Sienna Solar and Storage Project

Paleontological Resources Assessment

prepared for

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Executive Summary

Rincon Consultants, Inc. (Rincon) was retained by 99MT 8me, LLC (applicant) to conduct a paleontological resource assessment for the Sienna Solar and Storage Project (Project) located in the Lucerne Valley, San Bernardino County, California. This study has been prepared in conformance with the California Environmental Quality Act (CEQA) and includes a records search, literature review, and paleontological sensitivity assessment, consistent with the professional standards of the Society of Vertebrate Paleontology (SVP) (2010). The purpose of the literature review and records search was to identify the geologic units underlying the Project and to determine whether previously recorded paleontological localities occur either within the Project boundaries or elsewhere in the same geologic unit. Using the results of the literature review and records search, the paleontological resource potential of the Project area was determined in accordance with the 2010 SVP guidelines.

Results of Investigation

Published geologic mapping indicates that the Project area is underlain by four geologic units: Quaternary young (Holocene) alluvium (Qa), Quaternary young (Holocene) dune sand (Qs), Quaternary young (Holocene) playa deposits (Qc), and Quaternary old (Pleistocene) gravel deposits (Qog). A records search for paleontological locality data within the Project area and the vicinity was obtained from the Natural History Museum of Los Angeles County (NHMLAC) and online records were reviewed at the University of California's Museum of Paleontology. Based on the NHMLAC records search results, no vertebrate fossil localities have been previously recorded directly in the Project boundary; however, multiple vertebrate fossil localities have been previously recorded nearby within fine-grained Quaternary old (Pleistocene) alluvial deposits (e.g., Qoa), which may underlie the Project area at shallow or unknown depths. These localities yielded scientifically significant fossilized specimens of large terrestrial mammals, rodents, and reptiles (Bell 2021). Based on this assessment, the surficial geology of the Project area has a low paleontological sensitivity but increases with depth. Fine-grained Quaternary old (Pleistocene) sediments (e.g., Qoa) may underlie Quaternary young (Holocene) deposits (Qa, Qs, Qc) and coarse-grained Quaternary old sediments (Qog) at depths as shallow as five feet below ground surface in the vicinity of the Project area. As proposed, ground disturbing activities associated with the proposed foundations for mounting structures can extend up to 10 feet below ground surface. Therefore, the proposed Project has potential for impacts to scientifically significant vertebrate fossils as a result of construction activities.

Recommendations

Rincon recommends that a Qualified Paleontologist be retained to develop and implement measures to reduce impacts to paleontological resources to a less-than-significant level. These measures include paleontological training for construction staff (to be included with the Project's Worker's Environmental Awareness Program), paleontological monitoring in areas of high paleontological sensitivity, including areas requiring excavations exceeding five feet below ground surface within intact (native) Quaternary young (Holocene) and Quaternary old (Pleistocene) deposits (Qa, Qs, Qc, Qog), and preparation of a paleontological monitoring report, which shall be submitted to the County of San Bernardino. If the monitoring efforts produced fossils, then a copy

of the report shall also be submitted to the approved curation facility and accompanied by any significant fossils recovered during construction monitoring. These measures have been proven to be effective in reducing or eliminating adverse impacts to paleontological resources and would satisfy CEQA requirements.

1 Introduction

Paleontological resources (i.e., fossils) are the remains or traces of prehistoric life. Fossils are typically preserved in layered sedimentary rocks and the distribution of fossils across the landscape is controlled by the distribution and exposure of the fossiliferous sedimentary rock units at and near the surface. Construction related impacts that typically affect or have the potential to affect paleontological resources include mass excavation operations, drilling/borehole excavations, trenching/tunneling, and grading.

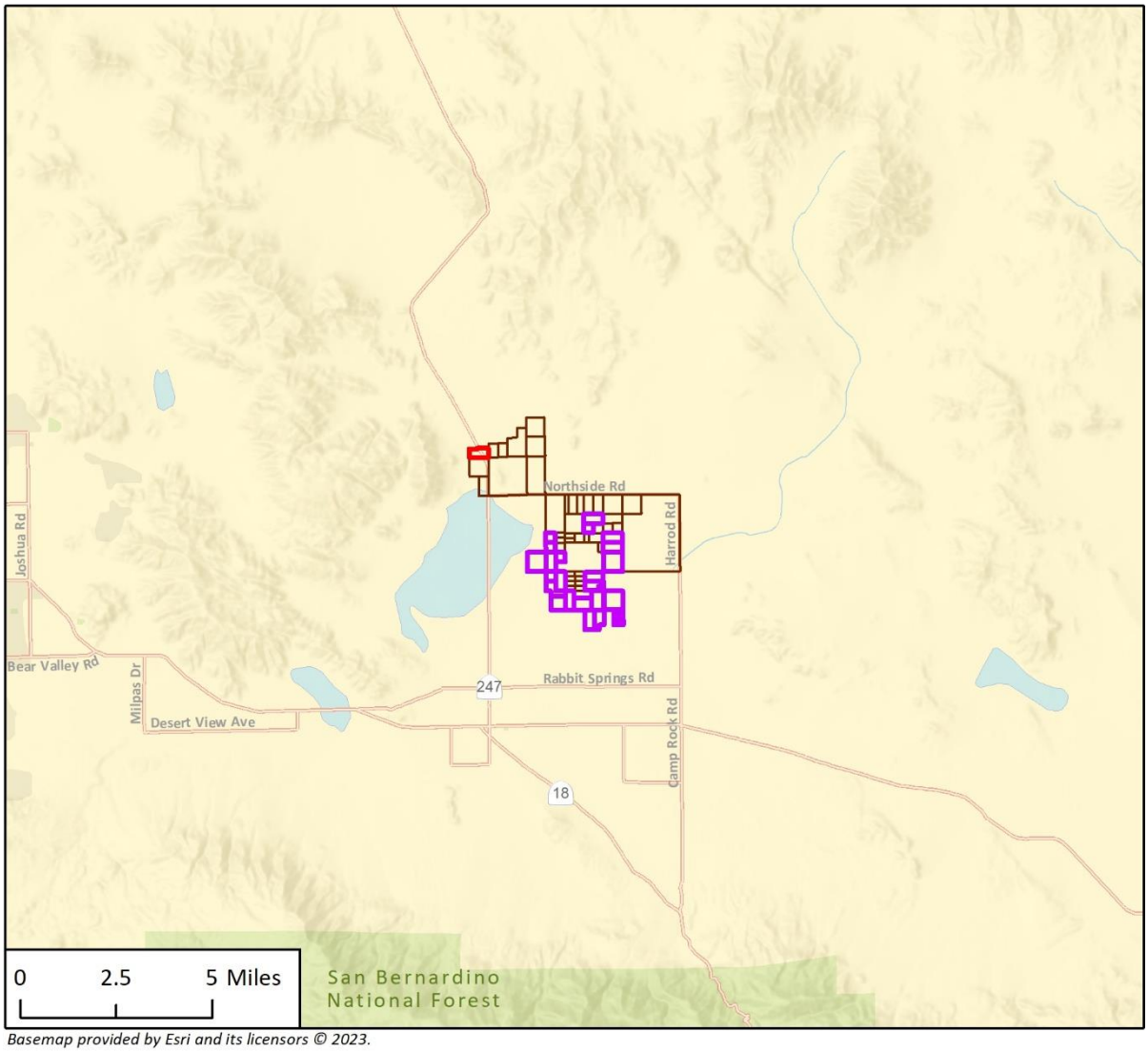
This Paleontological Resources Assessment provides a description of the geologic units mapped at the surface within the Project area, including types of fossils known to occur within the units (if any), the paleontological sensitivity for each unit, a review of relevant agency regulation, an assessment of potential impacts from Project development, and recommended mitigation measures for the protection and recovery of significant fossils that may be impacted. This study has also been conducted in accordance with the requirements of the California Environmental Quality Act (CEQA). The County of San Bernardino (County) is the CEQA Lead Agency for the Project.

1.1 Project Location and Description

The proposed Sienna Solar and Storage Project (Project) is a 525-megawatt (MW) utility-scale solar farm with 525-MW battery storage located in unincorporated San Bernardino County. Figure 1 and Figure 2 show the regional location and immediate vicinity of the Project area, respectively. 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 area is depicted on the *White Horse Mountain, Grand View Mine,* and *Lucerne Valley*, 7.5-minute U.S. Geological Survey topographic quadrangles and falls within: Township (T) T06N Range (R) 01W, Section (S) 36; T06N R01E S31; T05N R01W S1-2, 11-14, 24; T05N R01E S06-09, 16-21, 28-30; T05N R01E S10, 15, 22, 27; T05N R01E S28-33.

The Project consists of the installation of a photovoltaic (PV) solar facility, Battery Energy Storage System (BESS), and Operations and Maintenance (O&M) building(s).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 generation tie-in (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.

Figure 1 Regional Location



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Project Site

Proposed SCE Calcite Substation

Gen-Tie Line and/or Collector Line Alternatives

N

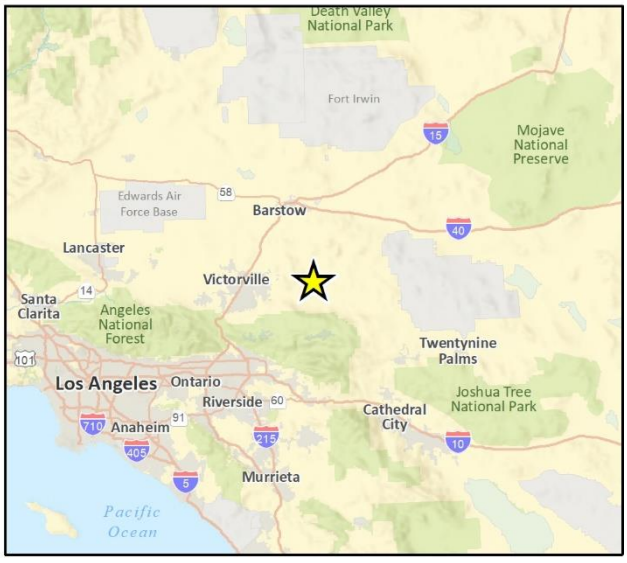

Fig 1 Regional Location Paleo

Figure 2 Project Location

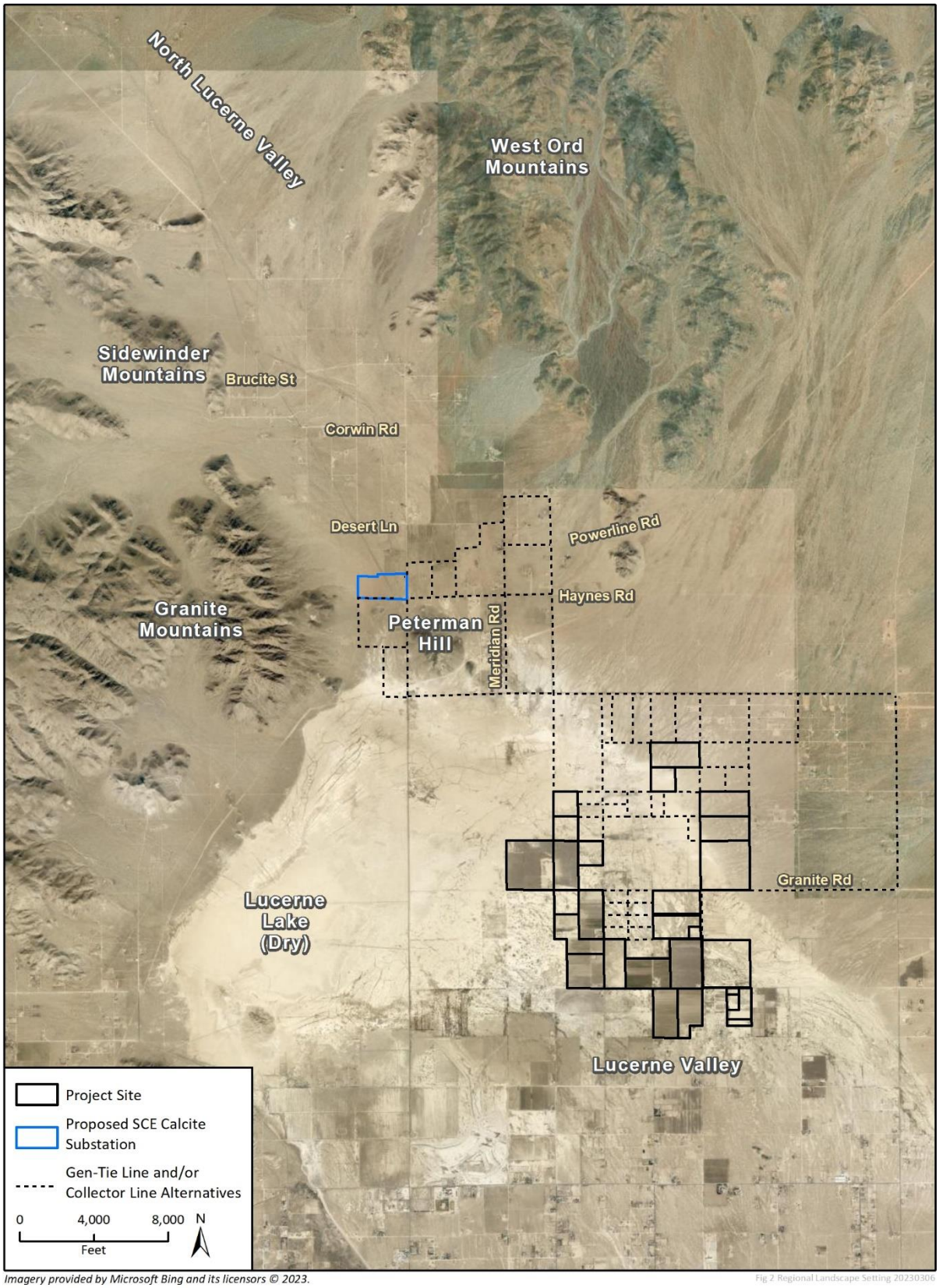

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Fig 2 Regional Landscape Setting 20230306

Construction of the facility will include site preparation, grading and earthwork, concrete foundations, structural steel work, electrical/instrumentation work, collector line installation, architecture, and landscaping. Ground disturbing activities are expected to be limited to the construction of the access roads, site grading, electrical trenching, foundation work for O&M building and substation, boring for transmission lines, and panel post installations. Groundwork is generally shallow, with trenching to moderate depths (3 to 5 feet) and foundation work typically shallower than 10 feet.

2 Regulatory Setting

Paleontological resources are considered nonrenewable scientific resources, because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under various federal, state, and local laws, ordinances, regulations, and standards. Regulations applicable to potential paleontological resources on the Project area are summarized below.

2.1 State

California Environmental Quality Act

CEQA requires public agencies and private interests to identify the potential environmental consequences of their proposed Projects on any object or site considered to be a historical resource of California (California Public Resources Code [PRC], section 21084.1, California Code of Regulations Title 14, section 15064.5). Appendix G of the *State CEQA Guidelines* (California Code of Regulations Title 14, Chapter 3) provides an Environmental Checklist of questions, including a single question related to paleontological resources (Section VII.f) as follows: "Would the project directly or indirectly destroy a unique paleontological resource or site?"

CEQA does not define "a unique paleontological resource or site." However, the Society of Vertebrate Paleontology (SVP) has defined a "significant paleontological resource" in the context of environmental review. The SVP defines a significant paleontological resource as:

> Fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years) [p. 11] (SVP 2010).

The loss of significant paleontological resources would be a significant impact under CEQA. The CEQA lead agency is responsible for ensuring that paleontological resources are protected in compliance with CEQA and other applicable statutes.

2.2 Local

San Bernardino County

The County of San Bernardino's Countywide Plan addresses paleontological resources within the *Cultural Resources Element*. The *Cultural Resources Element* contains the following goal and policy relating to paleontological resources that are relevant to the current Project:

- **Goal CR-2 Historic and Paleontological Prehistoric Resources.** Historic resources (buildings, structures, or archaeological resources) and paleontological resources that are protected and preserved for their cultural importance to local communities as well as their research and educational potential.
- **Policy CR-2.3 Paleontological and Archaeological Resources.** We strive to protect paleontological and archaeological resources from loss or destruction by requiring that new

development include appropriate mitigation to preserve the quality and integrity of these resources. We require new development to avoid paleontological and archeological resources whenever possible. If avoidance is not possible, we require the salvage and preservation of paleontological and archeological resources.

3 Resource Assessment Guidelines

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under CEQA. This assessment satisfies CEQA (13 Public Resource Code [PRC], 2100 et seq.), PRC Section 5097.5 (Stat. 1965, c 1136, p. 2792) requirements, and follows guidelines and significance criteria specified by the SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP 2010).

3.1 Paleontological Sensitivity

Paleontological sensitivity refers to the potential for a geologic unit to produce scientifically significant fossils. Direct impacts to paleontological resources occur when earthwork activities, such as grading or trenching, cut into geologic deposits (e.g., formations) within which fossils are buried, and result in physical damage to or destruction of the fossils. Because fossils are the remains of prehistoric animal and plant life, they are nonrenewable. Such impacts have the potential to be significant under CEQA guidelines and may require mitigation.

Significant paleontological resources are fossils or assemblages of fossils that are unique, unusual, rare, diagnostically important, or are common but have the potential to provide valuable scientific information for evaluating evolutionary patterns and processes, or which could improve our understanding of paleochronology, paleoecology, paleophylogeography (study of historical processes responsible for past geographic distributions of genealogical lineages), or depositional histories. New or unique specimens can provide new insights into evolutionary history; however, additional specimens of even well-represented lineages can be equally important for studying evolutionary pattern and process, evolutionary rates, and paleophylogeography. Even unidentifiable material can provide useful data for dating geologic units if radiocarbon dating is possible. As such, common fossils (especially vertebrates) may be scientifically important and therefore considered significant.

Paleontological sensitivity is determined by rock type, history of the geologic unit in producing significant fossils, and previously recorded fossil localities from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from any one specific survey. The SVP system outlined in the SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* is the generally accepted paleontological sensitivity classification scheme for projects on non-federal lands in California (SVP 2010). Rincon has characterized the paleontological sensitivity for the proposed Project according to the SVP procedures, as described below.

The SVP (2010) describes sedimentary rock units as having high, low, undetermined, or no potential for containing significant nonrenewable paleontological resources. This criterion is based on rock units within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. The SVP sensitivity categories are:

I. **High Potential.** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to,

sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

II. **Undetermined Potential.** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

III. **Low Potential.** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e.g. basalt flows or recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.

IV. **No Potential.** Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection or impact mitigation measures relative to paleontological resources.

4 Methods

Paleontological resources are contained within the geologic deposits or bedrock that underlies the soil layer. Therefore, to determine whether a given Project area has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature to determine the geology and stratigraphy of the area. For this assessment, published geologic maps, fossil locality data, and literature were reviewed to identify the geologic units present at and below the surface within the Project boundary, assess the paleontological sensitivity of the geologic units identified, and to determine the potential impacts to nonrenewable paleontological resources from Project development.

Based on a review of aerial imagery, the Project area is located on a flat (lacking any significant topographic relief), sandy alluvial plain with low to moderate density vegetation consisting primarily of creosote and saltbush. The Project area is devoid of any bedrock exposures and has limited ground visibility; therefore, no paleontological field survey was conducted for this analysis. However, a 100 percent pedestrian survey was conducted for cultural resources over the entire Project study area by qualified archeologists. Any potential paleontological resources would have been recorded by the field archeologists and brought to the attention of the Project paleontologist to be evaluated and addressed in this report.

A formal paleontological locality search was requested from the NHMLAC on July 14, 2021. In addition, Rincon reviewed the online paleontological collections database of the University of California Museum of Paleontology (UCMP) to identify known fossil localities in San Bernardino County from geologic formations similar to those identified in the Project area.

Following the paleontological inventory and assessment, the paleontological sensitivity ratings of the geological units were assigned based on the findings of the record search and literature review. Based on the paleontological sensitivity findings, the potential impact to nonrenewable paleontological resources due to Project development was determined in accordance with the professional standards of the SVP (2010).

5 Description of Resources

5.1 Regional Geology

California is divided into 11 geomorphic provinces that are "naturally defined geologic regions that display a distinct landscape or landform" (California Geologic Survey 2002). The Project area lies within the Lucerne Valley region of the Mojave Desert province. The Mojave Desert province is a "broad interior region of isolated mountain ranges separated by expanses of desert plains" (California Geological Survey 2002) that is effectively wedged to the west between the Sierra Nevada Range (by the Garlock Fault) and the Transverse Range (by the San Andreas Fault). The western Mojave Desert acts as a sediment catch from three geomorphic provinces: Basin and Range, Sierra Nevada, and Transverse Ranges. By the early Miocene or late Oligocene, an erosional surface rising eastward from the Garlock-San Andreas convergence (at the western end of the Mojave Desert) had developed, and depression of the region began. Depression resulted in the Mojave Desert province becoming an internal drainage area, with deposits of Miocene, Pliocene, and Pleistocene sediments accumulating in local basins (Norris and Webb 1990). Miocene sedimentary units deposited during this time contain basalt, volcanic mud flows, and air-fall tuff. Repeated glacial advance and retreat during the Pleistocene created numerous lakes which provided conditions for the preservation of fossils. The area around the Project area comprises a thick cover of Holocene to Pleistocene aged alluvium, composed of materials eroded from the surrounding mountains and accumulated during these periods of glacial advance and retreat.

Geology and Paleontology of the Project Area

The Project area is mapped at a scale of 1:62,500 by Dibblee and Minch (2008a, b) and 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), Quaternary old (Pleistocene) gravel deposits (Qog). Figure 3 depicts the surficial geologic units in the Project area, as well as the corresponding paleontological sensitivity assigned to each of these units.

Quaternary young (Holocene) Sedimentary Deposits (Qa, Qs, Qc)

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 2008 a, 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. Holocene-aged units are too young to contain scientifically significant paleontological resources and are considered to have low paleontological sensitivity. However, these younger deposits may grade downward into fine-grained Quaternary old (i.e., Pleistocene) alluvial deposits (e.g., Qoa), which may preserve fossil remains, at unknown depths within the Project area.

Quaternary old (Pleistocene) Sedimentary Deposits (Qog)

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). Quaternary old (Pleistocene) sedimentary deposits underlying the Project area are old enough to preserve fossil resources. In particular, fine-grained alluvial deposits are generally deposited under conditions that are conducive to fossil preservation. However, coarse-grained alluvial deposits (e.g., Qog) are deposited in high-energy conditions that tend to destroy and disperse organic material, and as such, are not conducive to fossil preservation.

Fine-grained Quaternary old (Pleistocene) alluvial deposits (i.e., Qoa) are mapped at the margins of the Ord Mountains approximately four miles southwest of the Project area. These units are not mapped within the Project area but are expected to underlie the Project area at shallow or unknown depths. Quaternary old (Pleistocene) alluvial deposits would be expected to occur at shallow depths (less than five feet) near the margins of the basin; however, the depth at which Quaternary old (Pleistocene) alluvial deposits occurs may vary throughout a basin, ranging from shallow to more than 100 feet depending on the local topography. In the absence of geotechnical data, the depth to Quaternary old (Pleistocene) alluvial deposits cannot be reliably estimated; however, sensitive older deposits are unlikely to occur at depths of less than five feet at the Project area based on the Project area being situated toward the center of the basin.

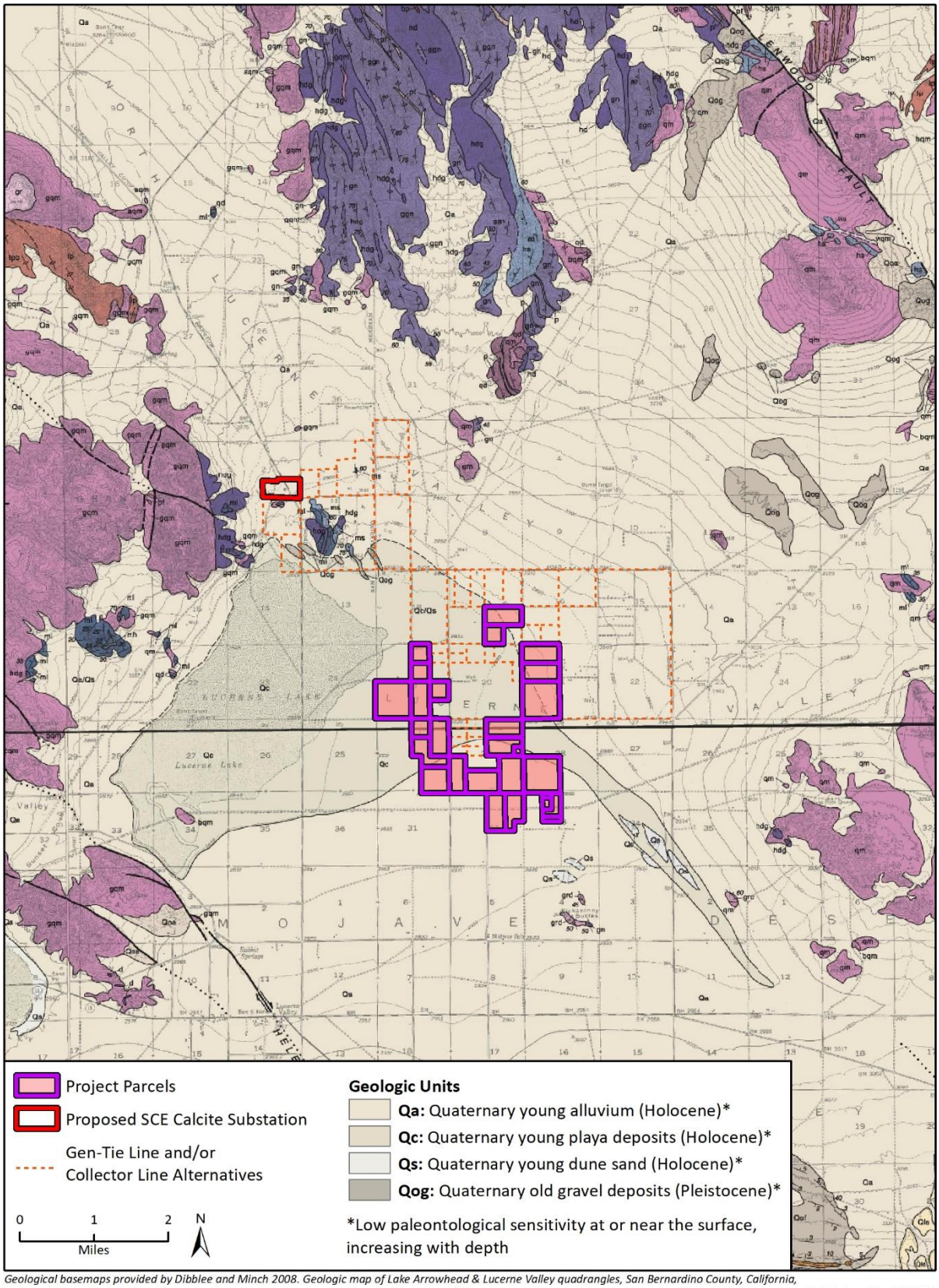
Quaternary old (Pleistocene) alluvial deposits (e.g., Qoa) have proven to yield significant vertebrate fossil localities throughout California, including San Bernardino County. Localities have produced fossil specimens of terrestrial mammals, such as mammoth, horse, elephant, camel, bison, birds, rodents, and reptiles (Jefferson 1991; Paleobiology Database 2021; Springer et al. 2009; UCMP 2021).

5.2 Locality Record Search Results

A search of the paleontological locality records at the NHMLAC resulted in no previously recorded fossil localities within the Project boundary; however, at least eight Pleistocene vertebrate localities (LACM VP 3350, 1224, 3352, 3353, 3498, 7786, 1123, and CIT 211) were identified in the general vicinity of the Project area. LACM VP 3350 produced fossil specimens of bison (*Bison*), camel (*Camelops*), and horse (*Equus*) southeast of the Project area near Surprise Spring in San Bernardino County. LACM VP 1224, 3352, 3353, 3498, and CIT 211 yielded specimens of the camel family (Camelidae), horse (*Equus*), mammoth (*Mammuthus*), deer family (*Cervidae*), and antelope family (*Antilocapridae*) approximately 20 miles west of the Project area near the city of Victorville. LACM VP 7786, which produced a fossil specimen of vole (*Microtus mexicanus*) at a depth of approximately 10 feet below ground surface, was documented approximately 25 miles west from the Project area near Southern California Logistics Airport. LACM VP 1123 yielded specimens of horse (*Equus*), antelope (*Breameryx*), fox (*Urocyon*), camel (*Camelops*), llama (*Tanupolama*), badger (*Taxidea*), wolf (*Canis*), human (*Homo sapiens*), sheep (*Ovis*), hare (*Lepus*), rabbit (*Sylvilagus*), kangaroo rat (*Dipodomys*), pocket mouse (*Perognathus*), pack rat (*Neotoma*), gopher tortoise (*Gopherus*), chuckwalla (*Sauromalus*), rattlesnake (*Crotalus*), vulture (*Gymnogyps*), horned owl (*Bubo*), Scops owl (*Otus*), duck (*Anas, Oxyura, Aythya*), coot (*Fulica*), merganser (*Mergus*), woodpecker (*Colaptes*), hawk (*Buteo*), cat (*Felis, Lynx*), crow (*Corvus*), dove (*Zenaida*), eagle (*Aquila*), less than 30 miles north of the Project area.

A supplemental review of the museum records maintained in the UCMP online collections database did not yield records of any vertebrate fossil localities in the general vicinity of the Project area.

Figure 3 Geologic Units and Paleontological Sensitivity in the Project Area



Geological basemaps provided by Dibblee and Minch 2008. Geologic map of Lake Arrowhead & Lucerne Valley quadrangles, San Bernardino County, California, and Geologic Map of Apple Valley and Ord Mountains 15 minute quadrangles, San Bernardino County, California.

However, at least two vertebrate UCMP vertebrate localities are recorded from Pleistocene sedimentary deposits in unspecified locations within San Bernardino County (UCMP 2021). UCMP Locality-676 yielded fossil specimens of horse (*Equus*), camel (*Camelops*), mammoth (*Mammuthus*), pelican (*Pelecanus erythrorhynchos*), and bat (*Pseudorhinolophus*). In addition, UCMP Locality-791 produced fossil specimens of bighorn sheep (*Ovis canadensis*) and coyote (*Canis latrans*) (UCMP 2021). The results of the museum records search are summarized in Table 1.

Table 1 Museum Records Search Results

Locality No.	Geologic Unit	Age	Taxa	Depth of Recovery
LACM VP 3350	Unknown formation	Pleistocene	Bison (*Bison*), camel (*Camelops*), (*Tanupolama*), horse (*Equus*)	Unreported
LACM VP 1224, 3352, 3353, 3498, CIT 211	Shoemaker Gravel Formation	Pleistocene	Camel family (Camelidae), horse (*Equus*), Mammoth (*Mammuthus*), deer family (Cervidae), antelope family (Antilocapridae)	Unreported
LACM VP 7786	Alluvial deposits	Pleistocene	Vole (*Microtus mexicanus*)	10-11 feet
LACM VP 1123	Unknown formation	Pleistocene	Horse (*Equus*), antelope (*Breameryx*), fox (*Urocyon*), camel (*Camelops*), lama (*Tanupolama*), badger (*Taxidae*), wolf (*Canis*), human (*Homo sapiens*), sheep (*Ovis*), hare (*Lepus*), rabbit (Sylvilagus), kangaroo rat (*Dipodomys*), pocket mouse (Perognathus), pack rat (*Neotoma*); gopher tortoise (*Gopherus*), chuckwalla (*Sauromalus*), rattlesnake (*Crotalus*); vulture (*Gymnogyps*), horned owl (*Bubo*), Scops owl (*Otus*), duck (*Anas, Oxyura, Aythya*), coot (*Fulca*), merganser (*Mergus*), woodpecker (*Colaptes*), hawk (*Buteo*), cat (*Felis, Lynx*), crow (*Corvus*), dove (*Zenaida),* eagle *(Aquila*).	Unreported
UCMP-676, -791	Unknown formation	Pleistocene	Horse (*Equus*), camel (*Camelops*), elephant (*Elephas*), mammoth (*Mammuthus*), pelican (*Pelecanus erythrorhynchos*), and bat (*Pseudorhinolophus*), bighorn sheep (*Ovis canadensis*) and coyote (*Canis latrans*)	Unreported

Source: Bell 2021; UCMP 2021

6 Evaluation, Impacts, and Recommendations

6.1 Paleontological Sensitivity Evaluation

Holocene sedimentary deposits younger than 5,000 years old (younger than middle Holocene) are too young to contain fossilized material. Therefore, Quaternary young (Holocene) alluvium (Qa), Quaternary young (Holocene) dune sand (Qs), and Quaternary young (Holocene) playa deposits (Qc) mapped in the Project area have been assigned a **low paleontological sensitivity** at or near the surface.

The coarseness of Quaternary old (Pleistocene) gravel deposits (Qog) generally preclude the preservation of significant paleontological resources and are assigned a **low paleontological sensitivity.**

According to existing paleontological locality data, fine-grained Quaternary old (Pleistocene) alluvial deposits may underlie Quaternary young (Holocene) deposits (i.e., Qa, Qs, Qc) and coarse-grained Quaternary old (Pleistocene) sediments (i.e., Qog) at depths as shallow as five feet deep in the vicinity of the Project. Although paleontologically sensitive older units may be overlain by thick units of low sensitivity younger alluvium (potentially exceeding 100 feet in thickness), the depth at which geologic units transition from low sensitivity younger units to high sensitivity older units is highly variable. Accurately assessing the boundaries between younger and older units is generally not possible without some form of radiometric dating, or fossil analysis, so conservative estimates of the depth at which paleontologically sensitive units may occur ensures impact avoidance. Quaternary old (Pleistocene) alluvial deposits that are likely to occur at an unknown depth but potentially as shallow as 10 feet below the surface have a **high paleontological sensitivity** throughout California (Bell 2021).

6.2 Impacts

Grading, trenching and other ground disturbing activities associated with development of this Project that may impact previously undisturbed, paleontologically sensitive geologic deposits have the potential for the destruction of significant paleontological resources.

The surficial geology of the Project area has a low paleontological sensitivity that increases with depth. Fine-grained Quaternary old (Pleistocene) sediments (e.g., Qoa) may underlie Quaternary young (Holocene) deposits and coarse-grained Quaternary old (Pleistocene) sediments at unknown depths within the Project area at depths of 10 feet or greater below ground surface.

The Project area is determined to have **low paleontological sensitivity** for paleontological resources at depths of 10 feet or less. The Project area is determined to have **high paleontological sensitivity** at depths exceeding 10 feet below ground surface.

Ground disturbing activities in previously undisturbed portions of the Project area may result in significant impacts to paleontological resources under Appendix G of CEQA if Quaternary old (Pleistocene) sediments are impacted at a depth. Impacts would be significant if construction activities result in the destruction, damage, or loss of scientifically important paleontological

resources and associated stratigraphic and paleontological data. Activities with the potential to impact paleontological resources include grading, excavation, trenching or other activity that disturbs geologic formations with a high-paleontological sensitivity.

6.3 Recommendations

The following recommendations would address the potentially significant impacts relating to the potential discovery of paleontological resources during Project implementation. Monitoring would only apply to Project construction activities requiring excavations exceeding 10 feet in depth within intact Quaternary young (Holocene) and Quaternary old (Pleistocene) deposits (i.e., Qa, Qc, Qs, Qog). Implementation of the following recommendations would reduce potential Project impacts to paleontological resources to a less-than-significant level pursuant to the requirements of CEQA.

- **Paleontological Worker Environmental Awareness Program (WEAP).** Prior to the start of construction, construction personnel shall be alerted to the potential for paleontological resources to be present on site and educated on the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction staff. This information should be conveyed to all new staff during WEAP presentation.
- **Paleontological Monitoring.** Initially, full-time monitoring should be conducted during ground construction activities (i.e., grading, trenching, foundation work, and other excavations) where ground disturbance exceeds 10 feet in depth within intact Holocene and Pleistocene deposits (i.e., Qa, Qs, Qc, Qog). Monitoring should be conducted by a qualified paleontological monitor or cross-trained monitor, who is defined as an individual who meets the minimum qualifications per standards set forth by the SVP (2010), which includes a B.S. or B.A. degree in geology or paleontology with one year of monitoring experience and knowledge of collection and salvage of paleontological resources, or requisite field experience and training and a B.S. or B.A. degree in a similar scientific field. The duration and timing of the monitoring should be determined by the Qualified Paleontologist and the location and extent of proposed ground disturbance. If the Qualified Paleontologist determines that full-time monitoring is no longer warranted based on the specific geologic conditions, the Qualified Paleontologist may recommend that monitoring be reduced to periodic spot-checking or ceased entirely. If paleontological resources are discovered, the qualified paleontologist should establish an avoidance buffer, develop a paleontological recovery plan in consultation with the County, and implement the specifics of the recovery plan.

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