



January 16, 2024

Nicole Morse
Principal
T&B Planning, Inc.
3200 El Camino Real, Suite 100
Irvine, CA 92602
Transmitted via email to NMorse@tbplanning.com

RE: Paleontological Resource Technical Memorandum for the Lake Creek Logistics Center Project, Town of Apple Valley, San Bernardino County, California

Dear Nicole Morse,

At the request of T&B Planning, Inc., PaleoWest, LLC dba Chronicle Heritage (Chronicle Heritage) prepared a paleontological resource technical memorandum for the Lake Creek Logistics Center (Project), in the town of Apple Valley, San Bernardino County, California. The goal of the assessment was to detail the results of the literature review and museum records search, summarize the paleontological sensitivity of the geologic units in and within the vicinity of the Project area, assess impacts from Project implementation to scientifically significant paleontological resources under the California Environmental Quality Act (CEQA) guidelines, and provide management recommendations for avoiding or reducing adverse effects to paleontological resources from Project development, as necessary.

This paleontological resource assessment included a fossil locality records search conducted by the Natural History Museum of Los Angeles County (NHMLAC). The records search was supplemented by a review of existing geologic maps and primary literature regarding fossiliferous geologic units that are relevant to the analysis of existing data of the Project. 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 CEQA.

Project Location and Description

The proposed Project is bound by Gustine Street to the north, Central Road to the east, Corwin Road to the south, and the Apple Valley Airport to the west in the town of Apple Valley (Figure 1). The Project area consists of five parcels (Assessor Parcel Numbers [APNs] 0463-373-01, 0463-373-03, 0463-373-04, 0463-373-05, and 0463-373-06) that total approximately 227 acres. More specifically, the Project area is within the southeastern quarter and a portion of the southwestern quarter of Section 27 of Township 6 North, Range 3 West, San Bernardino Baseline and Meridian, as depicted on the Apple Valley North, California 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle (Figure 2). The elevation of the Project area ranges from 2,980 to 3,080 feet above mean sea level.



Paleontological Resource Assessment for the Apple Valley Logistics Project,
Town of Apple Valley, San Bernardino County, California



Figure 1. Project vicinity map.

Paleontological Resource Assessment for the Apple Valley Logistics Project,
Town of Apple Valley, San Bernardino County, California

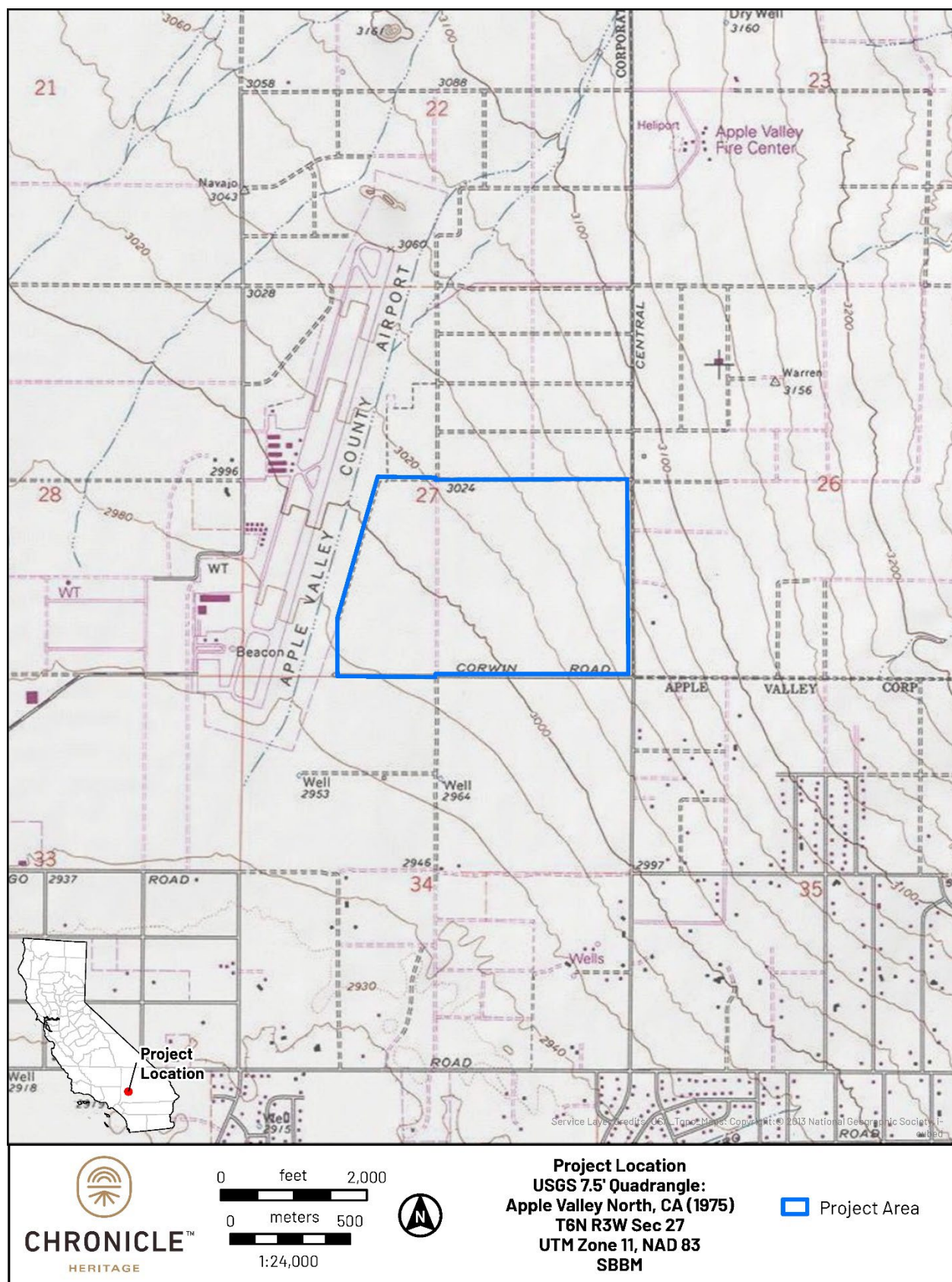


Figure 2. Project location map.

The Project proposes to construct three warehouse structures totaling approximately 3.48 million ft². Together, the warehouses would provide a total of 60,000 office spaces on the property. The warehouses would also provide 3,032 stalls for automobile parking, which includes standard stalls, American with Disabilities Act stalls, and electric vehicle stalls, 1,565 truck-trailer parking stalls, and 548 dock doors. Other improvements include the construction of full street classifications of Central Road, Gustine Road, and Corwin Road.

Regulatory Context

Paleontological resources (i.e., fossils) 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 and regulations. Laws pertinent to this Project are discussed below.

State Laws and Regulations

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 question: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?"

California Public Resources Code

Section 5097.5 of the PRC states the following:

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.

Local

The Town of Apple Valley General Plan (Town of Apple Valley, 2009) Chapter III: Environmental Resources, states the following:

The potential for geological formations to produce fossils is evaluated based on what fossil resources have been produced in the past at other nearby locations of similar geologic

composition. There are substantial exposures of Mesozoic-age (65,000,000 to 245,000,000 years ago) rocks in more elevated portions of the Town that may contain no fossils. Shallow grading of younger Quaternary alluvium that occurs throughout most of the area is not likely to reveal significant fossil remains. Potential for the presence of significant non-renewable paleontological resources exists where surface or subsurface Pleistocene-age (11,550 to 118,000 years ago) soils occur in the planning area. High priority is also given to older sediments along the Mojave River and at unknown depth below the surface.

Based on research of surface deposits, the soils in the planning area, which are relatively young, have a low potential for containing significant fossil remains. Surface deposits may in some areas constitute only a "veneer cover" that directly overlays older sediments; however, research indicates that no fossils have been reported in Town. Reports have, however, identified localities with fossil resources of an age that is similar soil deposits to those that occur in the Town and Sphere of Influence. In the overall, research indicates that there is a range of likelihood from low to high of encountering paleontological resources during future development projects; as discussed above, the potential depends on the location and sediments encountered. (Town of Apple Valley, 2009, p. III-64 - III-65)

Paleontological Resources

Paleontological Resource Definition

SVP has provided guidance designed to support state and federal environmental review. The SVP broadly defines significant paleontological resources as follows:

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). (SVP, 2010)

Significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, diagnostically important; are common but have the potential to provide valuable scientific information for evaluating evolutionary patterns and processes; or that could improve our understanding of paleochronology, paleoecology, paleophylogeography, 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 patterns and processes, evolutionary rates, and paleophylogeography. 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.

This definition is used for all projects that are subject to CEQA since CEQA does not define "a unique paleontological resource or site."

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 geologic units, (or members thereof), underlying a project area can be assigned to one of four categories defined by SVP (2010). Although these standards were written specifically to protect vertebrate paleontological resources, all fields of paleontology have adopted the following guidelines.

High Potential (Sensitivity)

Rock units from which significant vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered have a high potential for containing significant nonrenewable fossiliferous resources. These units include but are not limited to, sedimentary formations and some volcanic formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas which that contain potentially datable organic remains older than recent, including deposits associated with nests or middens, and areas which that may contain new vertebrate deposits, traces, or trackways are also classified as significant.

Low Potential (Sensitivity)

Sedimentary rock units that are potentially fossiliferous but have not yielded fossils in the past or contain common and widespread invertebrate fossils of well-documented and understood taphonomic, phylogenetic species, and habitat ecology are considered to have a low potential for containing significant nonrenewable fossiliferous resources. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow a determination that some areas or units have a low potential for yielding significant fossils before the start of construction. Generally, these units will be poorly represented by specimens in institutional collections and will not require protection or salvage operations. However, as excavation for construction is underway, it is possible that significant and unanticipated paleontological resources might be encountered and require a change of classification from low to high potential and thus require monitoring and mitigation if the resources are found to be significant.

Undetermined Potential (Sensitivity)

Specific areas underlain by sedimentary rock units for which little information is available have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to determine the rock units' potential are required before programs of impact mitigation for such areas can be developed.

No Potential

Rock units of metamorphic or igneous origin are commonly classified as having no potential for containing significant paleontological resources.

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 in and within 3 miles (mi) of the project area is necessary to determine whether fossil localities have been previously discovered within a particular rock unit. For this Project, a formal museum records search was conducted at the NHMLAC. Informal records searches were also conducted of the online University of California Museum of Paleontology Collections and San Diego Natural History Museum Collections as well as the online Paleobiology Database, FAUNMAP, Integrated Digitized Biocollections, and other published and unpublished geological and paleontological literature of the area.

Resource Context

Geologic Setting

The Project area is in the southwestern portion of the Mojave Desert geomorphic province. The Mojave Desert is a broad interior region of isolated mountain ranges separated by expanses of desert plains bordered and controlled by two prominent faults, the Garlock fault to the northwest and the San Andreas fault to the southwest (California Geological Survey [CGS], 2002). Locally, the Project area is in a valley basin surrounded by mountains of igneous intrusions, mostly emplaced during the Cretaceous Period (145 million years ago [Ma] to 66 Ma) (Dibblee, 1967). Sedimentary deposits in the basin area are dominated by alluvial detritus from the surrounding mountains deposited during the Pleistocene (2.6 Ma to 11,700 years ago) and Holocene (11,700 years ago to today) Epochs (Dibblee, 1967).

Site Specific Geology and Paleontology

According to Hernandez and Tan (2007), the Project is entirely underlain by old alluvial deposits (Qoa) composed of moderately consolidated, brown, fine- to medium-grained sand and fine to medium gravel composed of metamorphic, volcanic, and plutonic clasts deposited approximately 129,000–11,700 years ago during the late Pleistocene (Figure 3). Elsewhere in San Bernardino County, Pleistocene deposits have produced remains of a diverse terrestrial fauna including ground sloth, deer, mammoth, camel, horse, bison, badger, mole, rabbit, gray fox, coyote, snake, and rodent (Miller, 1971; Jefferson, 1991a, 1991b; Reynolds and Reynolds, 1991) and have a high potential for paleontological resources.

Paleontological Resource Assessment for the Apple Valley Logistics Project,
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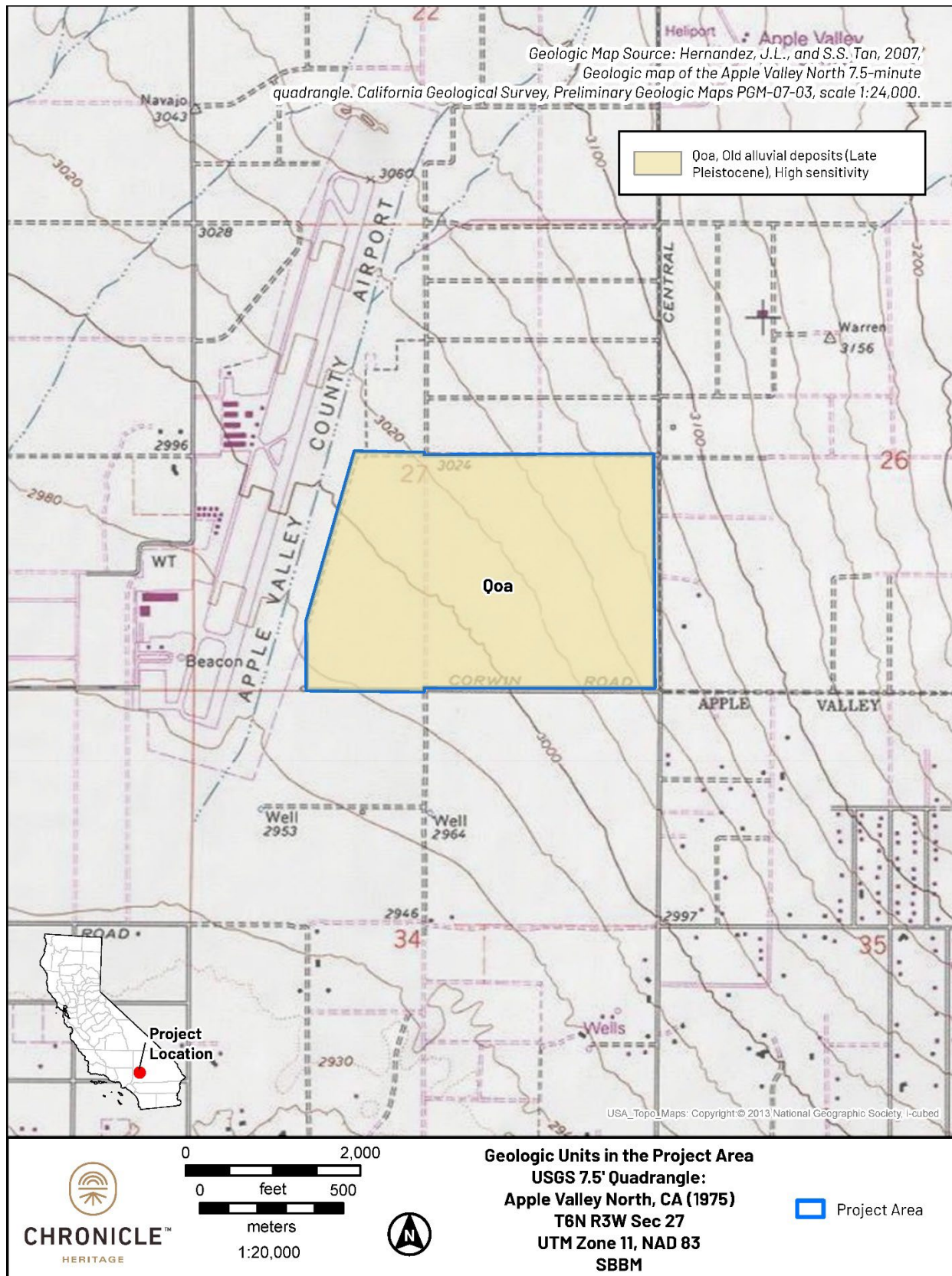


Figure 3. Geologic map of the Project area.

Records Search Results

The NHMLAC records search did not produce any fossil localities from within the Project area but did produce six localities in similar geologic deposits in the vicinity (Attachment A)(Table 1). Searches of online databases and other literature did not produce any fossil localities within 3 mi (Miller, 1971; Jefferson, 1991a, 1991b; Graham and Lundelius, 2010; iDigBio, 2024; Paleobiology Database, 2024; San Diego Natural History Museum, 2024; University of California Museum of Paleontology, 2024).

Table 1. Pleistocene Fossil Localities Documented in Vicinity of the Project

Locality No. ¹	Age	Formation	Taxa	Depth	Distance
LACM VP 3498	Pleistocene	Shoemaker Gravel	Horse (<i>Equus</i> sp.), deer (Cervidae), antelope (Antilocapridae)	Not specified	6 mi west
LACM VP 3352	Pleistocene	Shoemaker Gravel	Horse	Not specified	6.5 mi west
LACM VP 3353	Pleistocene	Shoemaker Gravel	Horse	Not specified	6.5 mi west-southwest
LACM VP 1224	Pleistocene	Shoemaker Gravel	Camelid (Camelidae)	Not specified	8 mi southwest
LACM IP 6125	Pleistocene	Unknown	Unspecified invertebrates	Not specified	12 mi southeast

¹ Attachment A: NHMLAC collection records

Findings

This memorandum uses the SVP system (2010) to assess paleontological sensitivity and the level of effort required to manage potential impacts to significant fossil resources. Using this system, the sensitivity of geologic units was determined by the relative abundance and risk of adverse impacts to vertebrate fossils and significant invertebrates and plants.

Based on the literature review and museum records search results, and in accordance with the SVP (2010) sensitivity scale, the old alluvial deposits (Qoa) in the Project area have a high paleontological sensitivity at the surface because similar Pleistocene sedimentary deposits have yielded significant fossils in the vicinity of the Project. Because of the presence of fossil localities in the vicinity, Project-related ground disturbance has the potential to affect paleontological resources throughout the Project area.

Recommendations

In general, the potential for a given project to result in 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 impacts to paleontological resources. Since this Project includes construction of warehouse structures, ground disturbances are anticipated. The presence of Pleistocene sediment at the surface and the presence of Pleistocene fossil localities in the vicinity suggests that ground disturbance may result in significant impacts under CEQA to

paleontological resources such as destruction, damage, or loss of scientifically important paleontological resources. Therefore, a qualified paleontologist should be retained to develop and implement the measures recommended 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, all field personnel should receive a worker's environmental awareness training on paleontological resources. The training should 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, an outline of steps to follow if a fossil discovery is made, and the contact information for the project paleontologist. The training will be developed by the project paleontologist and can be delivered concurrently with other training including cultural, biological, safety, and others.

Paleontological Mitigation Monitoring

Prior to the commencement of ground-disturbing activities, a professional paleontologist should be retained to prepare and implement a paleontological mitigation plan for the Project. The plan will describe the monitoring required during ground-disturbing activities starting at the surface. 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, they 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 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 resources as outlined in the paleontological mitigation plan 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 fossils can be removed in a safe and timely manner.
- (2) **Fossil Preparation and Curation.** The paleontological mitigation plan for the project 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 30 days after all laboratory work 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 a 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.

Thank you for contacting Chronicle Heritage for this Project. If you have any questions, please do not hesitate to contact us.

Sincerely,



Benjamin Scherzer, M.S. | Senior Paleontologist
Chronicle Heritage

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References

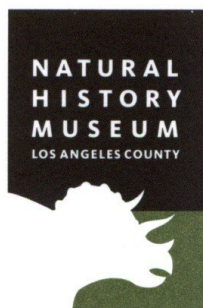
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University of California Museum of Paleontology [UCMP], 2024, UCMP Specimen Search: University of California Museum of Paleontology, <https://ucmpdb.berkeley.edu/> (accessed December 2023).

Attachment A.
NHMLAC Record 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

December 24, 2023

Chronicle Heritage
Attn: Benjamin Scherzer

re: Paleontological resources for the Apple Valley Logistics Project, #23-PC-01357

Dear Benjamin:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the Apple Valley Logistics project area as outlined on the portion of the Apple Valley North USGS topographic quadrangle map that you sent to me via e-mail on December 19, 2023. 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 3498	West of Portland Cement Co. plant in bluffs on west side of Mojave River, midway between I-15 and Air Expressway Rd.	Shoemaker Gravel Formation	Horse (<i>Equus</i>); deer (<i>Cervidae</i>); antelope (<i>Antilocapridae</i>)	Unknown
LACM VP 3352	West bank of the Mojave River, north end of Victorville (more precise locality not available)	Shoemaker Gravel Formation	Horse (<i>Equus</i>)	Unknown
LACM VP 3353	Second Street at sand & gravel pit; near top of bluff, west bank of Mojave River	Shoemaker Gravel Formation	Horse (<i>Equus</i>)	unknown
LACM VP 1224	North of Hesperia, near Dean Ave. & Dean Place	Shoemaker Gravel Formation	Camel family (<i>Camelidae</i>)	Unknown
LACM IP 6125	East end of Rabbit Lake; San Bernardino Co. Sand Pit between forks of road	Unknown formation (Pleistocene)	Invertebrates (unspecified)	Unknown

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,

A handwritten signature in black ink that reads "Alyssa Bell". The signature is written in a cursive, flowing style. The letters are connected, and the overall appearance is that of a personal or professional signature on a document.

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

enclosure: invoice

