COMBINED PALEONTOLOGICAL IDENTIFICATION REPORT/ PALEONTOLOGICAL EVALUATION REPORT

I-215/University Parkway Interchange Improvement Project

San Bernardino, CA

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Combined Paleontological Identification Report / Paleontological Evaluation Report (PIR/PER) for the Interstate 215/University Parkway Interchange Improvement Project, San Bernardino County, California

SBD-I-215-PM 11.63
EA 0E420

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November 2018

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EXECUTIVE SUMMARY

On behalf of the San Bernardino County Transportation Authority (SBCTA), Applied EarthWorks, Inc. (Æ) performed a paleontological resource assessment in support of the Interstate 215 (I-215)/University Parkway Interchange Improvement Project (Project) in San Bernardino County, California. The study consisted of a search of museum collections records maintained by the Natural History Museum of Los Angeles County, a comprehensive literature and geologic map review, and preparation of this Paleontological Identification Report (PIR). This PIR summarizes the methods and results of a paleontological resource assessment and provides Project-specific management recommendations.

The purpose of the literature review and museum records search was to identify the geologic units underlying the area within the Project limits and to determine whether previously recorded paleontological localities occur either within the Project boundaries or within the same geologic units elsewhere. Using the results of the museum records search and literature review, the paleontological resource potential of the area within the Project limits was determined in accordance with Society of Vertebrate Paleontology (SVP) and California Department of Transportation (Caltrans) guidelines. Published geologic maps indicate the area within the Project limits is underlain by Quaternary alluvium. Museum records indicate there are no previously recorded paleontological localities directly within the Project boundaries; however, at least two scientifically significant fossil localities have been recorded nearby, in older Pleistocene alluvial deposits, similar to those that underlie the Project area at depth.

As part of the Project, two alternatives are currently being evaluated: Alternative 1 (No Build) and Alternative 2 (Diverging Diamond Interchange [DDI]). Alternative 1 (No Build) maintains the interchange in its current condition with no changes implemented. Alternative 2 (DDI) requires improvements to access ramps and traffic flow on existing roads. Alternative 2 aims to replace the existing University Parkway tight diamond interchange configuration with a DDI configuration. Ground disturbance will be largely restricted to existing fill where negligible disturbance to native sediments is anticipated.

As a result of this study, the Project Area is determined to have a low to high paleontological resource potential (i.e., sensitivity), and the likelihood of impacting scientifically significant fossils because of Project development is low to high. Therefore, nonrenewable paleontological resources may be at risk of being adversely impacted by ground-disturbing activities during construction of the Project. A qualified paleontologist should be retained to oversee further paleontological resource management, including preconstruction worker environmental training and preparation/implementation of a Paleontological Mitigation Plan during Project construction. By implementing these management recommendations, 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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PROPOSED PROJECT

On behalf of the San Bernardino County Transportation Authority (SBCTA), Applied EarthWorks, Inc. (Æ) performed a paleontological resource assessment in support of the Interstate 215 (I-215)/University Parkway Interchange Improvement Project (Project) in San Bernardino County, California (Figure 1-1). The assessment consisted of a museum records search, a comprehensive literature and geologic map review, and preparation of this Paleontological Identification Report (PIR), which includes Project-specific management recommendations. This PIR was written in accordance with the guidelines set forth by the Society of Vertebrate Paleontology (SVP, 2010) and the California Department of Transportation (Caltrans) and will satisfy the requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

1.1 PROJECT FOOTPRINT AND EXCAVATION PARAMETERS

The Project limits encompass 15.35 acres on I-215 at milepost 11.63, approximately 1.6 miles north of the I-215/State Route 210 Interchange, 0.5 miles southwest of California State University, San Bernardino (CSUSB), within the City of San Bernardino (City). Specifically, the Project is mapped within the Muscupiabe Landgrant on the San Bernardino North CA 7.5-minute U.S. Geological Survey (USGS) quadrangle (Figure 1-2).

The depth of ground disturbance for the Project will be limited to the upper 5 feet for the construction of the new access ramps, which includes the construction of the roadway, driveways, and sidewalks. Ground-disturbing activities associated with the installation of traffic signal pole and overhead signage foundations under Alternative 2 (DDI) will reach depths of up to 15 feet, 3 to 6 feet in diameter.

1.2 PROJECT BACKGROUND AND DESCRIPTION

The I-215/University Parkway Interchange serves as the primary freeway access for CSUSB and numerous businesses and area residents. Ongoing growth and development in the area has increased commuter traffic, which has led to inadequate interchange queuing capacity and higher-than-State-average collision rates.

In order to reduce collision rates related to congestion and make intersection operations more efficient for commuters, SBCTA, in cooperation with Caltrans and the City, proposes to improve freeway ramps and traffic flow at the I-215/University Parkway Interchange. Caltrans is the lead agency for CEQA and also the lead agency for NEPA, as assigned by the Federal Highway Administration (FHWA), in accordance with NEPA (42 United States Code [USC] 4321 et seq.); and the Council on Environmental Quality (CEQ) Regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508).

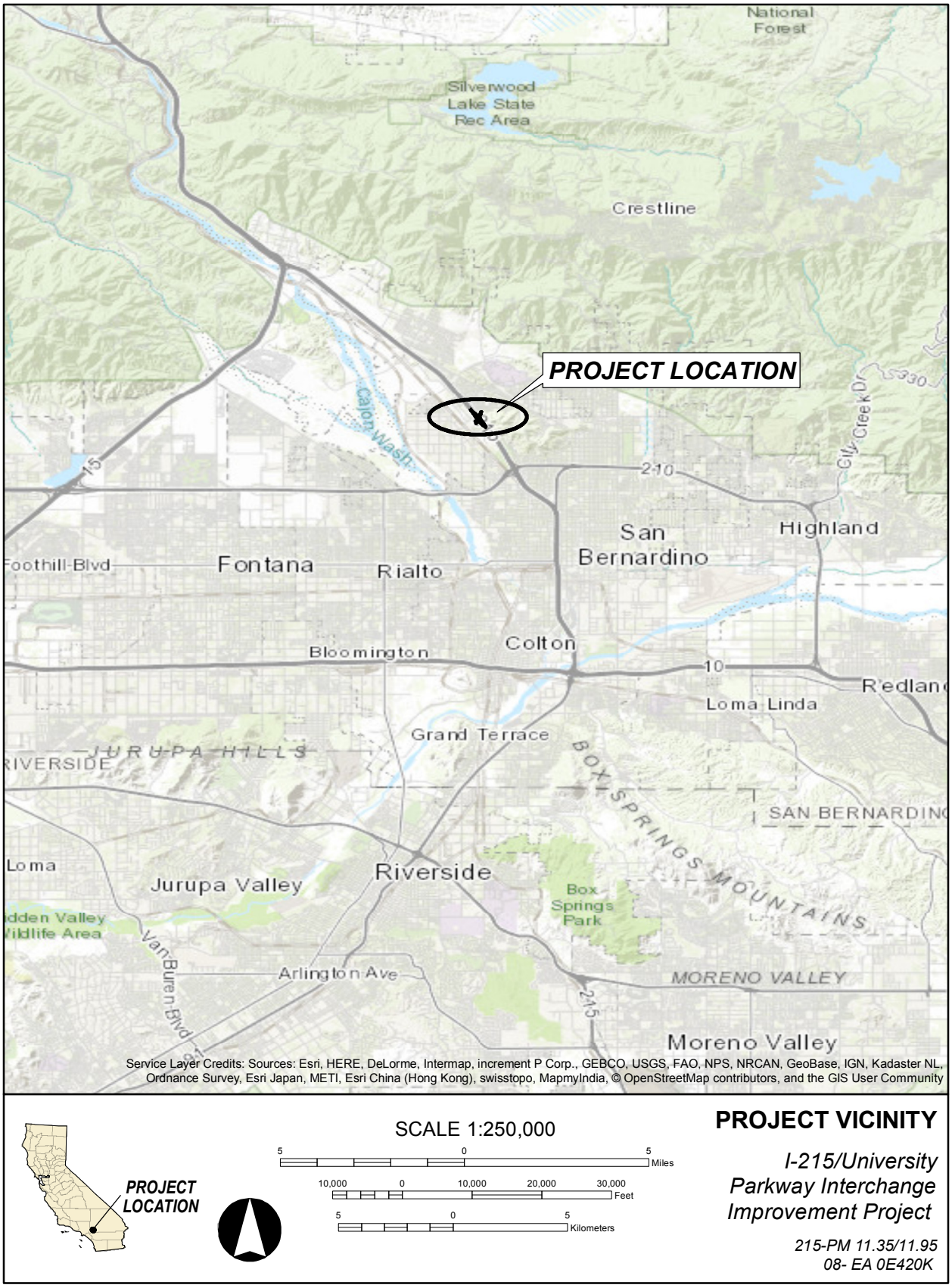

Figure 1-1 Regional location and Project vicinity map.

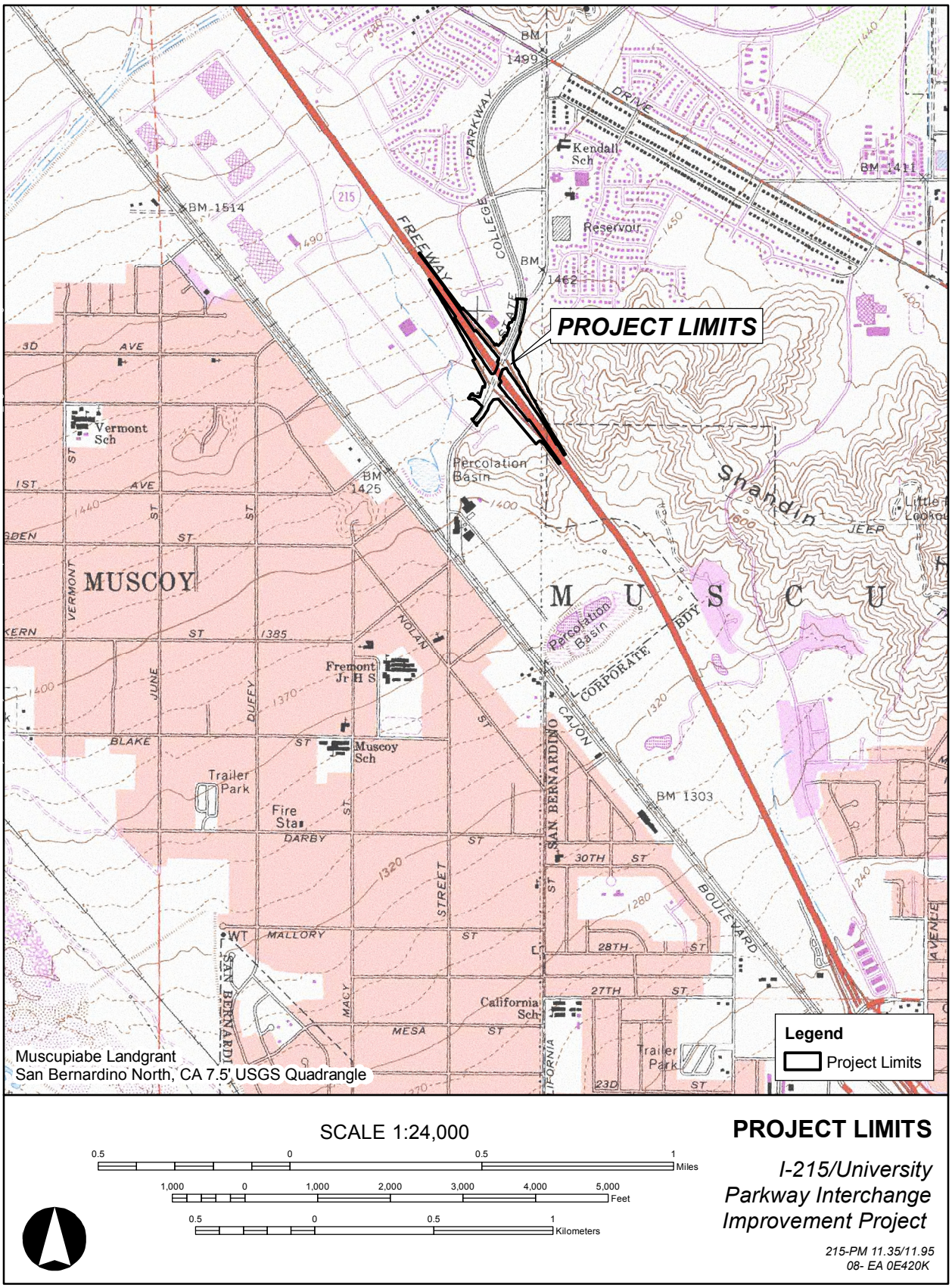

Figure 1-2 Project location map.

Two alternatives are being evaluated as part of the proposed Project: Alternative 1 (No Build) and Alternative 2 (DDI). Alternative 1 (No Build) would maintain the I-215/University Parkway Interchange in its current condition, and no improvements would be implemented. The single build alternative, the DDI, would replace the existing University Parkway tight diamond interchange configuration with a DDI configuration. The existing undercrossing would remain in place. Alternative 2 (DDI) would provide operational improvements to traffic flow by eliminating multiple traffic signal phases, which would reduce delay within the constrained area and allow for more efficient left-turn and right-turn movements at ramp terminals.

Improvements would generally occur within previously disturbed soils in the area of the existing interchange and would not require disturbance of adjacent structures. No widening would be required for the I-215 bridge, and right-of-way (ROW) impacts would be limited to partial acquisitions and temporary construction easements (TCEs). Although no property relocations are anticipated for the proposed Project, some changes are anticipated for the driveway access points of two properties (Scottish Rite Property and Retail Plaza) located along University Parkway. Vehicular and pedestrian access to these properties will be relocated or modified to accommodate the new interchange configuration.

Additional proposed improvements include the provision of street lighting; traffic signal modifications; minor paving; minor utility relocations; signage changes; re-striping; turn lanes; and bicycle, pedestrian, and median streetscape improvements. Installation of traffic signal pole and overhead signage foundations will require the excavation of a 3 to 6-foot-diameter area that will be excavated to a depth of up to 15 feet. No transmission towers are located within the Project limits.

Temporary construction-related signage and temporary delineation for traffic lanes are expected to occur. Construction-related signage would require ground disturbance to approximately 2 feet below ground surface with disturbance area 8 inches in diameter for temporary construction area sign posts. Construction staging will occur within the existing ROW and within the Project limits.

Project components that have the potential to impact paleontological resources include ground disturbance related to construction-related signage, utility relocations, and driveway access relocations and modifications.

1.3 PURPOSE OF INVESTIGATION

The purpose of this investigation is to: (1) identify the geologic units within the Project limits and, inventory known paleontological resources, and assess their paleontological resource potential; (2) determine whether the Project has the potential to adversely impact known scientifically significant paleontological resources; and (3) provide Project-specific management recommendations for paleontological resources mitigation, as necessary. This PIR was conducted in accordance with professional standards and guidelines set forth by the SVP (2010) and meets the requirements outlined in the Caltrans Standard Environmental Reference (SER) Environmental Handbook, Volume 1, Chapter 8 (Caltrans, 2016).

1.4 REPORT ORGANIZATION

This PIR documents the results of Æ's paleontological resource assessment of the Project limits. Chapter 1 has introduced the scope of work, identified the Project location and limits, described the Project, and defined the purpose of the investigation. Chapter 2 outlines the regulatory framework governing the Project. Chapter 3 presents the paleontological sensitivity criteria and resource guidelines used for this assessment. Chapter 4 provides the methods employed, and Chapter 5 describes the geology and paleontology of the area within the Project limits. The results of the museum records search and paleontological sensitivity assessment are discussed in Chapter 6. Findings and management recommendations are presented in Chapter 7 and references cited are listed in Chapter 8.

2
REGULATORY ENVIRONMENT

Paleontological resources (i.e., fossils) are considered nonrenewable scientific resources because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under various federal, state, and local laws and regulations. Laws pertinent to this Project are summarized below, excerpted in part from the Caltrans SER Environmental Handbook, Volume 1, Chapter 8 on Paleontology (Caltrans, 2016).

2.1 FEDERAL LAWS

Federal laws and regulations apply only when projects are located on federal lands or federally managed lands, or when they are federally funded. Federal laws pertinent to paleontological resources include the NEPA of 1969, the Federal Land Policy and Management Act of 1976, Statute 23 USC 305 Archaeological and Paleontological Salvage, and the Antiquities Act of 1906. Additionally, the Paleontological Resources Protection Act (PRPA) was recently enacted as a result of the passage of the Omnibus Public Lands Management Act of 2009. The PRPA requires federal land management agencies to manage and protect paleontological resources and affirms the authority of existing policies already in place. Caltrans is both the CEQA and federal lead agency for this Project; therefore, State and local regulations will apply.

2.2 STATE LAW, REGULATIONS, AND GUIDELINES

2.2.1 California Environmental Quality Act of 1970 (Public Resources Code [PRC] Section 21000 et seq.)

The CEQA Guidelines, Article 1, Section 15002(a)(3) state that CEQA is intended to "prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible." CEQA further states that public or private projects financed or approved by the state are subject to environmental review by the state. All such projects, unless entitled to an exemption, may proceed only after this requirement has been satisfied. CEQA requires detailed studies that analyze the environmental effects of a proposed project. In the event that a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered. If paleontological resources are identified as being within the proposed project study area, the sponsoring agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

2.2.2 Public Resources Code Section 5097.5

No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission

of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor. As used in this 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.

2.3 SAN BERNARDINO COUNTY

Paleontological resources are addressed under the Conservation Element of the County of San Bernardino General Plan (2007). The following policies are set forth under GOAL CO 3 in the Cultural/Paleontological Resources Section (V-C2), which stipulates that the San Bernardino County will preserve and promote its historic and prehistoric cultural heritage:

1. In areas of potential but unknown sensitivity, field surveys prior to grading will be required to establish the need for paleontologic monitoring.

2. Projects requiring grading plans that are located in areas of known fossil occurrences, or demonstrated in a field survey to have fossils present, will have all rough grading (cuts greater than 3 feet) monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Fossils include large and small vertebrate fossils, the latter recovered by screen washing of bulk samples.

3. A report of findings with an itemized accession inventory will be prepared as evidence that monitoring has been successfully completed. A preliminary report will be submitted and approved prior to granting of building permits, and a final report will be submitted and approved prior to granting of occupancy permits. The adequacy of paleontologic reports will be determined in consultation with the Curator of Earth Science, San Bernardino County Museum [V-18–V-19].

3
PALEONTOLOGICAL SENSITIVITY AND SIGNIFICANCE

3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES AND SIGNIFICANCE CRITERIA

Paleontology, exclusive of the study of fossil humans, is a natural science closely associated with geology and biology. In California, vertebrate, invertebrate, and plant fossils are usually found in sedimentary and metasedimentary deposits. Evidence of past life can also be represented by trackways, imprints, and burrows within sedimentary and metasedimentary deposits. In general, fossils are greater than 5,000 years old (older than Middle Holocene) (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).

3.2 PROFESSIONAL STANDARDS AND SVP CATEGORIES OF PALEONTOLOGICAL RESOURCE SENSITIVITY

Absent specific agency guidelines, most professional paleontologists in California adhere to guidelines set forth by the Society of Vertebrate Paleontology (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.

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 the 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.

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 Mitigation Plan (PMP) 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, or suspected to occur, in the geologic unit(s) underlying the Project area, then the plan will describe the methodology for matrix sampling and screening.

Table 3-1
Paleontological Sensitivity Classifications

SVP Resource Potential	Caltrans Tripartite Scale	Criteria	Mitigation Recommendations
No Potential	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; paleontological resources can generally be eliminated as a concern during preparation of the Preliminary Environmental Analysis Report (PEAR).
Low Potential	Low Potential	Rocks units that have yielded few, if any, vertebrate fossils in the past, but have the potential for containing fossilized remains, 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; however, for Caltrans projects, if an unanticipated paleontological resource is encountered, a Construction Change Order (CCO) must be prepared in order to have a qualified Principal Paleontologist evaluate the resource.
Undetermined Potential	n/a	In some cases, available literature on a particular geologic unit will be scarce and a determination of whether or not 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	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 anywhere within their geographical extent in the past or are likely to contain new significant vertebrate, significant invertebrate, significant plant, significant trace fossils, 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. For Caltrans projects, a final report (i.e., Paleontological Mitigation Report [PMR]) documenting the significance of the finds will also be required.

Sources: Caltrans, 2016; SVP, 2010

The PMP 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, no fossils whatsoever have been discovered, then the project paleontologist can reduce or eliminate monitoring efforts in that unit or area.

3.3 CALTRANS STANDARD ENVIRONMENTAL REFERENCE

For Caltrans projects, or projects conducted in accordance with Caltrans guidelines, the Caltrans SER, Chapter 8 (2016), recognizes two types of paleontological significance: (1) resources that are eligible for National Natural Landmark status, as defined under 36 CFR 62, and (2) scientifically significant paleontological resources. Because fossil resources with National Natural Landmark status are relatively rare, the scientific significance of paleontological resources is typically evaluated. Significance may be attributed to a particular fossil species, fossil assemblage, or for a rock unit as a whole, and is generally expressed as "sensitivity" or "potential." In order to evaluate the paleontological resource potential of a rock unit in a given project area, Caltrans uses the following tripartite scale:

> **High Potential:** Rock units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils. These units include, but are not limited to, sedimentary formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. These units may also include some volcanic and low-grade metamorphic rock units. Fossiliferous deposits with very limited geographic extent or an uncommon origin (e.g., tar pits and caves) are given special consideration and ranked as highly sensitive.
>
> **Low Potential:** This category includes sedimentary rock units that are potentially fossiliferous, but have not yielded significant fossils in the past; have not yielded fossils, but possess a potential for containing fossil remain; or contain common and /or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood. Rock units designated as low potential generally do not require monitoring and mitigation. However, as excavation for construction gets underway it is possible that new and unanticipated paleontological resources might be encountered. If the resource is determined to be significant, monitoring and mitigation is required.
>
> **No Potential:** Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources. For projects encountering only these types of rock units, paleontological resources can generally be eliminated as a concern and no further action taken [Caltrans, 2016].

Once the sensitivity has been determined, avoidance of significant paleontological resources should be considered as a management strategy before typical mitigation protocol is undertaken (e.g., monitoring). Avoidance measures may include project redesign to ensure that sensitive resources are outside of the area of potential effects or the creation of Environmentally Sensitive Areas (ESAs) to restrict access to sensitive resource areas during ground disturbance. If a paleontological resource cannot be avoided, then mitigation measures, in accordance to Caltrans SER guidelines shall be conducted (see Table 3-1).

4
METHODS

4.1 LITERATURE REVIEW AND RECORDS SEARCH

For projects that occur in areas where potentially sensitive paleontological units are buried beneath Holocene alluvium or soil, reconnaissance surveys are not sufficient to determine whether paleontological resources are present in the area that will be impacted by construction. Paleontological resources are not found in Holocene alluvium (sands, gravels) or soil but rather are contained within the geologic deposits or bedrock that underlie these upper deposits. Relevant scientific literature and geologic maps must be reviewed to determine the underlying geology of the Project limits to determine the potential to contain significant fossil resources at the subsurface. To delineate the boundaries of an area of paleontological sensitivity, the extent of the entire geologic unit with paleontological sensitivity must be determined—sensitivity is not limited to surface exposures of fossil material.

A museum records search was conducted at the Natural History Museum of Los Angeles County (LACM) to determine whether fossil localities have been previously discovered within the Project area or a particular rock unit beneath the Project limits.

4.2 KEY PERSONNEL

Æ's Associate Paleontologist Heather Clifford formerly served as Project paleontologist. She conducted the literature and geologic map review, requested the museum records searches, produced all graphics and was the primary author of this report. Ms. Clifford has more than four years of professional experience as a consulting paleontologist and meets the SVP's definition of a qualified professional paleontologist.

Æ's Associate Paleontologist Chris Shi currently serves as Project paleontologist. As the secondary author of this report, he revised many of the sections to be up-to-date with the current status of the Project. Æ Staff Paleontologist Christopher Shea assisted with revisions of the PIR and adaptation to a PIR/PER. Mr. Shi has two years of professional experience as a consulting paleontologist and will oversee implementation of the Project PIR/PER moving forward. Mr. Shea has a Master's degree in geology and possesses familiarity and proficiency with paleontology, sedimentology, and stratigraphy.

5
GEOLOGY AND PALEONTOLOGY

5.1 REGIONAL GEOLOGY

The Project is in the southern foothills of the San Bernardino Mountains, south of the Cajon Pass within the Transverse Ranges geomorphic province (Morton and Miller, 2006). A geomorphic province is a region of unique topography and geology that is readily distinguished from other regions based on its landforms and diastrophic history. The San Bernardino Mountains rise 11,502 feet above mean sea level (amsl) at the highest peak and extend for approximately 65 miles east from the Cajon Pass to Twentynine Palms and the Morongo Valley (Norris and Webb, 1976). The geology in the vicinity of the Project limits is complex and includes Mesozoic and Cretaceous granitic rocks, with local exposures of fossiliferous Precambrian and Paleozoic limestone and quartzite, unconformably overlain by Late Cenozoic sedimentary deposits and Quaternary alluvium (Morton and Miller, 2006). The regional geology has been highly influenced by movement along the San Andreas fault zone, which runs along the southern border of the San Bernardino Mountains and is located approximately one mile south of the Project limits (Wallace, 1990). Active uplift and erosion in the San Bernardino Mountains have produced steep canyons, rugged topography, numerous landslides, and extensive alluvial sedimentation (Morton and Miller, 2006).

5.2 GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

The Project limits are mapped at a scale of 1:100,000 by Morton and Miller (2006) and are directly underlain by rock units of the Cretaceous Pelona Schist metamorphic bedrock and Quaternary alluvial fan, valley, eolian, and wash deposits. The geology and paleontology of these units are described in the following sections and the geology is depicted in Figure 5-1.

5.2.1 Pelona Schist (pKm)

The Pelona Schist is mapped in the Project limits and is intermittently exposed throughout the central Transverse Ranges (Morton and Miller, 2006). The Pelona Schist consists of weathered, blue-grey to brown, semi-coherent schist composed of muscovite mica, albite feldspar, quartz, chlorite, and actinolite. The Pelona Schist was derived from marine clastic and volcanic rocks that were buried below the Vincent thrust, subsequently folded, subjected to medium- to high-grade metamorphism during the Mesozoic, and later uplifted and exposed at the surface due to erosion (Haxel et al., 2002). Due to the high heat and pressure of metamorphism, fossils have not been recorded in the Pelona Schist.

5.2.2 Quaternary Surficial Deposits

Quaternary alluvial (Qya) deposits are exposed throughout the Project limits and unconformably overlie older crystalline bedrock at an unknown but likely relatively shallow to moderate depth

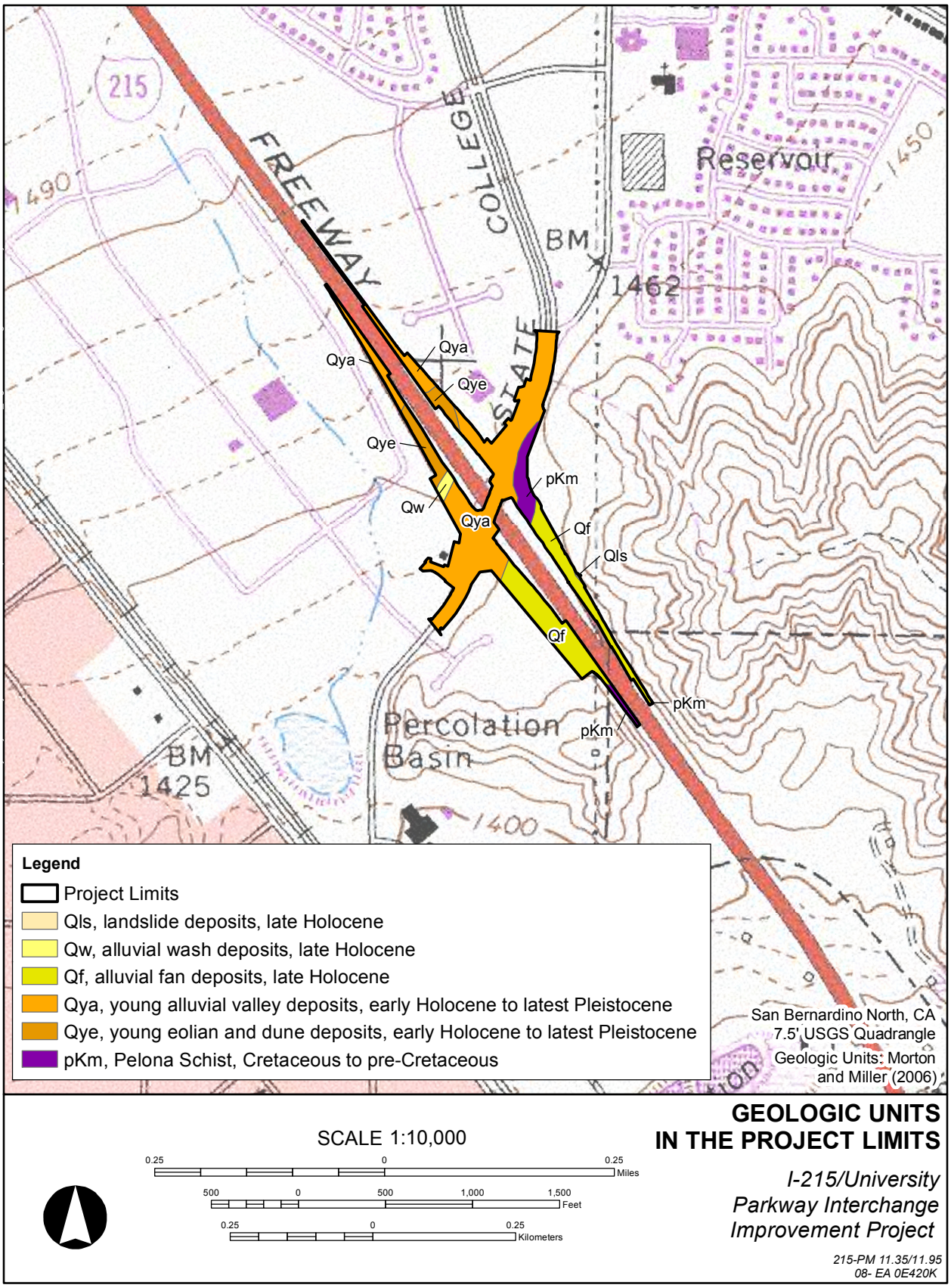

Figure 5-1 Geologic Units in the Project Limits.

(McLeod, 2017). The alluvial sediments are composed of tan to reddish-brown sandstone and siltstone that were deposited in an alluvial valley environment during the late Pleistocene to early Holocene. The deposits are moderately consolidated and poorly indurated with angular to subangular clasts, local pebble conglomerate lenses, moderate soil formation, abundant dissection, and local well sorted wind-blown sand (eolian) deposits (Qye) (Morton and Miller, 2006). Younger Quaternary alluvial fan (Qf), wash (Qw), and landslide (Qls) deposits overlie older Quaternary alluvium in the area of the Project limits (Morton and Miller, 2006). The recent alluvial deposits generally consist of gravel, sand, and clay restricted to valley, gully, wash, and landslide areas. According to McLeod (2017), Holocene alluvial deposits similar to those mapped at the surface of the Project limits, particularly those younger than 5,000 years old, are generally too young to contain fossilized material (SVP, 2010); however, they may be underlain at a relatively shallow depth by older late Pleistocene alluvial deposits that do contain significant fossil vertebrate remains.

Pleistocene-age alluvial deposits have proven to yield scientifically significant paleontological resources throughout southern California from the coastal areas to the inland valleys. Multiple vertebrate localities have been recorded south of the Project limits in the vicinity of the Santa Ana River valley. Approximately 15 miles southeast of the City near Moreno Valley, a fossil specimen of extinct horse was recovered from Quaternary older deposits, depth of recovery unreported. Approximately 15 miles southeast of Colton near Eastvale, a fossil specimen of coachwhip was recovered from Quaternary older deposits at a depth of 9 to 11 feet below the surface (McLeod, 2017). Farther south near Lakeview, a diverse assemblage of Pleistocene fossil resources has 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 recovered from depths ranging from 5 to 71 feet below ground surface (bgs) (Springer et al., 2009).

6
ANALYSIS AND RESULTS

6.1 MUSEUM RECORDS SEARCH RESULTS

The LACM reports that there are no previously recorded vertebrate fossil localities in the area within the Project limits or in the immediate vicinity from within Quaternary alluvial and eolian deposits. However, LACM museum collections identify two vertebrate localities (LACM 7811 and 1207) that were recorded nearby from within older fine-grained Pleistocene-age sedimentary deposits. According to McLeod (2017), these Pleistocene sedimentary deposits are likely similar to older alluvial deposits present at unknown depth within the Project limits. The localities were identified approximately 15 miles southwest of the Project limits and yielded vertebrate fossil specimens of deer and whipsnake, depth of recovery 9 to 11 feet bgs (McLeod, 2017). A supplemental review of online museum collections records maintained by the UCMP identified no previously recorded vertebrate localities from similar Pleistocene-age deposits in the vicinity of the Project limits.

6.2 DETERMINATION OF THE PALEONTOLOGICAL RESOURCE POTENTIAL FOR THE PROJECT AREA

Based on the literature review and museum records search results, the paleontological sensitivity was determined in accordance with the SVP's (2010) guidelines and Caltrans (2016) tripartite sensitivity scale. The Quaternary alluvial (Qya) deposits are determined to have a low to high paleontological resource potential, dependent on depth. The Quaternary alluvium is likely too young to contain fossilized remains near the surface due to the young age of the sediments; however, deeper and older Pleistocene deposits have been known to yield significant paleontological resources throughout the region. Younger Quaternary alluvial deposits (Qf, Qw, Qls) mapped within the Project limits have been determined to have a low paleontological resource potential because these sediments were deposited during the late Holocene and are too young to preserve fossilized remains. In addition, Quaternary eolian deposits (Qye) are not typically conducive to the preservation of fossilized remains due to the generally slow sedimentation rate and have thus been determined to have a low paleontological resource potential. The Cretaceous Pelona Schist metamorphic rocks (pKm) have no potential for fossil preservation due to the high heat and pressure of high-grade metamorphism. Refer to Figure 6-1 for a depiction of the paleontological sensitivity in the Project limits.

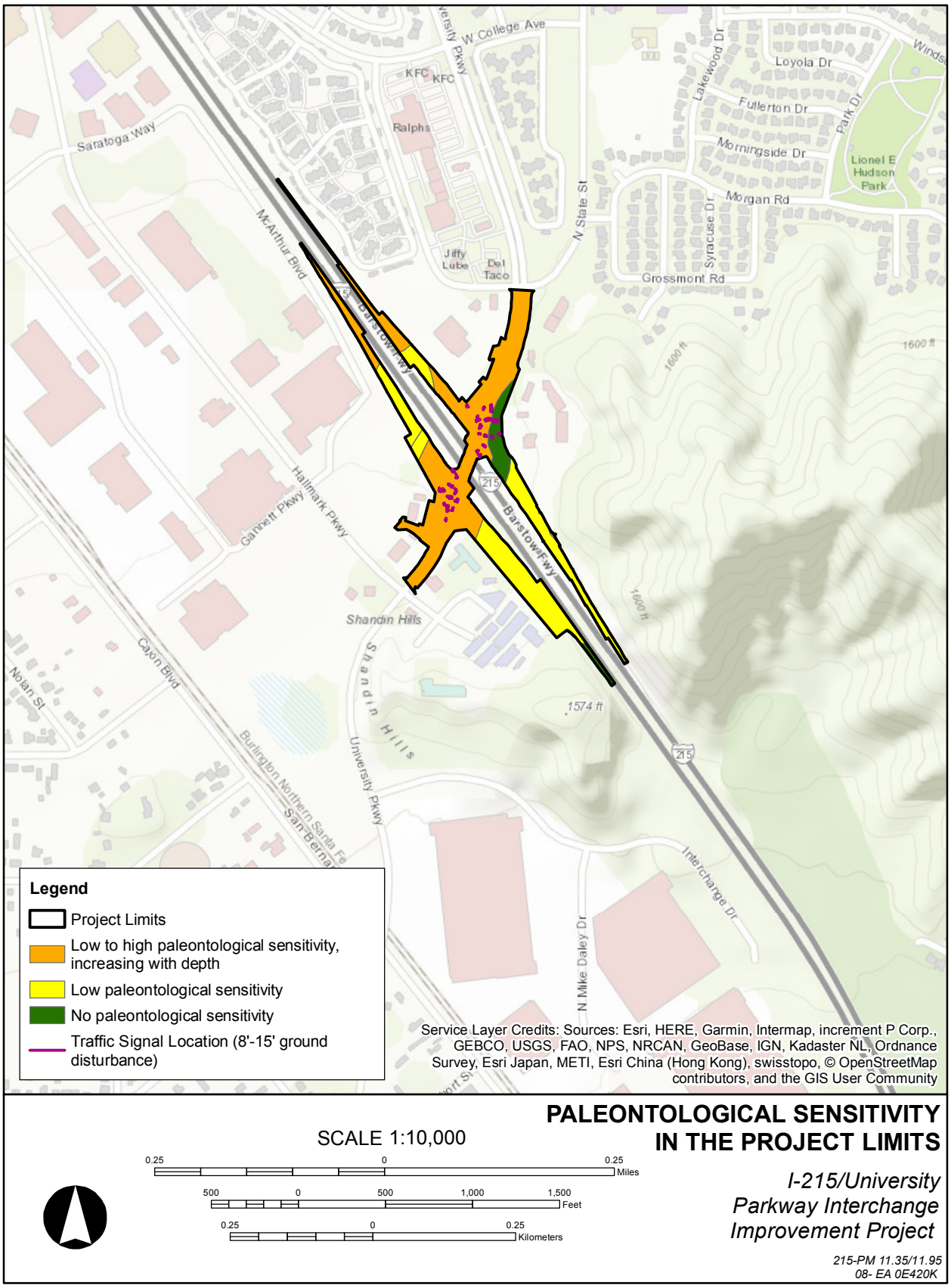

Figure 6-1 Paleontological Sensitivity in the Project Limits.

7
CONCLUSIONS AND RECOMMENDATIONS

Based on the literature review and museum records search results, the paleontological sensitivity of the Project limits was determined in accordance with Caltrans' (2016) tripartite sensitivity scale. Late Holocene alluvium (Qf, Qw, Qls), Quaternary eolian deposits (Qye), and Cretaceous metamorphic deposits (pKm) were determined to have low to no paleontological resource potential. Based on depths associated with regional fossil localities (Chapter 6), the Quaternary alluvial (Qya) deposits are determined to have a low paleontological sensitivity at shallow to moderate depth (0 to 5 feet bgs) and high paleontological sensitivity at depths greater than 5 feet bgs. In general, the potential for the Project to result in adverse impacts to paleontological resources is directly proportional to the amount of ground-disturbing activities.

As described in Chapter 1, the majority of the Project-related ground disturbance will be surficial and will primarily be restricted to areas of previous disturbance due to road construction, historic development, and agricultural use. Exceptions to this include excavations of up to 15 feet associated with the installation of traffic signal pole and overhead signage foundations (see Figure 6-1). Ground disturbances in areas that are immediately underlain by Quaternary alluvium (Qya) that are less than 5 feet bgs have a low potential to encounter fossil resources, while excavations greater than 5 feet bgs reach geologic strata with high paleontological sensitivity and therefore have a high potential to encounter fossil resources. However, 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.

7.1 MANAGEMENT RECOMMENDATIONS

7.1.1 Worker's Environmental Awareness Training

Prior to the start of construction, all field personnel should 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 should be accomplished at the pre-grade kick-off meeting or morning tailboard meeting and should 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 should 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.).

7.1.2 Paleontological Mitigation Monitoring

Prior to the commencement of ground-disturbing activities, a qualified professional paleontologist should be retained to prepare and implement a Paleontological Mitigation Plan for the Project. Part-time monitoring is recommended for grading and excavation activities at depths

greater than 5 feet bgs that will disturb previously undisturbed Quaternary Alluvium (Qya). Due to soil development, previous anthropogenic developments, and young age of surficial soil and native Quaternary surficial sediments, monitoring should not be required in Project areas where construction activities disturb sediments at depths less than 5 feet bgs. Monitoring should entail the visual inspection of excavated or graded areas and trench sidewalls.

PAL-1 In the event that an inadvertent fossil discovery is encountered during construction, all work shall cease within a 20 foot radius of the discovery. On-site personnel shall contact the construction superintendent and the Caltrans Paleontological Resource Specialist (PRS) immediately.

PAL-2 In the event that an inadvertent fossil discovery is encountered during construction, San Bernardino County Transportation Agency's (SBCTA) Resident Engineer will ensure that the Caltrans PRS shall examine the discovery to assess it for scientific significance and to determine if any paleontological resources mitigation is warranted, including monitoring, preservation in place, excavation, documentation, curation, or other appropriate measures.

PAL-3 In the event that an inadvertent fossil discovery is encountered during construction, and if the Caltrans PRS determines the find is scientifically significant and mitigation is warranted, SBCTA's Resident Engineer shall ensure that a qualified professional paleontologist be retained. Steps will be taken to protect against looting, erosion, or other human or natural damage while the fossil locality is exposed. Work may not resume within 100 feet of the discovery until pre-approved by the PRS.

7.1.3 Fossil Preparation, Curation, and Reporting

Upon completion of fieldwork, all significant fossils collected should 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 should be identified to the lowest taxonomic level, cataloged, analyzed, and delivered to the Natural History Museum of Los Angeles County for permanent curation and storage. The cost of curation is assessed by the repository and is the responsibility of HDR, Inc.

At the conclusion of laboratory work and museum curation, a final Paleontological Mitigation Report should be prepared describing the results of the paleontological mitigation monitoring efforts associated with the Project. The report should 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 should also be submitted to the Natural History Museum of Los Angeles County.

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REFERENCES CITED

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APPENDIX A

Museum Records Search Results

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

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

18 August 2017

Applied EarthWorks, Inc.
133 North San Gabriel Boulevard, Suite 201
Pasadena, CA 91107-3414

Attn: Heather Clifford, Associate Paleontologist / Geologist

re: Paleontological resources for the Paleontological resources for the proposed I-215 University Project, in the City of San Bernardino, San Bernardino County, project area

Dear Heather:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed I-215 University Project, in the City of San Bernardino, San Bernardino County, project area as outlined on the portion of the San Bernardino North USGS topographic quadrangle map that you sent to me via e-mail on 8 August 2017. We do not have any vertebrate fossil localities that lie directly within the proposed project area, but we do have localities farther afield from sedimentary deposits similar to those that may occur subsurface in the proposed project area.

In the southeastern portion of the proposed project area, in the elevated terrain of the Shandin Hills, there are bedrock exposures of metamorphic rocks of the Pelona Schist that will not contain any recognizable fossils. Surface deposits in the remainder of the proposed project area are composed of younger Quaternary Alluvium, derived as alluvial fan deposits from the San Gabriel Mountains to the north, primarily via Cable Creek from Cajon Canyon to the northwest. These deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, but they may be underlain at relatively shallow depth by older sedimentary deposits that do contain significant fossil vertebrate remains. Our closest fossil vertebrate locality from similar older Quaternary deposits is LACM 7811, quite some distance to the west-southwest of the proposed project area west of Mira Loma along Sumner Avenue, that produced

a fossil specimen of whipsnake, *Masticophis*, at a depth of 9 to 11 feet below the surface. Even further to the southwest between Corona and Norco our vertebrate fossil locality LACM 1207 produced a fossil specimen of deer, *Odocoileus*.

Excavations in the metamorphic rocks in the southeastern portion of the proposed project area will not uncover any recognizable fossils. Shallow excavations in the younger Quaternary Alluvium exposed throughout the remainder of the proposed project area are unlikely to encounter significant vertebrate fossils. Deeper excavations in the latter portions of the proposed project area that extend down into older Quaternary deposits, however, may well encounter significant remains of fossil vertebrates. 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