December 10, 2014

.
SUBJECT:

Cultural Resources Investigation for South Norco Channel Line S-1 Project, Riverside County, California

Dear
Joan George
Associate Archaeologist
Applied EarthWorks, Inc.

Thank you for contacting the Morongo Band of Mission Indians regarding the above referenced project. The Tribe greatly appreciates the opportunity to review the project and, respectfully, offer the following comments.

The project is outside of the Tribe's current reservation boundaries but within an area that may be considered a traditional use area or one in which the Tribe has cultural ties (e.g. Cahuilla/Serrano territory). However, the Morongo Band of Mission Indians asks that you impose specific conditions regarding cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications as follows:

- If human remains are encountered during grading and other construction excavation, work in the immediate vicinity shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5.

- In the event that Native American cultural resources are discovered during project development/construction, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the overall project may continue during this assessment period.

If significant Native American cultural resources are discovered, for which a Treatment Plan must be prepared, the developer or his archaeologist shall contact the Morongo Band of Mission Indians

("Tribe")[1]. If requested by the Tribe, the developer or the project archaeologist shall, in good faith, consult on the discovery and its disposition (e.g. avoidance, preservation, return of artifacts to tribe, etc.).

If I may be of further assistance with regard to this matter, please do not hesitate to contact me at your convenience.

Very truly yours,

MORONGO BAND OF MISSION INDIANS

[1] The Morongo Band of Mission Indians realizes that there may be additional tribes claiming cultural affiliation to the area; however, Morongo can only speak for itself. The Tribe has no objection if the archaeologist wishes to consult with other tribes and if the city wishes to revise the condition to recognize other tribes.

LIST OF NATIVE AMERICAN CONTACTS AND RECORD OF RESPONSES

Name	Date & Time of Calls	Responses
Denisa Torres Cultural Heritage Program Assistant Morongo Band of Mission Indians	December 9, 2014 Letter dated December 10, 2014	Scoping letter sent via email. Received letter from Ms. Torres via email. Ms. Torres stated that the Project is outside of Tribe's current reservation boundaries, but within an area that may be considered a traditional use area or one in which the Tribe has cultural ties. Therefore the Tribe requests the following: (1) proper procedures to be followed if human remains are encountered during construction activities; (2) if Native American cultural resources are discovered during construction, work will cease in the immediate area until the find can be assessed by a qualified archaeologist; (3) and if significant Native American cultural resources are discovered, for which a Treatment Plan must be prepared, the developer or his archaeologist shall contact the Morongo Band of Mission Indians.
Daniel McCarthy Director – CRM Department San Manuel Band of Mission Indians	December 9, 2014 December 9, 2014	Scoping letter sent via email. Received email response from Mr. McCarthy thanking me for the opportunity to comment. He said the Project is outside of Serrano ancestral territory and asked us to contact other tribes who have ancestral ties to the Project area.
Ernest H. Siva Tribal Elder Morongo Band of Mission Indians	December 10, 2014 Message left December 23, 2014	Scoping letter sent via United States Postal Service. Left detailed voicemail message describing the Project. No response received.
Goldie Walker Chairwoman Serrano Nation of Mission Indians	December 10, 2014 Call made December 23, 2014	Scoping letter sent via United States Postal Service. Attempted to call Ms. Walker, but no one answered the phone. No response received.

Appendix F

PALEONTOLOGICAL RESOURCE ASSESSMENT

Paleontological Resource Assessment for the South Norco Channel Line S-1 Project, City of Norco, Riverside County, California

(APNs 123-100-001, -130-010, -160-026,-220-001;
125-130-014, -015; and 125-140-025, -160-005)

Heather L. Clifford and Jessica L. DeBusk

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and

Riverside County Flood Control and Water Conservation District
1995 Market Street
Riverside, Ca 92501

December 2014

Corona North, CA USGS 7.5-min. quadrangle
19 acres
Results: No paleontological resources were recovered from the Project area

SUMMARY OF FINDINGS

At the request of HELIX Environmental Planning, Inc., on behalf of the Riverside County Flood Control and Water Conservation District (District), Applied EarthWorks, Inc. (Æ) performed a paleontological resource assessment for the South Norco Channel Line S-1 Project (Project) located in the city of Norco, in Riverside County, California. The Project proposes the stabilization, maintenance, and operation of a segment of the existing South Norco interim earthen flood control channel as well as construction, maintenance, and operation of two underground storm drain pipes, S-1 and S-5, that would connect from the South Norco channel. This report summarizes the methods and results of the paleontological resource assessment and provides Project-specific management recommendations.

This assessment included a comprehensive review of published and unpublished literature and museum collections records maintained by the San Bernardino County Museum (SBCM). The museum records were supplemented by a search of the University of California Museum of Paleontology (UCMP) online collections database. The purpose of the literature review and museum records search was to identify the geologic units underlying the Project area and to determine whether previously recorded paleontological localities occur either within the Project boundaries or within the same geologic units elsewhere. The museum records search was followed by a field survey, during which the ground was visually inspected for exposed fossils and the geologic exposures were evaluated for their potential to contain preserved fossil material at the subsurface. Using the results of museum records search and field survey, the paleontological resource potential of the Project area was determined in accordance with Society of Vertebrate Paleontology guidelines (2010).

Published geologic mapping indicates that the Project area is underlain by sedimentary deposits of Pliocene to Pleistocene age and Cretaceous plutonic igneous rocks. Museum records found no previously recorded paleontological localities directly within Project boundaries; however, UCMP records indicate that at least four previously documented fossil localities have been reported in Riverside County from within the same or similar geologic units as those that underlie the Project area.

As a result of this study, the Project area is determined to have a paleontological resource potential ranging from none to high, and the likelihood of impacting scientifically significant vertebrate fossils as a result of Project development is low to high. Therefore, it is recommended that a qualified paleontologist be retained to develop and implement a Paleontological Resource Impact Mitigation Program during construction. At the conclusion of all Project-related ground disturbances, all significant fossils found during the course of on-site monitoring should be permanently curated at the Western Science Center and a final technical report of findings should be drafted and submitted to the District. By implementing these mitigation measures during Project development, adverse impacts to paleontological resources can be reduced to a less than significant level pursuant to the requirements of the California Environmental Quality Act.

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1
INTRODUCTION

At the request of HELIX Environmental Planning, Inc., on behalf of the Riverside County Flood Control and Water Conservation District (District), Applied EarthWorks, Inc. (Æ) performed a paleontological resource assessment for the South Norco Channel Line S-1 Project (Project) in Riverside County, California (Figure 1-1). The study consisted of a museum records search, a comprehensive literature and geologic map review, and a field reconnaissance survey. This report summarizes the methods and results of a paleontological resource assessment and provides Project-specific management recommendations.

1.1 PROJECT LOCATION

The Project is located within the city of Norco, California, and is bounded on the west by Corona Street, to the east by Hillside Avenue, to the north by Fourth Street, and on the south by Second Street. Specifically, it is mapped within Township 3 South, Range 6 West, Sections 7 and 18 of on the Corona South, CA, U.S. Geological Survey quadrangle (Figure 1-2). The Project site is approximately 19 acres in size and encompasses Assessor's Parcel Numbers (APNs) 123-100-001, -130-010, -160-026, and -220-001; 125-130-014 and -015; and 125-140-025 and -160-005. The District proposes the stabilization, maintenance, and operation of a segment of the existing South Norco interim earthen flood control channel as well as construction, maintenance, and operation of two underground storm drain pipes, S-1 and S-5, that would connect from the South Norco channel.

1.2 PROJECT BACKGROUND AND DESCRIPTION

The primary objective of the Project is to stabilize the existing earthen channel. The desired method of stabilization is to convert the earthen channel to a concrete lined channel. This would eliminate the erosion problems currently experienced within the channel and downstream areas and would also reduce the frequency and need of sediment and plant material removal. In addition to stabilization of the main channel segment, the District also proposes to construct underground drainage pipes to transmit storm flows in place of existing surface flow facilities. The improvements may also include construction of two detention basins. Locations under consideration for the detention basins are the southwest corner of the Norco Intermediate School property adjacent to the existing earthen channel and downstream of the Norco High School property between Temescal Avenue and Second Street on property owned by the District. Ground-disturbing activities related to Project development will likely include trenching and excavation.

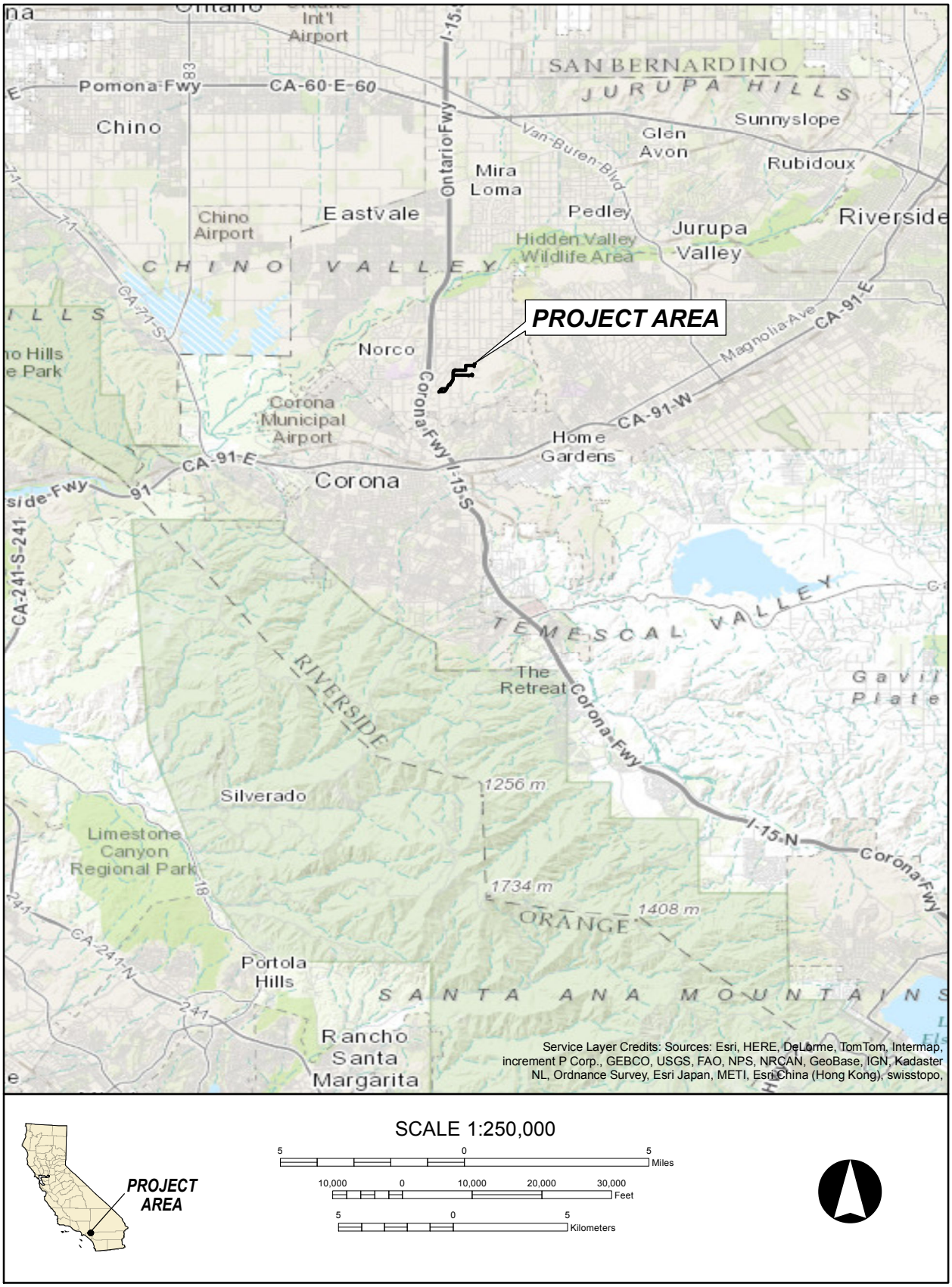

Figure 1-1 Project vicinity map.

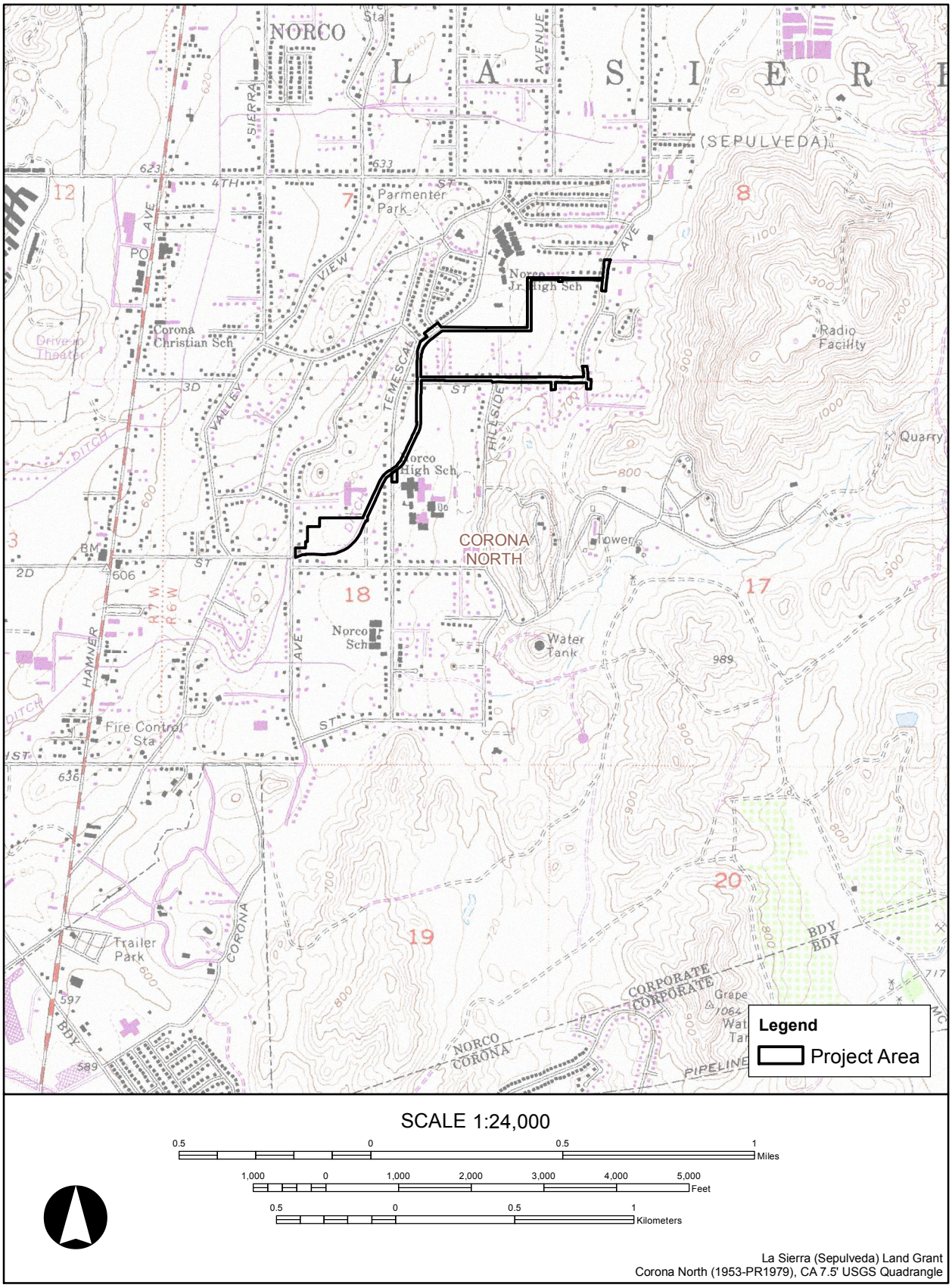

Figure 1-2 Project location map.

1.3 PURPOSE OF INVESTIGATION

The purpose of this paleontological resource assessment is to (1) identify the geologic units within the Project area, (2) assess their paleontological resource potential (i.e., "sensitivity"), (3) evaluate whether the Project has the potential to adversely impact scientifically significant paleontological resources, and (4) provide Project-specific mitigation measures to be implemented during Project development (as necessary). This assessment was performed to satisfy the requirements of the California Environmental Quality Act (CEQA) and was conducted in accordance with professional standards and guidelines set forth by the Society of Vertebrate Paleontology (SVP, 2010).

1.4 REPORT ORGANIZATION

This report documents the results of Æ's paleontological resource assessment of the Project area. Chapter 1 has introduced the scope of work, identified the Project location, described the Project, and defined the purpose of the investigation. Chapter 2 outlines the regulatory framework governing the Project. Chapter 3 presents the paleontological resource guidelines and professional standards used for this assessment and Chapter 4 presents the methods. The geology and paleontology of the Project area is discussed in Chapter 5, and the results of the field survey are presented in Chapter 6. Chapter 7 provides analysis, and management recommendations are provided in Chapter 8. The results and conclusions are discussed in Chapter 9, followed by a list of references in Chapter 10.

2
REGULATORY FRAMEWORK

Paleontological resources (i.e., fossils) are considered to be nonrenewable scientific resources because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under the various state and local laws and regulations briefly discussed in this chapter.

2.1 STATE

2.1.1 California Environmental Quality Act

CEQA (California Public Resources Code [PRC] Sections 21000–21177) encourages the protection of all aspects of the environment by requiring state and local agencies to prepare multidisciplinary analyses of the environmental impacts of a project and to make decisions based on the findings of those analyses. CEQA also takes into account the laws and procedures of local California jurisdictions.

The Guidelines for the Implementation of the California Environmental Quality Act (CEQA Guidelines; 14 CCR 15000 et seq.) include a definition of historical resources as "any object [or] site . . . that has yielded or may be likely to yield information important in prehistory" (14 CCR 15064.5[3]), which is typically interpreted as including fossil materials and other paleontological resources. More specifically, destruction of a "unique paleontological resource or site or unique geologic feature" constitutes a significant impact under CEQA, as indicated by CEQA Guidelines Appendix G: Environmental Checklist Form (Association of Environmental Professionals, 2014, p. 277).

Treatment of paleontological resources under CEQA is generally similar to treatment of cultural resources, requiring evaluation of resources in the project; assessment of potential impacts on significant or unique resources; and development of mitigation measures for potentially significant impacts, which may include avoidance, monitoring, or data recovery excavation.

2.1.2 California Public Resources Code

PRC Section 5097.5 affirms that no person shall willingly or knowingly excavate, remove, or otherwise destroy a vertebrate paleontological site or paleontological feature without the express permission of the overseeing public land agency. It further states under PRC Section 30244 that any development that would adversely impact paleontological resources shall require reasonable mitigation. These regulations apply to projects located on land owned by or under the jurisdiction of the state or city, county, district, or other public agency (California Office of Historic Preservation, 2005).

2.2 COUNTY OF RIVERSIDE

Paleontological resources are addressed under the Multipurpose Open Space Element of the Riverside County General Plan (2008), policy OS 19.9, which states the following:

> This policy requires that when existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor site grading activities, with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate repository, and file a report with the Planning Department [Riverside County Planning Department, 2008].

The Safeguard Artifacts Being Excavated in Riverside County (SABER) policy enacted in October 2011 by the Riverside County Board of Supervisors mandates that any paleontological resources found or unearthed in the County of Riverside be curated at the Western Science Center in the city of Hemet. This new policy will be included as an amendment to the Multipurpose Element of the General Plan Update.

3
PALEONTOLOGICAL RESOURCE ASSESSMENT GUIDELINES

3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES AND SIGNIFICANCE CRITERIA

Paleontological resources are the evidence of once-living organisms as preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (trackways, imprints, burrows, etc.). In general, fossils are considered to be greater than 5,000 years old (older than Middle Holocene) and are typically preserved in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks formed under certain conditions (SVP, 2010).

Significant paleontological resources are defined as "identifiable" vertebrate fossils, uncommon invertebrate, plant, and trace fossils that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronological data (SVP, 2010). These data are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes (Scott and Springer, 2003; SVP, 2010).

3.2 PROFESSIONAL STANDARDS AND PALEONTOLOGICAL RESOURCE SENSITIVITY

Absent specific agency guidelines, most professional paleontologists in California adhere to guidelines set forth by SVP in "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources" (SVP, 2010). These guidelines establish detailed protocols for the assessment of the paleontological resource potential (i.e., "sensitivity") of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development. In order to prevent project delays, SVP highly recommends that the owner or developer retain a qualified professional paleontologist in the advance planning phases of a project to conduct an assessment and to implement paleontological mitigation during construction, as necessary.

Using baseline information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) (or members thereof) underlying a Project area can be assigned to one of four categories defined by SVP (2010). These categories include high, undetermined, low, and no potential. The criteria for each sensitivity classification and the corresponding mitigation recommendations are summarized in Table 3-1 below.

If a project area is determined to have high or undetermined potential for paleontological resources following the initial assessment, then SVP recommends that a paleontological resource mitigation plan be developed and implemented during the construction phase of a project. The mitigation plan describes, in detail, when and where paleontological monitoring will take place and establishes communication protocols to be followed in the event that an unanticipated fossil

discovery is made during project development. If significant fossil resources are known to occur within the boundaries of the Project and have not been collected, then the plan will outline the procedures to be followed prior to the commencement of construction (i.e., preconstruction salvage efforts or avoidance measures, including fencing off a locality). Should microfossils be known to occur in the geologic unit(s) underlying the Project area or suspected to occur, then the plan will describe the methodology for matrix sampling and screening.

Table 3-1
Paleontological Sensitivity Categories

Resource Potential	Criteria	Mitigation Recommendations
No Potential	Rock units that are formed under or exposed to immense heat and pressure, such as high-grade metamorphic rocks and plutonic igneous rocks.	No mitigation required.
Low Potential	Rocks units that have yielded few fossils in the past, based upon review of available literature and museum collections records. Geologic units of low potential also include those that yield fossils only on rare occasion and under unusual circumstances.	Mitigation is not typically required.
Undetermined Potential	In some cases, available literature on a particular geologic unit will be scarce and a determination of whether it is fossiliferous or potentially fossiliferous will be difficult to make. Under these circumstances, further study is needed to determine the unit's paleontological resource potential (i.e., field survey).	A field survey is required to further assess the unit's paleontological potential.
High Potential	Geologic units with high potential for paleontological resources are those that have proven to yield vertebrate or significant invertebrate, plant or trace fossils in the past or are likely to contain new vertebrate materials, traces, or trackways. Rock units with high potential also may include those that contain datable organic remains older than late Holocene (e.g., animal nests or middens).	Typically, a field survey as well as onsite construction monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated into a museum. A final report documenting the significance of the finds will also be required.

Adapted from SVP (2010).

The paleontological mitigation plan should be prepared by a qualified professional paleontologist and developed using the results of the initial paleontological assessment and survey. Elements of the plan can be adjusted throughout the course of a project as new information is gathered and conditions change, so long as the lead agency is consulted and all parties are in agreement. For example, if after 50 percent of earth-disturbing activities have occurred in a particular unit or area, and no fossils whatsoever have been discovered, then the project paleontologist can reduce or eliminate monitoring efforts in that unit or area.

4
METHODS

4.1 LITERATURE REVIEW AND RECORDS SEARCH

Paleontological resources are not found in "soil" but are contained within the geologic deposits or bedrock that underlies the soil layer. Therefore, in order to ascertain whether a particular study area has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature and geologic mapping to determine the geology and stratigraphy of the area. Further, to delineate the boundaries of an area of paleontological sensitivity, it is necessary to determine the extent of the entire geologic unit because paleontological sensitivity is not limited to surface exposures of fossil material.

To determine whether fossil localities have been previously discovered within the Project area or a particular rock unit, a search of pertinent local and regional museum repositories for paleontological localities within and near the Project was performed. For this Project, a museum records search was conducted at the San Bernardino County Museum (SBCM) and supplemented by a search of the University of California Museum of Paleontology (UCMP) online database.

4.2 FIELDWORK

A field visit to the Project area was conducted on December 8, 2014. The purpose of the field survey was to visually inspect the ground surface for exposed fossils and to evaluate geologic exposures for their potential to contain preserved fossil material at the subsurface.

4.3 KEY PERSONNEL

This paleontological resource assessment was prepared under the direction of Æ's Paleontology Program Manager, Jessica DeBusk. She requested the museum records searches, served as Principal Investigator, and provided quality control for this report. Associate Archaeologist, Joan George, served as Project Manager. Associate Paleontologist Heather Clifford conducted the literature and geologic map review, produced all graphics, and was the primary author of the geology and paleontology sections of this report. Ms. DeBusk has more than 11 years of professional experience as a consulting paleontologist and meets the SVP's definition of a qualified professional paleontologist. Her résumé is provided in Appendix A.

5
GEOLOGY AND PALEONTOLOGY

5.1 REGIONAL GEOLOGY

The Project area is located in an alluvial plain within the Norco Hills area of the Temescal Mountains, south of the Santa Ana River and north of Temescal Creek (Morton and Miller, 2006). The Temescal Mountains are a range within the northern part of the geologically complex Peninsular Ranges geomorphic province. A geomorphic province is a region of unique topography and geology that is distinguished from other regions based on its landforms and diastrophic history (Norris and Webb, 1976). The Peninsular Ranges are a northwest-southeast oriented complex of blocks that extend 125 miles from the Transverse Ranges and Los Angeles Basin to the tip of Baja California. The Peninsular Ranges are bounded to the east by the Colorado Desert and range in width from 30 to 100 miles (Norris and Webb, 1976). The Project area is situated within the Perris Block; a relatively stable rectangular structural unit positioned between the Santa Ana Mountains of the Peninsular Ranges and San Jacinto Fault Zone. The Project area is just east of the Chino fault, a right-lateral/reverse fault that extends northward along the west side of the Chino Basin (Morton and Miller, 2006). The Chino fault is a splay from the Elsinore Fault Zone, located further to the south. The geology in the vicinity of the Project area includes Mesozoic metasedimentary rocks intruded by Cenozoic igneous rocks, which are unconformably overlain by mainly Pleistocene age fluvial and alluvial fan deposits (Morton and Miller, 2006) (Figure 5-1).

5.2 GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

According to Morton and Miller (2006), the Project area is directly underlain by Cretaceous age rocks of the Cajalco pluton (Kcg, Kmpc) and Pliocene to Pleistocene age nonmarine deposits, including the sedimentary rocks of Norco area (QTn), very old alluvial-fan deposits (Qvof), and very old axial-channel deposits (Qvof) (Figure 5-2). The rocks of the Cajalco pluton are composed of weathered porphyritic monzogranite and granodiorite, which were emplaced during the Cretaceous Period and are characteristic of the Peninsular Range (Morton and Miller 2006). The Pliocene to Pleistocene age sedimentary rocks of the Norco area consist of a nonmarine fluvial deposit composed of brownish-gray conglomerate with lithologically diverse pebble to boulder clasts derived from local granitic sources as well as quartzite clasts derived from the San Bernardino Mountains. The very old alluvial fan and channel deposits of Middle to Early Pleistocene age consist of moderately consolidated tan to orange or reddish-brown sand and silt with subordinate cobbles and pebbles, up to 50 feet thick in the vicinity of the Project area (Anderson et al., 2002). The Pleistocene age sediments are moderately to well indurated, contain angular to well-rounded clasts, display local pebble conglomerate interbeds, show localized soil formation, and contain abundant dissection (Morton and Miller, 2006). In general, the alluvial deposits were derived from erosion in the San Gabriel-San Bernardino Mountains and subsequent deposition along the south-facing bajada and nearby washes and streams, including the Santa Ana River.

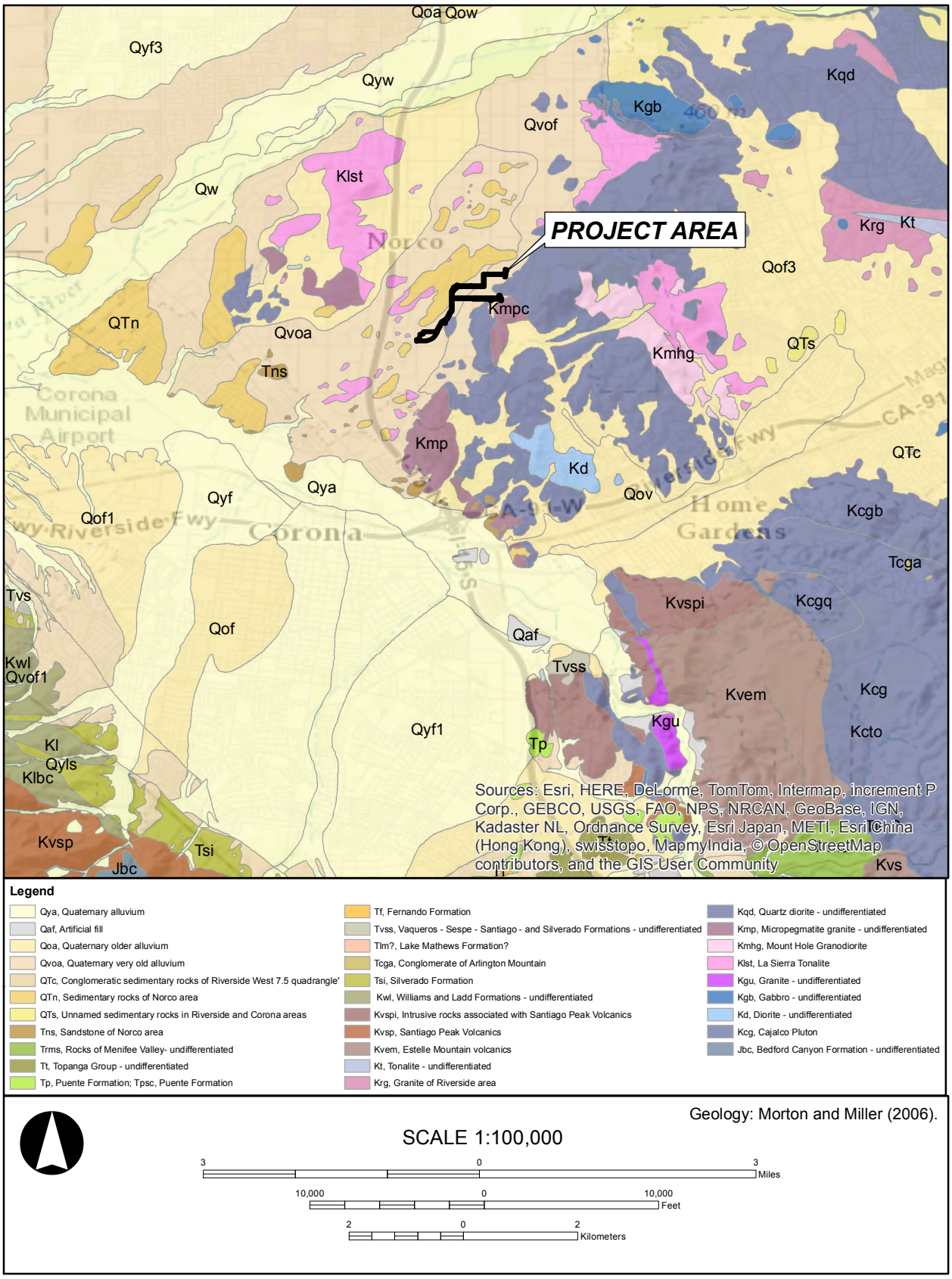

Figure 5-1 Regional geology in the vicinity of the Project area.

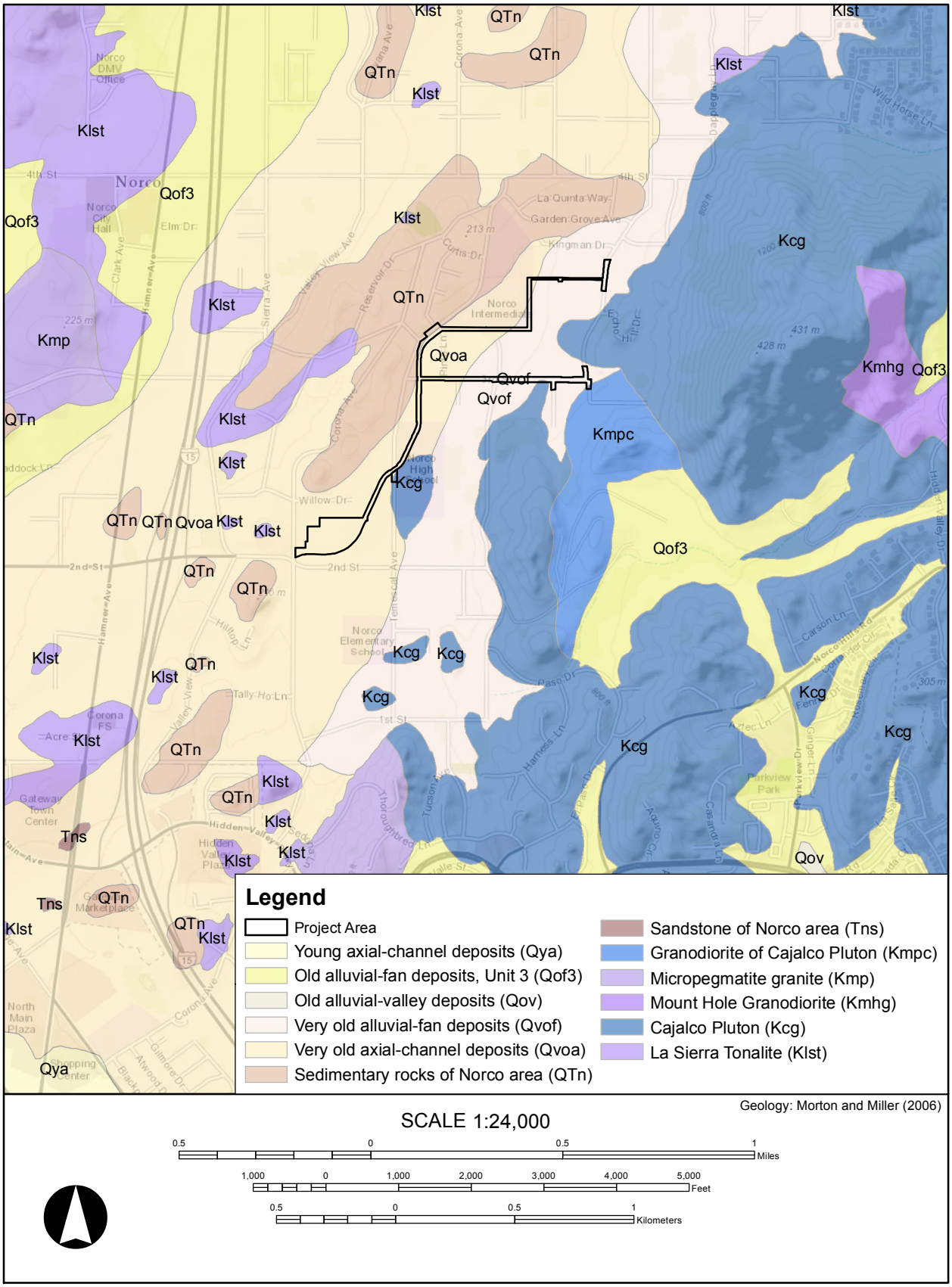

Figure 5-2 Geology of the Project area.

Alluvial, fluvial, and lacustrine deposits of Pliocene to Pleistocene age have proven to yield scientifically significant paleontological resources throughout Southern California, from the coastal areas to the inland valleys; however, the intrusive igneous bedrock within the Project area is not fossiliferous due to the high heat during its formation (Springer et al., 2009). Pleistocene age alluvial deposits in the vicinity of the Project area are potentially highly fossiliferous and localities identified within these deposits have yielded significant fossils of extinct Ice Age mammals (Scott, 2012). Southeast of the Project near Lake Mathews, *Ustatochoerus* cf. *californicus* (ground dwelling herbivore) and fossilized camel remains were recovered within Pliocene fluvial and alluvial deposits (Woodford et al., 1971). To the southwest, near Lakeview, a diverse assemblage of fossil resources have been recovered including *Mammuthus* sp. (mammoth), *Smilodon* sp. (sabre-toothed cat), *Equus* sp. (extinct horse), *Bison* sp. cf. *B. antiquus* (bison), and numerous small mammals, reptiles, invertebrates, and plant remains (Springer et al., 2009). Further south, the largest known open-environment non-asphaltic late Pleistocene fossil assemblage has been documented in Diamond and Domenigoni valleys. Discovered during excavations of the Diamond Valley Lake, which is approximately 40 miles southeast of the Project area and within a similar Quaternary depositional environment as the Project area, this locality has yielded nearly 100,000 identifiable fossils representing over 105 vertebrate, invertebrate, and plant taxa. The vertebrate taxa recovered includes reptiles such as frogs, turtles, and lizards; birds such as robins, swallows, jays, ravens, hawks, and ducks; small mammals such as rabbit, squirrel, mice, and weasels; and large mammals such as fox, bear, coyote, deer, bison, mammoths, mastodons, and ground sloths (Springer et al., 2009). The invertebrate taxa recovered includes ostracodes, snails, termites, slugs, beetles, and bivalves and the plant taxa recovered includes well-preserved diatoms, pollen, and wood debris (Springer et al., 2009; Anderson et al., 2002).

6
PALEONTOLOGICAL FIELD RECONNAISSANCE

A field survey of the Project area was conducted by Æ Associate Paleontologist Heather Clifford on December 8, 2014. A pedestrian walkover was performed utilizing evenly spaced zigzagged transects and the entire Project area was surveyed for paleontological resources. During the course of fieldwork, a windshield survey of the geology and topography surrounding the Project area was accomplished and all rock outcrops were examined for surface fossils. Project areas that obscured by pavement or asphalt (i.e., roadways) were subject to a windshield survey. Project areas underlain by Pliocene to Pleistocene age sedimentary units and Cretaceous igneous bedrock were found to be 100 percent obscured by vegetation, soil development, refuse and spoil dumping, levee and channel construction, flood debris, culvert installation, grading, and road pavement. In the field, Ms. Clifford utilized a Global Positioning System (GPS) unit, topographic maps, and aerial photographs to locate geologic formation and Project area boundaries. Notes were taken on the regional geology and lithology of exposed sediments and photographs were taken to document the survey (Photo 6-1).

The topography of the Project area consists of a lowland drainage area at the base of the Norco Hills. The Project area encompasses an earthen and concrete storm channel canal and retention basin as well as District rights-of-way (ROWs) along school district property and private and public roadways (Photos 6-2 and 6-3). The underlying geologic units in the Project area have been completely obscured by anthropogenic developments, vegetation, and soil development (Photos 6-4). Relict stream channel or catchment basin morphology is not visible in the Project area, further indicating that the Project area has been heavily modified and disturbed from its natural geologic setting. The levees of the earthen channel system have been eroded by a moderately well-developed gully network to depths of approximately 6 to 36 inches below ground surface (bgs). The gully erosion has exposed buried sediments, which consist of red clay soil with scant amounts (1 to 10 percent) of fine to coarse sand and angular pebbles (Photo 6-5). Exposures in several of the gullies indicate that the red clay soil has been removed and replaced with imported fill, probably following localized erosion or a larger flood event. The Pliocene to Pleistocene sedimentary deposits mapped within the Project area were not visible beneath the red clay soil, which was observed to be at least to 0.5 to 1.5 feet thick. Although native sediments were not visible on the levees, channel, or retention basin in the Project area, they are likely present at shallow depth below.

No fossil resources were discovered during the course of fieldwork. However, 100 percent of the survey area was obscured by vegetation, soil development, or anthropogenic disturbances that limited surface visibility. The Pleistocene age deposits, which underlie the majority of the Project area, are characterized by fine to medium-grained sediments that have proven to be conducive to the preservation of vertebrate remains. Therefore, these rock units may contain an unknown number of fossil resources at the subsurface.

Photo 6-1 **Overview of a portion of the storm channel network in the southwestern Project area, near Corona Ave., looking west.**

Photo 6-2 **The District ROW along Hillside Avenue in the Project area, view to the east. The underlying Pleistocene age alluvium is completely obscured by the paved road.**

Photo 6-3 **The District ROW at the Norco Intermediate School in the Project area, view to the west. The underlying Pleistocene age alluvium is completely obscured by the athletic field.**

Photo 6-4. **Pleistocene age alluvial deposits are completely obscured in the Project area by storm channel construction and grading, vegetation, soil development, recent channel sedimentation, and culvert installation. View to the south.**

Photo 6-5 **Gully erosion on the levee has exposed buried red clay soil, which is unevenly covered and truncated with imported gravel fill. View to the northeast.**

7
ANALYSIS AND RESULTS

7.1 MUSEUM RECORDS SEARCH RESULTS

To determine whether fossil localities have been previously discovered within the Project area, a museum records search was performed at the SBCM on May 18, 2012. The SBCM reports that there are no previously recorded vertebrate fossil localities directly within Project boundaries or within a 1-mile buffer around the Project area. A supplemental review was conducted of the UCMP online collections database, which identified four localities from within unnamed Pleistocene age deposits in Riverside County. Records retrieved from the UCMP database do not provide the exact location of recovered fossil specimens, only a rough description of the locality is given. As such, locality queries were performed for the entire County of Riverside. The UCMP localities yielded approximately 13 vertebrate fossil specimens, including mammal, rodent, and reptile (UCMP, 2014). The results of the museum records search are summarized below in Table 7-1 and provided in Appendix B.

Table 7-1
Vertebrate Localities Reported in the Vicinity of the Project Area within Riverside County

Locality No.	Geologic Unit	Age	Taxa
UCMP RV8601	Pleistocene age deposits	Pleistocene	*Microtus californicus* (California vole) and *Neotoma* sp. (packrat)
UCMP V7006-V7007	Pleistocene age deposits	Pleistocene	*Gopherus* sp. (gopher tortoise) and unspecified vertebrates
UCMP V65248	Pleistocene age deposits	Pleistocene	*Mammuthus* sp.

Source: UCMP online database (2014)

7.2 FIELDWORK RESULTS

The field survey established that shallow grading will likely not impact the Pliocene to Pleistocene age sedimentary rocks of the Norco area and Pleistocene alluvium mapped within the Project area because the deposits have been previously disturbed to a depth of approximately 3 feet; however, significant excavations in the Project area may impact native sediments. Exposures of Cretaceous plutonic rock have been previously disturbed by road building and will not be impacted by Project-related ground disturbance.

No fossil resources were discovered during the course of fieldwork; however, 100 percent of the survey area was obscured by levee and channel construction, imported fill, vegetation, and anthropogenic disturbances, limiting surface visibility. The Pleistocene age alluvium that underlies portions of the Project area is characterized by fine- to course-grained sediments that have proven to be conducive to the preservation of vertebrate remains. Therefore, these rock units may contain an unknown number of fossil resources at the subsurface.

7.3 DETERMINATION OF PALEONTOLOGICAL RESOURCE POTENTIAL FOR GEOLOGIC UNITS WITHIN THE PROJECT AREA

Based on the literature review, museum records search results, and field survey, the geologic units underlying the Project area are determined to have a paleontological sensitivity ranging from none to high in accordance with criteria set forth by SVP (2010). The Early to Middle Pleistocene age alluvium mapped in the Project area has a high potential to contain intact paleontological resources because similar deposits have yielded significant vertebrate fossils in Riverside County. The lithology of the Pliocene to Pleistocene sedimentary rocks of the Norco area is coarse-grained, which is typically not conducive to the preservation of fossil remains. However, similar deposits of Pliocene age have yielded vertebrates in the vicinity of the Project area; therefore, a high paleontological resource potential is assigned. The rocks of the Cajalco pluton have been determined to have no paleontological resource potential due to their high heat of formation. As a result, further paleontological resource management is recommended during Project development as discussed in Chapter 8. Refer to Table 7-2 and Figure 7-1 for the sensitivity ratings of the geologic unit underlying the Project area. In addition, Figure 7-2 presents the paleontological sensitivity of the Project area as shown on Riverside County's official paleontological sensitivity map (Riverside County Planning Department, 2008).

Table 7-2
Geologic Units* in the Project Area and Their Paleontological Sensitivity

Geologic Unit	Map Abbreviation	Age	Typical Fossils	Paleontological Resource Potential
Rocks of the Cajalco pluton	Kcg, Kmpc	Cretaceous	None	None
Sedimentary rocks of the Norco area	QTn	Pliocene to Pleistocene	None	High
Pleistocene age alluvium: very old axial-channel and alluvial fan deposits	Qvoa, Qvof	Early to Middle Pleistocene	Vertebrate; mammal, rodent	High

* Geology taken from Morton and Miller (2006).

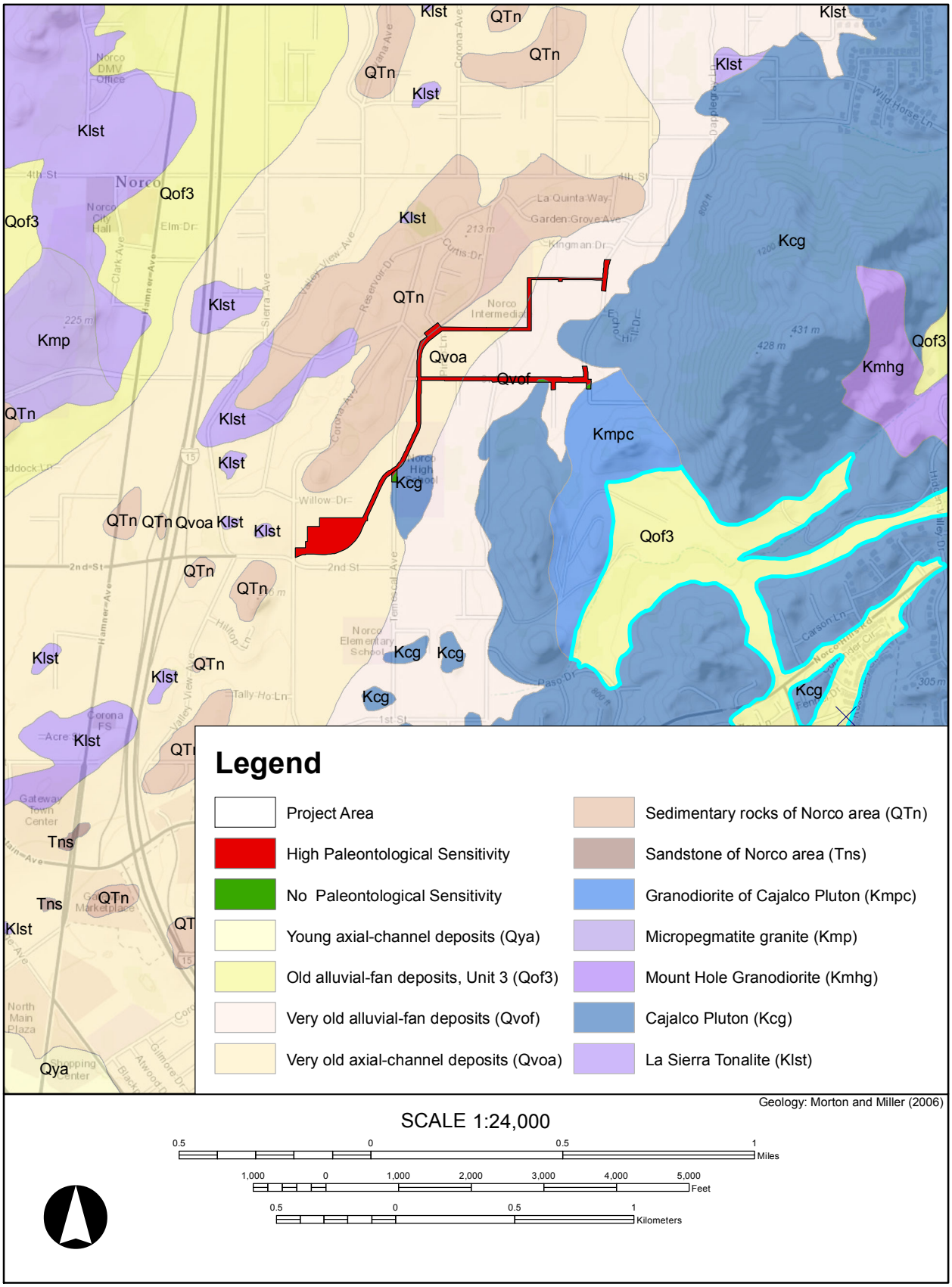

Figure 7-1 Paleontological Sensitivity of the Project area.

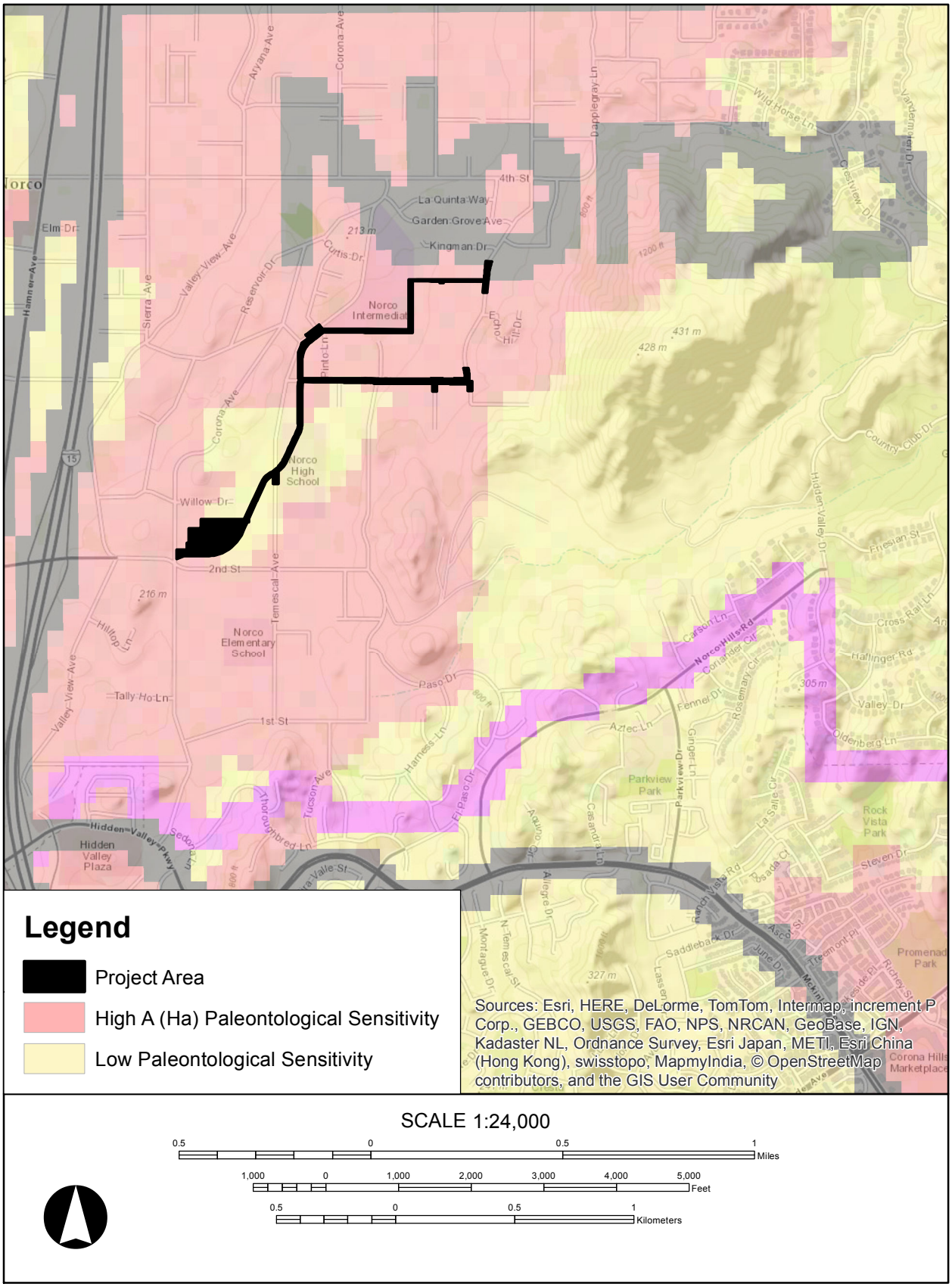

Figure 7-2 Paleontological Sensitivity of the Project Area, as shown on the Riverside County General Plan map (2008).

8
FINDINGS AND MANAGEMENT RECOMMENDATIONS

In general, the potential for a given project to result in adverse impacts to paleontological resources is directly proportional to the amount of ground disturbance associated with the project. Since this Project entails construction of underground drainage pipes, considerable new ground disturbances are anticipated. Ground disturbance is planned for portions of the Project area that are underlain by the highly sensitive Pliocene age sedimentary rocks of the Norco area and Pleistocene age very old alluvial-fan and axial-channel deposits, which may impact previously undisturbed lithology in those deposits that have proven to yield vertebrate remains in Riverside County. Significant ground disturbance is not likely to adversely impact paleontological resources in portions of the Project area underlain by the rocks of the Cajalco pluton, because intrusive igneous rocks have no potential to yield paleontological resources. Further, should any surficial ground disturbances (less than 3 feet in depth) occur in the Pliocene to Pleistocene age sedimentary deposits, those activities would likely not impact paleontological resources due to previous ground disturbance and soil development.

By implementing the management recommendations outlined in the following sections, including worker's environmental awareness training and on-site construction monitoring, adverse impacts to paleontological resources can be reduced to a less than significant level pursuant to the requirements of CEQA. These measures have been used by professional paleontologists for many years and have proven to be effective in reducing or eliminating adverse impacts to paleontological resources as a result of private and public development projects throughout California and elsewhere.

8.1 WORKER'S ENVIRONMENTAL AWARENESS TRAINING

Prior to the start of construction, all field personnel will be briefed regarding the types of fossils that could be found in the Project area and the procedures to follow should paleontological resources be encountered. This training will be accomplished at the pre-grading kick-off meeting or morning tailboard meeting and will be conducted by the Project Paleontologist or his/her representative. Specifically, the training should provide a description of the fossil resources that may be encountered in the Project area, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist and on-site monitor(s). The training will be developed by the Project Paleontologist and may be conducted concurrent with other environmental training (e.g., cultural and natural resources awareness training, safety training, etc.). The training may be videotaped or presented in an informational brochure for future use by field personnel not present at the start of the Project.

8.2 PALEONTOLOGICAL MITIGATION MONITORING

Prior to the commencement of ground-disturbing activities, a qualified professional paleontologist will be retained to prepare and implement a Paleontological Resource Impact Mitigation Program (PRIMP) for the Project. Initially, full-time monitoring is recommended for

grading and excavation activities that extend to 3 feet bgs, which will disturb previously undisturbed very old axial-channel deposits (Qvoa), very old alluvial fan deposits (Qvof), and sedimentary rocks of the Norco area (QTn), which have a high paleontological sensitivity, according to the criteria set forth by SVP (2010). Monitoring will not be required in Project areas underlain by geologic units with no paleontological resource potential (i.e., the rocks of the Cajalco pluton [Kcg, Kmpc]).

Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls. In the event that 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 collected. In areas of high sensitivity, monitoring efforts can be reduced or eliminated at the discretion of the Project Paleontologist if no fossil resources are encountered after 50 percent of the excavations are completed.

8.3 FOSSIL PREPARATION, CURATION, AND REPORTING

Upon completion of fieldwork, all significant fossils collected will be prepared in a properly equipped paleontology laboratory to a point ready for curation. Preparation will include the careful removal of excess matrix from fossil materials and stabilizing and repairing specimens, as necessary. Following laboratory work, all fossils specimens will be identified to the lowest taxonomic level, cataloged, analyzed, and delivered the Western Science Center for permanent curation and storage. The cost of curation is assessed by the repository and is the responsibility of the District.

At the conclusion of laboratory work and museum curation, a final report will be prepared describing the results of the paleontological mitigation monitoring efforts associated with the Project. The report will include a summary of the field and laboratory methods, an overview of the Project area geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. If the monitoring efforts produced fossils, then a copy of the report will also be submitted to the Western Science Center.

9
CONCLUSIONS

This assessment is based on the results of a museum records search, review of available geologic and paleontological literature, and a pedestrian survey of exposed geologic units within the Project area. No fossils were observed during the reconnaissance survey, therefore, only fossils that have already been inventoried or collected are available for this analysis. Based on this analysis, the Project area is in part underlain by geologic units determined to have a high paleontological sensitivity and high potential for buried fossils resources. These nonrenewable scientific resources may be at risk of being adversely impacted by earth-disturbing activities during the development of the Project. By implementing the management recommendations presented in Chapter 8, adverse impacts to paleontological resources can be reduced to a less than significant level pursuant to the requirements of CEQA.

10
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APPENDIX A

Résumé

JESSICA L. DEBUSK
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EXPERTISE

Paleontological resources management (field survey and assessments, mitigation monitoring, fossil preparation and identification, museum curation, and reporting), multidisciplinary project management (cultural, paleontological, and natural resources services), California geology and paleontology, Nevada geology and paleontology.

EDUCATION

B.S. Geology, Emphasis in Paleobiology, University of Nevada, Reno, 2002.

PROFESSIONAL EXPERIENCE

2012–	Paleontology Program Manager, Senior Project Manager, Applied EarthWorks, Inc., Pasadena, California.
2004-2012	Paleontology Team Leader and Senior Manager (2010-2012); Project Manager and Lead Paleontologist (2005-2010); Assistant Project Manager and Staff Paleontologist (2004-2005); SWCA Environmental Consultants, Mission Viejo and Pasadena, California.
2003-2004	Staff Paleontologist, Brian F. Smith and Associates, Poway, California.

TECHNICAL QUALIFICATIONS

Ms. DeBusk has more than 11 years of experience as a professional paleontologist in California. As Applied EarthWorks' Paleontology Program Manager, she directs and oversees all paleontology work for the company. She has successfully completed over 300 paleontological resources inventory and monitoring projects throughout California and Nevada and in parts of Arizona, Utah, New Mexico, Colorado, and Texas. As a Senior Paleontologist, she routinely directs or performs paleontological field surveys and assessments, mitigation monitoring of construction activities, third-party inspections, fossil salvage and collection, laboratory preparation and analysis of micro- and macrofossils, and technical reporting. She has field and laboratory experience in paleobotany, paleoentomology, micropaleontology, invertebrate paleontology, and vertebrate paleontology.

Ms. DeBusk has extensive experience providing paleontological resource management in support of power generation and transmission projects, having served as Senior Paleontologist for more than 30 such projects throughout California and the western U.S. In addition, she has provided paleontological resources expertise for a variety of project types including residential and commercial developments, oil and gas infrastructure, geophysical seismic exploration, transportation, and environmental planning. As Principal Investigator on Applied EarthWorks' statewide Bureau of Land Management Paleontological Resource Use Permits in California in Nevada, she has extensive experience with agency coordination and is well versed in the regulatory framework governing paleontological resources management requirements for small and large scale wind and solar power projects.

Ms. DeBusk received her Bachelor of Science degree in geology with an emphasis in paleobiology from the University of Nevada, Reno Mackay School of Mines in 2002 and her Project Management Certificate at California Institute of Technology in 2012. Prior to her career in consulting, Ms. DeBusk completed a lengthy internship in paleontology for the National Park Service studying some of the earliest known

freshwater diatoms from the Florissant Formation of Colorado and documenting and collecting hundreds of plant and insect fossils. She is an active member of the Project Management Institute, the Society of Vertebrate Paleontology and the Geological Society of America.

SELECTED PROFESSIONAL EXPERIENCE

2013-2014 **Alta East Wind Energy Project, Kern County, California.** On behalf of Alta Windpower Development and under subcontract to CH2M Hill, Applied EarthWorks provided paleontological resources management services in support of the Alta East Wind Energy Project located approximately 3 miles west of the city of Mojave, Kern County, California. As the BLM-approved Principal Investigator, Ms. DeBusk was responsible for the implementation of the Paleontological Resources Monitoring and Mitigation Plan approved by the BLM. Ms. DeBusk directed paleontological monitoring during the construction of wind turbine pads and associated access roads, managing a team of up to 12 paleontologists onsite at any given time. During the course of monitoring, Applied Earthworks' paleontologists recovered numerous vertebrate fossils localities from native sediments underlying the project area. Once on-site monitoring was completed, Ms. DeBusk directed the necessary laboratory work required to ensure that all significant fossils were analyzed and curated permanently into the Raymond M. Alf Museum in Claremont, CA in 2014. *Role: Principal Investigator and Project Manager.*

2012-2014 **Rising Tree Wind Farm Project, Kern County, California.** On behalf of Horizon Wind Energy, LLC, ("Applicant"), and under contract to EDP Renewables, Applied EarthWorks provided paleontological resources management services for the Rising Tree Wind Project, located on 3,302 acres on both private and public (BLM-managed) lands in Kern County, California. Ms. DeBusk conducted a comprehensive museum records search, literature search, and published geologic map review of the Project area and determined its Potential Fossil Yield Classification in accordance to BLM guidelines. She authored a draft Paleontological Resources Assessment Report that was subsequently approved by the BLM. In 2014, Applied EarthWorks was again contracted by CH2M Hill to conduct paleontological resource mitigation and monitoring services during the construction of the Project, now entirely on private lands. The project is ongoing. *Role: Principal Investigator/Project Manager.*

2011-2012 **Palm Springs Re-Power Wind Project, Cultural, Biological, and Paleontological Services; Riverside County, California.** On behalf of NextEra, SWCA was retained to conduct a paleontological resource survey and assessment of an existing wind energy facility; the purpose of the project was to replace outdated Wind Turbine Generators (WTGs) with new, larger WTGs. Because the project was located on both private lands as well as lands administered by the BLM, two separate reports were prepared in compliance with CEQA and NEPA. Ms. DeBusk requested the museum records searches, conducted the background and literature review, led the field survey, coordinated with the BLM, and served as primary author of both technical reports. *Role: Senior Paleontologist.*

2010-2012 **Blythe, Palen and Ridgecrest Solar Power Projects, Riverside and Kern Counties, California.** On behalf of AECOM, SWCA was retained to conduct a paleontological resource survey and assessment of Solar Millennium's Blythe, Palen, and Ridgecrest solar projects, encompassing 15,544 total acres. Ms. DeBusk supervised the field surveys and was primary author of each Paleontological Resources Assessment Report. She also authored a Paleontological Resources Mitigation and Monitoring Plan (PRMMP) for the Blythe Solar Power Project, and subsequently implemented the PRMMP during installation of Desert Tortoise fencing. *Role: Senior Paleontologist.*

APPENDIX B

Record Search Results

SAN BERNARDINO COUNTY MUSEUM

COUNTY OF SAN BERNARDINO

2024 Orange Tree Lane • Redlands, California USA 92374-4560
(909) 307-2669 • Fax (909) 307-0539 • www.sbcountymuseum.org
TDD (909) 792-1462

ROBERT L. McKERNAN
Director

18 May 2012

Applied EarthWorks, Incorporated
attn: Jessica DeBusk, Paleontology Program Manager
3292 E. Florida Avenue, Suite "A"
Hemet, CA 92544-4941

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, SOUTH NORCO CHANNEL PROJECT, CITY OF NORCO, RIVERSIDE COUNTY, CALIFORNIA**

Dear Ms. DeBusk,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named linear project in the City of Norco, Riverside County, California. The study area is located in portions of sections 7, 8, and 18, Township 3 South, Range 6 West, San Bernardino Base and Meridian, as seen on the Corona North, California 7.5' United States Geological Survey topographic quadrangle map (1967 edition, photorevised 1981).

Previous mapping of the proposed property (Rogers, 1965; Morton and Gray, 2002) indicates that the proposed project alignment traverses surface exposures of late Cenozoic sedimentary rocks of the Norco region (= unit **QTn**) and early Pleistocene alluvial fan deposits (= **Qvof$_n$**), overlain in some areas by a thin sedimentary veneer of Holocene or recent alluvium (= **Qya**). The Holocene sediments have low potential to yield significant fossil resources, and so are assigned low paleontologic sensitivity. In contrast, the late Cenozoic and Pleistocene sediments have high potential to yield significant paleontologic resources, and so are assigned high paleontologic sensitivity. Pleistocene alluvium elsewhere throughout Riverside and San Bernardino Counties and the Inland Empire has been reported to yield significant fossils of extinct animals from the Ice Age (Jefferson, 1991; Reynolds and Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, sabre-toothed cats, large and small horses, large and small camels, and bison, as well as plant macro- and microfossils (Jefferson, 1991; Reynolds and Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). If not previously disturbed by development, and depending upon the lithology exhibited, the late Cenozoic and Pleistocene sediments present within the boundaries of the study area may have high potential to contain significant paleontologic resources.

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this search indicate that no previously - known paleontologic resource

localities are recorded by the SBCM from within the study area, nor from within at least one mile in any direction.

Recommendations

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation in conjunction with development may have high potential to adversely impact significant nonrenewable paleontologic resources present within the proposed project corridor of the South Norco Channel Project. A qualified vertebrate paleontologist must therefore be retained to assess the paleontologic sensitivity of late Cenozoic sediments within the boundaries of the property and, if necessary, develop a program to mitigate impacts to significant paleontologic resources. This mitigation program should be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside. This program should include, but not be limited to:

1. Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor. Paleontologic monitors should be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described herein are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

2. Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils are essential in order to fully mitigate adverse impacts to the resources (Scott and others, 2004).

3. Identification and curation of specimens into an established, accredited museum repository with permanent retrievable paleontologic storage (e.g., SBCM). These procedures are also essential steps in effective paleontologic mitigation (Scott and others, 2004) and CEQA compliance (Scott and Springer, 2003). The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until such curation into an established museum repository has been fully completed and documented.

4. Preparation of a report of findings with an appended itemized inventory of specimens. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to fossil resources.

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Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum