PALEONTOLOGICAL RESOURCES ASSESSMENT

FLEMING RANCH PROJECT

CITY OF MENIFEE, COUNTY OF RIVERSIDE, CALIFORNIA

LSA

October 2017

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CITY OF MENIFEE, COUNTY OF RIVERSIDE, CALIFORNIA

Submitted to:

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Project No. TBB1701

LSA

October 2017

EXECUTIVE SUMMARY

LSA is under contract to T&B Planning, Inc., to conduct a paleontological resources assessment of the approximately 331.0-acre Fleming Ranch Project (project), in the City of Menifee (City), County of Riverside, California. This assessment was conducted pursuant to all applicable State and City regulations and policies regarding paleontological resources, as well as guidelines established by the Society of Vertebrate Paleontology. The City is the Lead Agency responsible for compliance with the aforementioned regulations and policies.

The project is a master-planned, medium-density residential community with freeway-oriented commercial uses adjacent to Encanto Drive. It includes up to 1,100 homes with a variety of lot sizes and an optional active adult village. There will be a large, 13-acre community sports park adjacent to the Hans Christensen Middle School and a 6-acre open space conservation area at the northeast corner on an existing knoll. Multi-purpose trails in landscaped areas with active use amenities will provide connectivity throughout the community. Three detention/water quality basins are also proposed, one in the commercial section and two in the residential section.

Development of this project will involve preparation of the project area; installation of new wet and dry utilities; construction of the new buildings, streets, and parking areas; and installation of lighting, signage, and landscaping. Based on current design plans, excavation is anticipated to reach depths of 15–20 feet and involve 907,544 cubic yards of cut. Excavation is expected to be conducted with standard methods and equipment (e.g., excavators, bulldozers, and backhoes).

The majority of the project area contains Old Alluvial Fan Deposits and Very Old Alluvial Fan Deposits, both of which have high paleontological sensitivity. Small portions of the eastern half of the project area also have rocks of the Peninsular Ranges Batholith, including Granodiorite to Tonalite of the Domenigoni Valley Pluton, Gabbro, and Intermixed Mesozoic Schist and Cretaceous Granitic Rocks, all of which have no paleontological sensitivity. Because development of this project is expected to involve excavation in deposits that have high paleontological sensitivity, the project has the potential to impact scientifically significant paleontological resources. Therefore, LSA recommends the following mitigation measures for the project:

PALEO-1 A paleontologist shall be retained to develop a Paleontological Resources Impact Mitigation Program (PRIMP) for this project. The PRIMP shall be consistent with the guidelines of the Society of Vertebrate Paleontology and include the methods that will be used to protect paleontological resources that may exist within the project area, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading.

PALEO-2 Ground-disturbing activities in rocks with no paleontological sensitivity (the Granodiorite to Tonalite of the Domenigoni Valley Pluton, Gabbro, or Intermixed Mesozoic Schist and Cretaceous Granitic Rocks) do not require paleontological monitoring. Ground-disturbing activities in deposits with high paleontological sensitivity (i.e., Old Alluvial Fan Deposits and Very Old Alluvial Fan Deposits) shall be

monitored by a paleontological monitor following a PRIMP. If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and a paleontologist should be contacted to assess the find for significance. If determined to be significant, the fossil shall be collected from the field.

PALEO-3 Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of the Western Science Center or other approved museum repository. At the conclusion of the monitoring program, a report of findings shall be prepared to document the results of the monitoring program.

By following the aforementioned mitigation measures, project impacts to scientifically significant paleontological resources would be reduced to a less than significant level.

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LIST OF ACRONYMS

CEQA	California Environmental Quality Act
City	City of Menifee
EIR	Environmental Impact Report
ft	feet/foot
LACM	Natural History Museum of Los Angeles County
Ma	million years ago
mi	mile/miles
NALMA	North American Land Mammal Age
NEPA	National Environmental Policy Act
PRC	Public Resources Code
PRIMP	Paleontological Resources Impact Mitigation Program
project	Fleming Ranch Project
SBCM	San Bernardino County Museum
SVP	Society of Vertebrate Paleontology
USGS	United States Geological Survey

INTRODUCTION

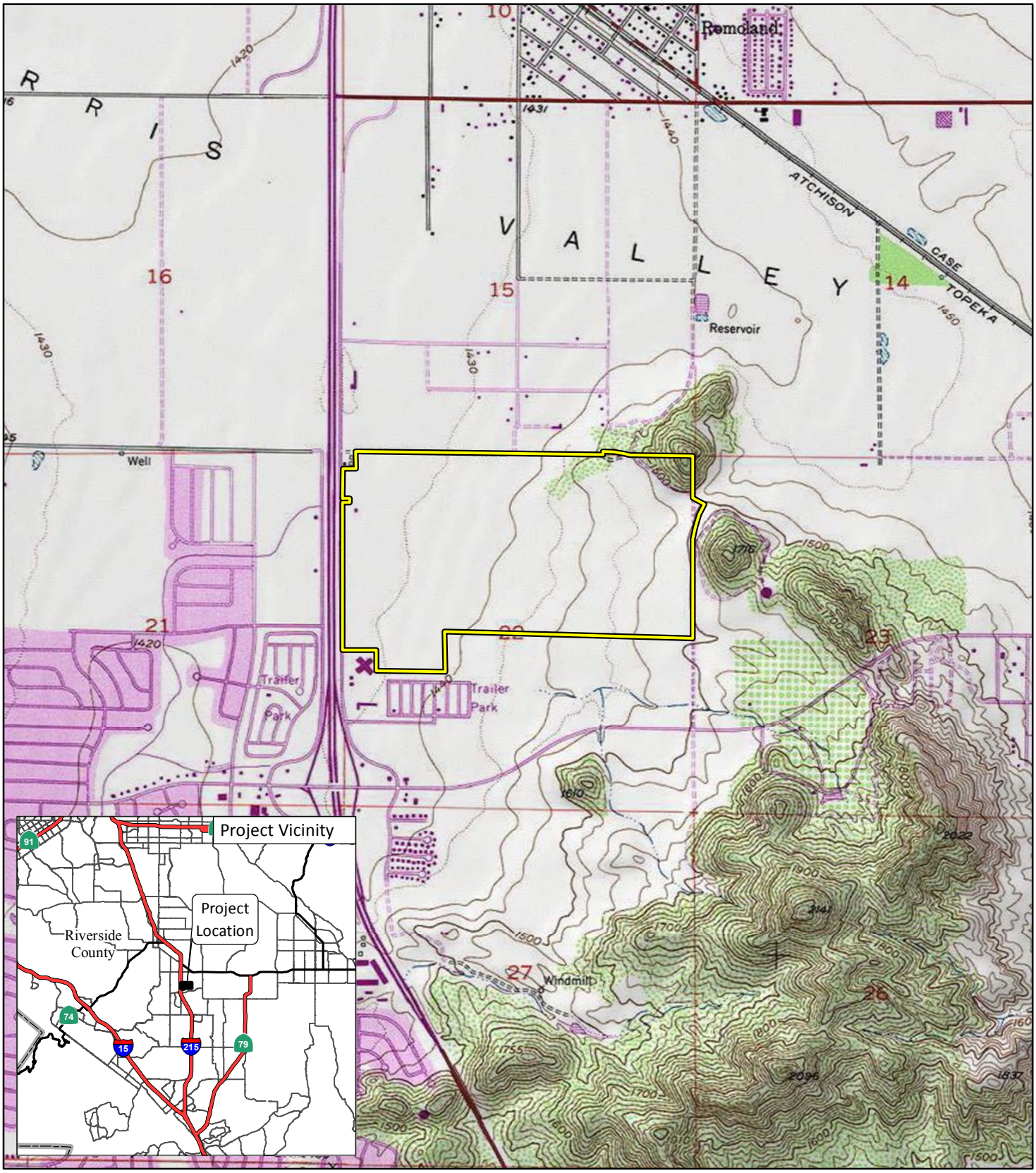
LSA is under contract to T&B Planning, Inc., to conduct a paleontological resources assessment of the approximately 331.0-acre Fleming Ranch Project (project), in the City of Menifee (City), County of Riverside, California. This assessment was conducted pursuant to all applicable State and City regulations and policies regarding paleontological resources, as well as guidelines established by the Society of Vertebrate Paleontology (SVP, 2010). The City is the Lead Agency responsible for compliance with the applicable regulations and policies for this project. This assessment documents the potential for encountering paleontological resources during project development and makes recommendations on how to mitigate impacts to those resources. It is not, and should not be used as, a geological assessment.

PROJECT LOCATION AND DESCRIPTION

The project is bounded by Encanto Road and Interstate 215 to the west, Rouse Road to the north, and Chambers Avenue to the south. The project area is depicted on the United States Geological Survey (USGS) *Romoland, California* 7.5-minute topographic quadrangle in Township 5 South, Range 3 West, Section 22, San Bernardino Baseline and Meridian (USGS, 1979; Figure 1).

The project is a master-planned, medium-density residential community with freeway-oriented commercial uses adjacent to Encanto Drive. It includes up to 1,100 homes with a variety of lot sizes and an optional active adult village. There will be a large, 13-acre community sports park adjacent to the Hans Christensen Middle School and a 6-acre open space conservation area at the northeast corner on an existing knoll. Multi-purpose trails in landscaped areas with active use amenities will provide connectivity throughout the community. Three detention/water quality basins are also proposed, one in the commercial section and two in the residential section.

Development of this project will involve preparation of the project area; installation of new wet and dry utilities; construction of the new buildings, streets, and parking areas; and installation of lighting, signage, and landscaping. Based on current design plans, excavation is anticipated to reach depths of 15–20 feet (ft) and involve 907,544 cubic yards of cut (personal communication, T&B Planning, Inc., June 2017). Excavation is expected to be conducted with standard methods and equipment (e.g., excavators, bulldozers, and backhoes).



LSA

LEGEND

Project Location

FIGURE 1

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0 1000 2000

FEET

Fleming Ranch

Project Location

SOURCE: USGS 7.5' Quad - Romoland (1979)

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REGULATORY ENVIRONMENT

This project is subject to State and City regulations and requirements regarding paleontological resources. A discussion of these regulations and requirements is provided below.

STATE OF CALIFORNIA

Under State law, paleontological resources are protected by the California Environmental Quality Act (CEQA) and Public Resources Code (PRC) Section 5097.5.

California Environmental Quality Act (Public Resources Code 21000 et seq.)

The purpose of CEQA is to provide a statewide policy of environmental protection. As part of this protection, State and local agencies are required to analyze, disclose, and, when feasible, mitigate the environmental impacts of, or find alternatives to, proposed projects. The *State CEQA Guidelines* (California Code of Regulations 15000 et seq.) provide regulations for the implementation of CEQA and include more specific direction on the process of documenting, analyzing, disclosing, and mitigating environmental impacts of a project. To assist in this process, Appendix G of the *State CEQA Guidelines* provides a sample checklist form that may be used to identify and explain the degree of impact a project will have on a variety of environmental aspects, including paleontological resources (Section V[c]). As stated in Section 15002(b)(1–3) of the *State CEQA Guidelines*, CEQA applies to governmental action, including activities that are undertaken by, financed by, or require approval from a governmental agency. Because this project requires approval by a governmental agency, CEQA regulations apply.

California Public Resources Code, Section 5097.5

This law protects historic, archaeological, and paleontological resources on public lands within California and establishes criminal and civil penalties for violations. Specifically, PRC Section 5097.5 states:

> (a) 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.
>
> (b) As used in this 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.

Because this project involves public lands as defined in Section 5097.5(b), the project is required to comply with this regulation.

CITY OF MENIFEE

The protection and preservation of paleontological resources within the city limits of Menifee are addressed in the City's General Plan (City of Menifee, 2013) and the Draft Environmental Impact Report (EIR) (The Planning Center, 2013) prepared for the adoption and implementation of the General Plan. According to the Open Space and Conservation Element of the City's General Plan, "paleontological and cultural resources are important for scientific, historic, and/or religious reasons to cultures, communities, groups, or individuals." As such, the City has established the goal, policies, and implementation action listed below for the protection and preservation of these resources.

Although not mentioned explicitly in the following policies, paleontological resources are inferred to be included because they are noted in the heading of this section of the General Plan.

> **Goal OSC-5:** Archaeological, historical, and cultural resources are protected and integrated into the city's built environment.
>
> > **Policy OSC-5.1:** Preserve and protect archaeological and historic resources and cultural sites, places, districts, structures, landforms, objects, and native burial sites, traditional cultural landscapes and other features, consistent with State law and any laws, regulations or policies which may be adopted by the city to implement this goal and associated policies.
> >
> > **Policy OSC-5.4:** Establish clear and responsible policies and best practices to identify, evaluate, and protect previously unknown archaeological, historic, and cultural resources, following applicable CEQA and NEPA procedures and in consultation with the appropriate Native American tribes who have ancestral lands within the city.
> >
> > **Policy OSC-5.5:** Develop clear policies regarding the preservation and avoidance of cultural resources located within the city, in consultation with the appropriate Native American tribes who have ancestral lands within the city.
> >
> > > **Implementation Action OSC-38:** Require monitoring of excavation in areas identified as likely to contain paleontological resources by a qualified paleontological monitor. Recovered specimens should be prepared to a point of [identification] and permanent preservation and curated into an established, accredited museum repository with permanent retrievable storage. A report of findings is required to be prepared. The report and inventory, when submitted to the appropriate lead agency, along with confirmation of the curation of recovered specimens, will signify completion of the program to mitigate impacts to paleontologic resources.

Section 5.5 Cultural Resources of the Draft EIR includes the following mitigation measure to reduce potential impacts to paleontological resources:

> **Mitigation Measure 5-2.** In areas of high sensitivity for paleontological resources, each project shall retain a qualified paleontologist to monitor ground disturbing activity. Should any potentially significant fossil resources be discovered, no further grading shall occur in the area of the discovery until the Community Development Director is satisfied that adequate provisions

are in place to protect these resources. Unanticipated discoveries shall be evaluated for significance by a professional paleontologist. If significance criteria are met, then the project shall be required to perform data recovery, professional identification, radiocarbon dates, and other special studies; submit materials to a museum for permanent curation; and provide a comprehensive final report including catalog with museum numbers to the City of Menifee Community Development Director.

SCIENTIFIC SIGNIFICANCE AND SENSITIVITY

SCIENTIFIC SIGNIFICANCE

The SVP (2010) provides the following definitions of significance:

- **Significant Nonrenewable Paleontological Resources** are fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small; uncommon invertebrate, plant, and trace fossils; and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than the middle Holocene (i.e., older than approximately 4,200 years ago [Walker et al., 2012]).

Eisentraut and Cooper (2002) developed a useful set of criteria for judging whether fossils are scientifically significant. Using their method, fossils can be judged scientifically significant if they meet any of the criteria within the following categories:

- **Taxonomy:** Assemblages that contain rare or unknown taxa, such as defining new (previously unknown to science) species or that represent a species that is the first or has very limited occurrence within the area or formation.

- **Evolution:** Fossils that represent important stages or links in evolutionary relationships or that fill gaps or enhance underrepresented intervals in the stratigraphic record.

- **Biostratigraphy:** Fossils that are important for determining or confining relative geologic (stratigraphic) ages or for use in defining regional to interregional stratigraphic associations. These fossils are often known as biostratigraphic markers and represent plants or animals that existed for only a short and restricted period in the geologic past.

- **Paleoecology:** Fossils that are important for reconstructing ancient organism community structure and interpretation of ancient sedimentary environments. Depending on which fossils are found, much can be learned about the ancient environment from water depth, temperature, and salinity to what the substrate was like (muddy, sandy, or rocky) to even whether the area was in a high energy location like a beach or a low-energy location like a bay. Even terrestrial animals can contain information about the ancient environment. For example, an abundance of grazing animals such as horse, bison, and mammoth suggest more of a grassland environment, while an abundance of browsing animals such as deer, mastodon, and camel suggest more of a brushy environment. Preserved parts of plants can also lend insight into what was growing in the area at a particular time. In addition, by studying the ratios of different species to each other's population densities, relationships between predator and prey can be determined.

  There is a complex but vital interrelationship among evolution, biostratigraphy, and paleoecology. Biostratigraphy (the record of fossil succession and progression) is the expression of evolution (change in populations of organisms through time), which in turn is driven by natural selection pressures exerted by changing environments (paleoecology).

- **Taphonomy:** Fossils that are exceptionally well or unusually/uniquely preserved or are relatively rare in the fossil record. This could include preservation of soft tissues such as hair, skin, or feathers from animals or the leaves/stems of plants that are not commonly fossilized.

Summary of Scientific Significance

All vertebrate fossils that have contextual information, such as the location and geologic unit from which they were recovered, are considered a scientifically significant, nonrenewable paleontological resource. Invertebrate and plant fossils, as well as other environmental indicators associated with vertebrate fossils, are considered scientifically significant. Certain invertebrate and plant fossils that are regionally rare or uncommon or help to define stratigraphy, age, or taxonomic relationships are considered scientifically significant.

SENSITIVITY

Paleontological sensitivity is a ranking that describes the potential to find scientifically significant fossils in a given geologic unit based on an evaluation of several factors, including the composition, age, depositional environment, and known importance of fossils from, or suspected to be in, that geologic unit. The sensitivity ranking provides the basis for determining which mitigation measures, if any, are appropriate for a particular project.

The *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP, 2010) has four categories for paleontological sensitivity: high, low, no, and undetermined. Each of these categories is described in more detail below.

- **High Potential:** Rock units from which vertebrate or scientifically significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional scientifically significant paleontological resources. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), some low-grade metamorphic rocks that contain scientifically significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, and fine-grained marine sandstones). Paleontological potential consists of both (1) the potential for yielding abundant or scientifically significant vertebrate fossils or for yielding a few scientifically significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils, and (2) the importance of recovered evidence for new and scientifically significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways, are also classified as having high potential.

- **Low Potential:** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have a low potential for yielding scientifically significant fossils. Such rock units will be poorly represented by fossil

specimens in institutional collections, or based on general scientific consensus, fossils are only preserved in rare circumstances; the presence of fossils is the exception, not the rule (e.g., basalt flows or Recent colluvium). Rock units with low potential typically will not require impact mitigation measures to protect fossils.

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

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

Summary of Sensitivity

A formation or rock unit has paleontological sensitivity or the potential for scientifically significant paleontological resources if it has previously produced, or has lithologies conducive to the preservation of, vertebrate fossils and associated or regionally uncommon invertebrate and plant fossils. All sedimentary rocks, except those younger than 4,200 years, certain extrusive volcanic rocks, and mildly metamorphosed rocks are considered to have potential for paleontological resources.

METHODS

LITERATURE REVIEW

The literature review included an examination of geologic maps of the project area and a review of relevant geological and paleontological literature to determine which geologic units are present in the project area and whether fossils have been recovered from those geologic units elsewhere in the region. As geologic units may extend over large geographic areas and contain similar lithologies and fossils, the literature review includes areas well beyond the project area. The results of this literature review include an overview of the geology of the project area and a discussion of the paleontological sensitivity (or potential) of the geologic units in the project area.

LOCALITY SEARCH

The purpose of a locality search is to establish the status and extent of previously recorded paleontological resources within and adjacent to the study area for a given project. In May 2017, a locality search was conducted through the Natural History Museum of Los Angeles County (LACM). The locality search included a 1 mile (mi) buffer around the current project area. In addition, a locality search was conducted through the San Bernardino County Museum (SBCM) for the previous paleontological assessment completed in 2005. The results of both locality searches are discussed in the Results section of this report, and a copy of the letter from Dr. Samuel McLeod, Curator of Vertebrate Paleontology at the LACM is provided in Appendix A.

FIELD SURVEY

The purpose of a field survey is to note the sediments at the surface; relocate any known paleontological localities, if present; and identify any unrecorded paleontological resources exposed on the surface of a project area. In this way, impacts to existing, unrecorded paleontological material may be mitigated prior to the beginning of ground-disturbing activities, and portions of the project area that are more likely to contain paleontological resources may be identified. As part of the previous paleontological assessment, in July 2005, LSA technicians David Brunzell and Morgan Goodwin conducted a pedestrian survey of the entire project area. A second pedestrian survey was completed by LSA technicians Kerrie Collison and Carlton Bennett on May 1–3, 2017. The pedestrian surveys were conducted by walking linear transects approximately 15 meters apart across the property. The results of both pedestrian surveys are discussed in the Results section of this report.

RESULTS

LITERATURE REVIEW

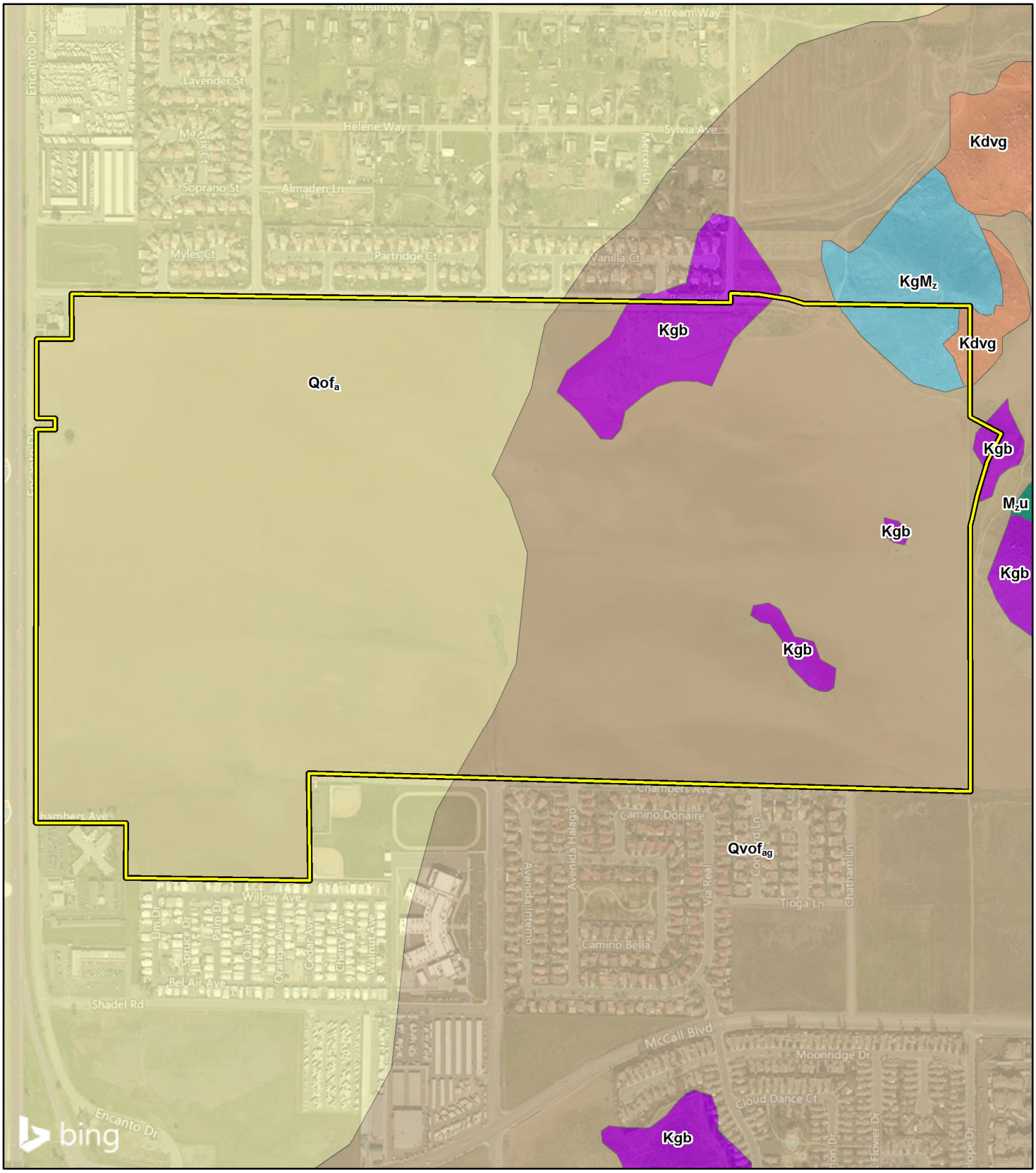
The project is located at the northern end of the Peninsular Ranges Geomorphic Province, a 900 mi long northwest-southeast trending structural block that extends from the Transverse Ranges in the north to the tip of Baja California in the south and includes the Los Angeles Basin (California Geological Survey, 2002; Norris and Webb, 1976). This province is characterized by mountains and valleys that trend in a northwest-southeast direction, roughly parallel to the San Andreas Fault Zone (Norris and Webb, 1976; Sharp, 1976). The total width of the province is approximately 225 mi, extending from the Colorado Desert in the east, across the continental shelf, to the Southern Channel Islands (i.e., Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) (Sharp, 1976). It contains extensive pre-Cenozoic (more than 66 million years ago [Ma]) igneous and metamorphic rock covered by Cenozoic (less than 66 Ma) sedimentary deposits (Norris and Webb, 1976).Within this province, the project is located in the central part of the Perris Block, a fault-bounded structural block that extends from the southern foot of the San Gabriel and San Bernardino Mountains southeast to the vicinity of Bachelor Mountain and Polly Butte (Morton, 2003; Morton and Miller, 2006; Kenney, 1999). The Perris Block is bounded on the northeast by the San Jacinto Fault and on the southwest by the Elsinore Fault Zone (Morton and Miller, 2006).

Across the majority of the project area, Morton (2003) mapped late to middle Pleistocene (11,700–781,000 years ago) Old Alluvial Fan Deposits and middle to early Pleistocene (126,000 years ago–2.588 Ma) Very Old Alluvial Fan Deposits. Small portions of the eastern half of the project area also have rocks of the Peninsular Ranges Batholith, including Cretaceous (66.0–145.0 Ma) Granodiorite to Tonalite of the Domenigoni Valley Pluton, Cretaceous Gabbro, and Mesozoic (66.0–251.902 Ma) Intermixed Mesozoic Schist and Cretaceous Granitic Rocks (Morton, 2003). The geology of the project area is illustrated on Figure 2 and described in more detail below. Dates for the geologic periods and epochs referenced in this report are derived from the International Chronostratigraphic Chart published by the International Commission on Stratigraphy (ICS, 2017).

Old Alluvial Fan Deposits

The Old Alluvial Fan Deposits accumulated during the late to middle Pleistocene (11,700–781,000 years ago) and consist of moderately consolidated, reddish brown sand and gravel (Morton, 2003). They show slight to moderate dissection by erosional gullies and may be capped by moderately to well developed soils (Morton, 2003). These sediments were eroded from higher elevations, carried by flooding streams and debris flows, and deposited in a fan or lobe shape at the base of the hills and across the valleys.

These deposits span the latest two North American Land Mammal Ages (NALMAs): the Rancholabrean (11,000–240,000 years ago) and the Irvingtonian (240,000 years ago–1.8 Ma) (Bell et al., 2004; Sanders et al., 2009). Fossils are known in similar Rancholabrean and Irvingtonian deposits from excavations for roads, housing developments, and quarries, as well as scientific investigations within the Southern California area (Jefferson, 1991a, 1991b; Miller, 1971; Pajak et al., 1996; Reynolds and Reynolds, 1991; Springer et al., 2009). These fossils include mammoths,



LSA

LEGEND

Project Location

Geologic Unit

Qof$_a$ - Old Alluvial Fan Deposits

Qvof$_{ag}$ - Very Old Alluvial Fan Deposits

a - sandy; g - gravel

Kdvg - Granodiorite to Tonalite

Kgb - Gabbro

M$_z$u - Metasedimentary Rocks, Undifferentiated

KgM$_z$ - Intermixed Mesozoic Schist and Cretaceous Granitic Rocks

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0 375 750

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SOURCE: Bing Maps (2014); Morton (2003)

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FIGURE 2

Fleming Ranch

Geology Map

mastodons, horses, bison, camels, saber-toothed cats, coyotes, deer, and sloths, as well as smaller animals like rodents, rabbits, birds, reptiles, and fish. As such, these deposits are considered to have high paleontological sensitivity.

Very Old Alluvial Fan Deposits

The Very Old Alluvial Fan Deposits formed during the middle to early Pleistocene (126,000 years ago–2.588 Ma) and consist of mostly well-indurated, reddish brown sand and gravel (Morton, 2003). They are well dissected by erosional gullies, and the surfaces show moderate to well developed soils (Morton, 2003). Like the Old Alluvial Fan Deposits, these sediments were eroded from higher elevations, carried by flooding streams and debris flows, and deposited in a fan or lobe shape at the base of the hills and across the valleys.

The Very Old Alluvial Fan Deposits formed during an interval that spans three NALMAs: the Rancholabrean (11,000–240,000 years ago), the Irvingtonian (240,000 years ago–1.8 Ma) and the Blancan (1.8–4.75 Ma) (Bell et al., 2004; Sanders et al., 2009). Fossils are known in similar Rancholabrean, Irvingtonian, and Blancan deposits from excavations for roads, housing developments, and quarries, as well as scientific investigations within the Southern California area (Bell et al., 2004; Miller, 1971; Pajak et al., 1996). These fossils include mammoths, mastodons, horses, camels, saber-toothed cats, coyotes, deer, peccaries, and sloths, as well as smaller animals like rodents, rabbits, birds, reptiles, and fish. As such, these deposits are considered to have high paleontological sensitivity.

Granodiorite to Tonalite of the Domenigoni Valley Pluton

The Granodiorite to Tonalite of the Domenigoni Valley Pluton consists of relatively uniform, massive hornblende biotite granodiorite that grades into tonalite (Morton, 2003). These rocks are part of the Peninsular Ranges Batholith and formed during the Cretaceous (66.0–145.0 Ma) as magma intruded the surrounding older rocks and cooled below the surface. Because they formed from magma below the surface, they will not contain fossils. Therefore, these rocks have no paleontological sensitivity.

Gabbro

The Gabbro is mainly composed of medium- to very coarse-grained hornblende and typically weathers to a brownish color (Morton, 2003). These rocks are part of the Peninsular Ranges Batholith, although they do not belong to a specific pluton, ring complex, or other suite of associated rocks (Morton, 2003). The Gabbro formed during the Cretaceous (66.0–145.0 Ma) as magma intruded the surrounding older rocks and cooled below the surface. Because they formed from magma below the surface, they will not contain fossils. Therefore, these rocks have no paleontological sensitivity.

Intermixed Mesozoic Schist and Cretaceous Granitic Rocks

The Intermixed Mesozoic Schist and Cretaceous Granitic Rocks formed during the Mesozoic (66–251.902 Ma) and contain a wide variety of schist and related metamorphic rocks that have been mixed with granitic rocks ranging in composition from monzogranite to quartz diorite (Morton, 2003). These intermixed rocks belong to the Peninsular Ranges Batholith and formed as sedimentary

rocks were buried and subjected to intense heat and pressure during the Mesozoic, and were then intruded by granitic igneous rocks during the Cretaceous (Morton, 2003).

Because the metamorphic rocks were subjected to intense heat and pressure below the surface, the potential for preserving identifiable paleontological resources in extremely low. Moreover, the igneous rocks formed below the surface and will not contain fossils. Therefore, this geologic unit is considered to have no paleontological sensitivity.

LOCALITY SEARCH

According to the locality search conducted by the LACM, there are no known fossil localities within the project area. However, the museum has records of fossil localities nearby in the same or similar deposits as those mapped in the project area. Southwest of the project area on the western margin of Menifee Valley around the Railroad Canyon Reservoir in similar older Quaternary alluvial fan deposits (i.e., Old Alluvial Fan Deposits and Very Old Alluvial Fan Deposits), locality LACM 5168 produced a fossil specimen of horse (*Equus*). Farther southwest of the project area around Lake Elsinore, locality LACM 6059 produced a specimen of fossil camel (*Camelops*).

The locality search through the SBCM conducted for the previous paleontological assessment also noted several fossil localities in the region from sediments similar to those found in the project area (LSA, 2005). At the Carbon Canyon Wastewater Facility in the City of Chino, east of State Route 71, localities SBCM 5.1.9 and 5.1.10 produced fossils of giant ground sloth (*Glossotherium*) and camel (*Camelops*) at depths of 11–15 ft below the surface. In Pleistocene deposits at the Los Serranos Creek site in the Puente Hills, locality SBCM 1.116.1 produced fossils of bison (*Bison* cf. *antiquus*), horse (*Equus*), and deer (*Odocoileus*) at a depth of 6 ft below the surface. Near Declezville, west of the City of San Bernardino on the north side of Jurupa Hills, locality SBCM 5.1.11 produced a fossil saber-toothed cat (*Smilodon*) approximately 5 ft below the surface. Lastly, in eastern Pomona Valley along Interstate 15, locality SBCM 5.1.8 produced a mammoth (*Mammuthus*) at a depth of 5 ft below the surface.

Neither the LACM nor the SBCM note any fossils from the igneous or metamorphic rocks mapped within the project area.

FIELD SURVEY

During the most recent survey completed by Ms. Collison and Mr. Bennett on May 1–3, 2017, ground visibility ranged from poor (10 percent to 25 percent) to good (75 percent to 90 percent), depending on the location in the project area. The terrain of the project area was mostly flat, with a very slight slope to the east and a steep-sided hill in the northeastern portion. The majority of the project area had been recently disturbed by mechanical plowing for agricultural activities, except for a few small areas around rock outcrops and the side of the hill. Modern trash was observed (e.g., food wrappers, beer bottle fragments) scattered throughout the project area. Exposed sediment profiles on the hill in the northeastern section of the project area, rodent backdirt, and rock outcrops were examined for paleontological resources and to note the sediments. Sediment in the project area consisted of yellow silty sand with outcrops of granite within the surrounding hillside, consistent with the geology mapped by Morton (2003). No paleontological resources were noted

during the most recent survey or during the pedestrian survey completed by Mr. Brunzell and Mr. Goodwin in July 2005.

RECOMMENDATIONS

The majority of the project area contains Old Alluvial Fan Deposits and Very Old Alluvial Fan Deposits, both of which have high paleontological sensitivity. Small portions of the eastern half of the project area also have rocks of the Peninsular Ranges Batholith, including Granodiorite to Tonalite of the Domenigoni Valley Pluton, Gabbro, and Intermixed Mesozoic Schist and Cretaceous Granitic Rocks, all of which have no paleontological sensitivity. Because development of this project is expected to involve excavation to depths of 15–20 ft and involve 907,544 cubic yards of cut in deposits that have high paleontological sensitivity, the project has the potential to impact scientifically significant paleontological resources. Therefore, LSA recommends the following mitigation measures for the project:

PALEO-1 A paleontologist shall be retained to develop a Paleontological Resources Impact Mitigation Program (PRIMP) for this project. The PRIMP shall be consistent with the guidelines of the Society of Vertebrate Paleontology and include the methods that will be used to protect paleontological resources that may exist within the project area, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading.

PALEO-2 Ground-disturbing activities in rocks with no paleontological sensitivity (the Granodiorite to Tonalite of the Domenigoni Valley Pluton, Gabbro, or Intermixed Mesozoic Schist and Cretaceous Granitic Rocks) do not require paleontological monitoring. Ground-disturbing activities in deposits with high paleontological sensitivity (i.e., Old Alluvial Fan Deposits and Very Old Alluvial Fan Deposits) shall be monitored by a paleontological monitor following a PRIMP. If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and a paleontologist should be contacted to assess the find for significance. If determined to be significant, the fossil shall be collected from the field.

PALEO-3 Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of the Western Science Center or other approved museum repository. At the conclusion of the monitoring program, a report of findings shall be prepared to document the results of the monitoring program.

By following the aforementioned mitigation measures, project impacts to scientifically significant paleontological resources would be reduced to a less than significant level.

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APPENDIX A

FOSSIL LOCALITY SEARCH RESULTS FROM THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

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

tel 213.763.DINO
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NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

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23 May 2017

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614

Attn: Sarah Rieboldt, Ph.D., Paleontologist

re: Paleontological Resources Records Check for the proposed Fleming Ranch Project, LSA Project # TBB1701, in the City of Menifee, Riverside County, project area

Dear Sarah:

I have thoroughly searched our paleontology collection records for the locality and specimen data for the proposed Fleming Ranch Project, LSA Project # TBB1701, in the City of Menifee, Riverside County, project area as outlined on the portion of the Romoland USGS topographic quadrangle map that you sent to me via e-mail on 5 May 2017. We do not have any vertebrate fossil localities that lie directly within the proposed project area boundaries, but we do have fossil localities somewhat nearby from deposits similar to those that occur subsurface in the proposed project area.

In the northeastern portion of the proposed project area, particularly in the elevated terrain, there are bedrock exposures of plutonic igneous rocks that will not contain recognizable fossils. These rocks probably underlie the remainder of the proposed project area at unknown depth. Most of the proposed project area though has surface sediments that consist of older Quaternary Alluvium, derived as alluvial fan deposits from the Mountains immediately to the east and southeast. These Quaternary alluvial fan deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, and we have no fossil vertebrate localities very nearby from these types of deposits, but they may have pockets of finer-grained sediments, particularly at depth, that may well contain significant vertebrate fossil remains. Our closest vertebrate fossil localities in somewhat similar older Quaternary deposits are LACM 5168,

southwest of the proposed project area on the western margin of Menifee Valley around the Railroad Canyon Reservoir, that contained a fossil specimen of horse, *Equus*, and LACM 6059, further southwest of the proposed project area around Lake Elsinore, that produced a specimen of fossil camel, *Camelops*.

Excavations in the igneous rocks exposed in the northeastern portion of the proposed project area will not encounter any recognizable fossils. Grading or shallow excavations in the Quaternary alluvial fan deposits exposed in the rest of the proposed project area are unlikely to encounter significant vertebrate fossils. Deeper excavations that extend down into older and finer-grained deposits in those latter areas, however, may well uncover significant fossil vertebrate remains. Any substantial excavations in the sedimentary deposits in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice