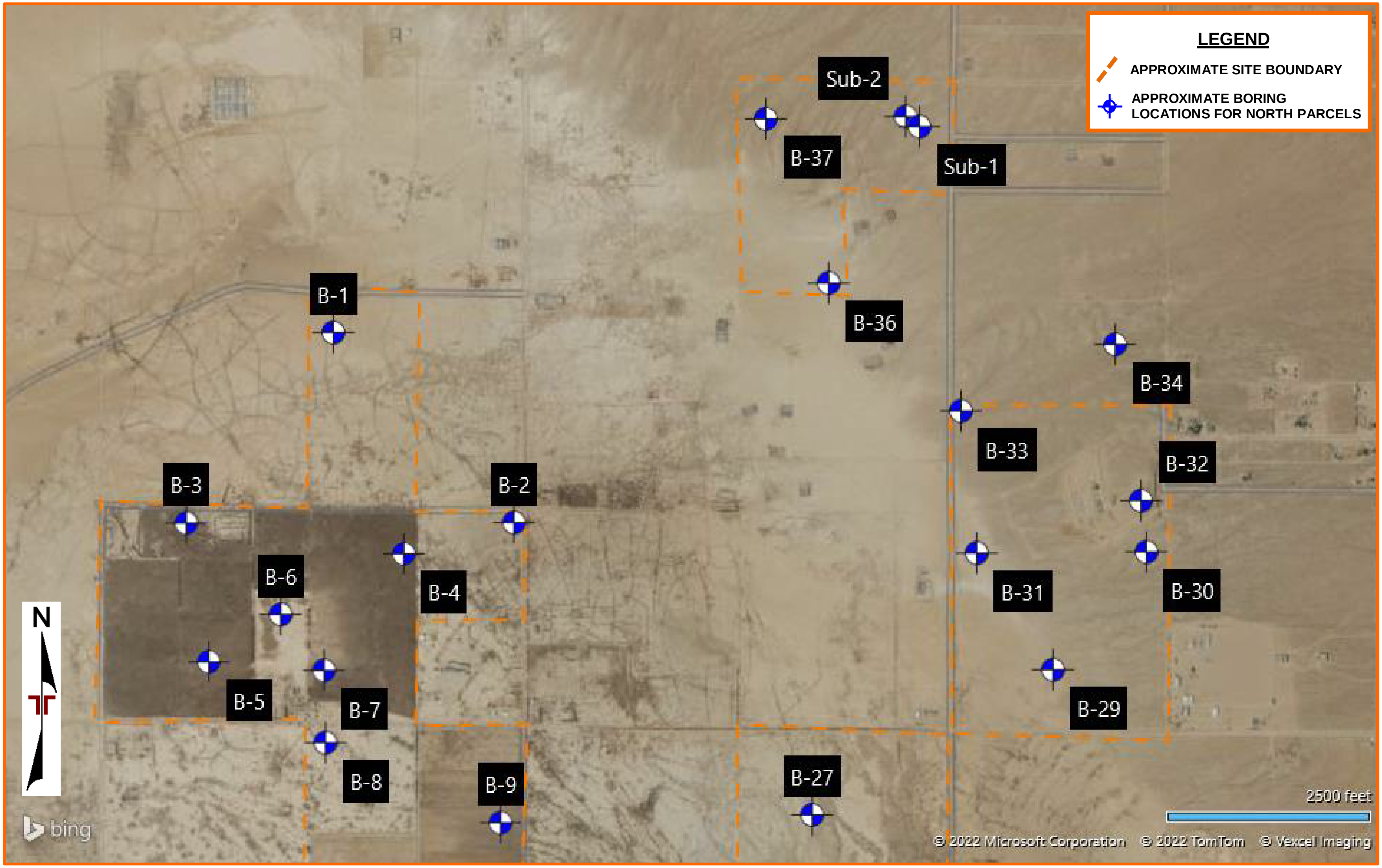


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Sienna Solar - CEQA Report ■ Lucerne Valley, CA

July 28, 2022 ■ Terracon Project No. LA225044

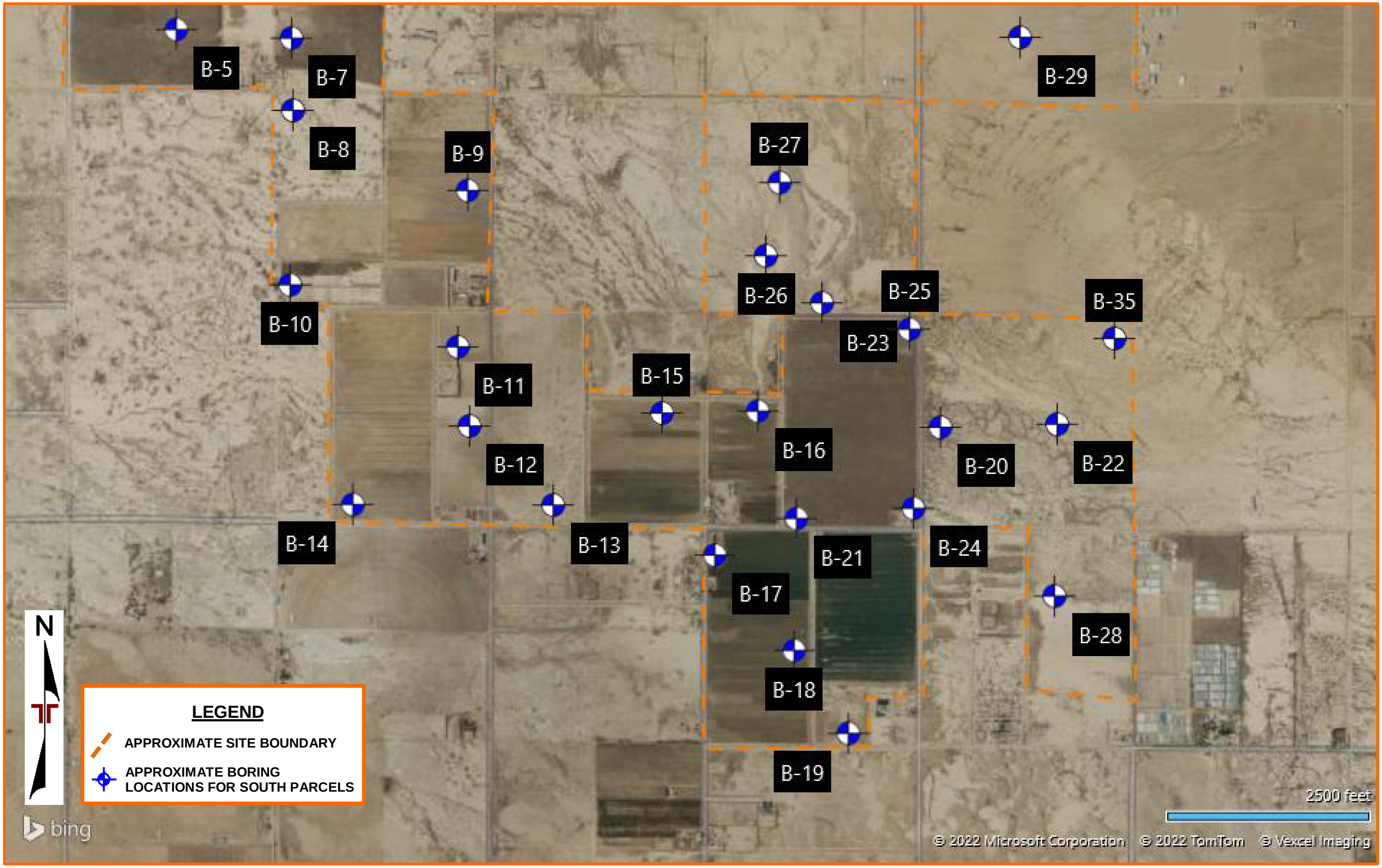


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

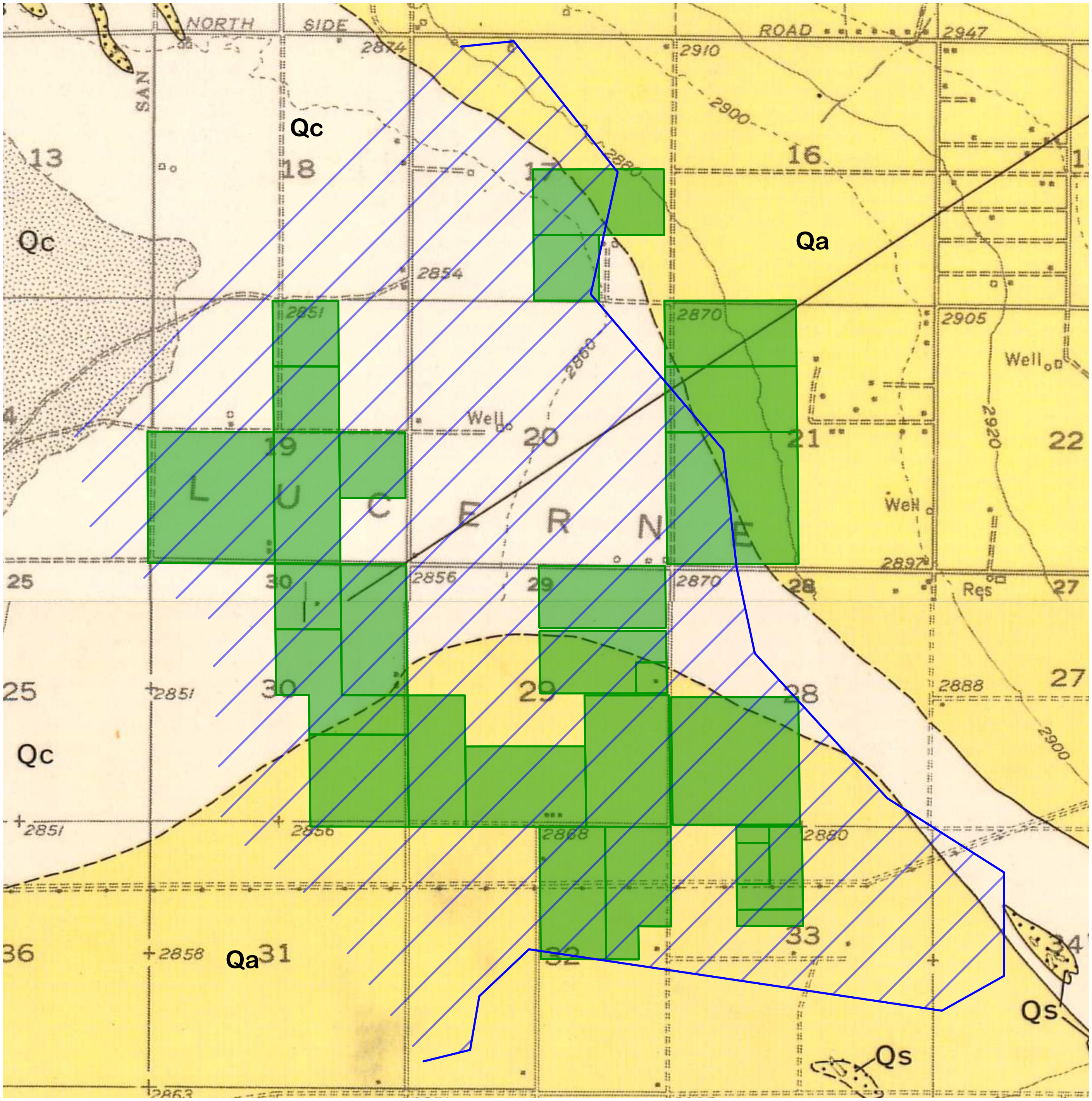
AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

GEOLOGIC INDEX MAP

Sienna Solar - CEQA Report ■ Lucerne Valley, CA

July 26, 2022 ■ Terracon Project No. LA225044

Terracon GeoReport



GEOLOGY:

Qc	Clay
Qa	Alluvium
Qs	Sand

Subsidence Zone per Brandt and Sneed (2021)

Sienna Project Parcels

SCALE

0 1500 3000 6000

(1 inch = 3000 feet)

N

Base Map: Dibblee (1964A and 1964B)

USDA SOILS MAP

Sienna Solar - CEQA Report ■ Lucerne Valley, CA
July 26, 2022 ■ Terracon Project No. LA225044

Terracon GeoReport

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

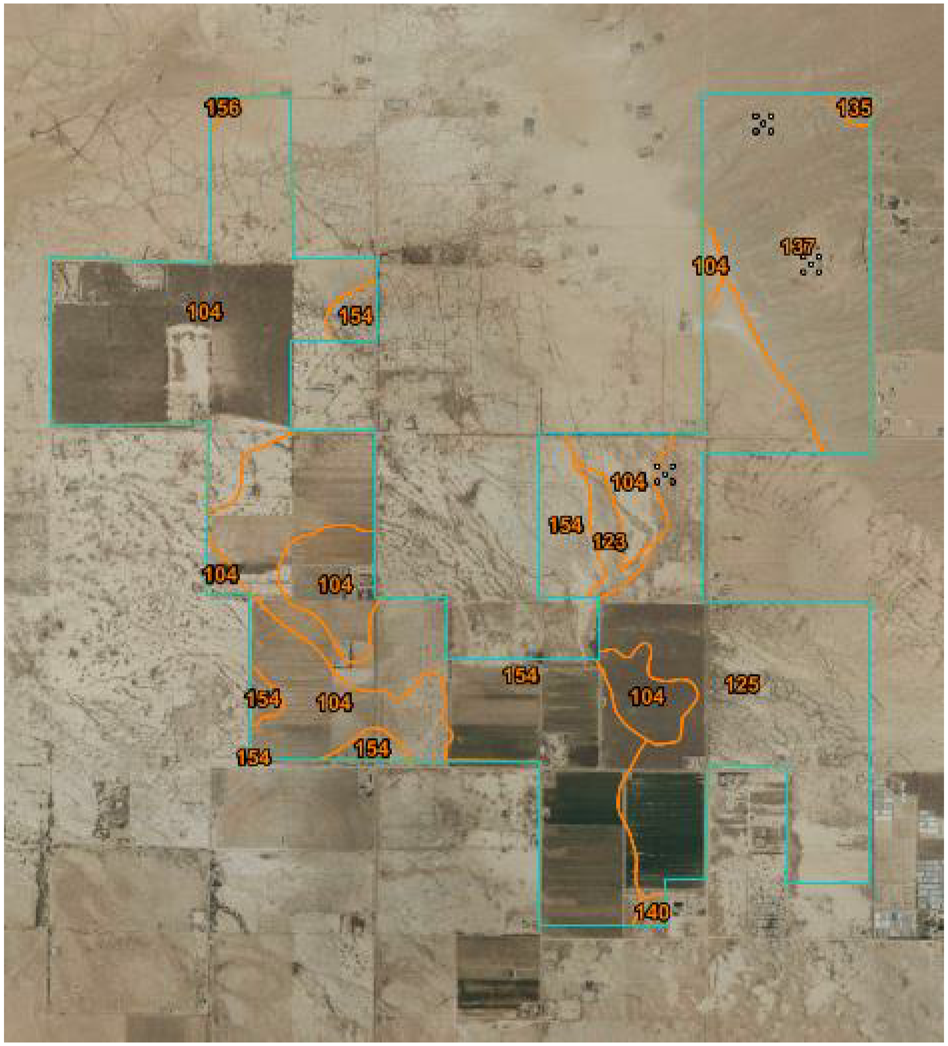
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 13, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2021—May 27, 2021

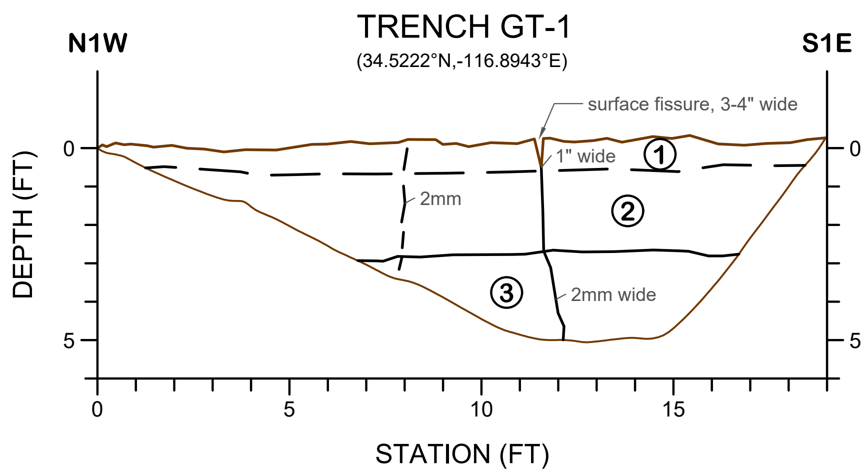
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

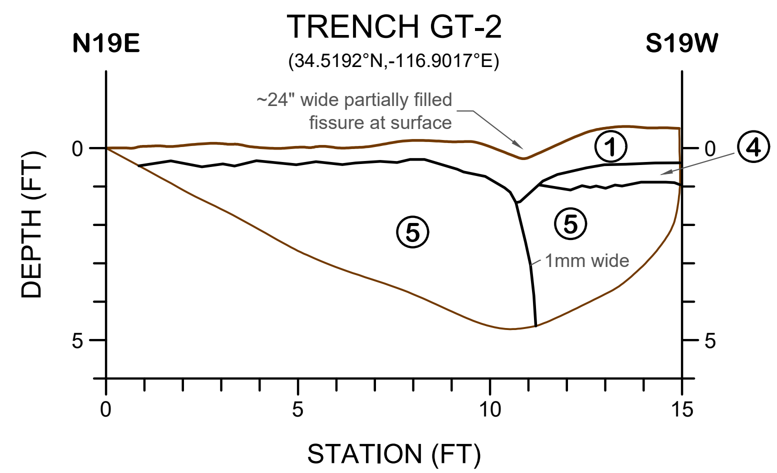


Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	BOUSIC CLAY	594.0	33.6%
123	DUNE LAND	20.1	1.1%
125	GLENDALE VARIANT SILT LOAM, SALINE-ALKALI	446.5	25.2%
135	JOSHUA LOAM, 2 TO 5 PERCENT SLOPES	5.3	0.3%
137	KIMBERLINA LOAMY FINE SAND, COOL, 0 TO 2 PERCENT SLOPES	269.7	15.2%
140	LAVIC LOAMY FINE SAND	5.1	0.3%
154	PETERMAN CLAY	426.3	24.1%
156	PLAYAS	3.2	0.2%
Totals for Area of Interest		**1,770.2**	**100.0%**

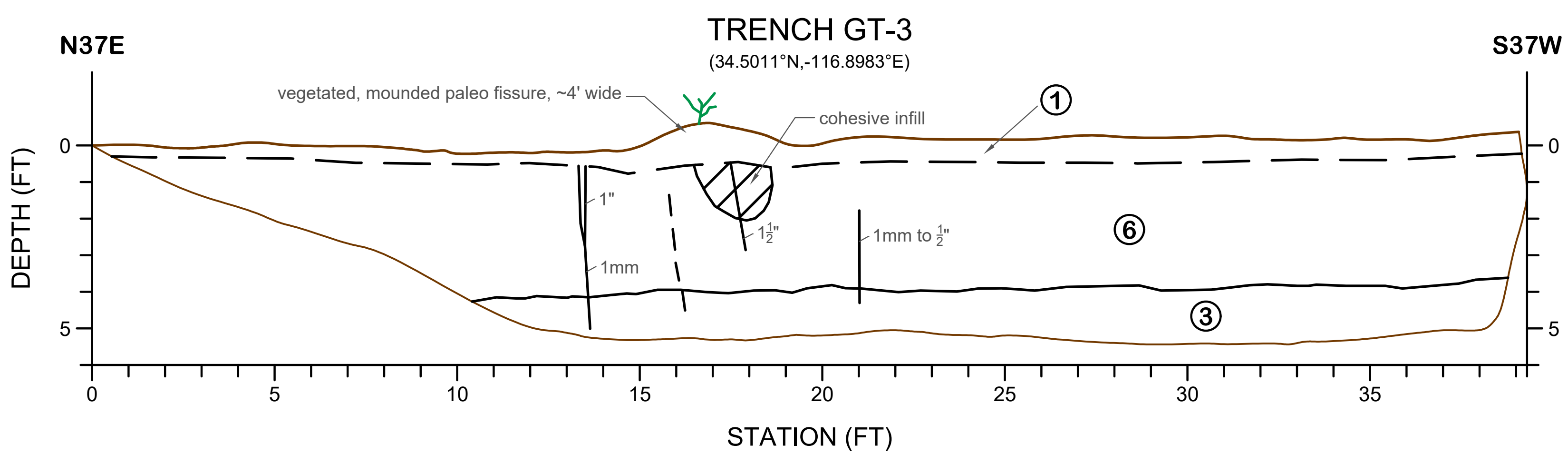
DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

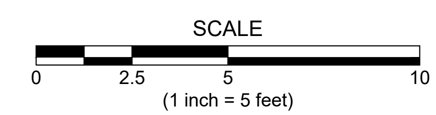


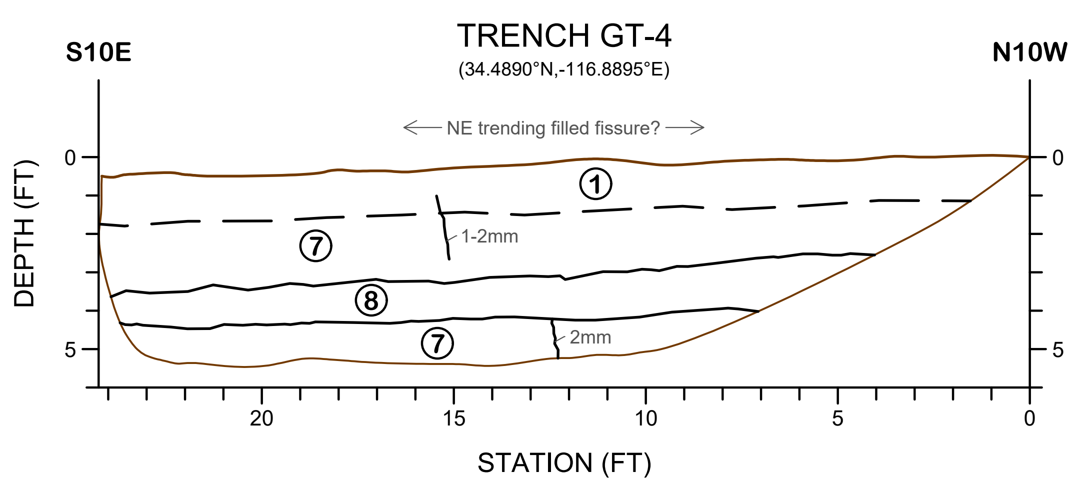


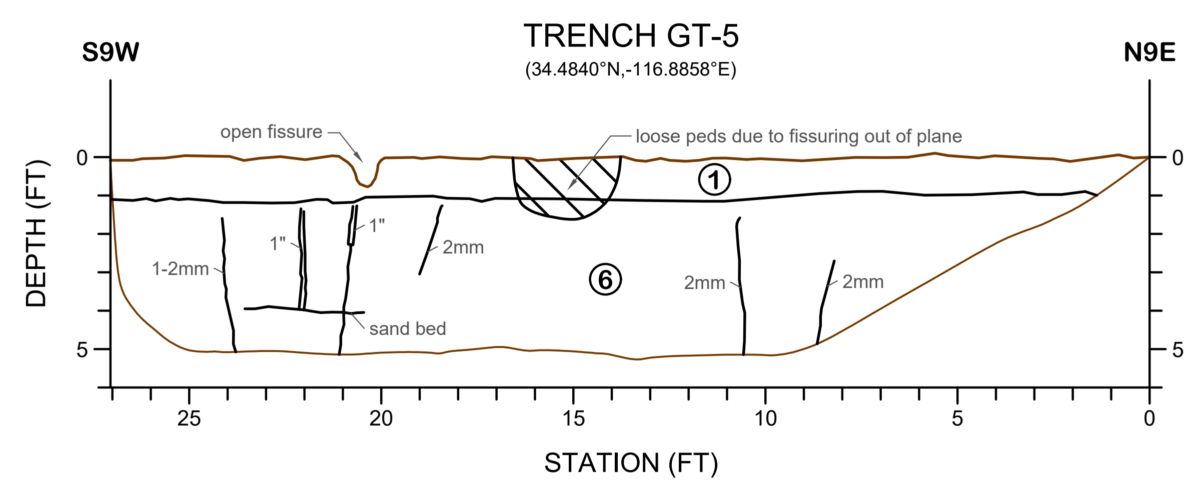
GEOLOGY:

1. Silty sand (SM), fine to medium, bioturbated (topsoil)
2. Silty sand (SM), fine to medium, carbonate nodules
3. Sand (SP), fine to coarse, hard, abundant carbonate (petrocalcic)
4. Sand (SP), fine to medium, bedded
5. Clayey sand (SC), fine to medium, carbonate nodules
6. Silty sand (SM), fine to medium
7. Sandy silt (ML)
8. Silt (ML), laminated









BORING LOG NO. B-01

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5154° Longitude: -116.9184°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown								
	medium dense				7-20-21	17	107		
5.0	**SILTY CLAY (CL-ML)**, trace sand, brown, medium stiff	5			4-4-2 N=6				92
	very stiff				7-9-13	18	113		
	stiff	10			3-3-6 N=9				
15.0	**LEAN CLAY (CL)**, trace sand, brown, stiff	15			4-5-8	35	83		
		20			4-4-6 N=10				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-11-2022	Boring Completed: 04-11-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-02

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.509° Longitude: -116.911°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILT WITH SAND (ML), brown							45-28-17	84
2.5	**LEAN CLAY (CL)**, trace sand, brown, medium stiff				4-4-4 N=8				
	very stiff	5			8-10-13	21	97		
	medium stiff				3-2-3 N=5				
	brown and grayish brown, stiff	10			3-6-8	29	89		
	trace gravel, grayish brown	15			3-4-6 N=10				
21.5		20			5-7-10	37	83		
	Boring Terminated at 21.5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-03

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.509° Longitude: -116.9244°

DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY CLAYEY SAND (SC-SM), brown			Grab (hand)					
2.5	**CLAYEY SAND (SC)**, light brown to brown, dense			Ring	18-26-35	18	109		
	stiff	5		SPT	4-4-5 N=9				
7.5	**SILTY SAND (SM)**, medium dense			Ring	8-10-11	19	97		
10.0	**SILTY CLAY (CL-ML)**, brown, medium stiff	10		SPT	3-3-4 N=7				
	gray and brown, very stiff	15		Ring	6-16-20	25	96		
20.0	**LEAN CLAY (CL)**, trace sand, light brown, medium stiff	20		SPT	3-4-4 N=8				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-11-2022	Boring Completed: 04-11-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-04

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.508° Longitude: -116.9155°

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), trace sand, brown								
		medium stiff				3-2-2 N=4				
		very stiff	5			5-9-12	16	92		
		medium stiff				4-3-3 N=6				
		grayish brown, very stiff	10			5-8-14	22	97		
	15.0	**FAT CLAY WITH SAND (CH)**, grayish green to grayish brown, medium stiff	15			4-3-3 N=6			50-19-31	76
	20.0	**LEAN CLAY (CL)**, stiff	20			4-5-8 N=13				
	21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-05

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables, San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd, Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5043° Longitude: -116.9235°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), light brown								
	medium dense				7-11-14	15	96		
	loose	5			6-4-5 N=9			48-23-25	
7.5	**LEAN CLAY (CL)**, trace sand, brown, very stiff				6-10-15	23	96		
10.0	**SILTY CLAYEY SAND (SC-SM)**, white and brown, loose	10			5-3-4 N=7				
15.0	**LEAN CLAY (CL)**, brown, very stiff	15			6-9-11	23	97		
	medium stiff	20			3-3-5 N=8				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-06

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5059° Longitude: -116.9206°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, light brown								
2.5	**LEAN CLAY WITH SAND (CL)**, trace sand, brown, medium stiff				4-4-4 N=8				
	light brown to brown, very stiff	5			7-11-17	23	91		
	with sand, light brown, stiff				5-6-7 N=13			36-19-17	71
	very stiff	10			5-10-19	20	100		
	light brown, medium stiff	15			2-3-3 N=6				
	stiff	20			4-6-8 N=14				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-07

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.504° Longitude: -116.9188°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), brown			Grab					
2.5	**LEAN CLAY (CL)**, trace sand, brown, very stiff			Ring	6-8-12	20	91		
	medium stiff	5		SPT	3-2-3 N=5				
	very stiff			Ring	5-8-12	24	93		
	medium stiff	10		SPT	3-4-4 N=8				
	grayish brown, stiff	15		Ring	4-7-7	36	84		
	medium stiff	20		SPT	3-4-4 N=8				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-08

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5016° Longitude: -116.9187°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, light brown								
2.5	**SANDY LEAN CLAY (CL)**, brown, very stiff			X	8-11-7 N=18				69
		5			8-12-18	21	85		
	medium stiff			X	3-3-3 N=6				
	trace gravel, very stiff	10			6-9-14	27	100		
	medium stiff	15		X	3-2-3 N=5				
	stiff	20		X	4-5-7 N=12				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-09

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4989° Longitude: -116.9116°

DEPTH (Ft.)	Material Description	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
0–2.5	**SANDY LEAN CLAY (CL)**, trace gravel, light brown		Bulk				40-22-18	59
2.5–15.0	**ELASTIC SILT (MH)**, trace gravel, brown, very stiff		Ring	9-9-12	20	83		
	soft		SPT	3-2-2 N=4			69-36-33	
	brown and white, very stiff		Ring	7-9-15	23	74		
	grayish white		SPT	8-8-11 N=19				
15.0–21.5	**LEAN CLAY (CL)**, trace sand, grayish green, stiff		Ring	4-7-11	40	69		
	trace gravel, grayish green to grayish brown, medium stiff		SPT	3-2-4 N=6				
21.5	***Boring Terminated at 21.5 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-10

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4957° Longitude: -116.9188°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY CLAY WITH SAND (CL-ML), brown			Hand					
	medium stiff			SPT	2-3-2 N=5				71
5.0	**LEAN CLAY (CL)**, trace sand, brown, stiff	5		Ring	3-5-9	33	96		
	grayish brown, medium stiff			SPT	3-2-4 N=6				
	trace gravel, brown, stiff	10		Ring	4-5-9	31	80		
	medium stiff	15		SPT	3-4-5 N=9				
21.5		20		Ring	4-5-2	26	97		
	Boring Terminated at 21.5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-11

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4936° Longitude: -116.912°

DEPTH	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
	SILTY SAND (SM), trace gravel, light brown								
	medium dense			Ring sampler	6-8-12	22	84		
5.0	**FAT CLAY (CH)**, trace sand, brown, very stiff	5		SPT	6-8-11 N=19				
	trace gravel			Ring sampler	6-11-22	32	87		
	stiff	10		SPT	5-6-8 N=14			80-35-45	
15.0	**LEAN CLAY (CL)**, trace sand, brown, very stiff	15		Ring sampler	5-8-14	28	93		
	medium stiff	20		SPT	2-2-3 N=5				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-12

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4909° Longitude: -116.9115°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, light brown								
				Hand					
	loose			SPT	4-3-5 N=8				
5.0	**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, stiff	5		Ring	4-6-8	22	76		
7.5	**SILTY CLAYEY SAND (SC-SM)**, trace gravel, brown, loose			SPT	4-4-5 N=9				
10.0	**LEAN CLAY (CL)**, trace sand, brown, very stiff	10		Ring	7-11-20	28	89		
	trace gravel, grayish brown	15		SPT	6-8-11 N=19				
	brown, stiff	20		Ring	5-7-10	32	88		
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022	Boring Completed: 04-12-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-13

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4883° Longitude: -116.9081°

GRAPHIC LOG DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, light brown			Grab					
	loose			Ring	9-6-6	12	74		
	very loose	5		SPT	2-2-1 N=3				
7.5	**SILTY CLAY (CL-ML)**, trace sand and gravel, light brown, medium stiff			Ring	7-8-8	14	83		
		10		SPT	3-3-4 N=7				88
15.0	**LEAN CLAY (CL)**, trace sand, brown, very stiff	15		Ring	5-8-15	28	87		
	stiff	20		SPT	5-5-9 N=14				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022	Boring Completed: 04-13-2022
Drill Rig: D90	Driller: Terracon
Project No.: 60225032	

BORING LOG NO. B-14

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4883° Longitude: -116.9163°

DEPTH	Material Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, light brown								
	loose			X	3-3-4 N=7			42-23-19	
5.0	**SILTY CLAYEY SAND (SC-SM)**, trace gravel, light brown, loose	5			4-7-8	13	98		
				X	4-5-4 N=9				
	brown, medium dense	10			8-15-23	18	108		
	loose	15		X	6-4-2 N=6				
20.0	**LEAN CLAY (CL)**, trace gravel, brown, very stiff	20		X	5-9-11 N=20				
21.5	***Boring Terminated at 21.5 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
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Boring Started: 04-13-2022	Boring Completed: 04-13-2022
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