

**Paleontological Resource Assessment for the  
Southern California Logistics Airport Specific  
Plan Amendment Technical Study Project,  
City of Victorville,  
San Bernardino County, California**

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draft

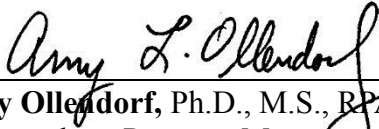
**Paleontological Resource Assessment for the  
Southern California Logistics Airport Specific Plan  
Amendment Technical Study Project,  
City of Victorville, San Bernardino County, California**

Prepared By:



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June 2019

## MANAGEMENT SUMMARY

At the request of Michael Baker International, Applied EarthWorks, Inc. (Æ) completed a Paleontological Resource Assessment (PRA) for the Southern California Logistics Airport (SCLA) Specific Plan Amendment Technical Study Project (Project) in the City of Victorville (City), San Bernardino County, California. This PRA is part of the environmental review process as required by the City, which serves as lead agency for compliance with the California Environmental Quality Act (CEQA). The Project area is approximately one mile east of U.S. Route 395 and one mile west of the community of Oro Grande and encompasses 2,312 acres.

This PRA consisted of desktop studies, which include a review of published and unpublished literature and maps as well as searches of museum records. The purpose of these studies was to identify the geologic units in the Project area and to determine whether previously recorded paleontological localities occur either within the Project area or within the same geologic units elsewhere. Æ utilized the results of all the desktop studies to determine the paleontological sensitivity of the ground surface in the Project area. Æ assigned Low potential to much of the Project area, including all of the western half and most of the eastern half, whereas a subarea in the southwest corner of the eastern half and subareas along the east boundary of the Project area are given a ranking of High potential for paleontological resources. Æ also concludes there is a high likelihood for significant paleontological resources to be preserved at unknown depths throughout the entire Project area and considers this under the recommendations.

Æ recommends the City retain a professional paleontologist who meets the Society of Vertebrate Paleontology's (SVP) qualification standards to develop and implement a paleontological resource impact mitigation program (PRIMP) for the Project prior to the start of ground-disturbing activities. As part of the PRIMP, Æ makes the following recommendations for construction monitoring of Project-related ground disturbance:

- Full-time monitoring at all depths in all High potential locations.
- Spot-check monitoring in all Low potential locations that will be disturbed at depths greater than 7 feet. The frequency of spot-check monitoring may be increased at the discretion of the professional paleontologist, if intact and significant paleontological resources are encountered below 7 feet of the present ground surface.

Implementation of these recommendations will ensure adverse impacts to paleontological resources will be reduced to a less than significant level in accordance with CEQA.

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# **1 INTRODUCTION**

At the request of Michael Baker International, Applied EarthWorks, Inc. (Æ) completed a Paleontological Resource Assessment (PRA) for the Southern California Logistics Airport (SCLA) Specific Plan Amendment Technical Study Area Project (Project) in the City of Victorville (City), San Bernardino County, California (Figure 1-1). This PRA is part of the environmental review process as required by the City, which serves as lead agency for compliance with the California Environmental Quality Act (CEQA).

## **1.1 PROJECT DESCRIPTION**

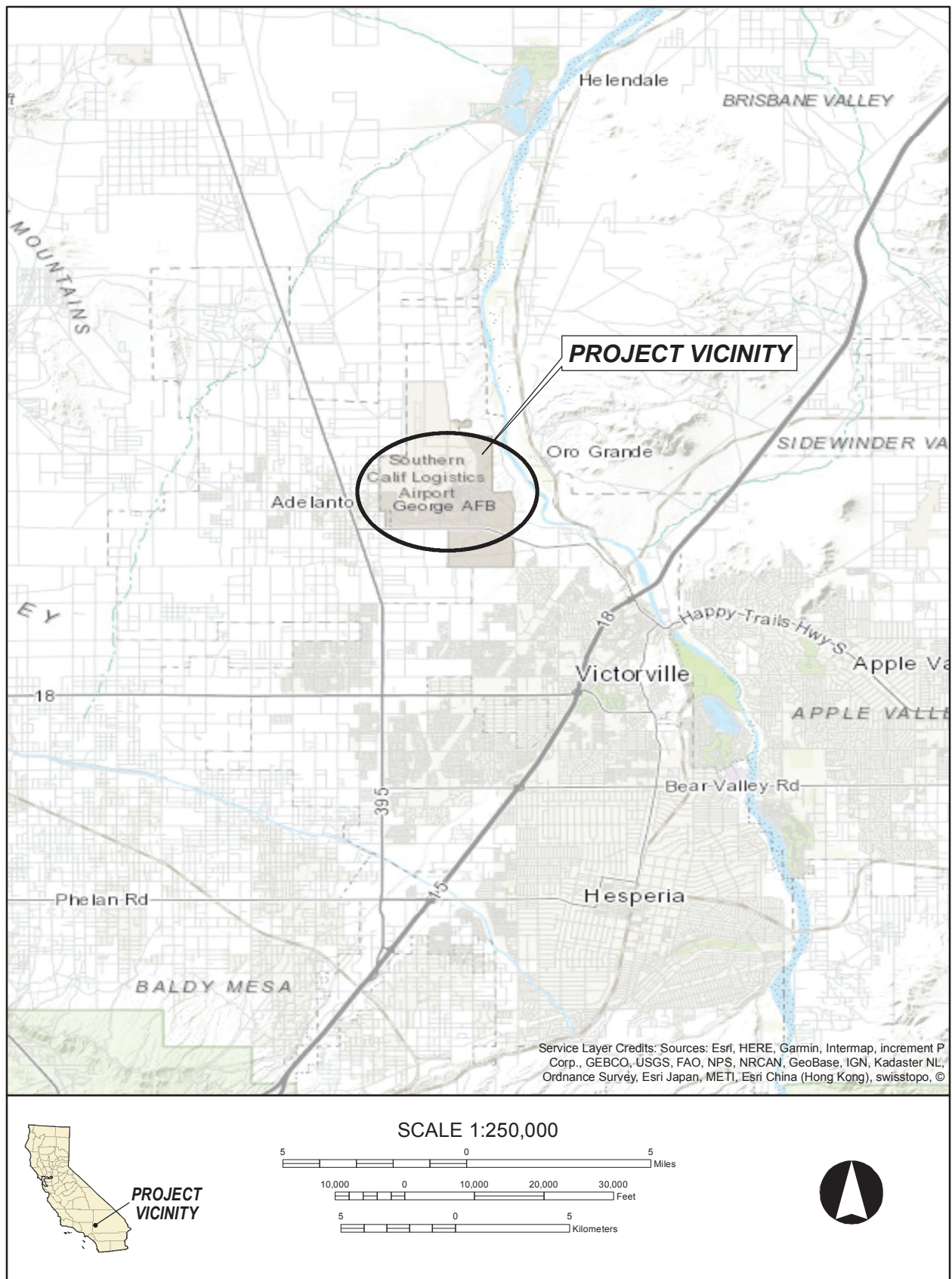
The Specific Plan became effective in 1993, with only one major amendment that occurred in 2004. Many of the foundational elements of the Specific Plan are now over 25 years old. Thus, the City, in partnership with Stirling Development, proposes to amend the Specific Plan for the SCLA to: (1) reflect current development trends, economic and market conditions, and design guidelines; (2) provide an updated description of existing infrastructure serving the SCLA, and projected requirements to serve future development; and (3) modernize the format and framework of the Specific Plan to more efficiently guide development at the SCLA.

The City has established a Priority Development Area, herein referred to as the “Project area”, for development feasibly occurring within the Specific Plan area over the next 25 years, based on available infrastructure and projected market demand for development. The Project area primarily occurs within the Central Core, Airport, and West Side development districts, with an area of approximately 2,312 acres. Development within this area is anticipated to occur over a total of five phases, in 5-year increments over the next 25 years, and would result in approximately 25,973,000 square feet of new building area.

The Project area is approximately one mile east of U.S. Route 395 and one mile west of the community of Oro Grande. It is mapped in Sections 15, 22, 23, 24, 25, 26, and 27 of Township 6 North, Range 5 West on the Adelanto and Victorville 7.5-minute U.S. Geological Survey (USGS) topographic quadrangles (Figure 1-2).

## **1.2 PURPOSE OF INVESTIGATION**

The purpose of this investigation is to: (1) identify the geologic units within the Project area and assess their paleontological resource potential; (2) determine whether the Project has the potential to adversely impact scientifically significant paleontological resources; (3) provide Project-specific management recommendations for paleontological resources, as necessary; and (4) demonstrate compliance with state laws and regulations.



**Figure 1-1 Project vicinity in San Bernardino County, California.**



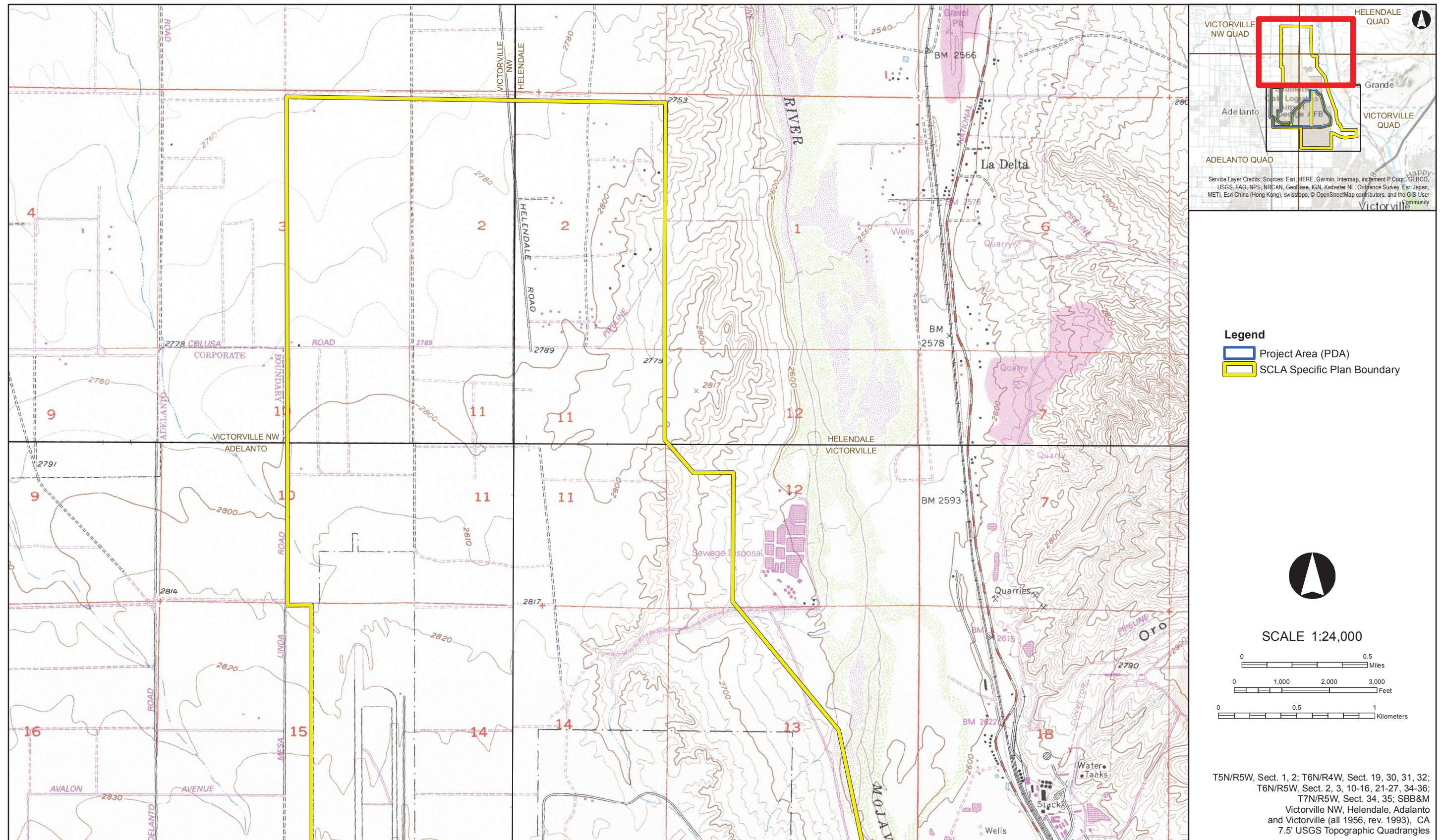


Figure 1-2a Project location (Sheet 1 of 2).



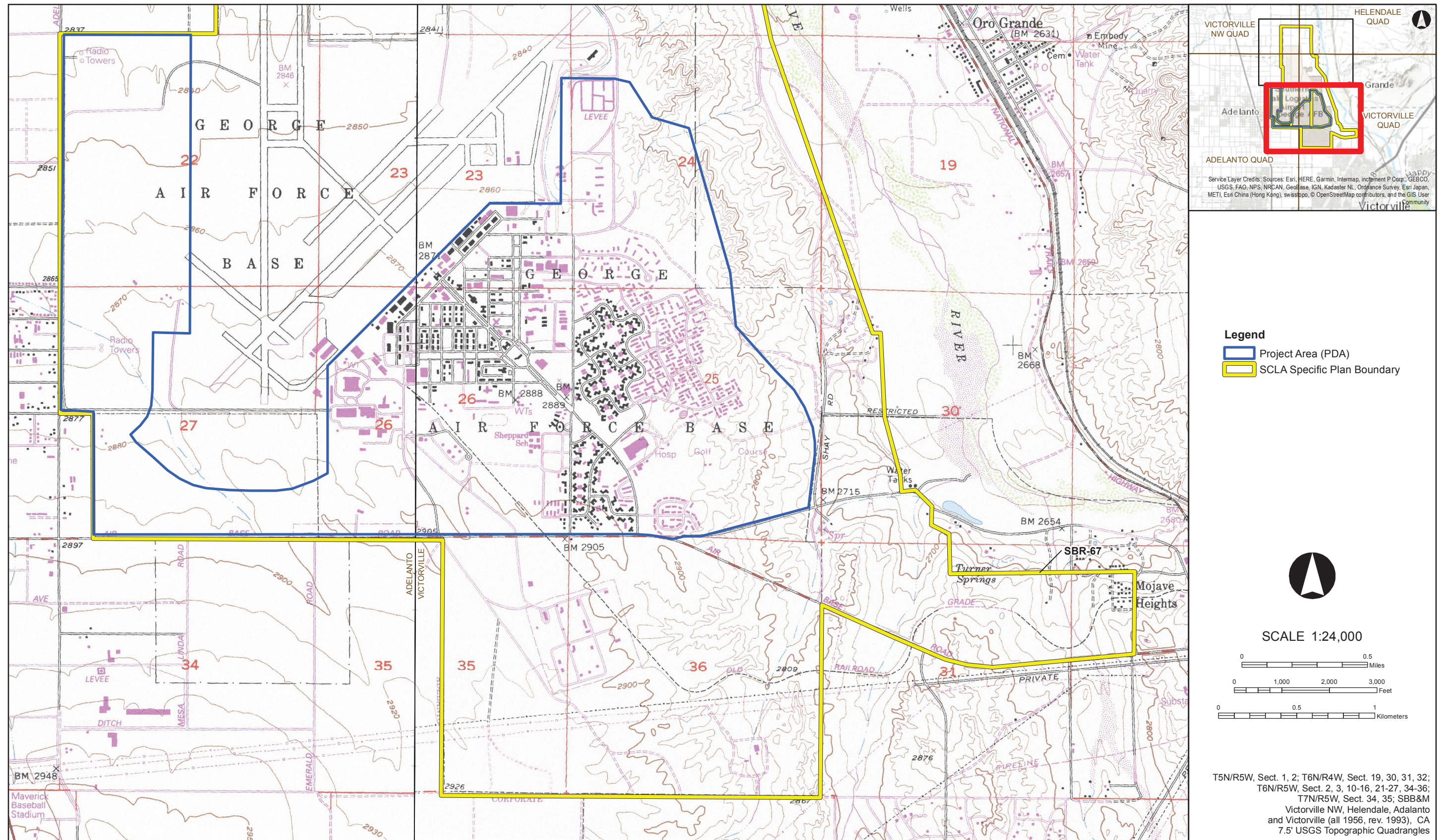


Figure 1-2b Project location (Sheet 2 of 2).



### **1.3 REPORT ORGANIZATION**

Chapter 1 has described the Project and defined the purpose of the investigation. Chapter 2 discusses 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 Project area. The results of the literature and map reviews, museum records searches, and paleontological sensitivity assessment are presented in Chapter 6. Management recommendations can be found in Chapter 7, and references cited are listed in Chapter 8. Appendix A contains qualifications of key personnel.

## 2 REGULATORY ENVIRONMENT

Paleontological resources (i.e., fossils) are considered nonrenewable scientific resources because when they are destroyed, they cannot be replaced. As such, paleontological resources are protected under various federal, state, and local laws. Laws pertinent to this project are discussed below.

### 2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT

Construction of the Project requires discretionary permits and authorization from the City. Thus, the Project is subject to the Guidelines for Implementation of CEQA (Title 14, California Code of Regulations, Chapter 3) Section 15002(a)(3), which states among the basic purposes of CEQA is the intention 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 Guidelines Section 15366(3)(b) further states, “a city or county will have jurisdiction by law with respect to a project when the city or county having primary jurisdiction over the area involved is (1) the site of the project; (2) the area in which the major environmental effects will occur; and/or (3) the area in which reside those citizens most directly concerned by any such environmental effects.” Under this provision, the City is the lead agency for CEQA.

The CEQA requires detailed studies that analyze the environmental effects of a proposed project. If a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered. Specifically, in Section VII(f) of Appendix G of the CEQA Guidelines, the Environmental Checklist Form, the question is posed, “Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” If paleontological resources are identified as being within the proposed project 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 CITY OF VICTORVILLE

Paleontological resources are directly addressed by the City. The Mitigation Monitoring Program (MMP) of the Final Program Environmental Impact Report for the City of Victorville General Plan 2030 includes the following mitigation measure for paleontological resources (City of Victorville, 2008:136):

- CUL-1:       The applicant shall provide for an on-site paleontological/archaeological inspector to monitor all grading operations, or a letter from said licensed professional indicating that monitoring is not necessary during grading. Further, if disturbed resources are required to be collected and preserved, the applicant shall be required to participate financially up to the limits imposed by Public Resources Code Section 21083.2. The results of said monitoring shall be filed with the Development Director or his designee prior to the final approval of the development.

## PALEONTOLOGICAL RESOURCE ASSESSMENT GUIDELINES

Protection of paleontological resources requires assessment of the potential for geologic units to contain significant paleontological resources that could be directly or indirectly impacted or destroyed during Project development, and the formulation and implementation of management measures to mitigate these impacts.

### 3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES AND SIGNIFICANCE CRITERIA

Paleontological resources are defined by the Society of Vertebrate Paleontology (SVP, 2010) as fossils and fossiliferous deposits. Fossils are the evidence of once-living organisms as preserved in the rock record. They include both the lithified 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 uncommon, certain volcanic rocks and low-grade metamorphic rocks may be fossiliferous if formed under certain conditions (SVP, 2010).

Well-preserved and identifiable individual fossils are considered significant paleontological resources if they are a type specimen, rare, a complete specimen, or part of an important diverse fossil assemblage. Of particular importance are fossils found in situ, or undisturbed from their primary geologic context. These fossils 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, including investigation into paleoenvironments and paleoclimates (Scott and Springer, 2003; SVP, 2010). Among the various types of fossils, intact and in situ vertebrate fossils are usually assigned a greater significance than other types as they are comparatively rare. Consequently, more attention tends to be placed on the recovery of vertebrate fossils than other types.

### 3.2 SENSITIVITY CRITERIA AND GUIDELINES

Most professional paleontologists in California adhere to the guidelines set forth by the SVP (SVP, 2010) to determine the course of paleontological mitigation for a given project on private and public lands, unless others are available (e.g., Riverside County, U.S. Bureau of Land Management). The SVP has developed its own guidelines that establish detailed protocols for the assessment of the paleontological 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 (SVP, 2010).

Following the SVP's established process, baseline information is used to assign the paleontological sensitivity of a geologic unit(s) (or members thereof) to one of four categories—No Potential, Low, High, and Undetermined (SVP, 2010). Geologic units are considered to be “sensitive” for paleontological resources and have a High Potential if vertebrate or significant



invertebrate, plant, or trace fossils have been recovered anywhere in their extent, even if outside the Project area; or if the units are sedimentary rocks that are temporally or lithologically suitable for the preservation of significant fossils. The criteria for the categories and associated mitigation recommendations are shown in Table 3-1.

**Table 3-1**  
**Paleontological Sensitivity Classification**

<b>Resource Potential</b>	<b>Criteria</b>	<b>Mitigation Recommendations</b>
No potential	Rock units that have no potential for paleontological resources are those 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	Rocks units from which few fossils have been recovered or are generally unsuitable for preservation of fossils are considered to have a low potential. These units typically yield fossils only on rare occasions and under unusual circumstances (e.g., basalt flows, recent colluvium, etc.).	Mitigation is not typically required.
High	Rock units from which vertebrate or significant specimens of other fossil types have been recovered are considered to have a high potential. Rock units with high potential also may include rock units that are temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, argillaceous and carbonate-rich paleosols, fine-grained marine sandstones, etc.).	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.
Undetermined	In some cases, available literature on a particular rock 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.	Typically, a field survey, as well as onsite construction monitoring, will be required to further assess the unit's paleontological potential.

Source: SVP (2010)

## 4 METHODS

This PRA was completed through desktop research. The twofold purpose of the research was (1) to identify the geologic units in the Project area and immediate vicinity to determine whether previously recorded paleontological localities occur either within the Project area or within the same geologic units elsewhere nearby and (2) to determine the sensitivity of the geologic units in the Project area for their potential to yield paleontological resources.

### 4.1 LITERATURE REVIEW AND MUSEUM RECORDS SEARCHES

In many areas, the near-surface layers of sediments and sedimentary rocks are broken down and converted to soil (pedogenesis) through chemical and physical weathering processes (Boggs, 2012). During pedogenesis, any fossils that were preserved within the near-surface layers often are destroyed or rendered unrecognizable. Therefore, intact and identifiable fossils are unlikely to be found in soil. In order to ascertain whether a particular project area has the potential for significant subsurface paleontological resources, it is necessary to review relevant geologic maps, regional geological publications, and unpublished reports to ascertain the geology and stratigraphy of the area.

To supplement the literature review, Æ requested a search of museum collection records maintained by the Natural History Museum of Los Angeles County (NHMLAC) and the Western Science Center (WSC). In addition, Æ also completed a search of the online database maintained by the University of California Museum of Paleontology (UCMP), which is readily available to the public.

### 4.2 KEY PERSONNEL

Æ's Paleontology Program Manager, Dr. Amy Ollendorf, served as the Principal Investigator and Co-Author of the PRA. She oversaw each task required for the production of this PRA, including quality control. Æ's Project Paleontologist, Chris Shi, co-authored the PRA. Æ GIS technician Cari Inoway produced the figures in close consultation with Shi.

Ollendorf has 35 years of environmental compliance experience across the United States and abroad. She also has interdisciplinary graduate degrees involving geology and a bachelor's degree in geology, all of which focused on paleontological subject matter. Shi meets the SVP (2010) qualifications standards for Project Paleontologist. He has a graduate degree in geology with an emphasis in paleontology, and possesses familiarity and proficiency with paleontology, sedimentology, and stratigraphy in California. Qualifications for key personnel can be found in Appendix A.

## 5 GEOLOGY AND PALEONTOLOGY

### 5.1 REGIONAL GEOLOGY

The Project is in the Mojave Desert geomorphic province in southeastern California, which extends from the San Andreas and Garlock faults toward the Basin and Range and Colorado Desert provinces (Dibblee and Hewett, 1966; Norris and Webb, 1976). The Mojave Desert is entirely landlocked and averages 2,500 feet above mean sea level (Norris and Webb, 1976). It is dominated by broad alluvial basins, uplifted and unroofed Paleozoic<sup>1</sup> and Mesozoic<sup>2</sup> basement rocks, Cenozoic<sup>3</sup> volcanism, and sedimentation from the Mojave River and pluvial lakes (Amoroso and Miller, 2012). The Project area occurs within relatively homogeneous alluvial basin to the west of the Mojave River, while granitic basement rocks are exposed just east of the river (Dibblee and Minch, 2008). The basin, referred to as either the Cajon or Victorville Basin, is approximately 25 miles wide and extends from the Project area and immediate vicinity south to Cajon Pass, with a depth of up to 5,000 feet (Dibblee, 1967; Cox et al., 2003). The active, right-lateral, northwest-trending Helendale Fault occurs 10 miles northeast of the Project area.

### 5.2 GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

The Project area is mapped at a scale of 1:62,500 by Dibblee (1960) and Dibblee and Minch (2008). The eastern half is mapped at a scale of 1:24,000 by Hernandez et al. (2008). Late Neogene and Quaternary Period alluvial sediments derived from the ancestral and modern Mojave River are distributed beneath disturbed soils and artificial fill across the majority of the Project area, particularly the eastern half and at the George Air Force Base (Hernandez et al., 2008; McLeod, 2019; Radford, 2019). The geology of the Project area is described in the following sections and shown in Figure 5-1, based on Dibblee and Minch (2008), and Figure 5-2, based on Hernandez et al. (2008).

#### 5.2.1 Pliocene and Pleistocene Alluvial Sediments (Qoam)

According to Hernandez et al. (2008) and references therein, Pliocene- to Pleistocene-age alluvial sediments (Qoam) are exposed in the eastern margin of the Project area and likely underlie artificial fill and disturbed sediments from human construction and grading activities in the eastern half of the Project area. This unit consists of loose to well consolidated yellowish-

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<sup>1</sup>Paleozoic Era: 541 to approximately 252 million years ago (Cohen et al., 2018).

<sup>2</sup>Mesozoic Era: 252 to approximately 66 million years ago (Cohen et al., 2018).

<sup>3</sup>Cenozoic Era (formerly Tertiary): 66 million years ago to present, subdivided into three periods—Paleogene, Neogene, and Quaternary (oldest to youngest); Pliocene Epoch occurred at the end of the Neogene Period and lasted from approximately 5.3 to approximately 2.6 million years ago; Quaternary Period covers the past approximately 2.6 million years and is subdivided into the Pleistocene and Holocene epochs; Pleistocene Epoch, or last Ice Age, lasted from approximately 2.6 million years ago to 11,700 years ago when the Holocene Epoch began (all dates according to Cohen et al. [2018]).



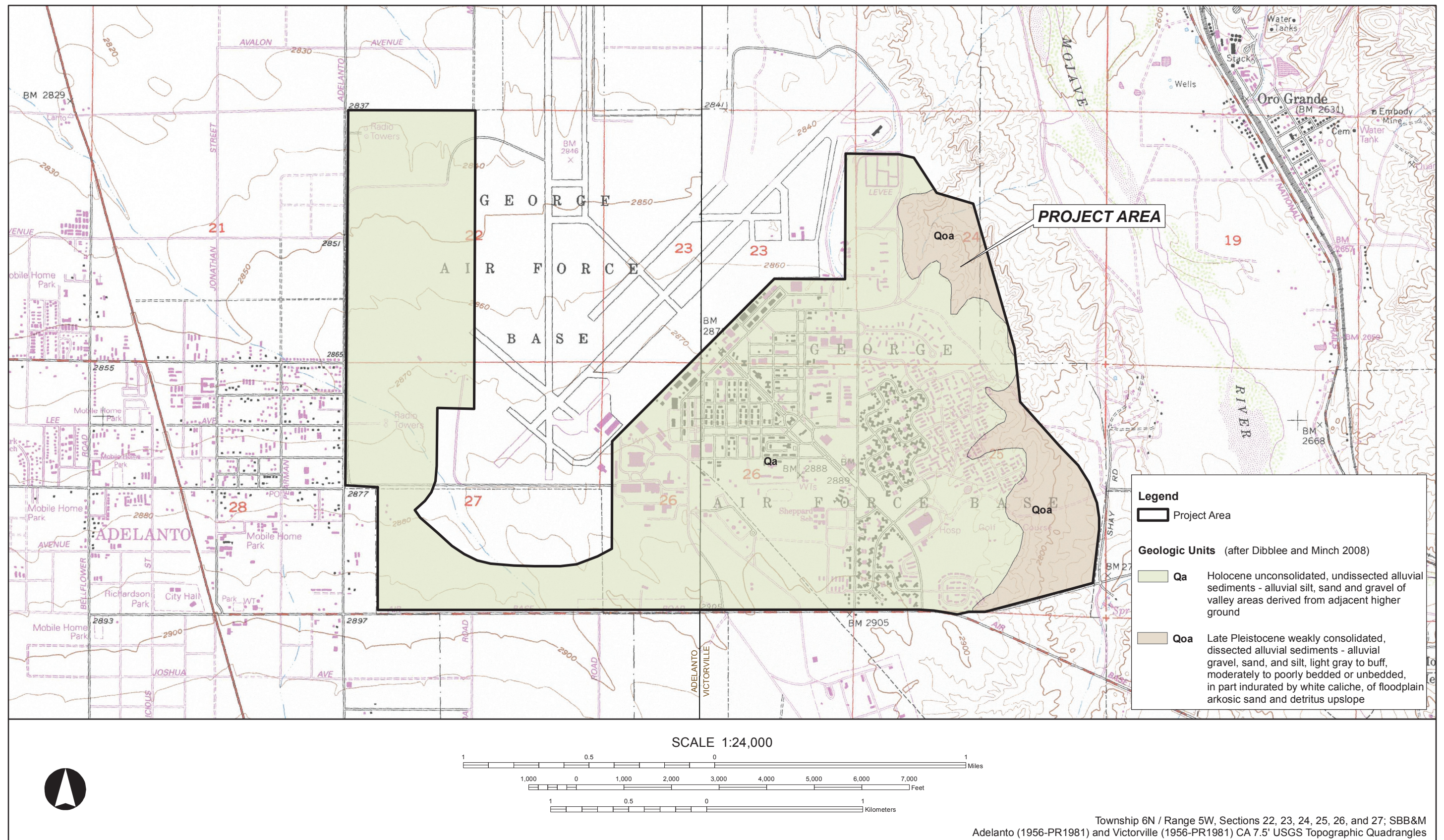
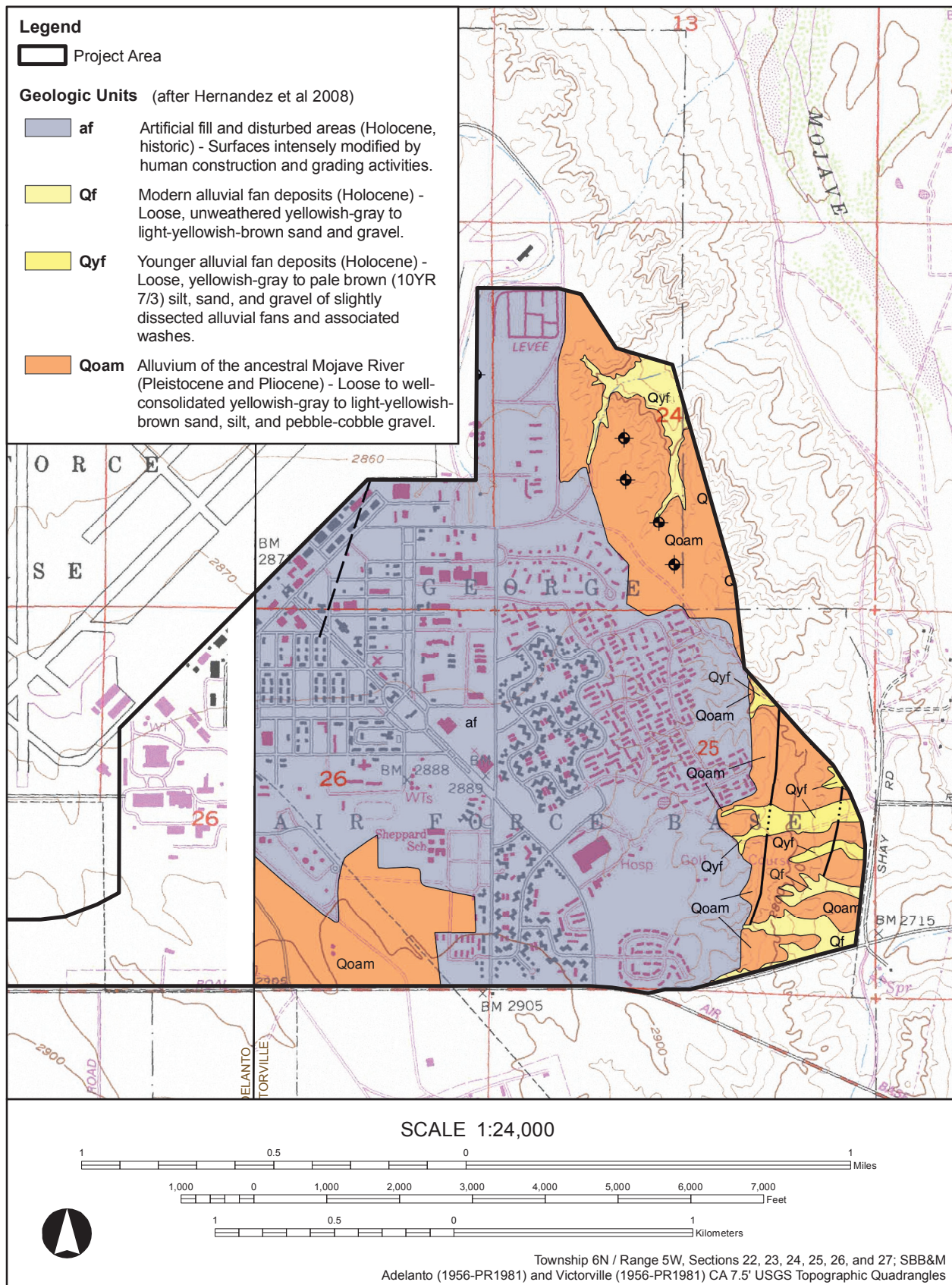


Figure 5-1 Geologic units in the Project area.





**Figure 5-2 Geologic units in the eastern half of the Project area.**

gray to light-yellowish-brown sand, silt, and pebble-cobble gravel. The unit underlies a deeply dissected high alluvial terrace lying about 60 to 78 meters above the active channel of the Mojave River. The sediments consist mainly of silicic plutonic detritus similar to those of the modern channel of the Mojave River east of the Project area (Qa, not shown in Figure 5-2). As such, they were likely deposited by the northward-flowing ancestral Mojave River. The unit is locally capped by an eroded soil profile comprising an argillic horizon about 0.5 meters thick and an underlying stage-III calcic horizon about 30 centimeters thick.

Pliocene- and Pleistocene-age alluvial sediments similar to those in the Project area have yielded a great diversity of vertebrate fossils in and around Victorville and elsewhere in San Bernardino County (Cox et al., 2003 and references therein; Jefferson, 2003; Reynolds and Reynolds, 1994; Scott and Cox, 2008).

### **5.2.2 Pleistocene Alluvial Sediments (Qoa)**

Weakly consolidated, dissected Pleistocene-age alluvial sediments (Qoa) mapped in the eastern margin of the Project area by Dibblee (1960) and Dibblee and Minch (2008) are likely partially equivalent to unit Qoam mapped by Hernandez et al. (2008). These are unbedded to moderately bedded deposits of light gray- to buff-colored arkosic gravel, sand, and silt. The grains are mainly derived from granitic and metamorphic rocks of the San Gabriel and San Bernardino mountains to the south. Deposits of this unit may be as much as 1,000 feet thick within the Project area and may be partly indurated in areas by white caliche. As referenced in the section above, Pleistocene-age alluvial sediments have yielded abundant fossils near the Project area.

### **5.2.3 Holocene Alluvial Sediments (Qa, Qf, Qyf) and Artificial Fill (af)**

According to Dibblee (1960) and Dibblee and Minch (2008), the majority of the ground surface in the Project area consists of unconsolidated, undissected Holocene-age alluvial sediments (Qa). This unit may be equivalent to unit Qa mapped by Hernandez et al. (2008) (not shown in Figure 5-2), as well as other approximately coeval units such as Qf and Qyf. Unit Qa as described by Dibblee (1960) and Dibblee and Minch (2008) is composed of gravel, sand, and silt derived from adjacent higher ground, with the thickness of the deposits reaching a maximum of 100 feet in the Project area. Unit Qf is described by Hernandez et al. (2008) as loose, unweathered yellowish-gray to light-yellowish-brown sand, gravel, and silt of lithic-arkosic composition. Unit Qyf includes younger sediments of similar color and composition as Qf.

The mapped distributions of Holocene-age alluvial sediments differ between Dibblee and Minch (2008) and Hernandez et al. (2008). While Dibblee and Minch (2008) indicate much of the Project area is covered by Holocene-age alluvial sediments (Qa), Hernandez et al. (2008) indicate these are restricted to ephemeral stream channels (Qf, Qyf) along the eastern boundary of the Project area. Also according to Hernandez et al. (2008), most of the remainder of the eastern half of the Project area is covered by disturbed sediments and artificial fill (af) with outcrops of older Pliocene- to Pleistocene-age sediments (Qoam) that interfigure with Qyf along the eastern boundary of the Project area as well as a subarea of Qoam in the southwest corner of the eastern half of the Project area. While their interpretations of the distribution of surface exposures of native sediments differ, Google Earth™ satellite images of the Project area confirm large portions of the ground surface has been modified by recent development.

It is unlikely for intact and significant fossils to be found near the ground surface in any areas with disturbed sediments or artificial fill. Similarly, Holocene-age alluvial sediments, particularly those less than 5,000 years old, are unlikely to yield significant fossils, as they generally are too young for the fossilization process to occur (SVP, 2010).

## 6 RESULTS AND ANALYSIS

This chapter reports on the results of the desktop studies completed for this Project and the assignment of SVP rankings to the geologic units that occur in the Project area.

### 6.1 LITERATURE REVIEW

Reynolds and Reynolds (1994) reported the occurrence of a Pliocene- to Pleistocene-age cotton rat (*Sigmodon* cf. *S. minor*) within alluvial deposits of the Victorville Basin. Several Pleistocene-age vertebrate assemblages including migratory bird and large mammal fossils also have been documented from the alluvial deposits around Victorville (Cox et al., 2003 and references therein; Scott and Cox, 2008). In particular, Scott et al. (1997) reported well-preserved specimens of the Early Pleistocene-age mammoth (*Mammuthus meridionalis*) from a locality approximately one mile southeast of the Project area, near the intersection of Air Expressway and Village Drive. The other Pleistocene-age fossil localities are reported from alluvial deposits farther south extending to northern Hesperia. A previous paleontological resource assessment for the Specific Plan determined these deposits to have a high potential for preserving paleontological resources; however, the field survey included in the study did not yield any resources (Quinn et al., 2003).

### 6.2 MUSEUM RECORDS SEARCHES

Several fossil localities within Pliocene and Pleistocene deposits in San Bernardino County are recorded in the UCMP's online database. However, there are no localities recorded within a 10-mile radius of the Project area.

The NHMLAC search found one vertebrate fossil locality within the Project area and several others nearby from "older" Quaternary deposits. In discussions of the geology of southern California, "older" Quaternary deposits typically imply Pleistocene-age deposits, although McLeod (2019) did not specify. McLeod (2019) reports the NHMLAC's one fossil locality (LACM 7786) is a specimen of meadow vole (*Microtus mexicanus*) found just east of the intersection of White Avenue and Adelanto Avenue within the central western portion of the Project area. This specimen was recovered from a depth of 10 to 11 feet below ground surface.

The closest NHMLAC localities outside the Project area are LACM 3352, 3353, and 3498 to the southeast. These three localities, all near the bluffs on the west side of the Mojave River drainage and centered around Interstate 15, yielded specimens of extinct horse (*Equus occidentalis*) and extinct bison (*Bison latifrons*). North of the Project area and southwest of Bryman, LACM (CIT) 209 yielded specimens of horse (*Equus*) and mammoth (*Mammuthus columbi*). The results of the NHMLAC records search are listed below in Table 6-1.

McLeod (2019) states shallow excavations within the Project area are unlikely to uncover significant vertebrate fossils, but deeper excavations that extend into older Quaternary deposits are likely to encounter them. He concludes that any substantial excavations in the Project area



below the very uppermost layers should be closely monitored during construction. Additionally, sediment samples should be collected and processed to determine the potential for small-fraction fossils in the Project area.

The WSC search did not report any fossil localities within the Project area or within a 1-mile radius. However, Radford (2019) does state the WSC has fossil localities in similarly mapped alluvial units elsewhere that did result in Pleistocene fossil specimens. Consequently, she predicts “any fossils recovered from the Southern California Logistics Center Project area would be scientifically significant” (Radford, 2019).

**Table 6-1**  
**NHMLAC Vertebrate Localities Reported Within or Near the Project Area**

Locality No.	Geologic Unit	Age	Taxa
LACM 7786*	Older Quaternary alluvium	Pleistocene?	<i>Microtus mexicanus</i> (meadow vole)
LACM 3352, 3353, and 3498	Older Quaternary alluvium	Pleistocene?	<i>Equus occidentalis</i> (horse) <i>Bison latifrons</i> (bison)
LACM (CIT) 209	Older Quaternary alluvium	Pleistocene?	<i>Equus</i> (horse) <i>Mammuthus columbi</i> (mammoth)

\* within the Project area  
Source: McLeod, 2018

### **6.3 DETERMINATION OF PALEONTOLOGICAL RESOURCE POTENTIAL WITHIN THE PROJECT AREA**

Using information obtained from the literature review and the record searches, Æ determined the paleontological resource potential of the geologic units exposed at the ground surface in the Project area in accordance with the SVP’s (2010) criteria (Figure 6-1). Æ created a single paleontological sensitivity map by utilizing the geologic units as mapped by Hernandez et al. (2008) in the eastern half of the Project area as well as Dibblee and Minch (2008) for the entire Project area. Google Earth™ satellite images provided information about development that has occurred in the Project area over the intervening years since both maps were made.

Æ assigned High potential to all areas in which Pleistocene-age deposits or older (Qoa, Qoam) are mapped at the ground surface, whereas Holocene-age deposits (Qa, Qf, Qyf) and artificial fill (af) were assigned a ranking of Low potential. Although Dibblee and Minch (2008) did not include artificial fill or disturbed sediments, Google Earth™ satellite images confirm the western half of the Project area is now largely developed. At unknown depths below the present ground surface, however, the subsurface throughout the entire Project area is considered to be High potential, because alluvial deposits of Pleistocene-age or older (Qoa, Qoam) likely are present below the surficial Holocene-age deposits and artificial fill. Reports of Pliocene to Pleistocene fossils from similar deposits nearby (e.g., Cox et al., 2003), as well as McLeod’s (2019) report of a fossil from a depth of 10 to 11 feet within the Project area support this.



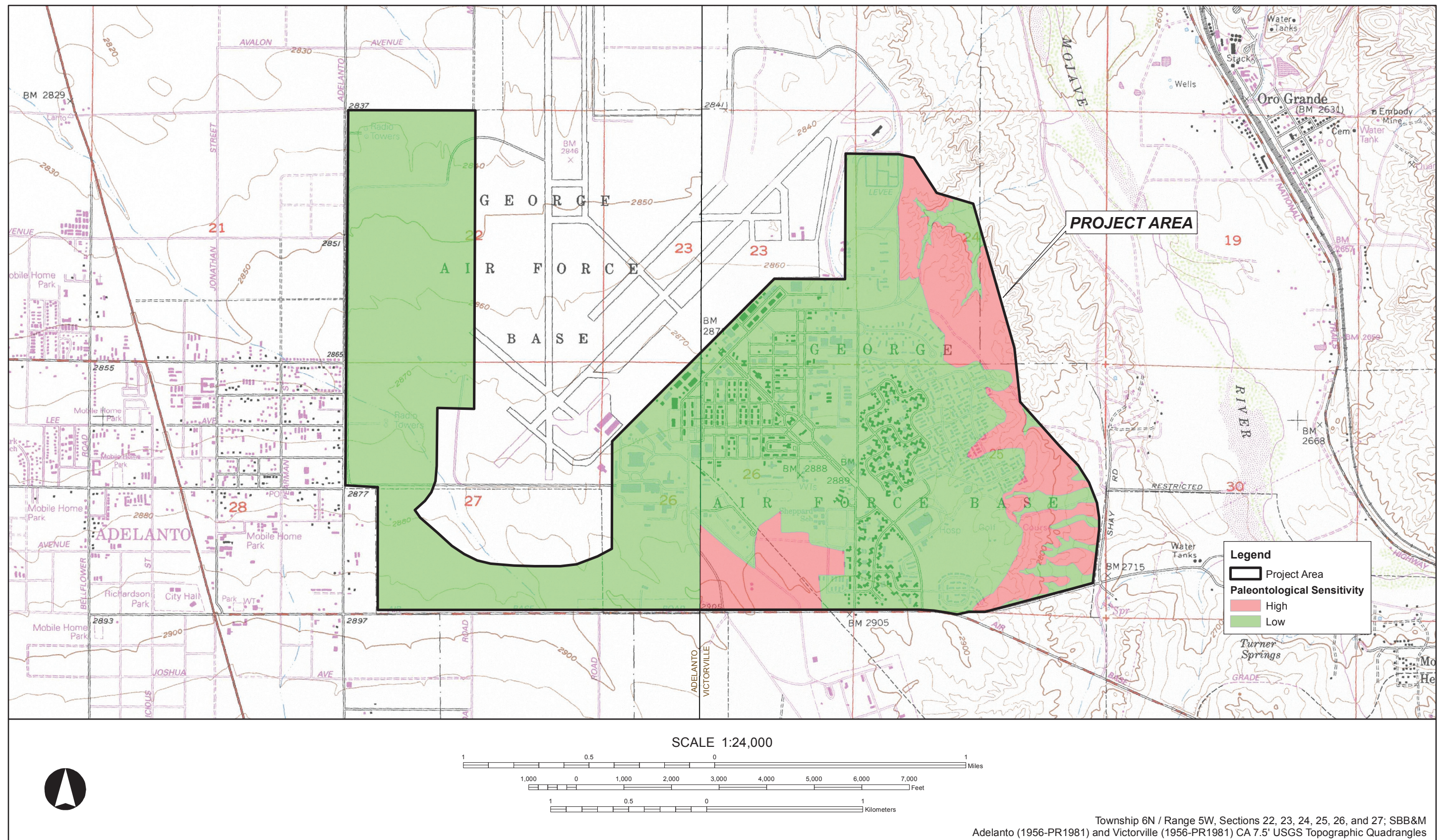


Figure 6-1 Paleontological sensitivity of the Project area (surficial).



## 7 RECOMMENDATIONS

Æ concludes that Project-related construction activities may impact significant paleontological resources across the entire Project area. Æ's desktop studies indicate the paleontological resource potential at or near the ground surface is Low within the majority of the Project area, as much of it is geologically young or has been disturbed by past human activity. However, these studies also indicate the subsurface potential is High at unknown depths, potentially as shallow as 7 to 10 feet, throughout the entire Project area. The paleontological resource potential is High from the ground surface downward in the southwest corner of the eastern half of the Project area and in subareas along the eastern boundary. Therefore,

In accordance with CEQA and the MMP for the City's General Plan, Æ recommends the City retain a professional paleontologist who meets the SVP's (2010) qualification standards to develop and implement a paleontological resource impact mitigation program (PRIMP) for the Project prior to the start of ground-disturbing activities. The PRIMP should include details for Worker Environmental Awareness Program (WEAP) training for construction personnel, procedures for construction monitoring, and a protocol for fossil discoveries and the subsequent treatment of fossils. As part of the PRIMP, Æ makes the following recommendations for construction monitoring of Project-related ground disturbance (Figure 7-1):

- Full-time monitoring at all depths in all High potential locations.
- Spot-check monitoring in all Low potential locations that will be disturbed at depths greater than 7 feet. The frequency of spot-check monitoring may be increased at the discretion of the professional paleontologist, if intact and significant paleontological resources are encountered below 7 feet of the present ground surface.

By implementing these recommendations, adverse impacts to paleontological resources can be reduced to a less than significant level pursuant to the requirements of CEQA.



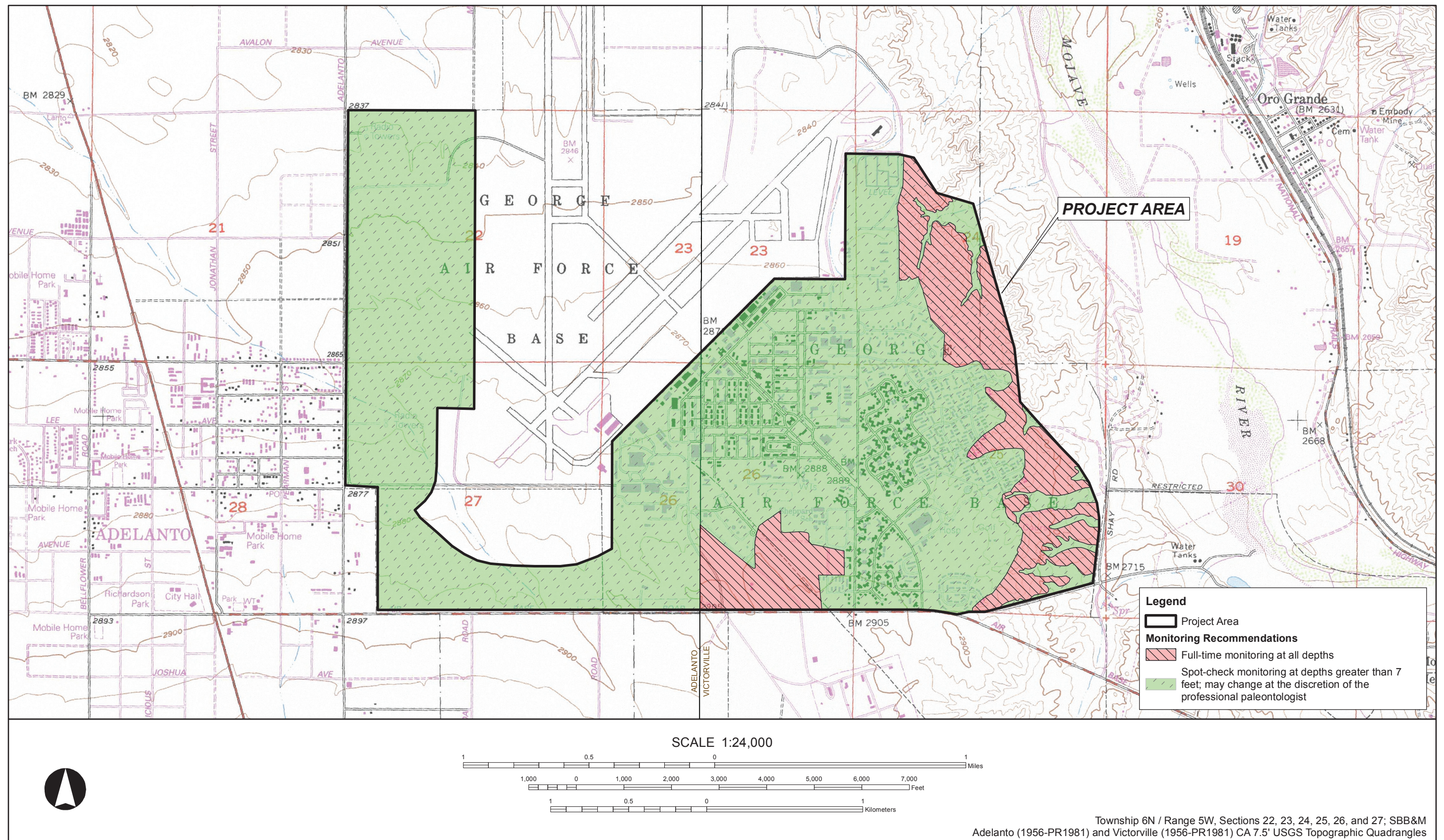


Figure 7-1 Monitoring recommendations.



## 8 REFERENCES CITED

- Amoroso, L., and D. M. Miller. 2012. Surficial geologic map of the Cuddleback Lake 30' x 60' quadrangle, San Bernardino and Kern Counties, California. U.S. 1:100,000. U.S. Geological Survey, Scientific Investigations Map 3107.
- Boggs, Jr., S. 2012. Principles of Sedimentology and Stratigraphy, 5th ed. Pearson Prentice Hall, Upper Saddle River, New Jersey, 585 pp.
- City of Victorville. 2008. Final Program Environmental Impact Report, General Plan 2030, October 13, 2008. Available at [http://www.sbcounty.gov/uploads/lafco/Proposals/3082/3082\\_edd\\_final\\_eir.pdf](http://www.sbcounty.gov/uploads/lafco/Proposals/3082/3082_edd_final_eir.pdf). Accessed May 16, 2019.
- Cox, B. F., J. W. Hillhouse, and L. A. Owen. 2003. Pliocene and Pleistocene Evolution of the Mojave River, and Associated Tectonic Development of the Transverse Ranges and Mojave Desert, Based on Borehole Stratigraphy Studies and Mapping of Landforms and Sediments near Victorville, California; pp. 1–42 in Y. Enzel, S. G. wells, and N. Lancaster (eds.), Paleoenvironments and Paleohydrology of the Mojave and Southern Great Basin Deserts, Geological Society of America Special Paper 368.
- Dibblee, T. W., Jr. 1960. Preliminary geologic map of the Victorville quadrangle, California, U.S. 1:62,500. U.S. Geological Survey, Mineral Investigations Field Studies Map MF-229.
- Dibblee, T. W., Jr. 1967. Areal geology of the western Mojave Desert, California. U.S. Geological Survey Professional Paper 522:153 pp.
- Dibblee, T. W., Jr., and D. F. Hewett. 1966. Geology of the Mojave Desert Region. U.S. Geological Survey and the California Division of Mines and Geology Bulletin 191:62–65.
- Dibblee, T. W., Jr., and J. A. Minch. 2008. Geologic map of the Shadow Mountains and Victorville 15' quadrangles, San Bernardino and Los Angeles Counties, California, U.S. 1:62,500. Dibblee Geological Foundation, Dibblee Foundation Map DF-387.
- Hernandez, J. L., H. J. Brown, B. F. Cox, C. I. Gutierrez, and K. Toman-Sager. 2008. Geologic map of the Victorville 7.5' quadrangle, San Bernardino County, California, U.S. 1:24,000. California Geological Survey Map.
- Jefferson, G. T. 2003. Stratigraphy and Paleontology of the Middle to Late Pleistocene Manix Formation, and Paleoenvironments of the Central Mojave River, Southern California; pp. 43–60 in Y. Enzel, S. G. wells, and N. Lancaster (eds.), Paleoenvironments and Paleohydrology of the Mojave and Southern Great Basin Deserts, Geological Society of America Special Paper 368.

- McLeod, S. A. 2019. Unpublished museum collections records. Natural History Museum of Los Angeles County.
- Norris, R. M., and R. W. Webb. 1976. *Geology of California*. John Wiley & Sons, New York, 378 pp.
- Quinn, H. M., B. Tang, and M. Hogan. 2003. Appendix H: Paleontological Resources Assessment Report, Environmental Review for the Southern California Logistics Airport Specific Plan Amendment & Rail Service Project, City of Victorville, San Bernardino County, California. CRM TECH. Unpublished document prepared for RBF Consulting, Irvine, California.
- Radford, D. 2019. Unpublished museum collections records. Western Science Center.
- Reynolds, R. E. and R. L. Reynolds. 1994. The Victorville fan and an occurrence of *Sigmodon*; pp. 31-33 in R. E. Reynolds (ed.), *Off limits in the Mojave Desert*, San Bernardino County Museum Association Special Publication 94-1.
- Scott, E., and S. M. Cox. 2008. Late Pleistocene Distribution of Bison (Mammalia; Artiodactyl) in the Mojave Desert of Southern California and Nevada; pp. 359-382 in X. Wang and L. G. Barnes (eds.), *Geology and Paleontology of Western and Southern North America*, Natural History Museum of Los Angeles County Science Series 41.
- Scott, E., K. Springer, and L. K. Murray. 1997. New records of early Pleistocene vertebrates from the west-central Mojave Desert, San Bernardino County, California. *Journal of Vertebrate Paleontology* 17(3, supplement):75A.
- Scott, E., and K. Springer. 2003. CEQA and Fossil Preservation in California. The Environmental Monitor, Fall 2003. Association of Environmental Professionals. Available at [www.co.contra-costa.ca.us/DocumentCenter/View/34165/ScottandSpringer-2003\\_CEQA-and-Fossil-Preservation](http://www.co.contra-costa.ca.us/DocumentCenter/View/34165/ScottandSpringer-2003_CEQA-and-Fossil-Preservation). Accessed March 30, 2019.
- Society of Vertebrate Paleontology [SVP]. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee. Available at [vertpaleo.org/Membership/Member-Ethics/SVP\\_Impact\\_Mitigation\\_Guidelines.aspx](http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx). Accessed March 30, 2019.

## **APPENDIX A**

### **Qualifications of Key Personnel**

## Education

Postdoctoral Research Associate,  
2006–2007, World Heritage Studies,  
University of Minnesota

Ph.D., Ancient Studies, 1993,  
University of Minnesota

M.S., Ancient Studies, 1986,  
University of Minnesota

B.S., Anthropology (with honors)  
and Geology, 1983, Beloit College

## Registrations/Certifications

- Registered Professional  
Archaeologist #12588
- Licensed Professional Geologist,  
Minnesota #30084 (6/1998-  
6/2018)

## Professional Experience

- 2018–present, Managing Principal/  
Paleontology Program Manager,  
Applied EarthWorks, Inc.
- 2015–2018, 2005–2008, President  
and Senior Project Manager,  
ALO Environmental Associates  
LLC
- 2006–2015, Program Manager,  
Cultural Heritage Planning and  
Management, AECOM
- 2003–2005, Director, Cultural  
Resources Management,  
Peterson Environmental  
Consulting, Inc.
- 2000–2003, Director, Cultural  
Resources Management, HDR  
Engineering, Inc.
- 1996–2000, Director, Cultural  
Resources Management, Braun  
Intertec Corporation, Inc.
- 1994–1996, Statewide Inventory  
Coordinator, Minnesota State  
Historic Preservation Office

## Summary of Qualifications

Dr. Ollendorf has more than 34 years of experience in cultural heritage, geoarchaeology, paleoecology, paleontology, and environmental compliance at the global, national, tribal, state, and local levels. She meets the US Secretary of the Interior's qualifications standards for principal investigator in prehistoric archaeology and history; she is also Æ's principal investigator on a CA statewide Paleontological Resource Use Permit for paleontology from the US Bureau of Land Management (BLM) for 2018-2021.

Dr. Ollendorf has supervised and/or participated in archaeological, historical, architectural history, and paleontological services, tribal negotiations, and agency coordination throughout her career. She also has managed EISs and EAs. Her project experience includes work in 35 states, including Southern California, and other western states, and abroad on a wide range of client projects across many different industry sectors.

During her career, Dr. Ollendorf has written or overseen many hundreds of compliance reports in addition to having published multiple articles in peer-reviewed professional journals and presented to a wide variety of audiences, including professional peers.

## Selected Project Experience

**Port of Long Beach Master Plan Update, City of Long Beach, Los Angeles County, California.** Paleontology Program Manager (2019-present). Overseeing preparation and providing QA/QC of paleontological resource sections of the Program Environmental Impact Report (PEIR) for the Port Master Plan Update (PMPU) for CEQA compliance. Working closely with paleontology staff (Christopher Shi). Client: Leidos for City of Long Beach.

**Pacific Gas & Electric (PG&E) Groundwater Remediation, Hinkley, San Bernardino County, California.** Paleontology Program Manager and Project Manager (2018-present). Over a multi-year period, completing Release-To-Construction (RTC) project-by-project reviews for cultural and paleontological resource management. Tasks include assessing project areas for sensitivity for cultural and paleontological resources, previously surveyed areas, and recorded locations of cultural resources. Also overseeing cultural and paleontological construction monitoring on a project-by-project basis. Requires project-specific reporting, annual reporting, regular client communication, and coordination with cultural and paleontological staff. Reports to date include Paleontological Resource Monitoring Report: Installation of Extraction Well 66 (EX-66); Cultural and Paleontological Resource Findings Report: Installation of monitoring Well 44S (SC-MW-44S); and 2018 Annual Report – all co-authored with Christopher Shi. Completing for CEQA compliance. Client: Arcadis for PG&E.





## Professional Experience (continued)

- 1993–1994, Staff Archaeologist, Institute for Minnesota Archaeology
- 1991–1993, Independent Contractor—Paleoecology
- 1990, Co-Director, Geoarchaeological Field School & Geoarchaeologist, Southern Illinois University-Edwardsville
- 1987–1990, Graduate Research Assistant, Limnological Research Center, University of Minnesota, Minneapolis
- 1984–1987, Graduate Research Assistant, Archaeometry Laboratory, University of Minnesota, Duluth
- 1983–1984, University of Maryland Research Assistant, Crustal Dynamics Project, Geology & Geophysics Branch, NASA Goddard Space Flight Center, Greenbelt, Maryland
- 1987, 1984, Assistant Geoarchaeologist, Tel Mique Excavations, ASOR-Albright Institute, Jerusalem, Israel
- 1983, Summer Intern, US Bureau of Land Management, Phoenix District, Arizona
- 1983, Teaching Assistant – Evolution of the Earth, Beloit College Geology Department
- 1983, Research Assistant – Palynomorphs (Acritarchs), Beloit College Geology Department

## Selected Project Experience (continued)

**500 MW Athos Renewable Energy Project, Riverside County, California.** Paleontology Program Manager and Project Manager (2018-present). Overseeing preparation and providing QA/QC of all paleontological resources tasks. For CEQA compliance (County), Project Area on private and state lands consisted of 3,662-acres, including a 11.1-mile-long by 200-foot-wide generation-tie transmission line corridor and access roads. Desktop study included the Project Area plus a 5-mile-wide buffer (Study Area). Supervised completion of paleontological work plan, reconnaissance-level pedestrian field survey for paleontological resources in addition to paleontological observations of geotechnical trenching, and Paleontological Identification Report (PIR). For NEPA compliance, oversaw Paleontology Resource Assessment (PRA), Potential Fossil Yield Classification (PFYC), and BLM Fieldwork Authorization Request for proposed project components on BLM lands. Working closely with paleontology staff (Christopher Shi, Scott Rohlf). Client: IP Athos, LLC and Aspen Environmental Group.

**Highpark Development Project (formerly Ponte Vista) in San Pedro, City of Los Angeles, Los Angeles County, California.** Paleontology Program Manager and Project Manager (2018-present). A provided multi-year paleontological monitoring during construction of 676 homes on 61.5 acres. By winter 2018, A paleontological monitors had documented 26 paleontological localities and recovered 27 large-vertebrate specimens along with over 4,000 pounds of additional bulk matrix which yielded thousands of scientifically significant invertebrate fossils and more than 25 small-fraction vertebrate specimens. A has processed the fossil specimens for permanent curation at the Natural History Museum of Los Angeles County and is preparing a final paleontological monitoring report for compliance with the CEQA (City). Final deliverables will be produced and submitted after A has received a fully executed Deed of Gift Form from the land developer. Oversaw final fossil preparation and providing QA/QC of monitoring report. Working closely with paleontology staff (Christopher Shi). Client: Harridge Development Group (formerly iStar Financial).

**Madera Travel Center at Avenue 17 and Highway 99 Interchange, Madera County, California.** Paleontology Program Manager (2018-present). Co-authored draft Paleontological Resource Mitigation Plan (PRMP) for commercial development of approximately 50 acres. Oversaw WEAP training and overseeing paleontological resource monitoring for construction. Worked closely with paleontology staff (Scott Rohlf, Christopher Shi, and Christopher Shea). Completed for CEQA compliance. Client: Love's Travel Stops & Country Stores to Madera County.

**Central Coast Oil and Gas Leasing and Development, California.** Principal Investigator (2018-2019). Updated paleontology sections of Affected Environment, Environmental Consequences, and References Cited chapters as well as updated the Administrative Record for 7 alternatives covered in the Resource Management Plan Amendment/FEIS on public lands and split mineral estate lands



## Other Paleontological Research

### Ph.D. Dissertation.

*Changing Landscapes in the American Bottom (USA): An Interdisciplinary Investigation with an Emphasis on the Late-Prehistoric and Early-Historic Periods.* Advisor: Herbert E. Wright, Jr.

### M.S. Thesis.

*A Study of Phytoliths from Philistine Levels at Tel Migne (Ekron), Israel.* Advisor: George R. Rapp, Jr.

### B.S. Theses.

*The High Diversity of the Mazon Creek Biota: The Result of Excellent Preservation in a Deltaic Environment.* Advisor (Geology): Carl Mendelson.

*The Role of Man in the Pleistocene Extinction of Large Mammals.* Advisor (Anthropology): Daniel Shea.

## Selected Project Experience (continued)

administered by the US Bureau of Land Management (BLM) across approximately 284,000 acres of surface estate and 793,000 acres of federal mineral estate (12 counties). Utilized BLM's Potential Fossil Yield Classification (PFYC) system. Completed for NEPA (BLM) and CEQA compliance (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources for CEQA). Client: Aspen Environmental Group for BLM.

**Santa Margarita Ranch Agricultural Subdivision Project, San Luis Obispo County, California.** Paleontology Program Manager (2019-present). Overseeing preparation and providing QA/QC of paleontological resource impact mitigation program (PRIMP) and worker environmental awareness program (WEAP) training brochure. Will oversee WEAP training, paleontological resource monitoring, and reporting. Completing for CEQA compliance. Working closely with paleontology staff (Christopher Shi). Client: Kirk Consulting for Santa Margarita Ranch, LLC.

**First Street Village Development, Burbank, Los Angeles County, California.** Paleontology Program Manager (2019-present). Overseeing preparation and providing QA/QC of paleontological resource monitoring for construction for CEQA compliance. Working closely with paleontology staff (Christopher Shi). Client: First Street Village LLC to City of Burbank.

**Biola University North Dorm Project: Tennis Courts and Wastewater Treatment Area Expansion, La Mirada, Los Angeles County, California.** Paleontology Program Manager (2019-present). Overseeing preparation and providing QA/QC of paleontological resource monitoring for construction for CEQA compliance. Working closely with paleontology staff (Christopher Shi). Client: Biola University to City of La Mirada.

**Southern California Logistics Center Project, Victorville, San Bernardino County, California.** Paleontology Program Manager (2019-present). Overseeing preparation and providing QA/QC of PRA and review of the paleontological resource section of the PEIR for the Victorville Airport for CEQA compliance. Working closely with paleontology staff (Christopher Shi). Client: Michael Baker for City of Victorville.

**5401 Telegraph Road Parking Structure, City of Commerce, Los Angeles County, California.** Paleontology Program Manager (2019-present). Overseeing preparation and providing QA/QC of WEAP program and training, and paleontological resource monitoring, and overseeing reporting for CEQA compliance. Working closely with paleontology staff (Christopher Shi). Client: Parkco Building Company.



## Selected Project Experience (continued)

**Duke Perry Street & Barrett Avenue Project in the City of Perris, Riverside County, California.**

Paleontology Program Manager (2019). Oversaw preparation and provided QA/QC of paleontological technical memorandum for construct an industrial warehouse and paved parking lot on approximately 7.25 acres. Recommended the creation of a PRIMP since the project area was ranked High B for paleontological sensitivity with nearby Pleistocene vertebrate fossil localities recorded in alluvial deposits similar to those in the Project area. Worked closely with paleontology staff (Christopher Shi). Completed for CEQA compliance. Lead agency: City of Perris. Albert A. Webb Associates for Duke Realty. Complete, January 2019.

**Cannabis Cultivation Warehouse on Assessor's Parcel 314-160-004, City of Perris, Riverside County, California.** Paleontology Program Manager (2019). Oversaw preparation and provided QA/QC of paleontological technical memorandum for development of 0.93 acres of vacant land. Recommended the creation of a PRIMP since the project area was ranked High B for paleontological sensitivity with nearby Pleistocene vertebrate fossil localities recorded in alluvial deposits similar to those in the Project area. Worked closely with paleontology staff (Christopher Shi). Completed for CEQA compliance. Client: Richard Park.

**LA Water Wheel Project, Los Angeles County, California.** Paleontology Program Manager (2019). Oversaw preparation and provided QA/QC of paleontological technical memorandum for the plan to divert waters from the Los Angeles River to irrigate nearby public parks, and will assist City of Los Angeles with Mitigated Negative Declaration (MND) for CEQA compliance. Client: Ruth Villalobos & Associates for City of Los Angeles.

**State Route (SR) 86/Avenue 50 New Interchange Project, City of Coachella, Riverside County, California.** 3<sup>rd</sup> Party Senior Reviewer (2018). Reviewed/rewrote Affected Environment, Environmental Consequences, and Avoidance Minimization, and/or Mitigation Measures paleontology chapters and References Cited chapter (of the Initial Study/EA written by Michael Baker International). Completed for NEPA, NHPA, Section 4(f), and CEQA compliance. Client: TranSystems Corporation to Caltrans, District 8.

**Menifee Town Center – Parcels 13, 14, and 15 Development Project, Riverside County, California.**

Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of PRIMP covering 13-acre project area. Worked closely with paleontology staff (Scott Rohlf and Christopher Shi). Completed for CEQA compliance. Client: Kristoff Commercial Real Estate to City of Menifee.

**Rose II Residential Development Project, Romoland, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of PRIMP covering subdivision of 45.6 acres. Worked closely with paleontology staff (Christopher Shi). Completed for CEQA compliance. Client: Pacific Communities Builder, Inc. to County of Riverside.

**Sycamore Hills Distribution Center, City of Riverside in Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of Paleontological Resource Assessment covering commercial development of 47.85 acres. Worked closely with paleontology staff (Christopher Shi). Completed for CEQA compliance. Client: Ruth Villalobos & Associates, Inc. to County of Riverside.

**Temescal Valley Riverside Clinic Investors IV, LLC Project, South of the City of Corona, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of letter report for paleontological resource mitigation monitoring during construction in the 12.5-acre project area. Worked closely with paleontology staff (Christopher Shi). Completed for CEQA compliance. Client: Riverside Clinic Investors IV, LLC to County of Riverside.

**39527 Colleen Way Mixed-Use Development Project, City of Temecula, Riverside County, California.**

Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of letter report for paleontological resource mitigation monitoring during construction in the 5.3-acre project area. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for CEQA compliance. Client: Courie Construction to County of Riverside.



**Beach Club Development, Thermal, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of technical memorandum for development of 240 acres of vacant land. Recommended mitigation measures since project area is in High paleontological sensitivity. Worked closely with paleontology staff (Christopher Shi and Niranjala Kottachchi). Completed for CEQA compliance. Client: Albert A. Webb Associates to County of Riverside.

**500 kV Ten West Link Transmission Connection, Maricopa County, Arizona to Riverside County, California.** Paleontology Program Manager and Project Manager (2018). Oversaw preparation and provided QA/QC of PRA for the entire 114-mile-long preferred alignment and alternatives. Utilized BLM's PFYC system. Worked closely with paleontology staff (Scott Rohlf, Christopher Shi, and Christopher Shea). Completed for NEPA and CEQA compliance. Client: DCR Transmission LLC to BLM and California Public Utilities Commission (CPUC).

**Talavera Pipeline Replacement, City of Indio, Riverside County, California.** Paleontology Program Manager (2018). Total project length: 5.7 miles. Oversaw preparation and provided QA/QC of paleontological resource technical memorandum for CEQA compliance. Worked closely with paleontology staff (Scott Rohlf, Christopher Shea, Christopher Shi). Client: Albert A. Webb Associates to Coachella Valley Water District.

**IDI Logistics – Indian and Ramona Project, City of Perris, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of paleontological resource technical memorandum on approximately 24 acres. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for CEQA compliance. Client: Albert A. Webb Associates to City of Perris.

**Blythe Airport Perimeter Fence Project, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of paleontological resource technical memorandum on approximately 700 acres. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for NHPA and CEQA compliance. Client: Mead & Hunt to Federal Aviation Administration (FAA) and Riverside County Economic Development Agency.

**Madison Avenue Improvements Project, City of Murrieta, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of the PRA, including identification survey for the Project and Constraints Analysis for the Warm Springs Creek Bridge Crossing for CEQA compliance. Worked closely with paleontology staff (Scott Rohlf and Christopher Shi). Client: Kleinfelder to City of Murrieta Public Works & Engineering.

**Proposed Development on the Northwest Corner of Alabama Street & Palmetto Avenue, City of Redlands, San Bernardino County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of paleontological resource technical memorandum on approximately 55 acres. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for CEQA compliance. Client: Albert A. Webb Associates to County of San Bernardino.

**I-10 Monroe Interchange Project, Riverside County, California.** Paleontology Program Manager (2018). Oversaw preparation and provided QA/QC of PIR for CEQA compliance. Included paleontological field surveys of two design alternatives over a total of approximately 73 acres. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Client: Michael Baker to Caltrans, District 8.

**Water-Main Replacement Project along the San Gorgonio River, City of Banning, Riverside County, California.** Paleontology Program Manager (2018). Total project length: 6.5 miles. Oversaw paleontological spot-check monitoring and reporting for water mainline replacement on private lands for CEQA compliance. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Will also oversee full-time monitoring and reporting in high-sensitivity areas on US Forest Service (USFS) lands for compliance with the Omnibus Public Land Management Act. Client: Aspen Environmental Group to City of Banning Public Works Department.





**De Anza Sewer Force Main Project, City of San Jacinto, Riverside County, California.** Paleontology Program Manager (2018). Total project length: 7,500 linear feet. Oversaw creation of informational brochure for construction-worker sensitivity training for Worker Environmental Awareness Program (WEAP) compliance. Also oversaw coordination and completion of spot-check monitoring. Completed senior review/quality assurance for paleontology mitigation (monitoring) letter report. Worked closely with paleontology staff (Christopher Shea). All completed for CEQA compliance. Client: HELIX to Eastern Municipal Water District.

**Sixth Street Park, Arts, River & Connectivity (PARC) Improvements, City of Los Angeles, Los Angeles County, California.** Paleontology Program Manager (2018). Completed QA/QC of paleontological resource technical memorandum for CEQA compliance. Worked closely with paleontology staff (Scott Rohlf). Client: GPA Consulting to City of Los Angeles Bureau of Engineering.

**Hay Lake and McFarland Parcels Land Exchange, Cook and St. Louis Counties, Minnesota.** Principal Investigator (2010). Researched and summarized Existing Conditions of paleontological resources for DEIS. Completed for NEPA compliance. Client: PolyMet Mining to USFS, Superior National Forest.

**Collaborative Research: Deltaic Resilience and the Genesis of Mesopotamian Cities (Iraq) Project.** Phytolith Analyst (2014). Completed phytolith analysis and reporting about mudbrick samples from the archaeological site of Ur after overseeing chemical processing. Client: Dr. Jennifer Pournelle, Principal Investigator, University South Carolina Research Foundation.

**Geological Background Research for the Naval Industrial Reserve Ordnance Plant (NIROP) Superfund Cleanup Project, City of Fridley, Hennepin County, Minnesota.** Staff Geologist (2014). Compiled and examined boring logs and identified stratigraphic contacts for 3D modeling at the 83-acre site located about 700 feet east of the Mississippi River. Research completed for compliance with the US Clean Water Act (CWA). Client: US Navy.

**Multiple Projects as Independent Contractor.** Paleoecologist (1991–1993). Distinguished the post-contact cultural horizon using pollen analysis for Dr. Daniel Engstrom (University of Minnesota) and Minnesota Pollution Control Agency (MPCA) for projects in Lake St. Croix (MN-WI border) and Duluth-Superior Harbor (MN-WI border). Collected modern pollen samples and made reference slides of Upper Midwest pollen taxa for Dr. Greg McDonald (Cincinnati Museum of Natural History & Science, Ohio). Processed sediment samples from the Island of Madeira and analyzed phytoliths for Dr. Glenn Goodfriend (Carnegie Institution, Washington, D.C.).

**Geoarchaeological Field School at Cahokia Mounds State Historic Site (UNESCO World Heritage Site), Collinsville, Illinois.** Co-Director (1990). Lectured on paleoecological research and geoarchaeology, led wetland-coring & laboratory activities, participated in remote sensing field and laboratory activities. Co-Director: Dr. Rinita Dalan.

**Limnological Research Center, University of Minnesota, Minneapolis.** Graduate Research Assistant (1987–1990). Conducted analyses of pollen and other appropriate material from lake-sediment and peat cores. Supervisors: Dr. Herbert Wright, Jr. and Dr. Linda Shane.

**Archaeometry Laboratory, University of Minnesota, Duluth.** Graduate Research Assistant (1984–1987). Conducted sediment grain-size analyses, processed and identified phytoliths and pollen, assisted in publication, obtained literature about sediment studies, performed various office duties. Supervisor: Dr. George (Rip) Rapp, Jr.

**Crustal Dynamics Project, Geology & Geophysics Branch, NASA Goddard Space Flight Center, Greenbelt, Maryland.** University of Maryland Research Assistant (1983–1984). Correlated geologic features with satellite magnetic anomalies (MAGSAT) and researched the crustal structure and composition of each feature for Principal Investigator (Dr. Herbert Frey).



**Tel Miqne (Ekron) Excavations, American Schools of Oriental Research, Israel.** Assistant Geoarchaeologist and Project Archaeologist (1984, 1987). Assisted the Project Geoarchaeologist (Dr. Arlene Rosen) in all phases of field and laboratory studies during spring-summer excavations. **1987 season** involved all phases of grain-size studies, including collection, processing, microscopic analysis, and data analysis; also assisted with on-site geological problems and flotation procedures. **1984 season** involved assistance with wadi stratigraphy studies, on-site geological problems, flotation procedures, and grain-size analyses.

### Selected Publications

Ollendorf, Amy L., 1994, New Paleoecological Data Pertaining to the Late Holocene in the American Bottom, USA. *Program and Abstracts of the 13th Biennial Meeting of the American Quaternary Association*, University of Minnesota, Minneapolis, p. 236.

Ollendorf, Amy L., 1993, Review of R.R. Brooks and D. Johannes, *Phytoarchaeology*, Portland, OR: Dioscorides Press. *American Antiquity* 58(4):763-764.

Ollendorf, Amy L., 1993, Toward a Classification Scheme of Sedge (Cyperaceae) Phytoliths, *In* G. Rapp, Jr. and S.C. Mulholland, eds., *Phytolith Systematics: Emerging Issues*. Plenum Press, p. 91-111.

Mulholland, Susan C., Rapp, George Jr., Ollendorf, Amy L., and Regal, R., 1990, Variation in Phytolith Assemblages within a Population of Corn (cv. Mandan Yellow Flour), *Canadian Journal of Botany* 68:1638-1645.

Ollendorf, Amy L., Mulholland, Susan C., and Rapp, George Jr., 1988, Phytolith Analysis as a Means of Plant Identification: *Arundo donax* and *Phragmites communis*. *Annals of Botany* 61:209-214.

Mulholland, Susan C., Rapp, George Jr., and Ollendorf, Amy L., 1988, Variation in Corn Phytolith Assemblages. *Canadian Journal of Botany* 66:2001-2008.

Ollendorf, Amy L., Mulholland, Susan C., and Rapp, George Jr., 1987, Phytoliths from Some Israeli Sedges. *Israel Journal of Botany* 36:125-132.

Ollendorf, Amy L., Mulholland, Susan C., and Rapp, George Jr., 1987, A New Apparatus for the Digestion of Plants in Phytolith Analysis. *Phytolitharien Newsletter* 5(1):13-16.

Ollendorf, Amy L., 1986, Tel Miqne, Israel - Phytoliths from Philistine Levels. *Old World Archaeology Newsletter* 10(2):16.

### Selected Presentations

Ollendorf, Amy L., 2000, "Pollen Analysis." Assisted Dr. Edward Cushing (Univ. of MN) by helping train health professionals during weekend seminar sponsored by Multidata Corporation. **Invited.**

Ollendorf, Amy L., 1999, "Pollen Analysis." Assisted Dr. Edward Cushing (Univ. of MN) by helping train health professionals during weekend seminar sponsored by Multidata Corporation. **Invited.**

Ollendorf, Amy L., 1997, "Sneezing, Wheezing, and the Study of Fossil Pollen: What this Allergenic Material Can Tell Us About the Past." Guest lecture at the *Annual Meeting of the Materials Information Society - Minnesota Chapter of the American Society of Metallurgists International*, Minneapolis, Minnesota. **Invited.**

Ollendorf, Amy L., 1997, "Paleoecological Research at Cahokia." Guest lecture for *Minnesota Archaeology Week and Hamline University Anthropology Club*, St. Paul, Minnesota. **Invited.**

Ollendorf, Amy L., 1994, "New Paleoecological Data Pertaining to the Late Holocene in the American Bottom, USA." *Program and Abstracts of the 13th Biennial Meeting of the American Quaternary Association*, University of Minnesota, Minneapolis, p. 236.

Ollendorf, Amy L., 1993, "Paleoecology and Culture Change in the American Bottom, USA." *58<sup>th</sup> Annual Meeting of the Society for American Archaeology*, St. Louis, Missouri.

Ollendorf, Amy L., 1993, "Recent Paleoecological Doctoral Research in the American Bottom." Guest lecture in the *Illinois State Museum Lunchtime Lecture Series*, Springfield, Illinois. **Invited.**



### Selected Presentations (continued)

Ollendorf, Amy L., 1991, "The Decline of the Mississippian Occupation of Cahokia: An Interdisciplinary Investigation of Landscape Changes in the American Bottom (USA)." *24<sup>th</sup> Annual Chacmool Conference*, University of Calgary, Alberta, Canada.

Ollendorf, Amy L. and Wright, H.E. Jr., 1989, "Landscape Changes Associated with Urbanization in Temperate Europe." *1<sup>st</sup> Joint Archaeological Congress*, Baltimore, Maryland. **Invited.**

Ollendorf, Amy L., 1988, "Comparison of Sedge Phytoliths from Widely Separated Geographic Areas, With an Emphasis on Israel." *3<sup>rd</sup> Annual Phytolith Workshop*, University of Missouri-Columbia.

Ollendorf, Amy L., 1986, "Phytoliths from Philistine Occupation Surfaces at Tel Migne (Ekron), Israel." *51<sup>st</sup> Annual Meeting of the Society for American Archaeology*, New Orleans, Louisiana.

## Education

Ph.D., Geology (studies), 2012-2016

M.S., Geology, University of California, Los Angeles, 2011

B.S., Biology, University of Minnesota, Minneapolis, 2006

## Professional Experience

2018–present, Associate Paleontologist, Applied EarthWorks, Inc., Pasadena, California

2016–2018, Paleontological Field Technician, Applied EarthWorks, Inc., Pasadena, California

2017–2018, Paleontology Field Technician, Rincon Consultants, Los Angeles, California

2008–2009, Instructor, Mad Science of Minnesota, St. Paul

## Other Paleontological Research

Ph.D., Geology Studies.

Proposed dissertation topic: *Establishing a link between the trend in changing seawater chemistry and the evolution of the first animals that built shells and skeletons from calcium carbonate during the Cambrian explosion.* Advisor: Bruce N. Runnegar.

M.S. Thesis.

*Demonstrating the application of confocal laser scanning microscopy in the characterization of a fossil fern from the Eocene.*

Advisor: J. William Schopf.

## Summary of Qualifications

Mr. Shi is a paleontologist and geologist with more than 10 years of experience in paleontology, evolutionary biology, mineralogy, and sedimentary geology, and meets the Society of Vertebrate Paleontology's (SVP) standards for a qualified professional paleontologist. He has a background in plant and invertebrate taphonomy, and his master's thesis focused on the characterization of fossilized Eocene ferns using a novel three-dimensional imaging technique. Additionally, Mr. Shi spent several years working toward a Ph.D. in geology with research focused on the link between the trend in changing seawater chemistry and the evolution of the first animals to develop shells from calcium carbonate during the Cambrian explosion.

Mr. Shi completes various tasks within the Paleontology Program of Applied EarthWorks. As the Paleontology Supervisor, he coordinates and schedules paleontological monitors throughout AE's 5 offices. In the field, Mr. Shi's responsibilities include stratigraphic analyses, geological and paleontological data collection, bulk-sediment sampling, and documentation of fossil localities. In the lab, Mr. Shi identifies, analyzes, and prepares collected fossils for permanent curation. Mr. Shi also regularly completes paleontological desktop literature and map reviews and coordinates with various paleontology curators for museum records searches; authors paleontology monitoring plans, inventory and evaluation reports, resource impact management plans, and worker environmental awareness training materials. In the past, Mr. Shi served as AE's lead monitor on a number of construction monitoring projects for transportation, land development, water, and power generation projects.

## Project Experience

**Santa Margarita Ranch Agricultural Subdivision Project, San Luis Obispo County, California.** Staff Paleontologist (2019). Completing paleontological resource impact mitigation program (PRIMP) and worker environmental awareness program (WEAP) training brochure for CEQA compliance. Will oversee WEAP training and paleontological resource monitoring for construction. Client: Kirk Consulting for Santa Margarita Ranch, LLC.

**Love's Travel Center, Madera County, California.** Staff Paleontologist (2018-2019). Co-authored and reviewed PRIMP, and conducted WEAP training for CEQA compliance. Overseeing paleontological resource monitoring for construction. Client: Love's Travel Stop Corporate Office.





**Project Experience**  
(continued)

**Biola University Tennis Courts and Wastewater Treatment Area Expansion, La Mirada, Los Angeles County, California.** Project Manager (2019). Overseeing archaeological and paleontological resource monitoring for construction for CEQA compliance. Client: Biola University.

**Southern California Logistics Center Project, Victorville, San Bernardino County, California.** Staff Paleontologist (2019). Completing PRA and review of the paleontological resource section of the programmatic environmental impact report (PEIR) for the City of Victorville for CEQA compliance. Client: Michael Baker for City of Victorville.

**California Flats Solar Project, Monterey County, California.** Staff Paleontologist (2018-2019). Overseeing paleontological resource monitoring for construction. Client: First Solar.

**Athos Renewable Energy Project, Riverside County, California.** Staff Paleontologist (2018-2019). Completed various steps for CEQA and federal compliance for construction of a 3,600-acre solar farm. CEQA compliance: oversaw ground-reconnaissance field survey of private lands, completed field observations of geotechnical test trenches for presence/absence of subsurface paleontological resources, co-authored paleontological identification report (PIR), and completed PRIMP. Federal compliance: completed ground-reconnaissance field survey of federal lands and completed PRA. Will oversee paleontological resource monitoring for construction. Client: Aspen Environmental Group for IP Athos.

**Port of Long Beach Master Plan Update, City of Long Beach, Los Angeles County, California.** Staff Paleontologist (2018-2019). Completed paleontological resource section of the PEIR for the City of Long Beach for CEQA compliance. Client: Leidos for City of Long Beach.

**5401 Telegraph Road Parking Structure, City of Commerce, Los Angeles County, California.** Project Manager (2019). Conducted WEAP training and oversaw archaeological and paleontological resource monitoring for construction for CEQA compliance. Client: Parkco Building Company.

**APN 360-130-003, City of Menifee, Riverside County, California.** Staff Paleontologist (2019). Completing updates for PRA following design changes for CEQA and federal compliance. Client: Albert A. Webb Associates for JPN Corporation.

**Hinkley Remediation Project, San Bernardino County, California.** Staff Paleontologist (2018-2019). Completed and oversaw paleontological resource monitoring for installation of a groundwater extraction well. Completed a cultural and paleontological finding report and a paleontological monitoring report for project components in 2018 for CEQA compliance. Completing 2018 annual report, and will oversee all project field components for the approximately 30,000-acre groundwater remediation area. Client: Arcadis for PG&E.



**Project Experience**  
(continued)

**LA Water Wheel Project, Los Angeles County, California.** Staff Paleontologist (2019). Completed paleontological technical memorandum for the plan to divert waters from the Los Angeles River to irrigate nearby public parks, and will assist City of Los Angeles with Mitigated Negative Declaration (MND) for CEQA compliance. Client: Ruth Villalobos & Associates for City of Los Angeles.

**Highpark (Ponte Vista) Residential Development Project, City of San Pedro, Los Angeles County, California.** Staff Paleontologist (2018-2019, 2017). 2018-2019: Completing paleontological monitoring report for CEQA compliance. Completed preparation of fossils for museum curation. 2017: Completed construction monitoring, fossil identification, bulk sediment sampling, stratigraphic analysis, and geological data collection. Client: Harridge Development Group (2018-2019); iStar Financial (2017-2018).

**Duke Perry and Barrett Project, City of Perris, Riverside County, California.** Staff Paleontologist (2018-2019). Completed paleontological technical memorandum for CEQA compliance. Client: Albert A. Webb Associates for City of Perris.

**0.93 Acres within APN 314-160-004, City of Perris, Riverside County, California.** Staff Paleontologist (2018-2019). Completed paleontological technical memorandum for CEQA compliance. Client: Richard Park for City of Perris.

**Talavera Pipeline Replacement Project, City of Indio, Riverside County, California.** Staff Paleontologist (2019). Completed review of technical memorandum, created informational brochure for WEAP, and conducted WEAP training for CEQA compliance. For: 5.7-mile-long pipeline replacement. Client: Albert A. Webb Associates for Coachella Valley Water District.

**Ten West Link 500 kV Transmission Project, Riverside County, California, Yuma and Maricopa Counties, Arizona.** Staff Paleontologist (2018-2019). Completed research and co-authorship of PIR of 114-mile-long preferred alignment corridor and alternatives for CEQA, PUC, and federal compliance. Client: DCR Transmission, LLC and BLM.

**Rose II Project, Community of Romoland, Riverside County, California.** Staff Paleontologist (2018). Completing paleontological resource impact mitigation program (PRIMP) for CEQA compliance. Client: Pacific Communities Builder, Inc.

**Sampson Road Improvements Project, City of San Pedro, Los Angeles County, California.** Lead Paleontology Monitor (2017). Managed Worker's Awareness Training for all construction crews on site. Completed construction monitoring, fossil identification, sample collection, stratigraphic analysis, and geologic data collection. For: urban and infrastructure development project spanning 400 acres. Client: Jones & Stokes.



**Project Experience**  
(continued)

**The Grove Project, City of Scotts Valley, Santa Cruz County, California.** Lead Paleontology Monitor (2017). Completed construction monitoring, fossil identification, stratigraphic analysis, and geologic data collection. For: 4.32-acre-lot cleared for the construction of residential units. Client: City Ventures.

**Crowder Canyon (SR 138) Paleontological Mitigation Project, San Bernardino County, California.** Paleontological Field Technician (2017). Completed construction monitoring, fossil identification, stratigraphic analysis, and geologic data collection. For: 1.7-mile-long state route realignment. Client: Caltrans, District 8.

**Malibu Wastewater Treatment Facility, City of Malibu, Los Angeles County, California.** Paleontological Field Technician (2017). Completed construction monitoring, fossil identification, stratigraphic analysis, and geologic data collection. For: 4.8-acre-lot cleared for the installation of the facility. Client: Myers-Banicki for City of Malibu.

**Sycamore Hills Distribution Center Project, City of Riverside, Riverside County, California.** Staff Paleontologist (2018). Completed ground-reconnaissance field survey and paleontological resource assessment for CEQA compliance. Client: Ruth Villalobos & Associates for March Joint Powers Authority and KB Development.

**Temescal Valley Riverside Clinic Investors IV, LLC Project, Riverside County, California.** Staff Paleontologist (2018). Completed paleontological monitoring report for CEQA compliance. Client: Riverside Medical Clinic Investors IV, LLC for County of Riverside.

**I-10 Monroe Interchange Project, City of Indio, Riverside County, California.** Staff Paleontologist (2018). Completed museum records search, online research, coordination of ground-reconnaissance field survey, and co-authorship of PIR for CEQA compliance. Client: Michael Baker for Caltrans.

**Thermal Beach Club Project, Community of Thermal, Riverside County, California.** Staff Paleontologist (2018). Co-authored and reviewed paleontological technical memorandum for CEQA compliance. Client: Albert A. Webb Associates for County of Riverside.

**Menifee Town Center – Parcels 13, 14, and 15 Development Project, City of Menifee, Riverside County, California.** Staff Paleontologist (2018). Completed PRIMP for CEQA compliance. Client: Kristoff Commercial Real Estate for City of Menifee.

**Madison Street Improvements Project, City of Murrieta, Riverside County, California.** Staff Paleontologist (2018). Completed museum records search, online research, paleontological technical memorandum, ground-reconnaissance field survey, and PRA for CEQA compliance. Client: Kleinfelder for City of Murrieta.

**Banning Water Canyon Main Replacement Project, City of Banning, Riverside County, California.** Staff Paleontologist (2018). Completed review of paleontological resource monitoring report for CEQA compliance. Client: Aspen Environmental Group for City of Banning.



## Project Experience (continued)

**De Anza Sewer Force Main Project, City of San Jacinto, Riverside County, California.** Staff Paleontologist (2018). Created informational brochure for construction-worker sensitivity training for WEAP for CEQA compliance. Client: HELIX for Eastern Municipal Water District.

**I-215 University Parkway Interchange Improvement Project, City of San Bernardino, San Bernardino County, California.** Staff Paleontologist (2018). Completed updates for PIR following design changes for CEQA compliance. Client: HDR for Caltrans.

**Blythe Airport Perimeter Fence Project, Riverside County, California.** Staff Paleontologist (2018). Completed museum records and online research for NEPA and CEQA compliance. Client: Mead & Hunt for Caltrans.

**Sixth Street Park, Arts, River & Connectivity Improvements Project, City of Los Angeles, Los Angeles County, California.** Staff Paleontologist (2018). Completed review of technical memorandum for CEQA compliance. For: construction of public spaces spanning 12 acres. Client: GPA Consulting for City of Los Angeles.

## Relevant Publications

Shi, C. S. 2013. Use of Confocal Laser Scanning Microscopy for Studies in Paleobotany: Documentation of Stem Anatomy of the Eocene Fern *Dennstaedtiopsis aerenchymata* (Dennstaedtiaceae). LAP LAMBERT Academic Publishing: 88 p.

Shi, C. S., J. W. Schopf, A. B. Kudryavtsev. 2013. Characterization of the stem anatomy of the Eocene fern *Dennstaedtiopsis aerenchymata* (Dennstaedtiaceae) by use of confocal laser scanning microscopy. American Journal of Botany, Vol. 100, No. 8: p. 1626-1640.

Zheng, J., W. Zhuang, N. Yian, G. Kou, H. Peng, C. McNally, D. Erichsen, A. Cheloha, S. Herek, C. Shi, and Y. Shi. 2004. Classification of HIV-1 mediated neuronal dendritic and synaptic damage using Multiple Criteria Linear Programming. Neuroinformatics, Vol. 2, No. 3: p. 303-326.