Zeta Solar and Battery Energy Storage System Project

Paleontological Resources Assessment

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Prepared for:

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ACRONYMS AND ABBREVIATIONS

AC	Alternating current
Applicant	Longroad Development Company, LLC
APN	Assessor parcel number
bgs	Below ground surface
CEQA	California Environmental Quality Act
County	Merced County Department of Community and Economic Development
Gen-tie line	Generation-tie line
kV	Kilovolt
LACM	Natural History Museum of Los Angeles County
Ma	Million years
MW	Megawatt
O&M	Operation and maintenance
PG&E	Pacific Gas and Electric
PRC	(California) Public Resources Code
Project	Zeta Solar and Battery Energy Storage System Project
PV	Photovoltaic
Stantec	Stantec Consulting Services Inc.
SVP	Society of Vertebrate Paleontology
UCMP	University of California Museum of Paleontology

GLOSSARY

Paleontological Resource	Any evidence of ancient life. This includes the remains of the body of an organism, such as bones, skin impressions, shell, or leaves, as well as traces of an organism's activity, such as footprints or burrows, called trace fossils. Also referred to as fossils. (Society of Vertebrate Paleontology [SVP] 2010)
Project Paleontologist	An individual who is recognized in the paleontological community as a professional and can demonstrate familiarity and proficiency with paleontology in a stratigraphic context, including fossil identification and recovery, with the equivalent of the following qualifications: a graduate degree in paleontology or geology, and/or a publication record in peer reviewed journals; demonstrated competence in field techniques, preparation, identification, curation, and reporting in the state or geologic province in which the roject occurs; at least two full years professional experience as assistant to a project paleontologist with administration and project management experience; experience collecting vertebrate fossils in the field. (SVP 2010)

EXECUTIVE SUMMARY

Stantec Consulting Services Inc. (Stantec) conducted a paleontological resources assessment on behalf of Longroad Development Company, LLC (Applicant) for the Zeta Solar and Battery Energy Storage System Project (the Project) on portions of approximately 675 acres of land, plus a 1,700-foot-long generation-tie (gen-tie) line, located along Poleline Road, south of Los Banos, in Merced County, California. This paleontological study was conducted in support of Applicant for the proposed construction of a photovoltaic solar facility, battery storage system, and gen-tie line.

The proposed Project is subject to compliance with the California Environmental Quality Act (CEQA) and County of Merced requirements regarding the Project's potential impacts on paleontological resources. As part of CEQA compliance, a paleontological resources assessment was conducted to examine these potential impacts of the proposed Project on paleontological resources.

This paleontological resource investigation consisted of a museum records search from the Natural History Museum of Los Angeles County of the 675-acre Project site and vicinity (Appendix A), as well as a review of the most recent geologic mapping, relevant scientific literature and reporting, and a search of online collections databases. This research was used to assign paleontological potential rankings of the Society of Vertebrate Paleontology ([SVP] 2010) to the geologic units present in the Project site, either at the surface or in the subsurface. The results of this assessment indicate that alluvial sediments are mapped at the surface of the Project site and will be disturbed by the Project. These sediments are assessed as having low-to-high paleontological potential, increasing with depth, with high-potential sediments likely present at depths of above five feet below ground surface. Project plans for ground disturbance involve access road construction and improvement, shallow surface grading across the entire Project site, utility line trenching to four feet below ground surface, the driving of piles for panel support, and 15-foot deep augering for power transmission poles. Of these activities, those that are restricted to the low-potential, upper layers of alluvium have low risk of impacts to paleontological resources. Deeper activities, such as the planned augering, may extend below the younger alluvium into buried older alluvium, which has high paleontological potential and so may risk impacting paleontological resources. To avoid impacts to paleontological resources, Stantec recommends the following mitigation activities for the Project:

1. A paleontologist meeting professional standards as a paleontological Principal Investigator as defined by Murphey et al. (2019) shall be retained as the Project paleontologist and shall develop a Workers' Environmental Awareness Program training that communicates requirements and procedures for the inadvertent discovery of paleontological resources during construction, to be delivered by the Project Paleontologist or their designee to the construction crew prior to the onset of ground disturbance.

2. Project activities that exceed the depth of younger alluvium and extend into older alluvium, estimated to occur at depths of 5 feet or greater, should be monitored by a paleontologist meeting professional standards as a Field Paleontologist as defined by Murphey et al. (2019) working under the supervision of the Project Paleontologist. The duration and extent of monitoring should be determined by the Project Paleontologist based upon final Project plans. Following completion

of the monitoring program, the Project Paleontologist should oversee drafting of a Paleontological Resources Mitigation Report that documents completion of the monitoring and other paleontological mitigation activities. This report will be delivered to the Lead Agency and, should fossils have been collected, the repository.

3. Should a potential paleontological resource be identified in the Project site, work should halt in a safe radius around the find (50 feet, or as determined by the Project paleontologist specific to the nature of construction activities) until the Project paleontologist can assess the find and, if significant, salvage the fossil for laboratory preparation and curation at an appropriate repository, such as the Natural History Museum of Los Angeles County.

Based on the findings in this study and the implementation of the above mitigation activities, the proposed Project should not cause an adverse impact to paleontological resources. Therefore, no additional paleontological resource studies are recommended or required at this time. Changes to the Project location or plans from those assessed in this study, including increases to the depths of ground disturbance, will require additional assessment for impacts to paleontological resources.

1 Introduction

Stantec Consulting Services Inc. (Stantec) conducted a paleontological resources assessment on behalf of Longroad Development Company, LLC (Applicant) for the Zeta Solar and Battery Energy Storage System Project (the Project) on portions of an approximately 675 acres of land, plus a 1,700-foot-long generation-tie (gen-tie) line, located along Poleline Road south of Los Banos, in Merced County, California. This paleontological study was conducted in support of Applicant for the proposed construction of a 75 megawatt (MW) photovoltaic (PV) solar facility, battery energy storage system (BESS), and gen-tie line.

The proposed Project is subject to compliance with the California Environmental Quality Act (CEQA) and County of Merced requirements regarding the Project's potential impacts on paleontological resources. As part of CEQA compliance, a paleontological resources assessment was conducted to assess any potential impacts of the proposed Project on paleontological resources.

1.1 PROJECT DESCRIPTION

The Applicant has applied to the Merced County Department of Community and Economic Development (County) for a Conditional Use Permit (Application No. CUP22-005) to construct, operate, maintain, and decommission the Project, a PV solar power generation facility with a BESS and onsite Project substation. The Project would generate up to approximately 75 MW alternating current (AC) renewable electrical energy and include an energy storage capacity of up to 8 hours of 75 MW of AC. The Project is located on all or portions of several contiguous parcels, totaling approximately 650 acres (Project site), plus an additional 1,700-foot-long generation-tie (gen-tie) line to deliver power from the Project to Pacific Gas and Electric’s (PG&E’s) existing Mercy Springs Substation (point of interconnection) in unincorporated Merced County, located approximately 0.25 mile north of the Project site.

The Project would include a solar array area surrounded by an up to 8-foot-tall security fence. Solar PV modules mounted in rows on single-axis trackers and racking equipment would occupy most of the Project site. The Project would also include, among other things, an underground direct current collector system, up to 21 electrical equipment pads with inverters and transformers within the PV facility, an approximately 15-acre BESS with regularly spaced battery units and 70 electrical equipment pads, an underground or above-ground AC collector system, an approximately 5-acre Project substation, an approximately 1,700-foot-long 70 kilovolt (kV) gen-tie line, an approximately 0.8-acre operation and maintenance (O&M) area including an O&M office and adjacent O&M warehouse, and access roads. As part of construction, an approximately 10-acre staging area/laydown yard would be located within the Project site and accessed via internal graveled or compacted earth access roads.

As part of the interconnection process, PG&E would install gen-tie line terminal equipment and the termination of the Project’s fiber optic line and install one circuit breaker to an existing 70 kV ring bus at the Mercy Springs Switching Station.

Construction of the Project facilities would occur over 24 consecutive months. The Project would operate year-round to generate electricity from the PV facilities during daylight hours and dispatch additional electricity during either daylight or non-daylight hours, depending on the application of the BESS portion of the Project.

1.2 PROJECT LOCATION

The Project is located on privately owned land in southwestern Merced County, approximately 9 miles south of Los Banos (Figure 1). The Project generation facility would occupy all or portions of three parcels identified by Merced County as Assessor Parcel Numbers (APNs) 090-130-018, 090-130-044, and 090-130-060 (Figure 2). The gen-tie line would extend north through APN 088-180-063 to the point of interconnection in APN 090-103-059. Poleline Road abuts the southwestern Project site boundary. The California Aqueduct and United States Interstate 5 run parallel to the southwest Project boundary about 300 feet and 800 feet to the west of the Project site, respectively. An unpaved access road (First Lift Canal) lies along the western boundary of the Project site, and the eastern boundary abuts an unnamed dirt/gravel road. The Project site consists of fallow agricultural lands, and there has been no agricultural production on the Project site for over 10 years. Land uses surrounding the Project site primarily consist of undeveloped active agricultural lands to the north, south, and east, in addition to a small (0.15-acre) developed area to the south housing a cell tower and undeveloped, hilly grasslands used for cattle grazing to the west. The Vega Solar Project site and Dos Amigos Pumping Plant are located 1,200 feet north and 0.5 miles northwest of the Project site, respectively.

1.3 PALEONTOLOGICAL RESOURCES

Fossils are any evidence of ancient life. This includes the remains of the body of an organism, such as bones, skin impressions, shell, or leaves, as well as traces of an organism's activity, such as footprints or burrows; these are known as trace fossils. In addition to the fossils themselves, geologic context is an important component of paleontological resources. It includes the stratigraphic placement of the fossil as well as the lithology of the rock to assess paleoecologic setting, depositional environment, and taphonomy. Fossils are protected by federal, state, and local regulations as nonrenewable natural resources.

CEQA requires analysis of whether a Project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature but does not define a significance threshold for paleontological resources. The standards of the Society of Vertebrate Paleontology (SVP) are often used to determine whether paleontological resources are unique or significant. The SVP defines significant paleontological resources as:

> 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 to be older than recorded human history and/or older than middle Holocene (i. e., older than about 5,000 radiocarbon years). (SVP 2010: 11)

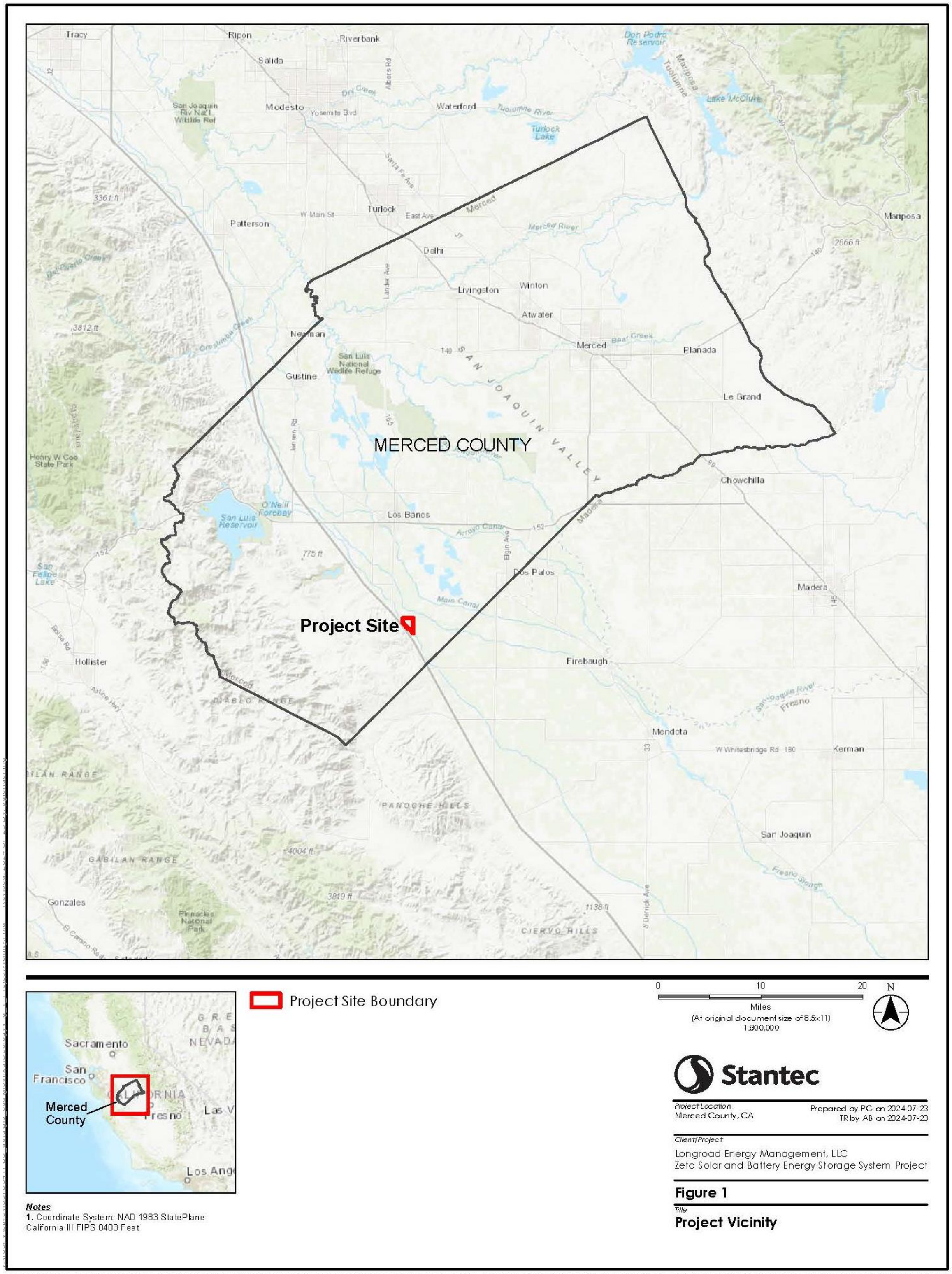

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Figure 1. Project Vicinity

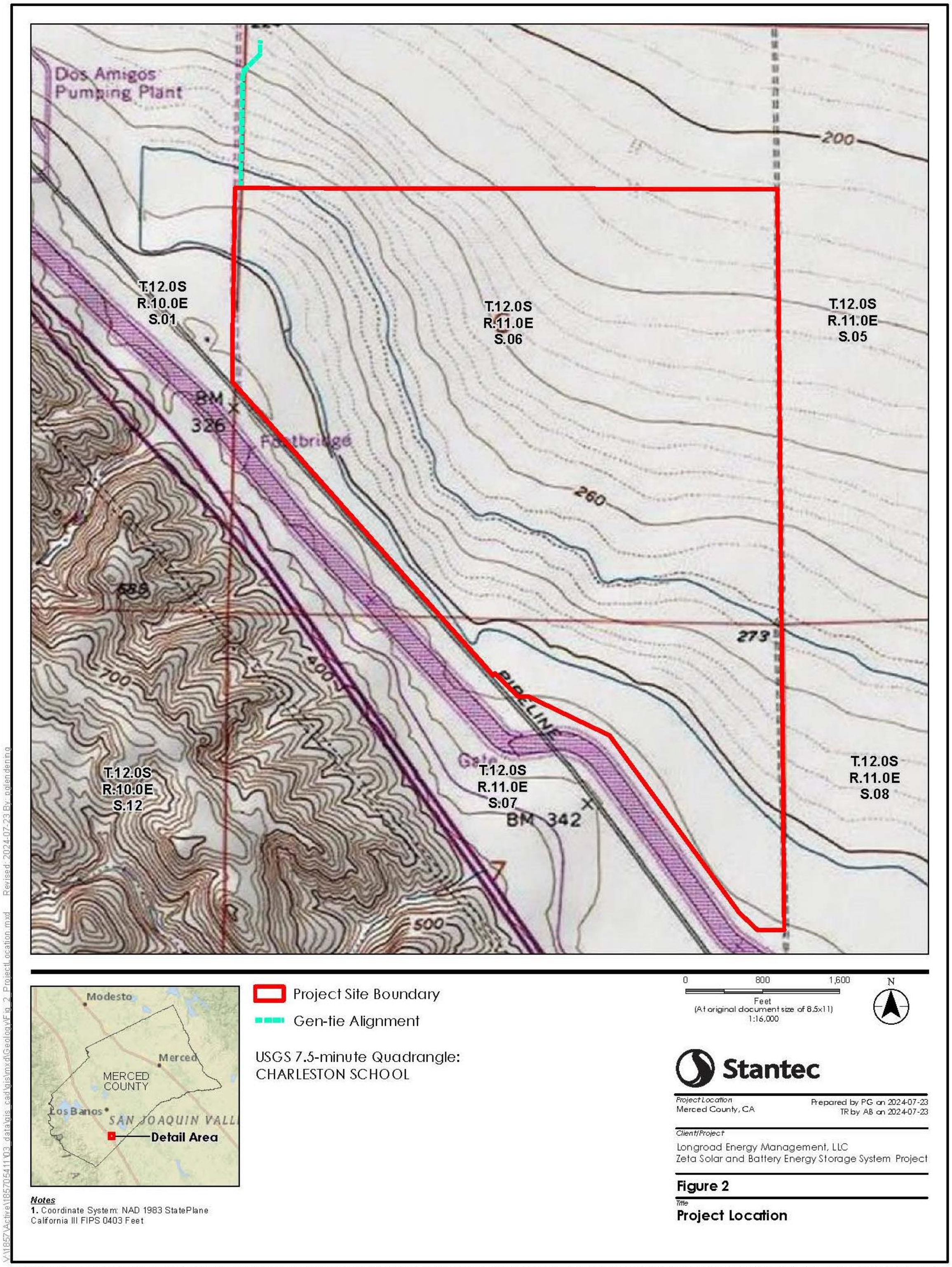

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Figure 2. Project Location

It should be noted that the potential significance of a paleontological resource varies based on a number of factors, including geologic unit, geographic area, and the current state of scientific research, and may also vary between different agencies (Murphey et al. 2019). Numerous paleontological studies have developed criteria for the assessment of significance for fossil discoveries (e.g., Eisentraut and Cooper 2002; Murphey et al. 2019; Murphey and Daitch 2007; Scott and Springer 2003). In general, these studies assess fossils as significant if one or more of the following criteria apply:

- The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct.
- The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events, through biochronology or biostratigraphy and the correlation with isotopic dating.
- The fossils provide ecological data, such as the development of biological communities, the interaction between paleobotanical and paleozoological biotas, or the biogeography of lineages.
- The fossils demonstrate unusual or spectacular circumstances in the history of life.
- The fossils provide information on the preservational pathways of paleontological resources, including taphonomy, diagenesis, or preservational biases in the fossil record.
- The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.
- The fossils inform our understanding of anthropogenic effects on global environments or climate.

A geologic unit known to contain significant paleontological resources is considered sensitive to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit will either disturb or destroy fossil remains directly or indirectly. This definition of sensitivity differs fundamentally from the definition for archaeological resources as follows:

> It is extremely important to distinguish between archaeological and paleontological (fossil) resource sites when defining the sensitivity of rock units. The boundaries of archaeological sites define the areal extent of the resource. Paleontological sites, however, indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontological potential in each case. (SVP 2010: 2)

Many archaeological sites contain features that are visually detectable on the surface. In contrast, fossils are often contained within surficial sediments or bedrock and are therefore not observable or detectable unless exposed by erosion or human activity.

In summary, in the absence of observable fossil resources on the surface, paleontologists must assess the potential of geologic units as a whole to yield paleontological resources based on their known potential to produce significant fossils elsewhere. Monitoring by experienced paleontologists ensures that any paleontological resources discovered during ground-disturbing activities can be properly salvaged to prevent adverse impacts.

1.4 PROJECT PERSONNEL

The paleontological assessment presented here was conducted by Stantec Principal Paleontologist Alyssa Bell, PhD. GIS maps and figures were drafted by GIS technician Paul Glendening, BA. This report was authored by Alyssa Bell with assistance from Paleontologist Matthew Cline, MS. and peer reviewed by Practice Leader Geraldine Aron, MS. Stantec's work in support of the Project was managed by Caitlin Schroeder, MS., who coordinated all work and provided quality assurance and control.

2 Regulatory Framework

California and Merced County have enacted multiple laws and regulations that provide for the protection of paleontological resources. This investigation was conducted to meet these requirements regarding paleontological resources on the lands proposed for development.

2.1 STATE OF CALIFORNIA

2.1.1 California Environmental Quality Act

CEQA (Public Resources Code [PRC] Sections 21000 et seq.) requires that before approving most discretionary Projects, the Lead Agency must identify and examine any significant adverse environmental effects that may result from activities associated with such Projects. As updated in 2016, CEQA separates the consideration of paleontological resources from cultural resources (PRC Section 21083.09). The CEQA Appendix G checklist (Title 14, Division 6, Chapter 3, California Code of Regulations [CCR] 15000 et seq.) requires an answer to the question, “Will the proposed Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” Under these requirements, Stantec has conducted a paleontological resources assessment to determine impacts of the proposed Project on paleontological resources within the Project site.

2.2 LOCAL REGULATIONS

2.2.1 County of Merced General Plan

The Recreation and Cultural Resources Element of the 2030 Merced County General Plan (Merced County 2013) recognizes the importance of paleontological resources under Goal RCR-2, Policy RCR-2.9, which establishes mandatory guidelines for use during the environmental review processes for private and public Projects to identify and protect historical, cultural, archaeological, and paleontological resources, and unique geological features.

This policy is supported by an implementation program (RCR-B), which states that, at a minimum, the guidelines shall include resource survey guidelines covering personnel qualifications, research and field techniques, investigation and documentation, data collection and recordation, and resource preservation, avoidance, minimization, and mitigation strategies (Merced County 2013). The guidelines shall specify broad categories of acceptable mitigation consistent with PRC Section 21083.2 and State CEQA Guidelines Section 15126.4(b), as they may be amended for any identified adverse effects to historic and cultural resources, paleontological resources, or unique geological features (Merced County 2013).

3 Professional Standards

The SVP (2010), Bureau of Land Management (BLM 2008), and a number of scientific studies (Eisentraut and Cooper 2002; Murphey et al. 2019; Scott and Springer 2003) have developed guidelines for professional qualifications, conducting paleontological assessments, and developing mitigation measures for the protection of paleontological resources. These guidelines are broadly similar, and include the use of museum records searches, scientific literature reviews, and, in some cases, field surveys to assess the potential of an area to preserve paleontological resources. Should that potential be high, accepted mitigation measures include paleontological monitoring, data recordation of all fossils encountered, collection and curation of significant fossils and associated data, and in some cases screening of sediment for microfossils.

This study has been conducted in accordance with these guidelines and the recommendations provided herein meet these standards.

4 Geologic Setting

The Project site is located between the Great Valley and the Coast Ranges geomorphic provinces. The Great Valley is an elongate basin extending for nearly 435 miles roughly north–northwest and averaging 50 miles wide (Bartow and Nilson 1990), bounded on the west by the Coast Ranges, to the east by the Sierra Nevada, to the north by the Klamath Mountains and Cascade Range, and to the south by the Transverse Ranges and the Mojave Desert (Norris and Webb 1990). The Great Valley consists primarily of alluvial plains or fans, with the far eastern margin yielding to the foothills of the Sierra Nevada (Page and LeBlanc 1969).

The Great Valley has been a depositional basin dating back to the late Jurassic, when the growing Nevadan Mountains began shedding sediment to the west and southwest, into what was at the time a shallow sea that deepened westward across the basin (Nilsen 1990). Deposition continued into the Cenozoic, with the later initiation of mountain formation on the western side of the Great Valley in the Coast Ranges. By the Pliocene the basin had transitioned to entirely nonmarine deposition, with sediment input from the highlands on the eastern and western borders of the Great Valley (Bartow and Nilson 1990). The thickness of the sediments Accumulated over this roughly 150-million-year (Ma) period varies along the valley but is over 8 miles thick in places (Orme et al. 2018).

The Coast Ranges consist of relatively young (3.5 Ma) northwest-trending mountain ranges and valleys that run along the Pacific coast from Santa Barbara to the Klamath Mountains, coincident with the Pacific-North American plate boundary (Page et al. 1998). It is divided into two subprovinces—the ranges south of San Francisco Bay to Santa Barbara County and the ranges north of the bay. This subdivision coincides with the northern ranges located east of the San Andreas Fault zone and the southern ranges mostly to the west (Norris and Webb 1990). The southern Coast Ranges, where the Project site is located, are lower in elevation with less rainfall than the northern Coast Ranges, and consequently have less vegetation.

The Coast Ranges preserve a thick sequence of sedimentary strata dating back to the Mesozoic Era (approximately 251 Ma) overlying granitic and metamorphic bedrock (Norris and Webb 1990). Although elevations are moderate within the Coast Ranges, the relief of these mountains is often considerable, with peaks rising around 1,000 meters just a few kilometers from the coast (Norris and Webb 1990). These sedimentary rocks have a rich fossil history in central California, recording the filling of offshore basins dating to the Mesozoic followed by the progressively shallowing sea and the emergence of terrestrial environments in the Pliocene and Pleistocene Epochs (Page et al. 1998).

Locally, the Project site is located at the western edge of the San Joaquin Valley at the base of the Diablo Range. As such, the Project site is a site of active deposition as sediments from the Mesozoic bedrock exposed in the Diablo Range are shed into the San Joaquin Valley.

5 Methodology

The paleontological resource assessment reported herein consisted of a records search from the Natural History Museum of Los Angeles County (LACM) as well as a review of the relevant scientific literature, environmental reporting, the most recent geologic mapping, and a review of the online database of the University of California Museum of Paleontology (UCMP). To assess if paleontological resources are likely to be encountered in any given area, the paleontological potential of the geologic units present in the area is assessed. Paleontological potential of a geologic unit consists of both (a) the potential for yielding abundant vertebrate fossils or for yielding 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 (SVP 2010).

Unlike archaeological resources that have a limited aerial extent, paleontological resources may occur throughout a geologic unit, and so paleontological potential is assessed for the unit as a whole. Provided below is the methodology used during the current study to assess the potential of the Project to impact paleontological resources.

5.1 ANALYSIS OF EXISTING DATA

To assess the paleontological potential of the Project site, Stantec conducted an analysis of existing data. A records search of the Project site and vicinity requested from the LACM on August 29, 2022 with the results received from the LACM on September 4, 2022. The search returned the closest known paleontological localities of the LACM to the Project site from geologic units that are present at the Project site, either at the surface or in the subsurface.

The most recent geologic mapping was consulted to identify all geologic units present at the surface or likely present in the subsurface. The scientific literature was then consulted to determine the history of each of these units for preserving fossil resources. The online database of the UCMP was searched for any fossil localities from geologic units relevant to the Project in Merced or adjoining counties. The database of the UCMP does not include precise locality information, but often the general vicinity of the locality can be determined from the available data.

5.2 PALEONTOLOGICAL RESOURCES ASSESSMENT

The results of the analysis of existing data were used to assign a paleontological potential ranking to the geologic units present in the Project site, in accordance with the SVP (2010). These rankings are designed to inform the development of appropriate mitigation measures for the protection of paleontological resources and are widely accepted as industry standards in paleontological mitigation (Murphey et al. 2019; Scott and Springer 2003). These rankings are as follows:

> **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. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations that are

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, etc.), some volcaniclastic formations (e.g., ashes or tephras), and some low-grade metamorphic rocks.

Undetermined Potential. Rock units for which little information is available in the literature or museum records concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study and field work is necessary to determine whether these rock units have high or low potential to contain significant paleontological resources.

Low Potential. Rock units that are poorly represented by fossil specimens in institutional collections, or, based on general scientific consensus, only preserve fossils in rare circumstances (e.g., basalt flows or Recent colluvium) have low paleontological potential.

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).

5.3 PALEONTOLOGICAL RESOURCES IMPACTS ASSESSMENT

Impacts to paleontological resources can be classified as direct, indirect, or cumulative. Impacts can also be considered as adverse impacts or as positive impacts. Direct adverse impacts on paleontological resources are the result of damage or destruction of these nonrenewable resources by surface-disturbing actions including construction excavations. Therefore, in areas that contain paleontologically sensitive geologic units, ground disturbance has the potential to adversely impact paleontological resources by damaging or destroying them and rendering them permanently unavailable to science and society. Positive direct impacts, however, may result when paleontological resources are identified during construction and then appropriately documented and salvaged, thus ensuring the specimens are protected for future study and education.

Indirect adverse impacts typically include those effects that result from the continuing implementation of management decisions and resulting activities, including normal ongoing operations of facilities constructed within a given Project site. They also occur as the result of the construction of new roads and trails in areas that were previously less accessible. This increases public access and therefore increases the likelihood of the loss of paleontological resources through vandalism and unlawful collecting, thus constituting an adverse indirect impact. Human activities that increase erosion also cause indirect impacts to surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Cumulative adverse impacts can result from incrementally minor but collectively significant actions taking place over time. The incremental loss of paleontological resources over time from construction-related surface disturbance or vandalism and unlawful collection would represent a significant cumulative adverse impact because it would result in the destruction of nonrenewable paleontological resources and the associated irretrievable loss of scientific information.

Positive impacts can result from the preservation of significant paleontological resources identified during construction, a direct impact, or following Project activities, an indirect impact. By successfully identifying, salvaging, and curating significant paleontological resources in a federally accredited repository, they are preserved in perpetuity and may contribute to scientific understanding and public education and awareness.

The impact assessment detailed here takes into consideration all planned Project activities in terms of aerial and subsurface extents, including the possibility of subsurface geologic units having a different paleontological potential than surficial units. For example, younger surficial sediments (alluvium, lacustrine, eolian, etc.) have low potential to preserve fossil resources due to their young age; yet sediments increase in age with depth and so these surficial deposits often overlie older units that have high paleontological potential. In areas with this underlying geologic setting, surficial work may be of low risk for impacting paleontological resources, while activities that require excavations below the depth of the surficial deposits would be at greater risk of impacting paleontological resources. For this reason, the impact assessment takes into consideration both the surface and subsurface geology and is tailored to Project activities.

6 RESULTS

The results of the paleontological potential and impacts assessments are described below.

6.1 PROJECT AREA GEOLOGY AND PALEONTOLOGY

Geologic mapping by Dibblee and Minch (2007) indicates the surface of the Project site consists of alluvial sediments (Figure 3). These sediments consist of varying proportions of unconsolidated gravel, sand, and clay (Dibblee and Minch 2007). Alluvial sediments represent terrestrial deposition of water-transported sediments from the surrounding highlands. These sediments are relatively young in age at the surface, dating from the Holocene to the Recent, and overlie older alluvial sediments that date to the Pleistocene.

As defined by the SVP (2010), paleontological resources must be over 5,000 years in age, corresponding to the middle part of the Holocene. Therefore, the alluvial sediments in the Project site are too young at the surface to preserve fossils. However, as sediments increase in age with depth, the subsurficial sediments in the Project site date to the early Holocene and beyond, and therefore are of an age to preserve paleontological resources.

A review of the scientific literature indicates that older alluvial sediments have a rich fossil history in central California. Fossils include animals still found in North America today, such as deer, bison, sheep, and horses; creatures no longer found in North America, such as camels, lions, cheetahs, and sloths; and extinct creatures such as mammoths, dire wolves, and saber-toothed cats (Jefferson 1991a, 1991b; Marchand and Allwardt 1977; McDonald and Jefferson 2008; Scott 2010). In addition to illuminating the striking differences between California in the Pleistocene and California today, this abundant fossil record has been vital in studies of extinction (e.g., Sandom et al. 2014; Barnosky et al. 2004), ecology (e.g., Connin et al. 1998; Trayler et al. 2015), and climate change (e.g., Roy et al. 1996; Trayler et al. 2015).

While the record search from the LACM in 2022 did not return any localities from older alluvial sediments in the vicinity of the Project site, a 2022 review of the UCMP database indicates nine localities in Merced County that are from Pleistocene-aged sediments not assigned to a formal geologic unit, and which therefore may be correlative with the older alluvial sediments in the Project site. While precise locality data is not provided in the online database, these localities appear to be spread across the county, including Hilmar, Merced Falls, and along the Merced River. Localities at the San Luis Dam appear to be closest to the Project site. These localities preserved invertebrates as well as fossils of mastodons, elephants, bison, horse, camel, and ground sloth (UCMP 2022). Given the record of significant fossils recovered from the older layers of alluvial sediments, the alluvium in the Project site is assessed as having low-to-high paleontological potential, increasing with depth. The exact depth at which this transition occurs cannot be determined precisely in the Project site; however, reports in the scientific literature (i.e., Jefferson 1991a, 1991b; Dundas et al. 2009) indicate depths of as little as 5 feet below ground surface (bgs) in the region may yield paleontological resources.

6.2 PALEONTOLOGICAL RESOURCES IMPACTS ASSESSMENT

The paleontological potential assessment presented above indicates that the Project site consists of alluvial sediments with low-to-high paleontological potential, increasing with depth. Older, high-potential sediments may be present at an estimated 5 feet bgs. Should paleontological resources preserved in the subsurface older alluvium be impacted by Project activities it would constitute a direct adverse impact under CEQA. Therefore, an impacts assessment was conducted to evaluate planned Project activities and their likelihood to pose an adverse impact to paleontological resources.

The Project plans to construct a 75 MW photovoltaic facility and battery storage system. This work will entail a variety of activities: updating and construction of access roads within the Project site, shallow grading of the entire Project site, digging of trenches to 4 feet bgs for collector lines, and pile driving. Following construction, operations and maintenance activities include maintaining access roads to the Project site and within the Project boundaries, and general maintenance within the Project site. The gen-tie line will entail augering for pole diameters of 18 inches to 24 inches, to depths of 15 feet bgs.

Of these activities, those that require ground disturbance that will extend into geologic units with high paleontological potential are at risk of posing an adverse impact to paleontological resources. Ground disturbance is expected to consist of shallow grading across the entire Project site, 4-foot-deep trenching for collector lines, piles driven for the panels, and 15-foot deep augering for the gen-tie poles. As high-potential units are anticipated at depths of greater than 5 feet bgs across the Project site, and most ground disturbance is limited to 4 feet bgs, such activities are unlikely to reach high potential units. Augering for the gen-tie poles may encounter high potential older alluvium in the subsurface. If this were to occur, and fossils encountered, their damage or destruction would constitute a direct adverse impact to paleontological resources. Following construction activities, operation and maintenance of the facility will not involve additional ground disturbance, so indirect or cumulative impacts are also unlikely.

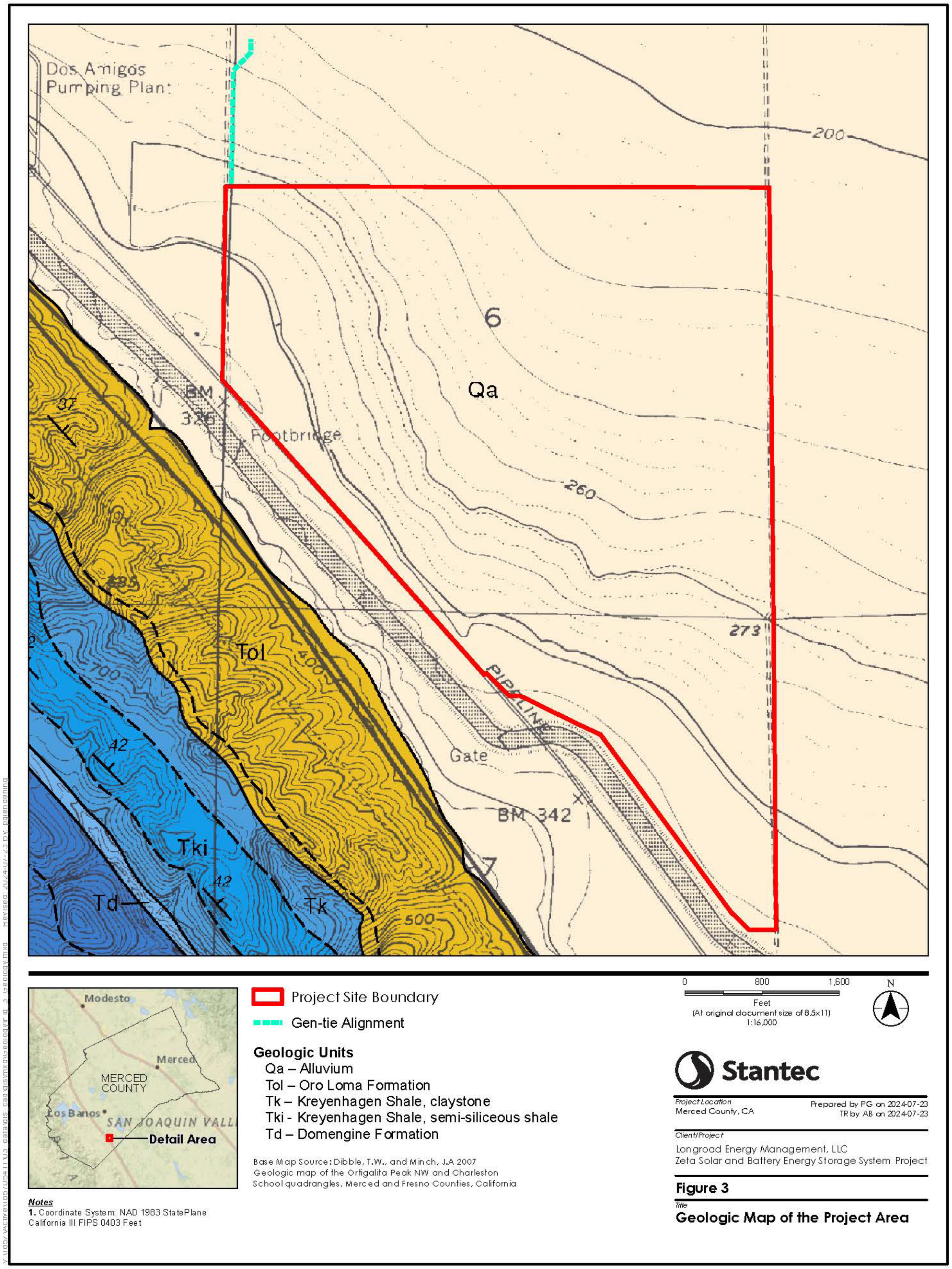

Figure 3. Geologic Map of the Project Site

7 Recommendations and Management Considerations

Due to the shallow nature of most planned ground disturbance for this Project, risks of adverse impacts are limited to the augering for gen-tie pole placement, as this activity exceeds 5 feet in depth. Paleontological monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if they are scientifically important, successful mitigation and salvage efforts may be undertaken to prevent adverse impacts to these resources.

The ability to apply monitoring is tied to the nature of the ground disturbing activity. Activities that produce cut surfaces, such as grading, or spoils, such as augering, are ideal targets for monitoring, as paleontologists can observe the cuts or spoils for fossils. The potential for augers to bring salvageable fossils to the surface is controlled by the diameter of the auger and the diameter of the fossils. The 18-inch to 24-inch augers planned for the Project could bring up smaller fossils intact, such as invertebrates or small animals, such as rodents, lizards, or birds. Therefore, to reduce potential impacts to paleontological resources to a level that is less than significant, Stantec recommends the following:

1. A paleontologist meeting professional standards as defined by Murphey et al. (2019) shall be retained as the Project Paleontologist and shall develop a Workers' Environmental Awareness Program training that communicates requirements and procedures for the inadvertent discovery of paleontological resources during construction, to be delivered by the Project Paleontologist or their designee to the construction crew prior to the onset of ground disturbance.

2. Project activities that exceed the depth of younger alluvium and extend into older alluvium, estimated to occur at depths of 5 feet or greater, should be monitored by a paleontologist meeting professional standards as a Field Paleontologist as defined by Murphey et al. (2019) working under the supervision of the Project Paleontologist. The duration and extent of monitoring should be determined by the Project Paleontologist based upon final Project plans. Following completion of the monitoring program, the Project Paleontologist should oversee drafting of a Paleontological Resources Mitigation Report that documents completion of the monitoring and other paleontological mitigation activities. This report will be delivered to the Lead Agency and, should fossils have been collected, the repository.

3. Should a potential paleontological resource be identified in the Project site, work should halt in a safe radius around the find (50 feet, or as determined by the Project Paleontologist specific to the nature of construction activities) until the Project Paleontologist can assess the find and, if significant, salvage the fossil for laboratory preparation and curation at an appropriate repository such as the Natural History Museum of Los Angeles County.

These recommendations meet the standards of the SVP (2010) and conform to industry best practices (e.g., Murphey et al. 2019, Scott and Springer 2003). Based on the findings in this study the proposed Project will not cause a significant adverse impact to paleontological resources with the incorporation of the above mitigation recommendations. Therefore, no additional paleontological resources studies are recommended or required at this time. Should the Project location or plans change, this assessment will need to be revised to address those changes.

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Appendix A LACM Paleontological Records Search Results

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

tel 213.763.DINO
www.nhm.org

Research & Collections

e-mail: paleorecords@nhm.org

September 4, 2022

Stantec Consulting Services Inc.
Attn: Alyssa Bell

re: Paleontological resources for the Zeta Solar (Project # 185705411)

Dear Alyssa:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the Zeta Solar project area as outlined on the portion of the Charleston School USGS topographic quadrangle map that you sent to me via e-mail on August 29, 2022. We do not have any fossil localities that lie directly within the proposed project area, but we do have fossil localities nearby from the same sedimentary deposits that occur in the proposed project area, either at the surface or at depth.

The following table shows the closest known localities in the collection of the Natural History Museum of Los Angeles County (NHMLA).

Locality Number	**Location**	**Formation**	**Taxa**	**Depth**
LACM VP 3720	SE of McKittrick	Tulare Formation	Borophagine canid (*Hyaenognathus pachyodon*)	Unknown
Over two dozen invertebrate localities	Kettleman Hills	Tulare Formation	Nonmarine invertebrates	Surface
LACM VP 3505, 3506, CIT 348	Little Panoche Valley	Tulare Formation	Short-faced bear (Tremarctinae), horse (*Equus*), camel family (Camelidae)	Surface, as float
LACM VP 4526, 5458, 6591, 65131	East of Skyline Blvd. on the north side of North Dome of Kettleman Hills	Tulare Formation	Fish (Osteichthyes, Teleostei), pack rat (*Neotoma*), Earred seal (Otariidae), oysters and other mollusks	Unknown
LACM VP 4526, 5458, 5914, 5763, 7434	North Dome of Kettleman Hills	Tulare Formation	Fish (Osteichthyes, Teleostei), pack rat (Neotoma), Earred seal (Otariidae), oysters and other mollusks	Surface

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

This records search covers only the records of the NHMLA. It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Potentially fossil-bearing units are present in the project area, either at the surface or in the subsurface. As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Bureau of Land Management or Society of Vertebrate Paleontology standards.

Sincerely,

Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County

enclosure: invoice