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Connie Anderson
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T&B Planning, Inc.
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Transmitted via email to canderson@tbplanning.com

**RE: Paleontological Resource Technical Memorandum for the Antelope Valley Commerce Center Project, Los Angeles County, California**

Dear Ms. Anderson,

At the request of T&B Planning, Inc. PaleoWest LLC (PaleoWest) conducted a paleontological resource technical memorandum for the Antelope Valley Commerce Center Project (Project) in the city of Palmdale, Los Angeles County, California. The goal of the memorandum is to detail the results of the literature review and museum records search, summarize the paleontological sensitivity of the geologic units within and in the vicinity of the Project area, assess potential impacts from Project implementation, and recommended measures to avoid potential impacts to paleontological resources during Project implementation, as necessary.

This paleontological resource assessment included fossil locality records searches conducted by the Natural History Museum of Los Angeles County (NHMLAC), as well as a search of the online databases of the University of California Museum of Paleontology's (UCMP) and San Diego Natural History Museum (SDNHM), and the online Paleobiology Database (PBDB) and FAUNMAP. The records searches were supplemented by a review of existing geologic maps and primary literature regarding fossiliferous geologic units within the proposed Project vicinity and region. This technical memorandum, which was written in accordance with the guidelines set forth by the Society of Vertebrate Paleontology (SVP) (2010), has been prepared to support environmental review under the California Environmental Quality Act (CEQA).

## PROJECT LOCATION AND DESCRIPTION

The Project area is located within the city of Palmdale along Colombia Way (Avenue M), northwest of the Palmdale Regional Airport and east of the Southern Pacific Railroad (Figure 1-1). The Project area totals approximately 398 acres. As shown in Figure 1-2, the Project area is within Section 34-36, Township 7 North, Range 12 West and Sections 1-3 and 10-12, Township 6 North, Range 12 West, San Bernardino Baseline and Meridian (SBBM), as depicted on the Lancaster West, CA and Lancaster East, CA 7.5' U.S. Geological Survey (USGS) topographic quadrangle maps. The elevation of the Project area is between 2500 and 2550 feet above mean sea level (amsl).


Figure 1: Project vicinity map.

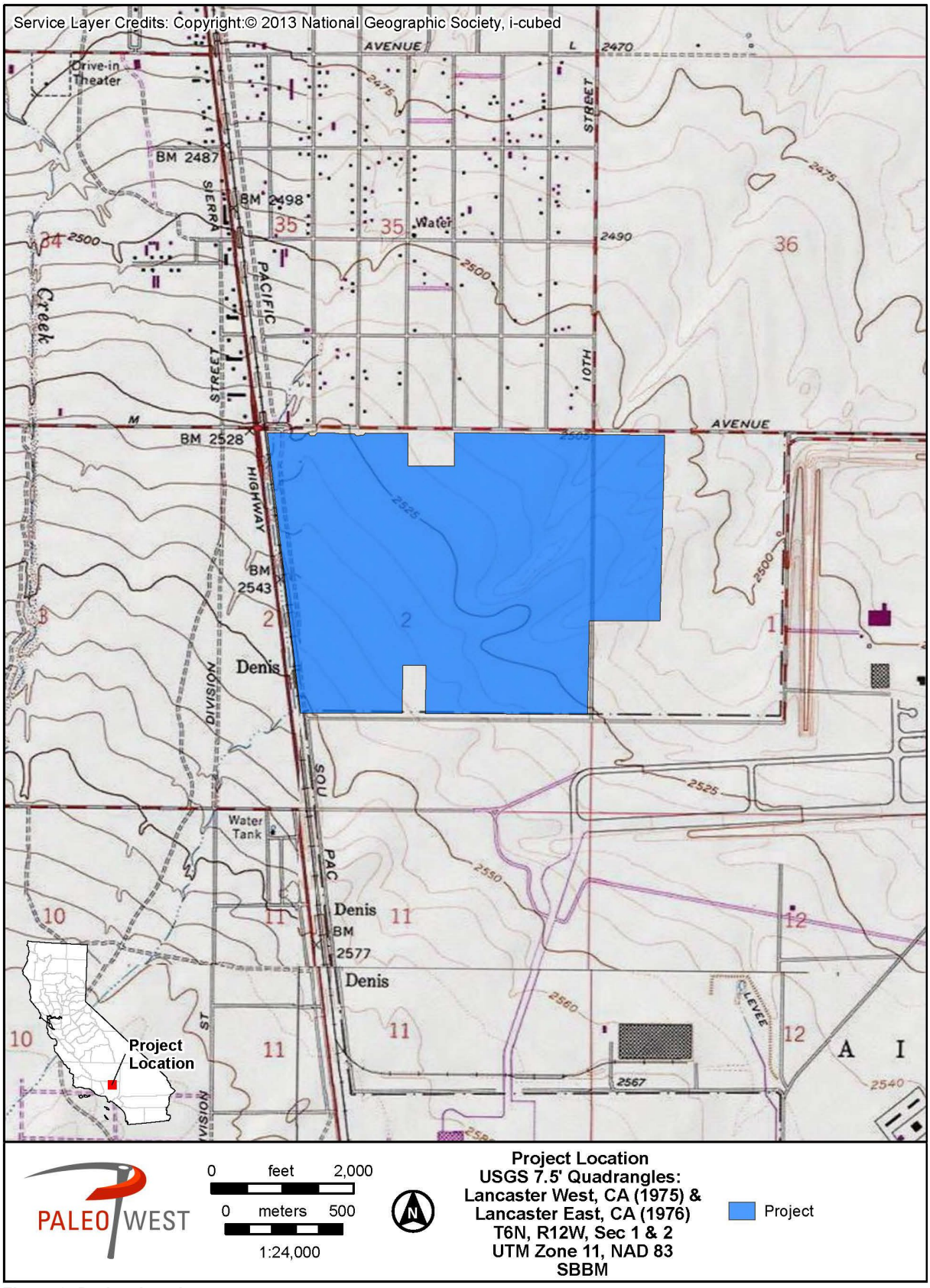



Figure 2: Project location map.

The Project includes the development of 398 acres of vacant land into a commercial and industrial center that will consist of 11 buildings, auto parking, and open space. Building height will not exceed 35 feet and landscape will cover approximately 10 percent of the project area. Access to the Project would be via East Avenue M with three new public streets providing access within the development.

# REGULATORY CONTEXT

## CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA requires that public agencies and private interests identify the potential environmental consequences of their Projects on any object or site of significance to the scientific annals of California (Division I, California Public Resources Code [PRC] Section 5020.1 [j]). Appendix G in Section 15023 provides an Environmental Checklist of questions (Section 15023, Appendix G, Section XIV, Part A) that includes the following: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?"

CEQA does not define "a unique paleontological resource or site." However, the Society of Vertebrate Paleontology (SVP) has provided guidance specifically designed to support state and Federal environmental review. The SVP broadly defines significant paleontological resources as follows (SVP 2010, page 11):

> "Fossils and fossiliferous deposits 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 to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years)."

Significant paleontological resources are determined to be 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 ancient chronology and environmental change, 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 landscape change. Even unidentifiable material can provide useful data for dating geologic units if radiometric dating is possible. As such, common fossils (especially vertebrates) may be scientifically important, and therefore considered significant.

## CALIFORNIA PUBLIC RESOURCES CODE

Section 5097.5 of the Public Resources Code (PRC) states:

> "No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor."

As used in this PRC section, "public lands" means lands owned by, or under the jurisdiction of, the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, public agencies are required to comply with PRC 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

## COUNTY OF LOS ANGELES

The County of Los Angeles has goals and policies related to paleontological resource issues in their General Plan (County of Los Angeles 2015). Chapter 9, Section VIII of the General Plan states:

> "Historic, cultural, and paleontological resources are non-renewable and irreplaceable. The County aims to promote public awareness of their value, and their public enjoyment should be fostered whenever possible. To this end, the County promotes cooperative efforts between public and private organizations to identify, restore, and conserve these resources."

Specifically, Goal C/NR 14: Protected historic, cultural, and paleontological resources established the following policies

> Policy C/NR 14.1: Mitigate all impacts from new development on or adjacent to historic, cultural, and paleontological resources to the greatest extent feasible.
>
> Policy C/NR 14.2: Support an inter-jurisdictional collaborative system that protects and enhances historic, cultural, and paleontological resources.
>
> Policy C/NR 14.5: Promote public awareness of historic, cultural, and paleontological resources.
>
> Policy C/NR 14.6: Ensure proper notification and recovery processes are carried out for development on or near historic, cultural, and paleontological resources.

## CITY OF PALMDALE

The City of Palmdale General Plan (City of Palmdale 1993) establishes protecting "historical and culturally significant resources which contribute to the community's sense of history" as Goal ER7. This includes paleontological resources as further detailed:

> Objective ER7.1: Promote the identification and preservation of historic structures, historic sites, archaeological sites, and paleontological resources in the City.
>
> > Policy ER7.1.3: Require that new development protect significant historic, paleontological, or archaeological resources, or provide for other appropriate mitigation.

The General Plan also establishes that the geologic deposits underlying the Project area has an unknown potential for producing paleontological resources (Project geology is discussed further below).

## PALEONTOLOGICAL RESOURCE POTENTIAL

Absent specific agency guidelines, most professional paleontologists in California adhere to the guidelines set forth by SVP (2010) to determine the course of paleontological mitigation for a given project. These guidelines establish protocols for the assessment of the paleontological resource potential of underlying geologic units and outline measures to mitigate adverse impacts that could result from project development. Using baseline information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) (or members thereof) underlying a project area can be assigned to one of four categories defined by SVP (2010). These categories include high, undetermined, low and no paleontological resource potential.

1. High Sensitivity: Vertebrate fossils, as well as the respective stratigraphic units in which these vertebrate fossils were discovered, are likely present, and likely have significant scientific value. In areas of high sensitivity, full-time monitoring is recommended during project-related ground disturbance.

2. Low Sensitivity: Stratigraphic units that have yielded few fossils in the past, based upon review of available literature and museum collections records, are considered to possess low paleontological sensitivity. Monitoring is usually not recommended during excavation within a stratigraphic unit of low sensitivity, although spot monitoring may be recommended to confirm that disturbance remains restricted to low-sensitivity units.

3. Undetermined Sensitivity: In certain instances, the lack of available literature on a particular geologic unit, or absence of exposures of that unit, make it difficult to determine a unit's likelihood of yielding fossiliferous remains. Under these circumstances, further studies may be recommended to assess the unit's paleontological resource potential (i.e., field survey). If a unit remains of "undetermined" paleontological sensitivity, then it is treated as possessing "high" sensitivity for purposes of initial monitoring and mitigation.

4. No Sensitivity: This category includes geological strata that are either too young (<10,000 years old), too weathered, metamorphosed, or too coarse-grained to preserve significant fossilized remains. Metamorphic and plutonic igneous rocks normally do not contain fossils due to the high heat and pressure during their formation, and commonly possess no paleontological sensitivity.

## METHODS

To assess whether a particular area has the potential to contain significant fossil resources at the subsurface, it is necessary to review published geologic mapping to determine the geology and stratigraphy of the area. Geologic units are considered "sensitive" for paleontological resources if they are known to contain significant fossils anywhere in their extent. Therefore, a search of pertinent local and regional museum repositories for paleontological localities within and nearby the Project area is necessary to determine whether fossil localities have been previously discovered within a particular rock unit. For this Project, data obtained from a recent

museum records search conducted at the NHMLAC was used to assess paleontological resource sensitivity. The museum records search was supplemented by a review of the online collections discussed above, and other published paleontological and geological literature which contains records for the surrounding area.

# RESOURCE CONTEXT

## GEOLOGIC SETTING

The Project area is in the western region of the Mojave Desert geomorphic province in southern California (Norris and Webb 1990). A geomorphic province is a region of unique topography and geology that is readily distinguished from other regions based on its landforms and tectonic history. The Mojave Desert geomorphic province is bounded to the northwest by the Transverse Ranges and to the southeast by the Colorado Desert. The northern extent is bordered by the Sierra Nevada and Basin and Ranges provinces, and the California-Nevada border and Colorado river establish the eastern boundary (Norris and Webb 1990). The Mojave Desert is wedged between the Garlock Fault running easterly along the southern side of the Sierra Nevada and extending into the Basin and Range, and the San Andreas Fault running northwest along its western extent.

The western Mojave contains three major rock groups, two of which relate to the presence of fossil deposition within the region. The first of these, are a group of Cenozoic-age (65 million to 2 million years old) mainly terrestrial sediments and volcanic rocks consisting of conglomerates, sandstones, shales, carbonates, tuffs, breccias, and intrusive and extrusive igneous rocks related to a period of intense volcanism and extensional faulting caused by the North American continental plate colliding with and overriding the Gulf of California Spreading Center (Dellinger 1988). The second of these consists of Quaternary-aged (2 million years ago to present) alluvial, fluvial and playa or lakebed deposits, primarily derived from the San Gabriel and Sierra Nevada Mountains. These deposits signify a transition into a period of uplift along the western extent of the region creating playa valleys with semi-arid climates where seasonal flooding eroded and carried large quantities of sediment downslope before depositing it in thick layers on top of Cenozoic and older rocks (Dellinger 1988).

## SITE SPECIFIC GEOLOGY AND PALEONTOLOGY

According to published geologic maps (Dibblee and Minch 2008), the Project area is entirely underlain by Surficial sediments of unconsolidated, undissected alluvial gravel, sand, and silt (Qa) of Holocene age (11,700 years ago to today) (Figure 3). Due to their young age, Holocene deposits have not been able to accumulate or preserve significant biological material and are

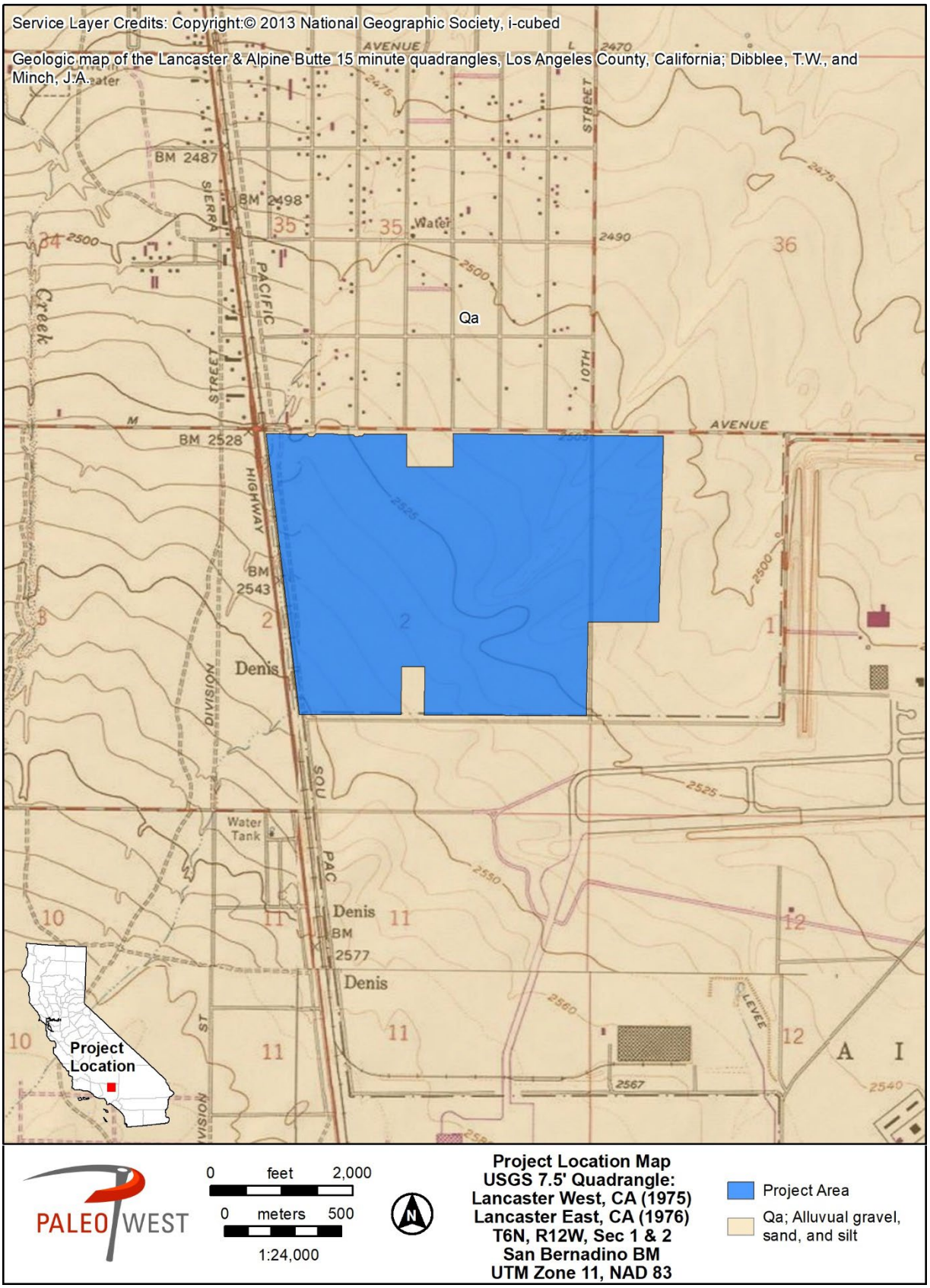



Figure 3: Project geology map.

considered to have low paleontological sensitivity. However, late Holocene deposits can transition with depth into older Pleistocene age (2.6 million years ago to 11,700 years ago) deposits which have a high paleontological sensitivity. The City of Palmdale General Plan describes much of the geologic units underlying the Palmdale area as "Pleistocene alluvium which is of high potential… covered by a thin layer of recent [Holocene] alluvium" (City of Palmdale 1993). Elsewhere in Los Angeles County, Pleistocene deposits have produced remains of a diverse fauna of hundreds of terrestrial (Jefferson 1991a, 1991b; Miller 1971, Stock and Harris 2001) and marine organisms (Delong 1939, Woodring, et al. 1946).

## RECORDS SEARCH RESULTS

The NHMLAC does not have on record any previously recorded vertebrate fossil localities directly within the proposed Project boundaries; however, several fossil localities from sedimentary deposits similar to those within the Project site have been recorded in the vicinity (Fossil Locality Numbers LACM VP 7884, LACM VP 5946, LACM VP 5947, LACM VP 7853, LACM VP CIT451, and LACM VP 7891). North of the project, LACM VP 7884 produced remains of camel (*Camelops hesternus*) at 4 feet (ft) bgs, and LACM VP 7853 produced abundant remains of multiple large and small mammals and scaled reptiles between 3 and 11 ft bgs. Southeast of the Project, LACM VP 5946 produced remains of a lizard (*Gambelia wislizenii*) between 0 and 10 ft below ground surface (bgs). Further to the southeast, LACM VP 5947 produced remains of a pocket gopher (*Thomomys*) between 0 and 10 ft bgs, and LACM VP CIT451 produced remains of Mastodon (Mammutidae) and horse (Equidae) at an unknown depth (Bell 2022).

A supplemental review of online museum collections records maintained by the UCMP, SDNHM, PBDB, and FAUNMAP returned no previously recorded vertebrate localities in the vicinity of the Project (Graham and Lundelius 2010, PBDB 2022, SDNHM 2022, UCMP 2022). Extensive Pleistocene fossils have been recovered from deposits in Los Angeles County, but they are almost exclusively from further south, such as the La Brea Tar Pits of the Los Angeles Basin and San Pedro Sand of Palos Verdes Peninsula. Table 1 below summarizes the compiled information on known vertebrate localities from the vicinity of the Project.

## FINDINGS

The two closest localities (LACM VP 7884 and LACM VP 7853) produced fossils at 4 ft and 3 ft bgs, respectively, though further locations have produced fossils at a shallower depth (Bell 2022). The presence of Pleistocene fossils in the vicinity, combined with the lack of mapped exposures of Pleistocene sediments within the Project area, would give the Surficial sediments an undetermined sensitivity (SVP 2010). This classification would be consistent with the unknown sensitivity assigned by the City of Palmdale (1993). Excavations may impact Pleistocene deposits of Qa, which should be treated as high paleontological sensitivity (SVP 2010). Excavation into Pleistocene deposits could potentially impact paleontological resources and should be monitored by a qualified paleontological monitor to identify and effectively salvage any recovered resources while minimizing discovery-related delays. PaleoWest recommends a pedestrian survey of the Project area to determine if fossils or fossil-bearing units are exposed at or near the ground surface.

**Table 1. Vertebrate Localities Reported from the Project Vicinity, San Bernardino County**

| LOCALITY NO. | GEOLOGIC UNIT | AGE | TAXA |
|---|---|---|---|
| LACM VP 7884 | Unknown formation (fluvial brown clayey silt) | Pleistocene | Camel (*Camelops hesternus*) |
| LACM VP 7853 | Unknown (sand loess under a dune deposit strand, sand siltstone, siltstone to clayey siltstone) | Pleistocene | Rabbit (*Sylvagus*), camel family (Camelidae), antelope squirrel (*Ammospermophilus*), kangaroo rat (*Dipodymus*), pocket mouse (*Perognathus*), pack rat (*Neotoma*), deer mouse (*Peromyscus*), vole family (Microtinae), iguana (*Dipsosaurus*), pocket gopher (*Thomomys*), spiny lizard (*Sceloporus*), side blotched lizard (*Uta*), colubrid snakes (*Trimorphodon*, *Masticophis*, *Phyllorhynchus*), night lizard (*Xantusia*), western alligator lizard (*Elgaria*), toothy skinks (*Plestiodon*), whiptail lizard (Aspidocelis), spiny lizards (Phrynosomatidae), smelt (Osmeridae) |
| LACM VP 5946 | Unknown formation | Holocene | Lizard (*Gambelia wislizenii*) |
| LACM VP 5947 | Unknown formation | Holocene | Pocket gopher (*Thomomys*) |
| LACM VP CIT451 | Harold Formation | Pleistocene | Mastodon (Mammutidae), horse family (Equidae) |

**Sources:** McLeod 2022

# RECOMMENDATIONS

In general, the potential for a given project to result in negative impacts to paleontological resources is directly proportional to the amount of ground disturbance associated with the project; thus, the higher the amount of ground disturbances within geological deposits with a known paleontological sensitivity, the greater the potential for negative impacts to paleontological resources. Information about the proposed Project indicated ground disturbance is anticipated to reach 25 ft bgs. Sediments in the Project area have an unknown paleontological sensitivity, potentially containing high sensitivity Pleistocene deposits at or near the ground surface. Ground disturbing activities in previously undisturbed portions of the Project may result in significant impacts under CEQA to paleontological resources, such as destruction, damage, or loss of scientifically important paleontological resources. A qualified paleontologist should be retained to develop and implement the measures recommended below. A review of the grading and excavation plans, when available, should help inform the need for the measures below. These measures have been developed in accordance with SVP guidelines; if implemented, these measures will satisfy the requirements of CEQA.

## WORKER'S ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

Prior to the start of the proposed Project activities, a qualified paleontologist will perform a pedestrian field survey of the project area to determine if fossils or fossil-bearing Pleistocene deposits are exposed at or near the surface in the Project area. If Pleistocene deposits are observed at or near the surface, this information will be used to determine when paleontological monitoring or Project-related excavations will occur.

## WORKER'S ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

Prior to the start of the proposed Project activities, all field personnel will receive a worker's environmental awareness training on paleontological resources. The training will provide a description of the laws and ordinances protecting fossil resources, the types of fossil resources that may be encountered in the Project area, the role of the paleontological monitor, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist. The training will be developed by the Project Paleontologist and can be delivered concurrent with other training including cultural, biological, safety, etc.

## PALEONTOLOGICAL MITIGATION MONITORING

Prior to the commencement of ground-disturbing activities, a professional paleontologist will be retained to prepare and implement a Paleontological Resources Mitigation and Monitoring Plan (PRMMP) for the proposed Project. The PRMMP will describe the monitoring required during excavations that impact Pleistocene sediment and the location of areas deemed to have a high paleontological resource potential. Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls. If the Project Paleontologist determines full-time monitoring is no longer warranted, based on the geologic conditions at depth, he or she may recommend that monitoring be reduced or cease entirely.

## FOSSIL DISCOVERIES

If a paleontological resource is discovered, the monitor will have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and, if appropriate, collected. If the resource is determined to be of scientific significance, the Project Paleontologist shall complete the following:

1. Salvage of Fossils. If fossils are discovered, all work in the immediate vicinity should be halted to allow the paleontological monitor, and/or Project Paleontologist to evaluate the discovery and determine if the fossil may be considered significant. If the fossils are determined to be potentially significant, the Project Paleontologist (or paleontological monitor) should recover them following standard field procedures for collecting paleontological as outlined in the PRMMP prepared for the project. Typically, fossils can be safely salvaged quickly by a single paleontologist and not disrupt construction activity. In some cases, larger fossils (such as complete skeletons or large mammal fossils) require more extensive excavation and longer salvage periods. In this case the paleontologist should have the authority to temporarily direct, divert or halt construction activity to ensure that the fossil(s) can be removed in a safe and timely manner.

2. Fossil Preparation and Curation. The PRMMP will identify the museum that has agreed to accept fossils that may be discovered during project-related excavations. Upon completion of fieldwork, all significant fossils collected will be prepared in a properly equipped laboratory to a point ready for curation. Preparation may include the removal of excess matrix from fossil materials and stabilizing or repairing specimens. During preparation and inventory, the fossils specimens will be identified to the lowest taxonomic level practical prior to curation at an accredited museum. The fossil specimens must be delivered to the accredited museum or repository no later than 90 days after all fieldwork is completed. The cost of curation will be assessed by the repository and will be the responsibility of the client.

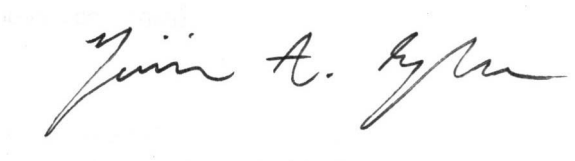
### FINAL PALEONTOLOGICAL MITIGATION REPORT

Upon completion of ground disturbing activity (and curation of fossils if necessary) the Project Paleontologist should prepare a final mitigation and monitoring report outlining the results of the mitigation and monitoring program. The report should include discussion of the location, duration and methods of the monitoring, stratigraphic sections, any recovered fossils, and the scientific significance of those fossils, and where fossils were curated.

It has been a pleasure working with you on this Project. If you have any questions, please do not hesitate to contact us.

Sincerely,

PALEOWEST



Benjamin Scherzer, M.S.
Senior Paleontologist

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