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Paleontological Resources Technical Study

Zone Change No. PP-ZC-24-0005
South of Rosedale Highway (APN 368-060-32)
City of Bakersfield, California

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Executive Summary

This paleontological resources technical study was prepared for the Zone Change No. PP-ZC-24-0005, South of Rosedale Highway project (Project), located in the western portion of the City of Bakersfield, Kern County, California. The purpose of this report is to provide baseline data on the paleontological resources at the Project site, evaluate the significance of these resources, examine potential impacts to paleontological resources that may occur during construction of the Project, and provide recommended mitigation measures designed to fulfill paleontological resource compliance requirements set by Kern County. The report also includes the results of a literature review, an institutional paleontological records search at the Natural History Museum of Los Angeles County (NHMLA), and an internal search of the paleontological records at the San Diego Natural History Museum (SDNHM).

The Project site encompasses approximately three acres within Assessor's Parcel Number 368-060-32, which is located south of Rosedale Highway and east of Coffee Road, and is bounded on all sides by existing development. The Project proposes a zone change from Agriculture to General Manufacturing.

As depicted on published geologic maps covering the Project area, the Project site is reported to be entirely underlain by sediments mapped as Holocene-age alluvial deposits, which are in turn underlain in the subsurface by middle to late Pleistocene-age old alluvial fan deposits.

Following the paleontological resource potential criteria developed by the Society of Vertebrate Paleontology, a low paleontological resource potential is assigned to Holocene-age alluvial deposits based on their relatively young geologic age and lack of documented fossil discoveries. In contrast, a high paleontological resource potential is assigned to old alluvial fan deposits, based on their age, depositional environment, and proven potential to contain significant fossils.

It is anticipated that proposed earthwork confined to the surficial five feet of soils and sediments at the Project site will only impact Holocene-age alluvial deposits. Because these deposits are assigned a low paleontological resource potential, impacts resulting from earthwork will not be significant and will not require mitigation. In contrast, proposed earthwork that extends deeper than five feet below ground surface (bgs) may impact previously undisturbed middle to late Pleistocene-age old alluvial fan deposits, which are assigned a high paleontological resource potential. Thus, implementation of a paleontological mitigation program in the form of paleontological monitoring is recommended for any earthwork extending deeper than five feet bgs. A series of proposed mitigation measures designed to fulfill paleontological resource compliance requirements issued by Kern County is provided to address this recommendation. Implementation of these mitigation measures will reduce any Project-related impacts to paleontological resources to less than significant levels.

Contents

Executive Summary i

1.0 Introduction 1

1.1 Project Description & Scope of Work 1
1.2 Definition of Paleontological Resources 1
1.2.1 Definition of Significant Paleontological Resources 3
1.3 Regulatory Framework 3
1.3.1 State 3
1.3.2 Kern County 4
1.3.3 City of Bakersfield 4

2.0 Methods 4

2.1 Paleontological Records Searches and Literature Review 4
2.2 Paleontological Resource Assessment Criteria 5
2.3 Paleontological Impact Analysis 6

3.0 Results 6

3.1 Results of the Paleontological Records Searches and Literature Review 6
3.1.1 Geologic Setting 6
3.1.2 Alluvial deposits 7
3.1.3 Old alluvial fan deposits 7
3.2 Results of the Paleontological Resource Potential Analysis 9
3.2.1 Alluvial deposits 9
3.2.2 Old alluvial fan deposits 9
3.3 Results of the Paleontological Impact Analysis 9

4.0 Recommendations & Conclusions 9

4.1 General Strategies for Paleontological Mitigation 11
4.1.1 Avoidance 11
4.1.2 Environmentally Sensitive Areas 11
4.1.3 Paleontological Monitoring 11
4.2 Impact Summary and Recommendations 11
4.2.1 Recommended Mitigation Measures 12

5.0 References 13

Appendix A: Results of NHMLA Paleontological Records Search A1

1.0 Introduction

1.1 Project Description & Scope of Work

This paleontological resources technical study was prepared for the Zone Change No. PP-ZC-24-0005, South of Rosedale Highway Project (Project), located in the western portion of the City of Bakersfield, Kern County, California (Figure 1). The Project site encompasses approximately three acres within Assessor's Parcel Number 368-060-32, which is located south of Rosedale Highway and east of Coffee Road, and is bounded on all sides by existing development. The Project proposes a zone change from Agriculture to General Manufacturing.

The purpose of this paleontological resource assessment is to provide baseline data on the paleontological resources of the Project site. The assessment summarizes existing paleontological resource data for the Project site, discusses the significance of these resources, and examines potential impacts to paleontological resources that may occur as a result of the proposed construction activities. The assessment highlights specific areas within the Project site that are paleontologically sensitive, as well as specific types of earthwork operations that may negatively impact paleontological resources in sensitive areas, and provides recommended mitigation measures designed to fulfill paleontological resource compliance requirements set by Kern County.

This report was prepared for QK under contract to ASM Affiliates, Inc., and was written by Zev Brook, M.S., Katie M. McComas, M.S., and Thomas A. Deméré, Ph.D., of the Department of PaleoServices, San Diego Natural History Museum (SDNHM).

1.2 Definition of Paleontological Resources

As defined here, paleontological resources (i.e., fossils) are the buried remains and/or traces of prehistoric organisms (i.e., animals, plants, and microbes). Body fossils such as bones, teeth, shells, leaves, and wood, as well as trace fossils such as tracks, trails, burrows, and footprints, are found in the geologic units/formations within which they were originally buried. The primary factor determining whether an object is a fossil or not is not how the organic remain or trace is preserved (e.g., "petrified"), but rather the age of the organic remain or trace. Although typically it is assumed that fossils must be older than ~11,700 years (i.e., the generally accepted end of the last glacial period of the Pleistocene Epoch), organic remains older than recorded human history and/or older than middle Holocene (about 5,000 radiocarbon years) can also be considered to represent fossils (Society of Vertebrate Paleontology [SVP], 2010).

Fossils are considered important scientific and educational resources because they serve as direct and indirect evidence of prehistoric life and are used to understand the history of life on Earth, the nature of past environments and climates, the membership and structure of ancient ecosystems, and the pattern and process of organic evolution and extinction. In addition, fossils are considered to be non-renewable resources because typically the organisms they represent no longer exist. Thus, once destroyed, a particular fossil can never be replaced.

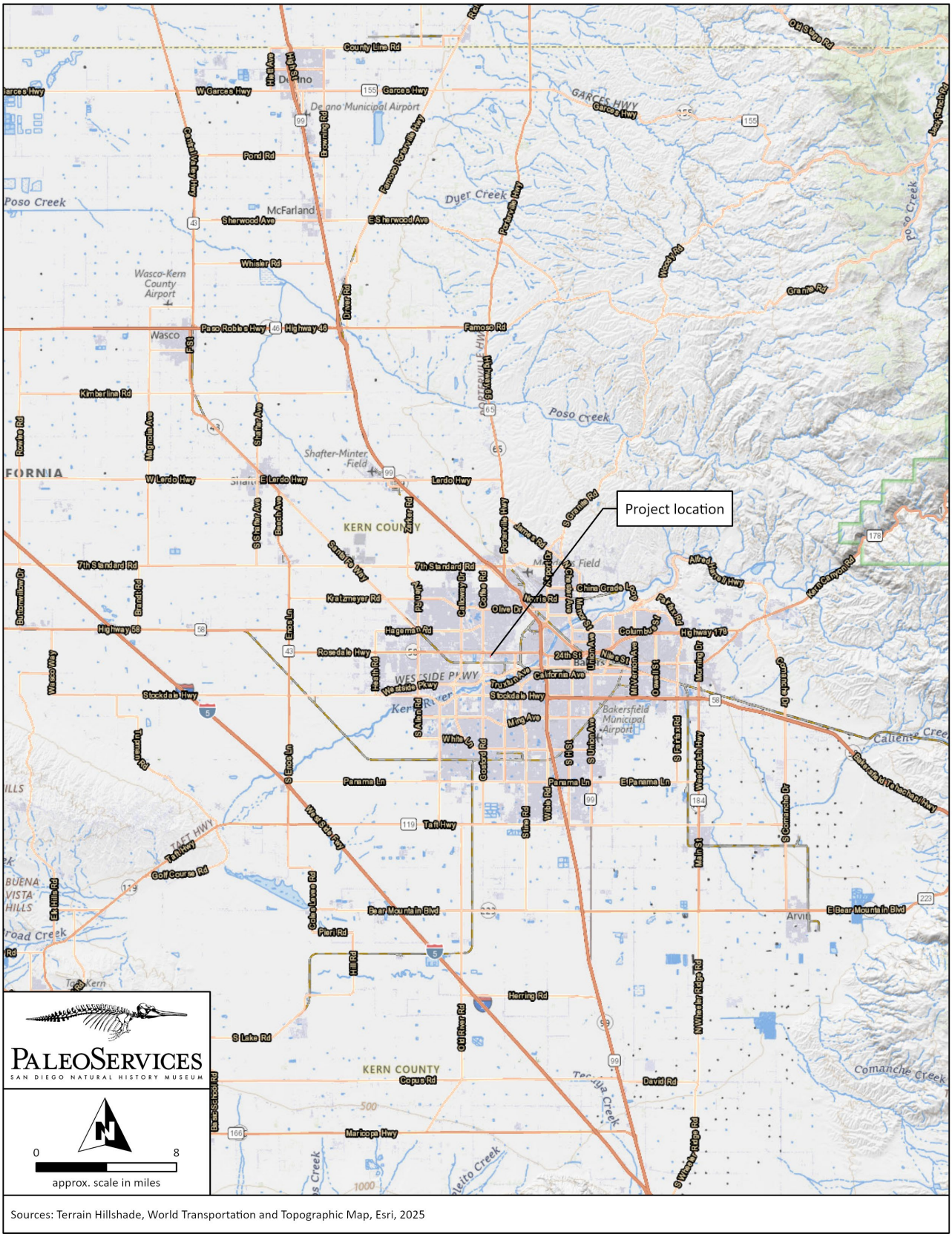


Figure 1. Overview map of the Project location.

The paleontological site, or locality, includes both the geographic and stratigraphic context of fossils—the place on the Earth and stratum (deposited during a particular time in Earth's history) from which the fossils were collected. Localities themselves may persist for decades, in the case of a fossil-bearing outcrop that is protected from natural or human impacts, or may be temporarily exposed and ultimately destroyed, as is the case for fossil-bearing strata uncovered by erosion or construction. Localities are documented with a set of coordinates and a measured stratigraphic section tied to elevation detailing the lithology of the fossil-bearing stratum as well as overlying and underlying strata. This information provides essential context for any future scientific study of the recovered fossils.

1.2.1 Definition of Significant Paleontological Resources

SVP has defined significant paleontological resources as consisting of "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" (SVP, 2010).

Additional scientific significance criteria proposed by Scott and Springer (2003) are outlined below:

- The fossils provide data on the evolutionary relationships and developmental trends among organisms, both living and 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 therein.
- The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas.
- The fossils demonstrate unusual or spectacular circumstances in the history of life.
- 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.

1.3 Regulatory Framework

Because paleontological resources are considered scientifically and educationally significant nonrenewable resources, they are protected under a variety of state (e.g., CEQA, Public Resources Code) and local (e.g., Kern County General Plan, Metropolitan Bakersfield General Plan) laws, regulations, and ordinances. For the Project site, which is located on privately owned land in the City of Bakersfield, Kern County, both state and local regulations are applicable.

1.3.1 State

Notable State legislative protection for paleontological resources includes the California Environmental Quality Act and the Public Resources Code.

The **California Environmental Quality Act (CEQA, Public Resources Code Section 21000 *et seq.*) of 1970** protects paleontological resources on both state and private lands in California. This act requires the identification of environmental impacts of a proposed project, the determination of significance of the impacts, and the identification of alternative and/or mitigation measures to reduce adverse environmental impacts. The Guidelines for the Implementation of CEQA (Title 14, Chapter 3, California Code of Regulations: 15000 *et seq*.) outlines these necessary procedures for complying with CEQA. Paleontological resources are specifically included as a question in the CEQA Environmental Checklist

(Section 15023, Appendix G): "Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature."

Other state requirements for paleontological resource management are included in the **Public Resources Code (Chapter 1.7), Section 5097.5 and 30244**. These statutes prohibit the removal of any paleontological site or feature on public lands without permission of the jurisdictional agency, defines the removal of paleontological sites or features as a misdemeanor, and requires reasonable mitigation of adverse impacts to paleontological resources from developments on public lands. "Public lands" are defined as "lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof."

1.3.2 Kern County

The 2009 **Kern County General Plan** addresses paleontological resources in Chapter 1 (Land Use/Conservation/Open Space Element), Section 1.10 (General Provisions), Subsection 1.10.3 (Archaeological, Paleontological, Cultural, and Historical Preservation).

- Policy 25: The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.
    - Implementation Measure M: In areas of known paleontological resources, the County should address the preservation of these resources, where feasible.

1.3.3 City of Bakersfield

The City of Bakersfield addresses impacts to paleontological resources (fossils) under mineral resources (Chapter V. Conservation Element: Section B. Mineral Resources) in the **Metropolitan Bakersfield General Plan** (adopted in 2002, updated in 2016), and sets forth the following policy and related implementation program specific to paleontological resources:

- Policy 9: Encourage preservation of any known deposits of gemstones and fossils.
    - Implementation Program 2: [...] Unique gem and fossil localities shall be protected from extraction operations. [...]

2.0 Methods

2.1 Paleontological Records Searches and Literature Review

Paleontological records searches were conducted at several regional institutions in order to identify any documented fossil collection localities in the vicinity of the Project site. These include a formal search of the paleontological collections at the Natural History Museum of Los Angeles County (NHMLA), as well as an internal search of the paleontological collections records at the SDNHM.

In addition, a literature review was conducted to gain a greater understanding of the geologic conditions of the Project site and surrounding area, as well as to determine the types of fossils that specific geologic units underlying the Project site have produced, if any. The literature review included examination of relevant published geologic maps and reports, peer-reviewed paleontological papers, and other relevant literature (e.g., field trip guidebooks, unpublished theses and dissertations, archived paleontological mitigation reports). This approach was followed in recognition of the direct relationship between paleontological resources and the geologic units within which they are found. Knowing the

geologic history of a particular area and the fossil productivity of geologic units that occur in that area, it is possible to predict where fossils may or may not be encountered.

2.2 Paleontological Resource Assessment Criteria

The Society of Vertebrate Paleontology (SVP, 2010) has developed mitigation guidelines for paleontological resources that were developed with input from a variety of federal and state land management agencies and conform with industry standards (Murphey et al., 2019). Use of the SVP (2010) guidelines is common practice by CEQA lead agencies.

The SVP (2010) guidelines recognize that significant paleontological resources are considered to include not only actual fossil remains and traces, but also the fossil collecting localities and the geologic units containing those fossils and localities, and thus evaluate paleontological resource potential of individual geologic units within a project area. Paleontological resource potential is determined based on the existence of known fossil localities within a given geologic unit, and/or the potential for future fossil discoveries, given the age and depositional environment of a particular geologic unit. The SVP guidelines include four classes of paleontological resource potential: High Potential, Low Potential, No Potential, or Undetermined Potential (SVP, 2010). The criteria for each paleontological resource potential ranking is outlined below, as defined by SVP (2010).

2.2.1 High Potential

Geologic units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e. g., ashes or tephras), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary geologic units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological resource potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Geologic units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and geologic units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

2.2.2 Undetermined Potential

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

2.2.3 Low Potential

Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some geologic units have low potential for yielding significant fossils. Such

geologic units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule (e.g., basalt flows or Recent colluvium). Geologic units with low potential typically will not require impact mitigation measures to protect fossils.

2.2.4 No Potential

Some geologic 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). Geologic units with no potential require no protection nor impact mitigation measures relative to paleontological resources.

2.3 Paleontological Impact Analysis

Direct impacts to paleontological resources occur when earthwork operations cut into the geologic units within which fossils are buried and physically destroy the fossil remains. As such, only those project-related excavations that will disturb potentially fossil-bearing geologic units have the potential to significantly impact paleontological resources. As described above, potentially fossil-bearing geologic units are those rated with a high potential. Taking a conservative approach, geologic units with an undetermined potential are also considered to be potentially fossil-bearing, until proven otherwise. Although impact avoidance is possible through relocation of a proposed action, paleontological monitoring during construction is typically recommended to reduce any negative impacts to paleontological resources to less than significant levels.

The purpose of the impact analysis is to determine which (if any) of the proposed Project-related earthwork activities may disturb potentially fossil-bearing geologic units, and where and at what depths these potential impacts will occur. The paleontological impact analysis involved analysis of available Project documents and comparison with geological and paleontological data gathered during the records searches and literature review.

3.0 Results

3.1 Results of the Paleontological Records Searches and Literature Review

A formal records search request of the NHMLA paleontological collections did not identify any documented fossil collection localities from Pleistocene alluvial deposits in the general vicinity of the Project site, but did note the presence of NHMLA fossil localities in equivalent Pleistocene nonmarine deposits that occur elsewhere in Kern County (see Appendix A).

A records search of the SDNHM paleontological collection database did not identify any fossil collection localities definitively located within five miles of the Project site, nor any localities from Pleistocene alluvial deposits in the general vicinity of the Project site.

The results of the literature review are discussed below.

3.1.1 Geologic Setting

The Project site is located in the western portion of the City of Bakersfield, in central Kern County, California. Bakersfield is located in the southern Great Valley geomorphic province (Norris and Webb, 1990), which encompasses the entire San Joaquin Valley. The San Joaquin Valley is bounded by the

southern Coast Ranges to the west, the Tehachapi Mountains to the south, and the foothills of the Sierra Nevada to the east (Figure 1). The oil-producing geologic units of the San Joaquin Valley record the history of a late Mesozoic to Cenozoic (~100 to 2.5 million years old; myo) inland sea that was intermittently connected to the Pacific Ocean and once occupied the majority of the southern San Joaquin Valley (Scheirer and Magoon, 2007). This inland sea receded during Pliocene to Pleistocene (~3 to 1.5 myo) times as the adjacent Coast Ranges were being uplifted as a result of tectonic activity associated with the San Andreas Fault Zone.

For the most part, the San Joaquin Valley is a broad alluvial plain, the southern portion of which is primarily a closed basin with Sierran rivers like the Tule River and Kern River flowing into it and, until the 20th century, filling large and landlocked freshwater lakes (e.g., Tulare Lake, Kern Lake, and Buena Vista Lake). From the Pleistocene through the present, sediments eroded out of the surrounding highlands have been transported downslope to form extensive coalesced alluvial fans near the mountain fronts, and finer-grained fluvial and lacustrine deposits farther out on the valley floor. The extensive Kern River alluvial fan is the southernmost alluvial fan complex of the western Sierra Nevada, and consists of sediments derived from erosion of granitic rocks exposed in the eastern mountains and transported westward by the Kern River as it incised the Kern River gorge (Dale et al., 1966).

Published geologic maps and reports (e.g., Bedrossian et al., 2012; Figure 2) indicate that the Project site is entirely underlain at the surface by Holocene-age undivided alluvial deposits. These surficial deposits are underlain in the subsurface by middle to late Pleistocene-age old alluvial fan deposits, which are mapped as being exposed at the surface about half a mile to the north of the Project site.

3.1.2 Alluvial deposits

Published geologic mapping by Bedrossian et al. (2012) indicates that the entirety of the Project site is underlain by a surficial sequence of Holocene-age (less than 11,700 years old) undivided alluvial deposits (Figure 2). These sediments were mainly deposited during the late Holocene, but likely transition in the shallow subsurface of the site to older Pleistocene-age deposits. Holocene-age deposits do not typically contain fossils because of their young age, and any subfossil remains would generally be conspecific with extant organisms in the area.

3.1.3 Old alluvial fan deposits

Published geologic mapping by Bedrossian et al. (2012) indicates that middle to late Pleistocene-age (129,000 to 11,700 years old) old alluvial fan deposits are present at the surface approximately half a mile north of the Project site, and likely underlie the entirety of the Project site in the subsurface at uncertain depths (Figure 2). These older sediments primarily consist of alluvial fan deposits that were deposited during the Pleistocene and were subsequently uplifted by regional tectonic activity. Old alluvial fan deposits are conservatively estimated to be present at depths as shallow as five feet below ground surface (bgs) underlying the entirety of the Project site. This estimated depth of occurrence may be confirmed or modified by any future Project-specific geotechnical evaluations.

Paleontological resources in alluvial deposits of Pleistocene age are only sparsely known in the general vicinity of the Project site, and in Kern County, are nearly late Pleistocene in age (~120,000 to 11,700 years old) and broadly correlative with the Rancholabrean North American Land Mammal Age. One fossil locality in Pleistocene-age alluvial deposits was documented during construction of the Sycamore Cogeneration Plant located approximately six miles northeast of the Project site (Reynolds, 1990). The recovered fossils includes skeletal remains of frogs, colubrid snakes, the pocket gopher *Thomomys* sp., the meadow vole *Microtus* sp. cf. *M. californicus*, and unidentified small- and large-bodied mammals. Fossils have also been recovered from old alluvial fan deposits in the Bakersfield area at Eagle Crest, during construction of the Bakersfield Canal, and near Poso Creek (Jefferson, 1991).

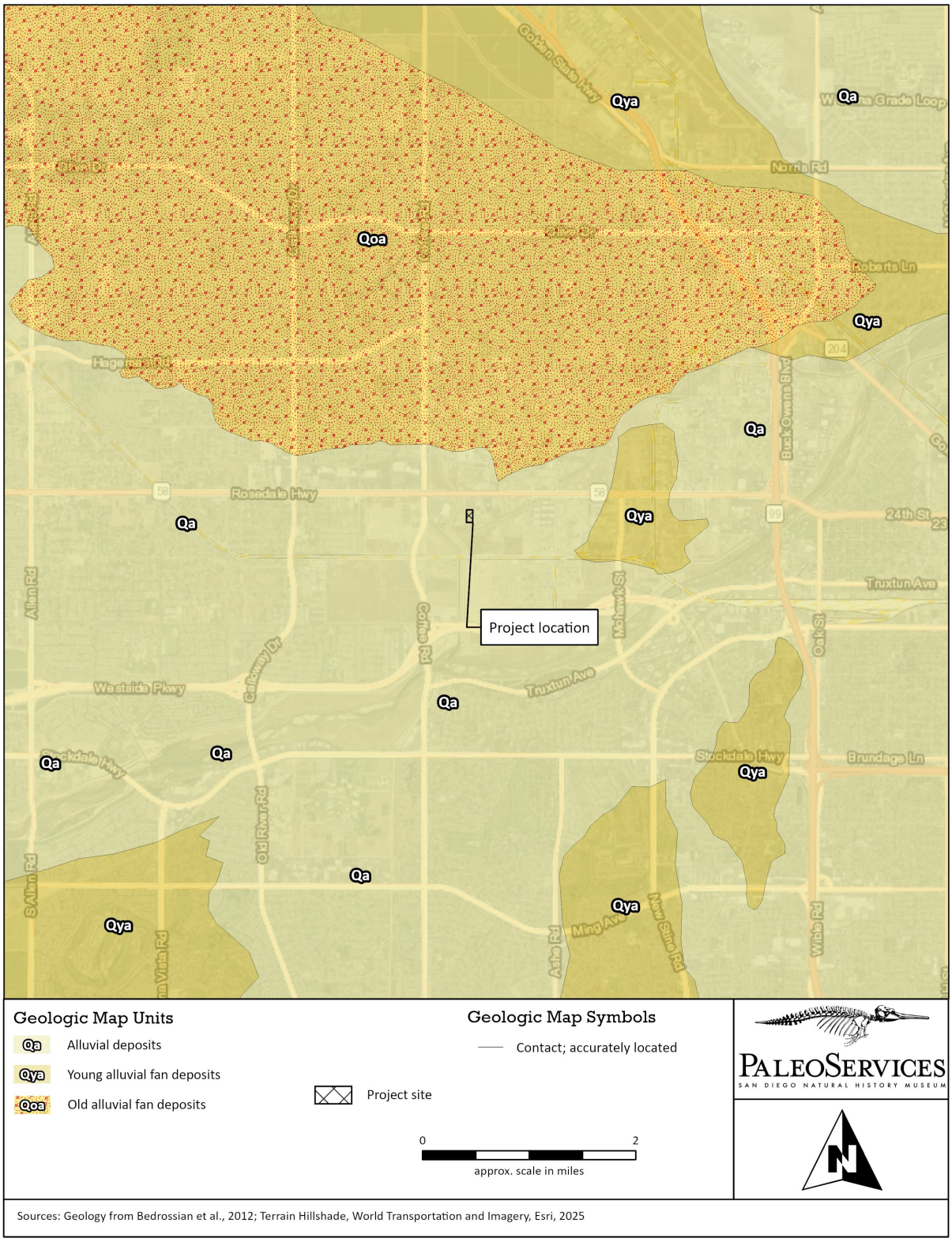


Figure 2. Geologic map of the Project site and vicinity.

Taken together with localities documented elsewhere in the southern San Joaquin Valley, Pleistocene-age alluvial deposits have produced fossil remains of freshwater snails and bony fishes, as well as fossils of terrestrial insects, salamanders, frogs, turtles, snakes, lizards, birds, small mammals (e.g., rabbits and hares, pocket mice, kangaroo rats, geomyid rodents, muskrats, shrews, bats), and large mammals (e.g., horse, deer, pronghorn, coyote, fox, mammoth) (Jefferson, 1991; Reynolds, 1990).

3.2 Results of the Paleontological Resource Potential Analysis

The paleontological resource potential of each geologic unit present within the Project site is assigned below using the classification system developed by SVP (2010; see Section 2.2). The paleontological resource potential of geologic units underlying the Project site is also summarized in Table 1 and depicted in Figure 3.

Table 1. Summary of paleontological resource potential of geologic units underlying the Project site.

Geologic Unit	Age (years old)	Paleontological Resource Potential
alluvial deposits (Qa)	Holocene (less than 11,700)	Low potential
old alluvial fan deposits (Qoa)	middle to late Pleistocene (129,000 to 11,700)	High potential

3.2.1 Alluvial deposits

A low paleontological resource potential is assigned to Holocene-age alluvial deposits, based on their young age.

3.2.2 Old alluvial fan deposits

A high paleontological resource potential is assigned to old alluvial fan deposits, based on their age, depositional environment, and proven potential to contain significant fossils.

3.3 Results of the Paleontological Impact Analysis

Construction of the Project has the potential to impact paleontological resources if: 1.) earthwork operations are involved, and 2.) if the earthwork operations will specifically impact previously undisturbed strata with high or undetermined paleontological resource potential (i.e., Pleistocene old alluvial fan deposits). Earthwork disturbing geologic units assigned a low resource potential (i.e., Holocene-age alluvial deposits) is not anticipated to impact paleontological resources.

Construction plans and a project description are not currently available, but in general, the construction of manufacturing facilities most likely will require site grading, trenching for underground utilities, and potentially deeper excavation for building foundations. Pleistocene old alluvial fan deposits are conservatively estimated to be present at depths as shallow as five feet bgs. **Therefore, earthwork extending five or more feet bgs has the potential to impact paleontological resources.**

4.0 Recommendations & Conclusions

Paleontological mitigation is recommended for Project construction activities that will involve earthwork operations anticipated to impact previously undisturbed paleontologically sensitive strata (i.e., Pleistocene old alluvial fan deposits). At the Project site, these potential impacts may occur during all earthwork that extends more than five feet bgs.



Figure 3. Paleontological resource potential map of the Project site.

4.1 General Strategies for Paleontological Mitigation

Mitigation of impacts to sensitive paleontological resources within the Project site may be accomplished through avoidance, establishment of Environmentally Sensitive Areas (ESAs), or paleontological monitoring, as summarized below. Paleontological monitoring is recommended as the most reasonable mitigation option for the Project.

4.1.1 Avoidance

Avoidance of project impacts can be achieved through project redesign so that paleontological resources are completely outside the project's impact area (e.g., a different project footprint is developed that avoids the resource or a construction approach is employed that does not entail excavation that affects paleontologically sensitive geologic units). However, because similar geologic conditions are present throughout the Project area, avoidance is not a practical strategy for minimizing impacts for this Project.

4.1.2 Environmentally Sensitive Areas

The establishment of ESAs is designed to protect resources within or immediately adjacent to a project while concurrently allowing the project to proceed. Generally, ESAs involve some combination of exclusionary fencing or monitoring as an alternative to excavation. In the event that the special measures prove ineffective for one reason or another, more traditional mitigation becomes necessary. This fallback generally affects delivery schedules and/or total project costs. If viable and properly implemented, however, ESAs can reduce costs and time associated with more extensive traditional mitigation approaches. For the same reason given above under avoidance, the establishment of ESAs around paleontological localities within the Project footprint is not a practical strategy for minimizing impacts.

4.1.3 Paleontological Monitoring

Development and implementation of a paleontological mitigation program centered on paleontological monitoring of earthwork can minimize impacts through recovery and conservation of fossils unearthed during construction, and is the most commonly employed paleontological mitigation strategy.

Implementation of the paleontological mitigation program generally involves paleontological monitoring and the recovery and conservation of fossils that may be unearthed during a construction project. Most commonly, the paleontological mitigation program is implemented during construction (e.g., active monitoring of excavations), but in rare cases, monitoring and fossil salvage can occur prior to construction (e.g., if fossils are readily visible in surficial sediments within the project site, and can be collected prior to the start of earthwork). Fossils recovered as a result of monitoring are prepared and then curated into a designated regional fossil repository.

4.2 Impact Summary and Recommendations

For the Project, paleontological monitoring shall be implemented for earthwork activities that are anticipated to directly impact paleontologically sensitive geologic units (i.e., Pleistocene old alluvial fan deposits) anticipated to occur at depths greater than five feet bgs. The following mitigation measures are provided to reduce potential project-related impacts to paleontological resources to less than significant levels. Adopting the measures outlined below will reduce impacts to paleontological resources resulting from project-related ground disturbance to less than significant levels.

4.2.1 Recommended Mitigation Measures

The mitigation measures below are formulated in accordance with industry standards (e.g., SVP, 2010; Murphey et al., 2019).

MM PALEO-1: Prior to the start of earthwork, a qualified Project Paleontologist shall be retained to oversee the paleontological mitigation program and a professional repository shall be designated to receive any recovered fossils. The Project Paleontologist shall have an advanced academic degree (M.A., M.S., or Ph.D.) with an emphasis in paleontology and will have proven knowledge of local paleontology and geology, as well as at least two years of demonstrated professional experience with paleontological mitigation procedures and techniques. The repository shall be a recognized paleontological specimen repository (e.g., an American Alliance of Museums-accredited museum or university) with a permanent curator and be capable of storing fossils in a facility with adequate security against theft, loss, damage, fire, pests, and adverse climate conditions (e.g., Natural History Museum of Los Angeles County, San Diego Natural History Museum, or University of California Museum of Paleontology).

MM PALEO-2: The Project Paleontologist or designated Field Monitor shall attend appropriate pre-construction meetings, provide Worker Environmental Awareness Program (WEAP) training, and attend other relevant meetings or conference calls (e.g., daily tailboards) in order to consult with project manager(s) and/or any excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues. Field Monitors will have academic training (B.A. or B.S.) with an emphasis in paleontology or demonstrated equivalent experience (minimum of two years of cumulative professional or nonprofessional work in laboratory, preparation, curation, or field work related to paleontology and documented self-taught knowledge of the discipline of paleontology). If it has been determined that Project construction will include excavations extending deeper than five feet below ground surface, the Field Monitor, under the supervision of the Project Paleontologist, shall be on-site on a full-time basis to inspect relevant excavations within previously undisturbed Pleistocene old alluvial fan deposits. Based on the initial monitoring results, monitoring may be reduced to part-time or to spot checks at the discretion of the Project Paleontologist. The Field Monitor shall take appropriate field notes and photographs to collect and document stratigraphic and paleontological data.

MM PALEO-3: If fossils are discovered, they shall be salvaged by the Field Monitor. In most cases this fossil salvage can be completed in a short period of time (e.g., minutes to hours). Because of the potential for the recovery of microvertebrate fossil remains, such as isolated mammal teeth, from Pleistocene old alluvial fan deposits, it may be necessary to collect bulk sedimentary matrix samples, as determined by the Project Paleontologist. In the event that fossils are unearthed during a period when a Field Monitor is not on site (an inadvertent discovery), earthwork within the vicinity of the discovery site shall temporarily halt and the Project Paleontologist contacted to evaluate the significance of the discovery. If the inadvertent discovery is determined to be significant, the fossils shall be salvaged by the Field Monitor. Fossil remains collected during monitoring and salvage shall be cleaned, repaired, sorted, identified, and cataloged as part of the mitigation program. Fossil preparation may also include screen washing for microvertebrate fossils or other laboratory analyses, if applicable. Fossil preparation and curation activities may be conducted at the laboratory of the contracted Project Paleontologist (if so equipped) and/or at the designated fossil repository and shall

follow the standards of the designated repository. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, shall be donated to the designated repository. Curation of the fossils shall be accompanied by financial support from the project owner for initial specimen storage (e.g., purchase of storage cabinets, storage drawers, and curatorial supplies).

MM PALEO-4: A final summary report shall be completed that outlines the results of the mitigation program. This report will include discussions of the methods used, stratigraphic section(s) exposed, and significance of recovered fossils (if any). This report shall be submitted to the lead agency and the designated repository (if fossils are recovered).

5.0 References

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Appendix A: Results of NHMLA Paleontological Records Search

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Research & Collections

e-mail: paleorecords@nhm.org

November 16, 2025

Department of PaleoServices
San Diego Natural History Museum
Attn: Katie McComas

re: Paleontological resources records search for the Rosedale Hwy Zone Change Study Project

Dear Katie:

I have conducted a search of our paleontology collection records for the proposed development at the Rosedale Hwy Zone Change Study project area as outlined on the portion of the Oildale USGS topographic quadrangle map that you sent to me via e-mail on November 4, 2025. We do not have fossil localities that have been recorded or georeferenced directly within the proposed project area, but we do have fossil localities from similar sedimentary deposits that may 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 6701	Flynn ranch, 14 km SE of Ducor, CA	Unknown formation (Pleistocene; green sand)	Mammoth (*Mammuthus*)	6 feet bgs
LACM VP 4087	3 miles east of Terra Bella	Unknown formation (Pleistocene)	Mammoth (*Mammuthus*)	Unknown (found in decomposed granite pit)
LACM VP CIT117	Near intersection of Rd 80 and Ave 120, east of Angiola	Unknown formation (Pleistocene, blue shale)	Horse (*Equus*)	425 feet bgs, in well boring

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

This records search is limited to the records of the NHMLA. It is not intended as a paleontological assessment of the project for the purposes of California Environmental Quality Act (CEQA) or National Environmental Policy Act (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 paleontological assessment be conducted by a paleontologist meeting Federal (43 Code of Federal Regulations Part 49.110) or Society of Vertebrate Paleontology standards for compliance with applicable regulations, such as CEQA or NEPA.

Sincerely,



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