Paleontological Resource Assessment for the Pacific Topaz Tentative Tract Map 53642 Project, City of Lancaster, Los Angeles County, California

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MANAGEMENT SUMMARY

At the request of Pacific Communities Builder, Applied EarthWorks, Inc. (Æ) completed a Paleontological Resource Assessment (PRA) for the Pacific Topaz Tentative Tract Map 53642 Project in the southwest portion of the city of Lancaster in Los Angeles County, California (Project). This PRA is written in partial satisfaction of the California Environmental Quality Act (CEQA) and the City of Lancaster (City) is the lead agency for CEQA compliance. The Project area encompasses 36.99 acres of vacant land proposed for development of a 200-plus single-family detached, 55-year-plus community in the northeast quadrant of the intersection of West Avenue K-8 and 60th Street West.

This PRA was completed from desktop studies and a field survey. The desktop studies included a review of published literature and maps as well as museum records searches. 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 nearby. The field survey was conducted to ground-truth the results of the desktop studies. Æ utilized the results of all the desktop studies and the field survey to determine the paleontological sensitivity of the Project area. Æ assigned the entire Project area to High Potential at all depths in locations where alluvium is exposed and at a depth of 4 feet or greater below ground surface (bgs) in locations where artificial fill is present on the surface.

Æ recommends the City retain a qualified professional paleontologist who meets qualification standards for Principal Investigator, Project Paleontologist as per industrywide practices or the Society of Vertebrate Paleontology (SVP) guidance to develop and implement a paleontological resource impact mitigation program (PRIMP) for the Project prior to the start of ground-disturbing activities. Æ makes the following recommendations to be included in the PRIMP:

- Initial period of full-time construction monitoring at all depths where alluvium is exposed in the Project area and at depths greater than or equal to 4 feet bgs where artificial fill is present in the Project area.

- Full-time monitoring may be reduced to spot-check monitoring at the discretion of the Project Paleontologist if no intact and significant paleontological resources are encountered during the initial period of construction monitoring.

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 Pacific Communities Builder, Applied EarthWorks, Inc. (Æ) completed a Paleontological Resource Assessment (PRA) for the Pacific Topaz Tentative Tract Map 53642 Project in the southwest portion of the city of Lancaster in Los Angeles County, California (Project) (Figure 1-1). This PRA is written in partial satisfaction of the California Environmental Quality Act (CEQA) and the City of Lancaster (City) is the lead agency for CEQA compliance.

1.1 PROJECT DESCRIPTION

The Project entails the development of a 200-plus single-family detached, 55-year-plus community in the northeast quadrant of the intersection of West Avenue K-8 and 60th Street West. The Project area covers 36.99 acres of presently vacant land and is mapped in the northwest quarter of Section 26 in Township 7 North, Range 13 West, as shown on the Lancaster West, California 7.5-minute U.S. Geological Survey topographic quadrangle map (Figure 1-2).

The Project area will be excavated and graded to create compacted housing pads and paved streets will be installed throughout the community to serve the new neighborhood. The new residential development will hook into public utilities and will have perimeter landscaping with fencing. The maximum depth of proposed Project-related ground disturbance is 13 feet below ground surface (bgs).

1.2 PURPOSE OF INVESTIGATION

This PRA is designed to accomplish several goals: (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 local regulations. The following section describes the ways in which this PRA meets the stated goals.

1.3 KEY PERSONNEL

Qualifications for Æ's key paleontology personnel can be found in Appendix A. Æ's Paleontology Program Manager, Dr. Amy Ollendorf, served as the Principal Investigator for the paleontological investigation. She oversaw each task required for this PRA, including quality control. Ollendorf qualifies as a principal investigator for paleontology per industry standards (Murphey et al., 2019). She has interdisciplinary Doctor of Philosophy and Master of Science degrees involving geology and a Bachelor of Science degree in geology and anthropology (double major), all of which focused on paleontological subject matter. Although she does not have hands-on experience with vertebrate fossil specimens in the field, Ollendorf does have indirect experience with vertebrate paleontology in addition to extensive field and laboratory experience in paleobotany. Ollendorf also is the principal investigator for paleontology on Æ's 2021–2024 California Statewide Paleontological Resource Use Permit (CA-21-06P). She also is a Registered Professional Archaeologist (RPA 12588) with over 38 years of experience.



Figure 1-1 Project vicinity in Los Angeles County, California.

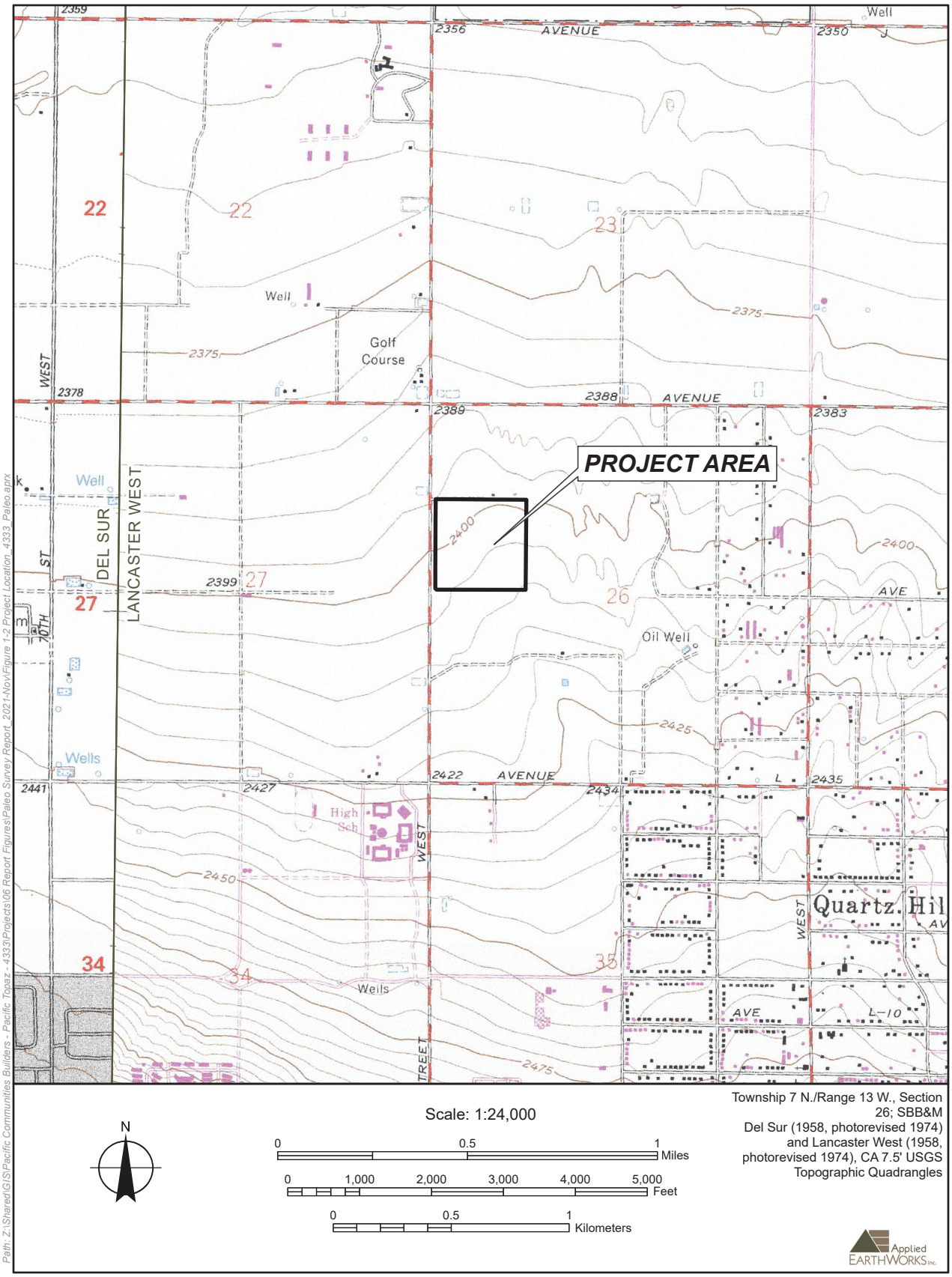

Figure 1-2 Project location on USGS Del Sur and Lancaster West 7.5-minute topographic quadrangles.

Æ Senior Paleontologist Chris Shi completed the desktop research and wrote the PRA; he also completed the field survey. Shi meets the Society of Vertebrate Paleontology (SVP, 2010) standards for qualified professional paleontologist and is another principal investigator for paleontology on Æ's CA-21-06P permit. Shi has a Master of Science degree in geology with a focus on paleontology and has over 10 years of experience in sedimentary geology and various subdisciplines of paleontology, as well as the past 5 years in construction monitoring for paleontological resources, fossil recovery, laboratory analysis and preparation of fossils, and report preparation.

1.4 REPORT ORGANIZATION

Chapter 1 has described the Project, defined the purpose of the investigation, and provided a description of Æ's key personnel for this PRA. 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 desktop studies, field survey, 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 afforded protection under various federal, state, and local laws. This Project is not subject to federal laws. Consequently, all resources are protected under only state and local laws, as described in the following sections.

2.1 STATE

California is among the states that protect significant paleontological resources. CEQA is the legal framework through which this protection is accomplished. Enacted in 1970, CEQA does not directly regulate land uses but instead requires state and local agencies within California to follow a protocol of analysis and public disclosure of environmental impacts of proposed projects and adopt all feasible measures to mitigate those impacts.

2.1.1 California Environmental Quality Act

This Project is subject to Section 15002(a)(3) of the Guidelines for Implementation of CEQA (California Code of Regulations, Title 14, Chapter 3), which states one of 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." Therefore, 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.

2.1.2 CEQA Implementation

Guidelines for implementation of CEQA are codified in the California Code of Regulations (CCR), Title 4, Chapter 3, Sections 15000 et seq., which requires state and local public agencies to identify the environmental impacts of proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. The various agencies within state government all have their own guidance documents to assist with CEQA compliance. The City is the government agency responsible for compliance with the CEQA for the Project.

2.2 LOCAL

The City provides guidance for the identification, protection, and preservation of significant paleontological resources. The following sections describe all relevant objectives, policies, and required actions and mitigation measures.

2.2.1 City of Lancaster

Paleontological resources were previously addressed in the CEQA as part of cultural resources until moved in 2019 to be considered with geology and soils. Consequently, the City's *Adopted General Plan Policy Document* addresses paleontological resources within "Objective 12.1: Historic, Archaeological, and Cultural Resources" as well as a policy and two specific actions l (City of Lancaster, 2009a:4-26). The accompanying Final Environmental Impact Report (FEIR) for the General Plan includes a Mitigation Measure also covering paleontological resources within cultural resources (City of Lancaster, 2009b:12-6). Therefore, the following verbiage from the General Plan (City of Lancaster, 2009a) and FEIR for the General Plan (City of Lancaster, 2009b) utilize the now outdated verbiage:

- **Policy 12.1.1.** Preserve features and sites of significant historical and cultural value consistent with their intrinsic and scientific values.

- **Specific Action 12.1.1(a).** As part of the CEQA review process, require site-specific historical, archaeological, and paleontological studies when there exists a possibility that significant environmental impacts might result or when there is a lack of sufficient documentation on which to determine potential impacts.

- **Specific Action 12.1.1(e).** Work with area school districts and historical/archaeological/paleontological preservation support groups to establish educational programs related to all phases of Lancaster's cultural and historical heritage.

- **Mitigation Measure CR-1**. In the event that cultural resources (archeological, historical, paleontological) resources are unearthed during excavation and grading activities of any future development project, the contractor shall cease all earth-disturbing activities within a 100-meter radius of the area of discovery and shall retain a qualified archaeologist to evaluate the significance of the finding and appropriate course of action. Salvage operation requirements pursuant to Section 15064.5 of the CEQA Guidelines shall be followed. After the find has been appropriately mitigated, work in the area may resume.

3
PALEONTOLOGICAL RESOURCE ASSESSMENT GUIDELINES

Protection of paleontological resources requires assessment of the potential for geologic units to yield significant paleontological resources that could be directly or indirectly impacted or destroyed during Project development. Successful protection also involves the formulation and implementation of appropriate management measures to mitigate impacts. Mitigation measures are proportional to the potential of individual areas to yield intact and significant paleontological resources.

3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES AND SIGNIFICANCE CRITERIA

Paleontological resources are defined in the SVP (2010) guidelines 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, the SVP (2010) considers fossils to be greater than 5,000 years old (older than Middle Holocene Subepoch[1]) and to typically be preserved in sedimentary rocks, although certain volcanic rocks and low-grade metamorphic rocks may be fossiliferous if formed under certain conditions.

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 PROFESSIONAL STANDARDS AND CLASSIFICATION OF PALEONTOLOGICAL RESOURCE SENSITIVITY

Most professional paleontologists in California adhere to the SVP (2010) guidelines, unless others are available. The City does not have its own guidelines for paleontological sensitivity; therefore, this PRA utilizes the SVP's. These guidelines establish detailed protocols for the assessment of the paleontological sensitivity of a project area and outline measures to follow in

[1] Middle Holocene: extends from 8,200 to 4,200 years ago in the Holocene Epoch of the Quaternary Period, covering approximately the past 11,700 years (Cohen et al., 2021); the Quaternary Period also includes the older Pleistocene Epoch, which lasted from approximately 2.6 million years ago to approximately 11,700 years ago (Cohen et al., 2021).

order to mitigate adverse impacts to known or unknown fossil resources during project development (SVP, 2010).

Baseline information gathered during a paleontological resource assessment is used to assign the paleontological sensitivity of the geologic unit(s) (or members thereof) exposed at or distributed across the ground surface of a project area, in addition to those thought to be beneath a project area at depth. It should be noted that surface geology is not always indicative of subsurface geology or the potential for paleontological resources. For instance, an area whose surface geology is mapped as non-fossiliferous sediments may cover fossil-rich Pleistocene sediments at depth. Also, an area mapped as granite, devoid of fossils, may be covered by fossil-rich Pleistocene sediments. Thus, actual paleontological sensitivity across a project area ultimately can be determined only through a combination of desktop and field efforts.

The SVP provides a classification system to rank a geologic unit's sensitivity or potential for significant paleontological resources. The SVP scale includes High, Undetermined, Low, and No Potential. Geologic units are considered to have a High Potential if vertebrates or significant specimens of other fossil types have been recovered anywhere in their extent; or if the units are sedimentary rocks that are temporally or lithologically suitable for the preservation of significant fossils. The criteria for the categories are shown in Table 3-1.

Table 3-1
Paleontological Sensitivity Classifications

SVP Sensitivity/ Potential	Criteria	Mitigation Recommendations
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, PRIMP, and onsite construction monitoring will be required. Any significant specimens discovered during monitoring 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.	A field survey is required to further assess the unit's paleontological potential. The survey may provide data for development of a Paleontological Resource Impact Mitigation Program (PRIMP) prior to construction.
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; however, if an unanticipated paleontological resource is encountered, a qualified professional paleontologist (Principal Investigator, Project Paleontologist) may need to evaluate the resource to consider mitigation.
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.

Source: SVP (2010)

4
METHODS

This PRA was completed through desktop studies and a field survey. The twofold purpose of the off- and on-site 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 REVIEWS 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 preserved within the near-surface layers often are destroyed or rendered unrecognizable. Therefore, intact and identifiable fossils are unlikely to be found in soil. Reviews of relevant geologic maps, regional geological publications, and unpublished reports are necessary to ascertain the geology and stratigraphy of a project area to determine the potential for significant subsurface paleontological resources.

To supplement the map and literature reviews, Æ requested a search of records of the invertebrate and vertebrate collections maintained by the Natural History Museum of Los Angeles County (NHMLAC). Æ also completed online searches of two databases readily available to the public—the Paleobiology Database (PBDB) and the database maintained by the University of California Museum of Paleontology (UCMP). All records searches were completed to identify known fossil localities within or near the Project area.

4.2 FIELD SURVEY

Prior to the field survey, Æ examined recent aerial photographs of the Project area and vicinity in Google Earth to determine possible locations of geologic outcrops and potential survey routes. Shi conducted the field reconnaissance survey for the Project alongside Æ Archaeologist Keith Warren on October 26, 2021. The survey served multiple purposes—(1) to verify the mapped surface geology, (2) to confirm the presence/absence of exposed fossils on the ground surface, and (3) to evaluate geologic exposures for their potential to yield subsurface fossil material. The survey consisted of a combination of close visual inspection of non-vegetated locations and spot-checking of the ground surface for evidence of paleontological resources while walking along transects oriented north-south through the Project area and spaced approximately 10 to 15 feet apart. The survey began in the southeast corner of the Project area and finished in the southwest corner.

Close visual inspection was conducted for portions of the Project area where the ground surface was visible and unobscured by vegetation. This also included locations where the surficial sediments appeared undisturbed or only slightly disturbed. Spot-checking was conducted for the remainder of the Project area and vicinity where the ground surface was obscured by vegetation

and/or heavily disturbed. Shi kept notes on the geology and sedimentology encountered in a field notebook and took photographs to document the survey. Observed fossils, if any, were to be field-documented and not collected.

5
GEOLOGY AND PALEONTOLOGY

The following sections provide the geological context of the Project area as well as descriptions of the geologic units mapped as surface exposures within the boundaries of the Project area in addition to units exposed nearby and thought to be present in the subsurface. The section also includes any paleontological information reported from the units.

5.1 REGIONAL GEOLOGY

The Project area is in the west end of the Antelope Valley within the Mojave Desert geomorphic province (California Geological Survey, 2002). A geomorphic province is a region of unique topography and geology that is distinguished from other regions based on its landforms and tectonic history (American Geological Institute, 1976). The Mojave Desert is bordered by the Transverse Ranges to the southwest, the Tehachapi Mountains to the northwest, the Basin and Range Province to the northeast, and the Colorado River and Colorado Desert to the southeast.

The western portion of the Mojave Desert lies within the Mojave Block; a large wedge that extends from the San Andreas Fault in the southwest and Garlock Fault in the northwest to the Basin and Range Province in the east (Bartley et al., 1990). The Mojave Block is a transpressional structure, or deformation caused by strike-slip fault movement, formed by the right lateral movement of the San Andreas Fault and left lateral movement of the Garlock Fault (Glazner et al., 2002). Faults rarely follow a single trace, and instead form complex networks of roughly parallel fault zones. Both of these fault zones accommodate primarily lateral displacement, although vertical displacement is also common and allows for the rotation of the block between the fault zones.

The complicated geologic history of the Mojave Block includes Mesozoic subduction and volcanism, followed by extension and transpression associated with the formation of the San Andreas Fault during the Miocene Epoch[2] (Glazner et al., 2002; Schermer et al., 2002). The western portion of the Mojave Block is characterized by a series of northwest-striking strike-slip faults parallel to the San Andreas Fault, Mesozoic Era[3] igneous bedrock, and thick beds of Cenozoic Era[4] sediments.

During the Pleistocene, the enclosed basins in the Mojave Desert and Basin and Range Provinces were occupied by large lakes, such as Lake Manix and Lake Mojave, along the Mojave River (Enzel et al., 2003). The southern shoreline of ancestral Lake Thompson, a perennial lake that filled much of the Antelope Valley around 12,000 years ago (i.e., during the late Pleistocene

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[2] Miocene Epoch: approximately 23 million to 5.3 million years ago; first epoch of the Neogene Period in the Cenozoic Era (see footnote 4 below) (Cohen et al., 2021).
[3] Mesozoic Era: approximately 252 million to 66 million years ago; encompassing the Triassic, Jurassic, and Cretaceous Periods (Cohen et al., 2021).
[4] Cenozoic Era: approximately 66 million years ago to present; encompassing the Paleogene, Neogene, and Quaternary Periods (Cohen et al., 2021).

Subepoch), is approximately 1 mile north of the Project area (Hernandez, 2010). Source waters for Lake Thompson originated from the San Gabriel, Sierra Pelona, and Tehachapi mountains during the wetter times of the late Pleistocene. One of these drainages, Amargosa Creek, flowed approximately 4 miles to the northeast of the Project area. The maximum extent of this lake, approximately 34,000 years ago, covered approximately 950 square kilometers from Lancaster north to the Rosamond Hills. Lake level and extent varied through the end of the Pleistocene, eventually segmenting into the Rosamond and Rogers lakes, dry playa lakebeds visible today (Orme, 2004).

5.2 GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

The Project area has been mapped at various scales:

- **1:250,000** – Los Angeles Sheet (Jennings and Strand, 1969; and references therein)
- **1:62,500** – Lancaster Quadrangle (Dibblee, 1960) and Lancaster and Alpine Butte 15-minute quadrangles (Dibblee and Minch, 2008; and references therein)
- **1:24,000** – Lancaster West Quadrangle (Hernandez, 2010)

Jennings and Strand (1969) is part of the *Geologic Atlas of California* series published between 1958 and 1969, which provides the first complete consistent view of the geology of the state (California Department of Conservation, 2019). These compilations adopt a single set of map symbols to correlate potentially equivalent geologic units by defining the units only by geologic time rather than by both time and lithology.

Hernandez (2010) refines earlier mapping by Dibblee (1960), Jennings and Strand (1969), and Dibblee and Minch (2008). His map utilizes information from more recent studies and original field data to further refine the geology within their specific regions. Consequently, this PRA is based largely on the interpretations of Hernandez (2010) as the most recent published and most comprehensive map. The recent geotechnical report for the Project also provides additional, geologic information (Ruiz and Coyne, 2021). According to these sources, the surficial geology of the region consists mostly of Quaternary sandy alluvial deposits with recent artificial fill present on the east and north sides of the Project area (Figure 5-1).

5.2.1 Alluvial Deposits (Qyfs, Qyfc, Qyf, Qya, Qf) and Playa Deposits (Qyp)

The ground surface of the Project area was previously mapped by Jennings and Strand (1969) as alluvium (Qal); and by Dibblee (1960) and Dibblee and Minch (2008) as alluvial gravel, sand, and silt (Qa). According to Hernandez (2010), late Pleistocene- to Holocene-age younger alluvium (Qya) covers the entire undisturbed ground surface portions of the Project area. Other surficial deposits mapped in the vicinity but outside the Project area are also generally alluvial and of similar age, including silt-rich younger alluvial fan deposits (Qyfs) to the southeast, clay-rich younger alluvial fan deposits (Qyfc) to the north, younger alluvial fan deposits (Qyf) to the east, and modern alluvial fan deposits (Qf) to the northwest (Hernandez, 2010). Other surficial deposits in the surrounding area include younger playa deposits (Qyp) mapped 1.5 miles to the northwest of the Project area (Hernandez, 2010).

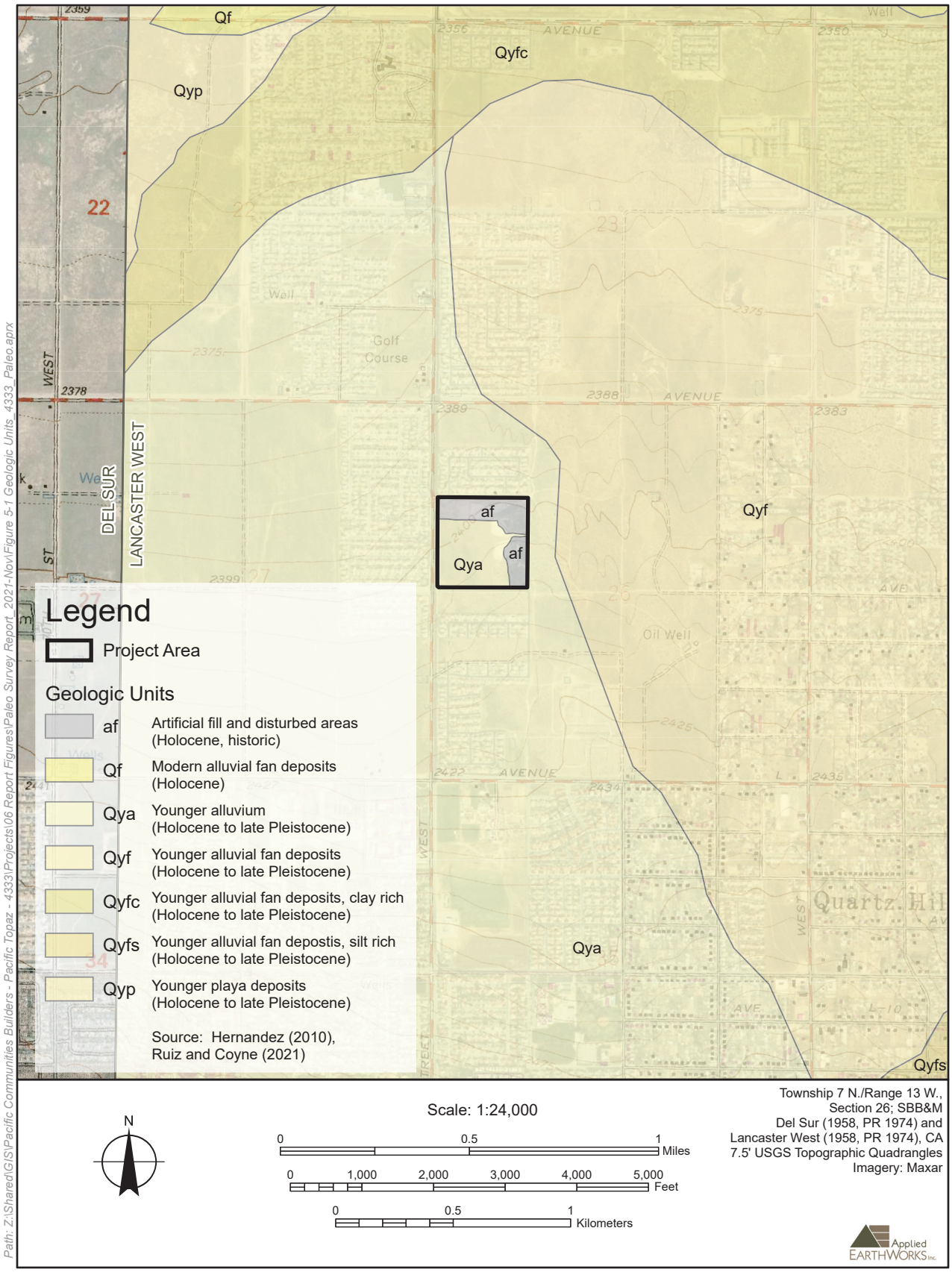

Figure 5-1 Geologic map for Project area and vicinity.

The alluvial deposits in the region are sands with varying amounts of silts and gravels, which originated in the nearby Sierra Pelona Mountains. The Qya-Qyf contact is mapped less than 500 feet to the east of the Project area, whereas the Qya-Qyfc contact is mapped less than 1 mile to the north. The Qyfc deposits are thought to be distal fan deposits near the southern shoreline of Pleistocene Lake Thompson. The lacustrine deposits are silts and clays with minor well-sorted sands and fine gravels deposited in the shallow water of Lake Thompson (Hernandez, 2010).

Holocene-age alluvial deposits, 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). In contrast, deposits older than 5,000 years, such as early Holocene- and Pleistocene-age alluvial deposits, have shown great fossil preservation potential throughout California (Reynolds and Reynolds, 1991). In fact, Pleistocene megafauna have been described from deposits associated with ancestral Lake Thompson in the city of Rosamond (Wilkerson et al., 2011), approximately 17 miles north-northeast of the Project area.

5.2.2 Artificial Fill (af)

The geotechnical report for the Project indicates the presence of previously undocumented artificial fill (af) in the north half of the northwest quadrant, most of the northeast quadrant, and the east half of the southeast quadrant (Ruiz and Coyne, 2021). As described in the next chapter, the thickness of the artificial fill varies across the north and east sides of the Project area. Deposits of artificial fill have been modified by previous construction and grading activities, with sediments possibly derived from local sources outside of the Project area. Paleontological sensitivity of artificial fill is low, as any fossils present are out of context.

6
RESULTS AND ANALYSIS

This chapter reports on the results of the desktop studies and field survey completed for this Project. Paleontological sensitivity rankings also are assigned to the geologic units mapped at the ground surface and likely present at unknown depths within the Project area.

6.1 PUBLISHED LITERATURE

Wilkerson et al. (2011) report the presence of many Pleistocene megafauna fossils from a Lake Thompson locality approximately 12 miles north of the Project area. This fossiliferous unit is associated with the shorelines of ancestral Lake Thompson (Orme, 2004; Wilkerson et al., 2011). Fossils include *Mammuthus columbi* (mammoth), *Paramylodon* (giant ground sloth), *Equus* (horse), *Bison antiquus* (bison), and a large camel specimen (Camelidae), along with oxidized plant traces found in excavations at unknown depths. This locality is recorded within late Pleistocene- to Holocene-age Qyfc sediments temporally equivalent to those mapped in the Project area by Hernandez (2010).

6.2 GEOTECHNICAL REPORT

The geotechnical investigation for the Project included excavation of seven hollow-stem auger borings to a depth of 26 feet bgs and 18 backhoe test pits to a depth of 12 feet bgs throughout the Project area (Ruiz and Coyne, 2021). From the boring and test pit logs, the artificial fill reaches a depth of 3.7–8 feet bgs and is directly underlain by intact Quaternary alluvium.

6.3 MUSEUM RECORDS SEARCHES

No fossil localities are recorded within the Project area, although several vertebrate fossil localities have been reported from the same sedimentary units as those mapped in and close to the Project area (Bell, 2021) . No nearby invertebrate localities are recorded in the NHMLAC's collections. Table 6-1 summarizes the records search results from the vertebrate paleontology (VP) collections of the NHMLAC (initialized as LACM), literature review, and the online databases.

Table 6-1
Fossil Localities Reported Near the Project Area

Locality No.	Geologic Unit	Taxon	Depth	Approximate Distance from Project area
LACM VP 7884[1]	Unknown formation (Pleistocene; fluvial brown clayey silt)	camel (*Camelops hesternus*)	4 feet bgs	6 miles
LACM VP 7853[1]	Unknown formation	smelt (Osmeridae)	3–11 feet bgs	7 miles

Table 6-1
Fossil Localities Reported Near the Project Area

Locality No.	Geologic Unit	Taxon	Depth	Approximate Distance from Project area
	(Pleistocene; sandy loess under a dune deposit strand, sandy siltstone, siltstone to clayey siltstone)	colubrid snakes (*Trimorphodon, Masticophis, Phyllorhynchus*) iguana (*Dipsosaurus*) spiny lizards (Phrynosomatidae, *Sceloporus*) side blotched lizard (*Uta*) night lizard (*Xantusia*) western alligator lizard (*Elgaria*) toothy skinks (*Plestiodon*) whiptail lizard (*Aspidocelis*) antelope squirrel (*Ammospermophilus*) kangaroo rat (*Dipodymus*) pocket mouse (*Perognathus*) pack rat (*Neotoma*) deer mouse (*Peromyscus*) vole (Microtinae) rabbit (*Sylvilagus*) camel (Camelidae)		
N/A[2]	Quaternary alluvium	mammoth (*Mammuthus columbi*) Harlan's ground sloth (*Paramylodon harlani*) horse (*Equus*) bison (*Bison antiquus*) camel (Camelidae)	unknown	12 miles
LACM VP 5942–5950[1]	Unknown formation (Holocene)	snake (Ophidia) kingsnake (*Lampropeltis*) gopher snake (*Pituophis*) lizard (Lacertilia) leopard lizard (*Gambelia*) birds (Aves) rodent (Rodentia) kangaroo rat (*Dipodomys*) pocket mouse (*Chaetodippus*) pocket gopher (*Thomomys*) rabbit (Lagomorpha)	0–9 feet bgs	14+ miles
LACM VP 7891[1]	Unknown formation (Pleistocene)	camel (*Hemiauchenia*)	21 feet bgs	14+ miles

Source: [1]Bell (2021); [2]Wilkerson et al. (2011)

The nearest previously recorded locality to the Project area, LACM VP 7884, is approximately 6 miles to the northeast near the corner of the intersection of East Avenue H-13 and East 3rd Street within the city of Lancaster. This locality yielded a camel specimen from clayey fluvial sediments near a shoreline of ancestral Lake Thompson. LACM VP 7853, from the Lancaster Landfill approximately 7 miles northeast of the Project area, is from sandy loess and sandy to clayey siltstones associated with a dune deposit along the shoreline of ancestral Lake Thompson. This locality yielded a wide variety of reptilian and mammalian taxa. LACM VP 5942–5950 are more than 14 miles to the southeast from unspecified locations along Avenue S between the city of Palmdale and Lake Los Angeles, which yielded various reptilian, avian, and mammalian taxa.

Lastly, LACM VP 7891 is more than 14 miles to the north-northwest near Willow Springs between the Tehachapi Mountains and Rosamond Hills. This locality yielded a specimen of camel. Because of these results, Bell (2021) suggests potentially fossil-bearing units are present in the Project area, either in the near-surface or subsurface.

The UCMP and PBDB online databases list numerous vertebrate, invertebrate, and plant fossil localities from Los Angeles County. However, no localities are specified from late Pleistocene- to Holocene-age deposits within a 10-mile radius of the Project area.

6.4 FIELD RESULTS

The topography of the Project area is generally low relief, with 85 to 90 percent of the ground surface covered in vegetation, such as grasses, creosote bush, and sagebrush (Figure 6-1). As indicated in the geotechnical report (Ruiz and Coyne, 2021), artificial fill is present across the north and east sides of the Project area where it is distributed unevenly across the ground surface and concentrated in low stockpiles (Figures 6-1 and 6-2). The fill consists of light gray (10YR 7/1) very fine- to coarse-grained sands and gravels with abundant refuse such as concrete blocks, metal scraps, and erosion-control matting.

Fill is absent in the southwest quadrant, the west half of the southeast quadrant, the southwest corner of the northeast quadrant, and the south half of the northwest quadrant of the Project area. The sediments there appear only lightly disturbed by occasional off-road vehicle tracks and consist of dark brown (10YR 4/4) very fine- to medium-grained sands with abundant silt and intact soil horizons. These are likely deposits of unit Qya based on the texture and color of the sediments described by Hernandez (2010) (Figure 6-3). No paleontological resources were encountered during Æ's field survey of the Project area.



Figure 6-1 **Overview from the northeast corner of the Project area with stockpiles of artificial fill visible near the upper left of the photograph; facing southwest.**



Figure 6-2 **Artificial fill in the northeast quadrant of the Project area, showing light gray (10YR 7/1) sands and gravels with modern construction debris, such as concrete blocks; facing north.**



Figure 6-3 Lightly disturbed, dark brown (10YR 4/4) silty sands with intact soil horizons, likely unit Qya; facing east.

6.5 DETERMINATION OF PALEONTOLOGICAL RESOURCE POTENTIAL WITHIN THE PROJECT AREA

Using information obtained from the desktop studies and field survey, Æ determined the paleontological resource potential of the Project area. Æ's paleontological sensitivity rankings follow the SVP's (2010) classification system. Based on the findings, Æ recommends the assignment of High Potential to the entire Project area, but notes the paleontological sensitivity varies in depth depending on location (Figure 6-4).

The silty textures of lightly disturbed and undisturbed sediments observed within the Project area support the interpretation of an alluvial depositional environment and are consistent with the late Pleistocene- to Holocene-age unit Qya, as mapped by Hernandez (2010). While the youngest Holocene-age surficial sediments may be too young to preserve fossils, the paleontological sensitivity of the unit increases with depth because of the greater likelihood of older Holocene- and Pleistocene-age sediments to preserve fossils. This transition potentially occurs at shallow depths in the Project area, as fossil localities have been documented elsewhere nearby from surficial and near-surface sediments (0–3 feet bgs) associated with Lake Thompson that are of similar age range to those found in the Project area (Wilkerson et al., 2011; Bell, 2021). Hernandez (2010) mapped deposits representing the southern shoreline of Lake Thompson near the Project area, approximately 1 mile to the north. Furthermore, during the latest Pleistocene, when Lake Thompson was at its largest extent, numerous creeks to the east and west of the Project area drained into the lake. Consequently, Æ regards all portions of the Project area where alluvium is exposed to have High Potential for paleontological resources at all depths.

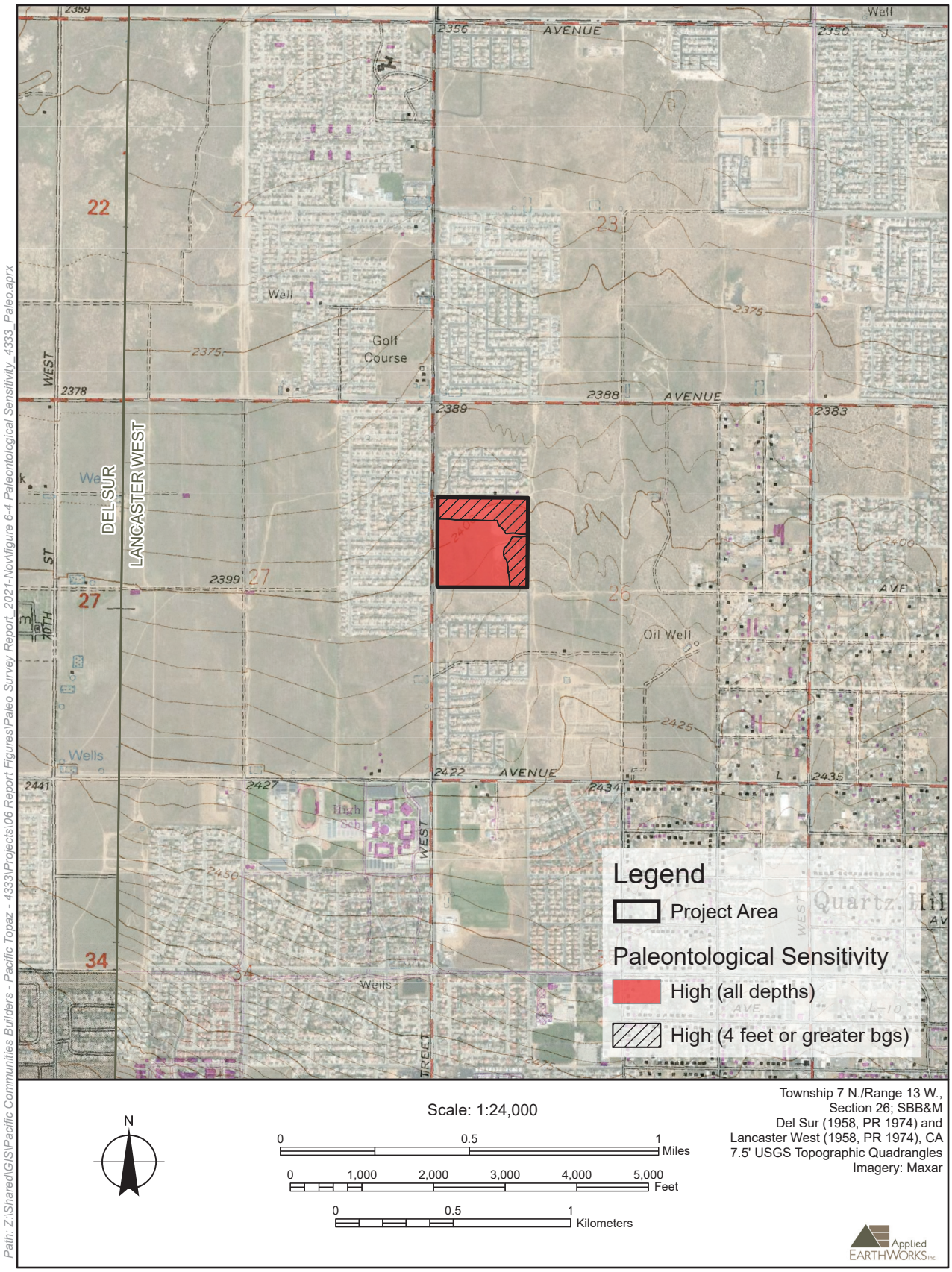

Figure 6-4 Paleontological sensitivity of the Project area.

Artificial fill—which itself does not preserve intact and significant fossils—is present in the northwest, northeast, and southeast quadrants of the Project area. However, it is immediately underlain by alluvium. Therefore, Æ regards portions of the Project area beneath exposed fill to also have High Potential. Some of these locations with intact sediments under the fill begin as shallow as 3.7 feet bgs while others start as deep as 8 feet bgs.

7
RECOMMENDATIONS

Æ concludes that Project-related construction activities may impact significant paleontological resources across the entire Project area. Æ's desktop studies and field survey together indicate the entire Project area has High Potential for paleontological resources; specifically, at all depths in locations where alluvium is exposed and at a depth of 4 feet or greater bgs in locations where artificial fill is present on the surface.

Prior to the issuance of grading permits and consistent with Policy 12.1.1 (City of Lancaster, 2009a:4-26), Æ recommends a paleontological resource mitigation program (PRIMP) be prepared by a qualified professional paleontologist (Paleontological Principal Investigator, Project Paleontologist) as defined by mitigation paleontology industry standards (Murphey et al., 2019) and/or the SVP (2010). The PRIMP will specify the steps to be taken to mitigate impacts to paleontological resources. For instance, Worker's Environmental Awareness Program (WEAP) training should be prepared prior to the start of Project-related ground disturbance and presented in-person to all field personnel to describe the types of fossils that may be found and the procedures to follow if any are encountered.

A PRIMP also will indicate where construction monitoring will be required for the Project and the frequency of required monitoring (i.e., full-time, spot-checks, etc.). Based on the findings thus far, Æ recommends the following:

- Initial period of full-time construction monitoring at all depths where alluvium is exposed in the Project area and at depths greater than or equal to 4 feet bgs where artificial fill is present in the Project area.

- Full-time monitoring may be reduced to spot-check monitoring at the discretion of the Project Paleontologist if no intact and significant paleontological resources are encountered during the initial period of construction monitoring.

In addition to construction monitoring procedures, a PRIMP also will provide details about fossil collection, analysis, and preparation for permanent curation at an approved repository, such as the NHMLAC. Lastly, the PRIMP describes the different reporting standards to be used, such as monitoring with negative findings versus monitoring resulting in fossil discoveries.

8
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APPENDIX A

Qualifications of Key Personnel

Applied EARTHWORKS Inc.

AMY L. OLLENDORF

Managing Principal/Paleontology Program Manager

Areas of Expertise

- Paleontology, mineralogy, and sedimentary geology
- CEQA/NEPA compliance
- Project management

Years of Experience

- 37

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, expired)
- Certified Paleontologist and Archaeologist, Orange County (2020-present)
- Paleontology and Cultural Consultant, Riverside County (2018-present)

Permits/Licenses

BLM - California Statewide Paleontological Resources Use Permit *CA-18-05P*, Principal Investigator.

BLM - Nevada Statewide Paleontological Resources use Permit *N-090758*, Principal Investigator, Field Director.

Summary of Qualifications

Dr. Ollendorf has more than 37 years of experience in cultural heritage, geoarchaeology, paleoecology, paleontology, and environmental compliance at the global, national, tribal, state, and local levels. She meets industry standards for principal investigator in paleontology and she is also Æ's principal investigator on Æ's California and Nevada statewide Paleontological Resource Use Permits for paleontology from the US Bureau of Land Management (BLM).

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

Recurrent Energy Crimson Solar Project, Riverside County, California. Paleontology Program Manager (2020-present). Oversaw completion and provided QA/QC of Paleontological Resource Mitigation and Monitoring Plan (PRMMP) and Worker Environmental Awareness Program (WEAP) training materials for a 350 MW solar farm on 2,800+ acres for federal (BLM) and state (California Department of Fish & Wildlife [CDFW]) compliance. Paleontologically sensitive geologic units: Alluvial deposits of the Mule Mountains and Pleistocene to Holocene alluvium. Worked closely with paleontology staff (Melissa Macias and Chris Shi) and agency representatives. Client: Recurrent Energy, LLC.

Professional Experience

- 2018–present, Managing Principal/Paleontology Program Manager, Applied EarthWorks, Inc.
- 2015–2018 and 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
- 1993–1994, Staff Archaeologist, Institute for Minnesota Archaeology
- 1991–1993, Independent Contractor—Paleoecology
- 1990, Co-Director, Geoarchaeological Field School, Southern Illinois University, Edwardsville
- 1987–1990, Graduate Research Assistant, Limnological Research Center, University of Minnesota
- 1984–1987, Graduate Research Assistant, Archaeometry Laboratory, University of Minnesota
- 1983–1984, Research Assistant, Crustal Dynamics Project, Geology & Geophysics Branch, NASA Goddard Space Flight Center
- 1987, 1984, Assistant Geoarchaeologist, Tel Miqne 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)

Fairmead Landfill Expansion, City of Chowchilla, Madera County, California. Paleontology Program Manager (2019-present). Oversaw pre-construction WEAP training and construction monitoring over the 121-acre Project area immediately adjacent to the paleontologically diverse Fairmead Locality (Pleistocene, Irvingtonian). Continuing to oversee additional phases of preconstruction WEAP training and construction monitoring; recovered fossil inventory, condition assessment, treatment, and transfer for permanent curation at University of California Museum of Paleontology (UCMP); quarterly and annual reports; and post-construction monitoring reports. Completed QA/QC of quarterly paleontological findings reports and annual reports for 2019 and 2020; will complete QA/QC quarterly and annual reports through 2022. Paleontologically sensitive geologic units: Modesto, Riverbank, and Turlock Lake Formations. Completing for CEQA compliance (County). Working closely with paleontology staff (Chris Shi and Michael George). Client: County of Madera.

California High-Speed Rail Construction Package 1, Madera and Fresno Counties, California. Paleontology Program Manager and Project Manager (2018-present). *Æ* is providing multi-year paleontological monitoring during construction of the 32-mile segment from Avenue 19 in Madera County to East American Avenue in Fresno County. The segment includes 12 grade separations, two viaducts, one tunnel, and a major crossing over the San Joaquin River. Overseeing daily construction monitoring and reporting; onsite and offsite screening of sediments and rock matrix; and offsite fossil analyses. Will complete treatment and preparation of significant fossils for permanent curation at UCMP. Paleontologically sensitive geologic units: undifferentiated Modesto and post-Modesto Holocene-age sediment; Modesto, Riverbank, Turlock Lake, Tulare, Laguna, and Mehrten Formations; North Merced Gravel; and Pleistocene non-marine sediment. Completing for CEQA compliance (California High-Speed Rail Authority) and NEPA compliance (Federal Railroad Administration). Working closely with paleontology staff (Melissa Macias, Erik Pino, and Michael George). Client: Parsons.

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. Advisors: Herbert E. Wright, Jr.

M.S. Thesis.
A Study of Phytoliths from Philistine Levels at Tel Miqne (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)

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. Paleontologically sensitive geologic units: Pleistocene alluvium and Middle to Late Pleistocene lacustrine deposits associated with Pluvial Harper Lake. Reports to date include individual cultural and paleontological RTC reports of field findings as a result of preconstruction surveys and monitoring, and 2018 and 2019 Annual Reports co-authored with Chris Shi. Completing for CEQA compliance (State of California's Lahontan Regional Water Quality Control Board) and NEPA compliance (U.S. Fish & Wildlife Service). Client: Arcadis for PG&E.

Owens Valley Mitigation Project, Owens Valley, Inyo County, California. Paleontology Program Manager (2021-present). Will provide QA/QC of paleobotanical analyses of 27 collected fossil specimens. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium and lacustrine deposits. Completing for CEQA compliance (City). Client: Formation Environmental, LLC for Los Angeles Department of Water and Power.

Pacific Topaz TTM 53642 Project, City of Lancaster, Los Angeles County, California. Paleontology Program Manager (2021-present). Overseeing completion and providing QA/QC of Paleontological Resource Assessment (PRA) for residential development on 37 acres. Completing for CEQA compliance (City). Worked closely with paleontology staff (Chris Shi). Client: Pacific Communities Builder.

Selected Project Experience (continued)

Pacific Promenade TTM 64843 Project, City of Lancaster, Los Angeles County, California. Paleontology Program Manager (2021-present). Overseeing completion and providing QA/QC of Paleontological Resource Assessment (PRA) for residential development on 114 acres. Completing for CEQA compliance (City). Worked closely with paleontology staff (Chris Shi). Client: Pacific Communities Builder.

McKay Point Reservoir Project, Tulare County, California. Paleontology Program Manager (2020-2021). Oversaw completion and provided QA/QC of Paleontological Resource Assessment (PRA) for construction of a water storage/regulation facility on 194 acres along the Kaweah River, approximately 3 miles downstream of the terminus Dam on Lake Kaweah. Completed for CEQA compliance (Tulare Irrigation District). Paleontologically sensitive geologic units: Modesto and Riverbank Formations. Worked closely with paleontology staff (Melissa Macias). Client: Sespe Consulting, Inc.

Creekside Tentative Tract Map 20274, City of Victorville, San Bernardino County, California. Paleontology Program Manager (2020-2021). Oversaw completion of WEAP training, construction monitoring, and report for paleontological resources for CEQA compliance (City). Paleontologically sensitive geologic units: Crowder Formation, Pleistocene alluvium. Worked closely with paleontology staff (Chris Shi). Client: KB Home.

Phase 1 and 2 Developments near the City of Lake Elsinore, Riverside County, California. Paleontology Program Manager (2020-2021). Oversaw preparation and completed QA/QC of PRA for development on 14.21 acres of vacant land. Included museum records searches and field survey. Completed for CEQA compliance (County). No paleontologically sensitive geologic units – Triassic Period metamorphic rocks of the Menifee Valley and Cretaceous Period tonalite. Worked closely with paleontology staff (Chris Shi and Melissa Macias). Client: Pacific Hydrotech Corporation.

Phase 1 of Tract 2586 Development, Santa Margarita Ranch, San Luis Obispo County, California. Paleontology Program Manager (2019-2021). Oversaw preparation and completed QA/QC of paleontological resource impact mitigation program (PRIMP) for 1,500-acre residential and agricultural development. Paleontologically sensitive geologic units: Monterey, Santa Margarita, and Paso Robles Formations and older Quaternary alluvium; also younger Quaternary alluvium with Undetermined potential at depth. Completed for CEQA compliance (County). Worked closely with paleontology staff (Chris Shi). Client: Vineyard Oaks (2020-2021); Kirk Consulting (2019-2020).

First Street Village Development, Burbank, Los Angeles County, California. Paleontology Program Manager (2019-2021). Oversaw pre-construction WEAP training, construction monitoring, and negative findings construction monitoring report for Phase 1 development for CEQA compliance (City). Paleontologically sensitive geologic units: Quaternary alluvium. Working closely with paleontology staff (Chris Shi). Client: First Street Village LLC.

Highpark Development Project (formerly Ponte Vista) in San Pedro, City of Los Angeles, Los Angeles County, California. Paleontology Program Manager and Project Manager (2018-2021). Æ provided multi-year paleontological monitoring during construction of 676 homes on 61.5 acres. Paleontologically sensitive geologic units: San Pedro Formation and Palos Verde Sand. By winter 2018, Æ 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. Æ has processed and delivered the fossil specimens for permanent curation at the Natural History Museum of Los Angeles County, obtained fully executed Deed of Gift Forms from the land developer, and prepared a final paleontological monitoring report for compliance with the CEQA (City). Oversaw final fossil preparation and provided QA/QC of monitoring report. Worked closely with paleontology staff (Chris Shi). Client: Harridge Development Group (formerly iStar Financial).

Selected Project Experience (continued)

Southern California Logistics Airport Lot 43 Warehouse Project, City of Victorville, San Bernardino County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of PRMMP for development of new warehouse and associated infrastructure on 35.7 acres. Completed for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene-age or older alluvial deposits possible at depth. Worked closely with paleontology staff (Chris Shi). Client: Michael Baker International.

Southern California Logistics Airport Lot 44 Distribution Center Project, City of Victorville, San Bernardino County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of PRMMP for development of new warehouse and associated infrastructure on 108.8 acres. Included field survey. Completed for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene-age or older alluvial deposits possible at depth. Worked closely with paleontology staff (Chris Shi). Client: ECM Management for Stirling Capital Investments/Lot 44, LLC.

New Warehouse on the Southwest Corner of Rider Street and Redlands Avenue, City of Perris, Riverside County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of paleontological technical memorandum for new construction on 6.3 acres of vacant land. Completed for CEQA compliance with the CEQA (City). Paleontologically sensitive geologic units: early-to-middle Pleistocene-age very old alluvial-fan deposits. Worked closely with paleontology staff (Chris Shi). Client: Albert A. Webb Associates, Inc.

Tentative Tract Map 30943 Project, City of San Jacinto, Riverside County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of paleontological technical memorandum for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: JD Pierce Company, Inc.

Sycamore Hills Distribution Center, City of Riverside, Riverside County, California. Paleontology Program Manager (2018-2021). Oversaw completion and provided QA/QC of ground-reconnaissance field survey and PRA for CEQA compliance with the CEQA (City). Paleontologically sensitive geologic units: none. Worked closely with paleontology staff (Chris Shi). Client: Ruth Villalobos & Associates, Inc.

Cherry Valley Boulevard/Interstate 10 Interchange Improvement Project, City of Calimesa, Riverside County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of paleontological constraints analysis for improvements to west- and east-bound on/off ramps. Project area totaled 2.6 acres. Paleontologically sensitive geologic units: Pleistocene alluvial-fan deposits. Worked closely with paleontology staff (Chris Shi). Client: Albert A. Webb Associates, Inc.

Battery Storage System at California Flats 280MW Solar Project, Monterey County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of WEAP training and construction monitoring for paleontological resources within the 3-acre battery storage system subarea of the 2,900-acre Project area. Paleontologically sensitive geologic units: Pliocene marine deposits, Paso Robles Formation, and Pleistocene to Holocene alluvium. Completed for CEQA compliance (County). Worked closely with paleontology staff (Chris Shi). Client: First Solar.

IDI South Perris 215 Improvement Project, City of Perris, Riverside County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of paleontological technical memorandum for improvements to the Interstate-215/State Route 74 (I-215/SR-74) interchange southbound ramps. Maximum depth of disturbance will be 15 feet below the ground surface. Paleontologically sensitive geologic units: middle to late Pleistocene old alluvial-fan deposits. Æ recommended a PRIMP for compliance with the County's open space policy and WEAP training in accordance with industry-wide best practices. Completed for compliance with the CEQA (City). Worked closely with paleontology staff (Melissa Macias). Client: Albert A. Webb Associates, Inc.

Selected Project Experience (continued)

Mud Slough Restoration Project, Merced County, California. Paleontology Program Manager (2021). Oversaw completion and provided QA/QC of paleontological technical memorandum for restoration of the connection between Newman Lake and Mud Slough through alterations to and removal of bypass and levee structures. Project area was 4.6 acres subdivided into four subareas with 5 feet below ground surface the maximum depth of disturbance. Paleontologically sensitive geologic units: none (only Low sensitivity Dos Palos Alluvium present to unknown depth). Completed for compliance with the Clean Water Act (USACE) and CEQA (San Luis & Delta-Mendota Water Authority). Worked closely with paleontology staff (Chris Shi). Client: Summers Engineering.

Crossroads North-TPM 36545 Project near the Community of Winchester, Riverside County, California. Paleontology Program Manager (2020-2021). Oversaw preparation and completed QA/QC of PRIMP and negative findings construction monitoring report for paleontological resources for drainage facilities improvements within the 50-acre Project area. Paleontologically sensitive geologic units: Quaternary older alluvium. Completed for CEQA compliance (County). Worked closely with paleontology staff (Melissa Macias). Client: Albert A. Webb Associates, Inc.

Intersection Improvements at Avenue 50 and Jackson Street, City of Indio, Riverside County, California. Paleontology Program Manager (2019-2020). Oversaw completion of ground-surface reconnaissance field survey and provided QA/QC of paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Lake Cahuilla beds. Worked closely with paleontology staff (Chris Shi). Completed for CEQA compliance (County). Client: Albert A. Webb Associates, Inc.

Bellota-Warnerville 230 kV Reconductoring Project, San Joaquin and Stanislaus Counties, California. Paleontology Program Manager (2019-2020). Completed paleontology sections of draft Proponent's Environmental Assessment (PEA); also oversaw preparation and completed QA/QC of field survey and Paleontological Field Survey Report (PFSR) for CEQA compliance (California Public Utilities Commission [CPUC]) for the 23-mile-long project. Paleontologically sensitive geologic units: Modesto, Riverbank, Turlock Lake, Mehrten Formations and possibly also the Laguna Formation. Worked closely with paleontology staff (Chris Shi). Client: Stantec.

Replacement of Two Timber Railroad Avenue Bridges near the Community of Whitewater, Riverside County, California. Paleontology Program Manager and Project Manager (2019-2020). Oversaw preparation and completed QA/QC of paleontological technical memorandum for replacement of the Railroad Avenue Bridge over Fornat Wash (Bridge Number 56C0099) and the Railroad Avenue Bridge over East Channel Stubbe Wash (Bridge Number 56C0101) within a 4.5-acre Project area. Paleontologically sensitive geologic units: Older Alluvial Deposits, Palm Spring Formation, and Imperial Formation. Completed for NEPA (Caltrans, District 8) and CEQA (County) compliance. Worked closely with paleontology staff (Chris Shi). Client: WSP.

Port San Luis Harbor Terrace Project, San Luis Obispo County, California. Paleontology Program Manager (2019-2020). Oversaw preparation and completed QA/QC of WEAP training brochure for CEQA compliance (County). Paleontologically sensitive geologic units: Atascadero and Pismo Formations. Worked closely with paleontology staff (Chris Shi). Client: RTA Harbor Terrace, LLC.

Menifee Town Center – Parcels 13, 14, and 15 Development Project, Riverside County, California. Paleontology Program Manager (2018-2020). Oversaw preparation and completed QA/QC of negative findings construction monitoring report for cultural and paleontological resources as well as PRIMP covering 13-acre project area. Paleontologically sensitive geologic units: Middle to Late Pleistocene alluvial fan deposits. Worked closely with paleontology staff (Scott Rohlf, Chris Shi, and Aimee Montenegro). Completed for CEQA compliance (City). Client: Kristoff Commercial Real Estate.

Selected Project Experience (continued)

Love's Travel Center at Avenue 17 and Highway 99 Interchange, Madera County, California. Paleontology Program Manager (2018-2020). Co-authored and completed QA/QC of PRIMP, oversaw preparation and completed QA/QC of WEAP training and construction monitoring for paleontological resources. Completed paleontological monitoring report for CEQA compliance (County). Paleontologically sensitive geologic units: Turlock Lake, Riverbank, and Modesto Formations. Worked closely with paleontology staff (Chris Shi). Client: Love's Travel Stops and Country Stores.

Pacific Opal Active Adult Community Project, City of Lancaster, Los Angeles County, California. Paleontology Program Manager (2020). Oversaw completion and provided QA/QC of a Paleontological PRA for the 82.12-acre Project on vacant land for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium, possibly also lacustrine deposits at depth. Worked closely with paleontology staff (Melissa Macias). Client: Pacific Communities Builder, Inc.

Coachella Valley Association of Governments (CVAG) Art and Music Multi-Purpose Trail Project, Riverside County, California. Paleontology Program Manager (2020). Oversaw completion of museum records search for CEQA compliance (CVAG). Paleontologically sensitive geologic units: Pleistocene alluvium, Lake Cahuilla beds. Worked closely with paleontology staff (Chris Shi). Client: Albert A. Webb Associates.

Indio Behavioral Health Hospital Project, City of Indio, Riverside County, California. Paleontology Program Manager (2020). Oversaw WEAP training for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene alluvium. Worked closely with paleontology staff (Chris Shi). Client: ALPA Construction.

Interstate 15/State Route 74 (I-15/SR 74) Interchange Improvement Project, City of Lake Elsinore, Riverside County, California. Paleontology Program Manager (2020). Oversaw preparation and completed QA/QC of paleontological identification report (PIR) along approximately 2 miles of I-15 and 0.5-mile along SR 74 for NEPA and CEQA compliance (Caltrans, District 8). Paleontologically sensitive geologic units: Pleistocene alluvium and Paleocene-age Silverado Formation. Worked closely with paleontology staff (Chris Shi and Melissa Macias). Client: HDR.

Double Trouble Telecommunication Site near City of Indio, Riverside County, California. Paleontology Program Manager (2020). Oversaw preparation and completed QA/QC of Potential Fossil Yield Classification (PFYC) Assessment for development of 0.35-acre lease area and access road. Completed for NEPA compliance (BLM). Paleontologically sensitive geologic units: Late Pleistocene to Holocene (younger) alluvial fan deposits, Late to Middle Pleistocene (older) alluvial fan deposits, and Pliocene- to Pleistocene-age Ocotillo and Palm Spring Formations. Worked closely with paleontology staff (Chris Shi). Client: InterConnect Towers, LLC.

Interstate 10/Cherry Valley Boulevard Interchange Project, City of Calimesa, Riverside County, California. Paleontology Program Manager (2020). Oversaw preparation and provided QA/QC of paleontological identification report-paleontological evaluation report (PIR-PER) along approximately 1.7 miles of I-10 and 0.30-mile along Cherry Valley Boulevard for NEPA and CEQA compliance (Caltrans, District 8). Paleontologically sensitive geologic units: Middle to Early Pleistocene alluvial-fan deposits, Late to Middle Pleistocene alluvial-fan deposits, Pleistocene-age Live Oak Canyon fluvial braidplain deposits, including paleosols, Pliocene- to Pleistocene-age San Timoteo Formation. Worked closely with paleontology staff (Chris Shi and Melissa Macias). Client: Michael Baker International.

Universal Pipeline Construction Storage Yard Project (PPT180027) near City of Perris, Riverside County, California. Paleontology Program Manager (2020). Oversaw preparation and completed QA/QC of the PRA, including field survey, for development of 3-acre storage yard for construction. Completed for CEQA compliance (County). Paleontologically sensitive geologic units: Pleistocene-age alluvial deposits. Worked closely with paleontology staff (Chris Shi and Melissa Macias). Client: Universal Pipeline, Inc.

Selected Project Experience (continued)

Sites 3 and 4 of the Bloomington Business Park Project, Community of Bloomington, San Bernardino County, California. Paleontology Program Manager (2020). Oversaw preparation and completed QA/QC of paleontological technical memorandum for the development of 74.6 acres within the Bloomington Business Park Specific Plan area. Completed for CEQA compliance (County). Paleontologically sensitive geologic units: Pleistocene-age alluvial deposits. Worked closely with paleontology staff (Melissa Macias and Chris Shi). Client: Howard Industrial Partners.

Rosewood Village Residential Project, City of Commerce, Los Angeles County, California. Paleontology Program Manager (2020). Oversaw preparation and completed QA/QC of paleontological technical memorandum for the development of multiple housing complexes on 5.74 acres. Paleontologically sensitive geologic units: Pleistocene-age alluvial deposits, Pliocene-age Fernando Formation, and Miocene-age Monterey Formation. Completed for CEQA compliance (City). Worked closely with paleontology staff (Win McLaughlin and Chris Shi). Client: City Ventures.

Menifee Town Center Plot Plan No. 2018-023, Menifee Plaza Development, Precise Grading Plan GP19-060 Project, City of Menifee, Riverside County, California. Paleontology Program Manager (2020). Oversaw completion of ground-surface reconnaissance field survey and provided QA/QC of the PRIMP and joint paleontological and cultural negative findings construction monitoring report covering commercial development of 1.95 acres. Completed for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene valley deposits and very old alluvial fan deposits. Worked closely with paleontology staff (Chris Shi). Client: Golden Star Investment Properties, LLC.

VENTANA Tentative Tract Map No. 37884 Project, City of Indio, Riverside County, California. Paleontology Program Manager (2020). Oversaw completion of ground-surface reconnaissance field survey and provided QA/QC of PRA for CEQA compliance. Paleontologically sensitive geologic units: Lake Cahuilla beds; Pliocene- to Pleistocene-age alluvial deposits, including Bautista Beds. Client: Ave. 50 Indio, LLC.

California Flats 280MW Solar Project, Monterey County, California. Paleontology Program Manager (2018-2019). Oversaw paleontological resource monitoring for construction within the 2,900-acre Project area. Paleontologically sensitive geologic units: Pliocene marine deposits, Paso Robles Formation, and Pleistocene to Holocene alluvium. Completed for CEQA compliance (County). Worked closely with paleontology staff (Chris Shi). Client: First Solar.

Athos Renewable Energy Project, Riverside County, California. Paleontology Program Manager (2018-2019). Supervised completion of paleontological desktop and field investigations and completed QA/QC of all deliverables -- PIR to the County, and Fieldwork Authorization Request and PRA and PRIMP to the BLM (utilized BLM's PFYC system for the PRA) – for the 500 MW solar generation and storage Project covering 3,662-acres, including a 11.1-mile-long by 200-foot-wide generation-tie transmission line corridor and access roads. Paleontologically sensitive geologic units: Early Pleistocene nonmarine sediments, including Ocotillo Conglomerate, older Pleistocene Pinto Formation and paleosols. Worked closely with paleontology staff (Scott Rohlf, Chris Shi, and Christopher Shea). Completed for NEPA (BLM) and CEQA (County) compliance. Client: Aspen Environmental Group for IP Athos, LLC.

Duke Perry Street & Barrett Avenue Project in the City of Perris, Riverside County, California. Paleontology Program Manager (2018-2019). Oversaw preparation and completed 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 (Chris Shi). Completed for CEQA compliance. Lead agency: City of Perris. Albert A. Webb Associates, Inc. for Duke Realty.

Selected Project Experience (continued)

Western San Bernardino County Distribution System Infrastructure Protection Program (DSIPP), San Bernardino County, California. Paleontology Program Manager (2019). Oversaw completion of PRA for O&M activities throughout the Programmatic Footprint (74 miles of pipeline, 392 pipeline structures, and approximately 50 miles of patrol roads through 10 cities) as well as within work areas for 13 individual Capital Investment Plan (CIP) projects. Paleontologically sensitive geologic units: Late Miocene to Early Pliocene Puente Formation, Early Holocene or older axial-channel deposits and alluvial fan deposits; Undetermined sensitivity: Miocene-age unnamed fault-bounded conglomerate and sandstone unit. Completed for CEQA compliance (Metropolitan Water District of Southern California). Worked closely with paleontology staff (Chris Shi). Client: Dudek.

Bending the River Back into the City: LA Water Wheel Project, City of Los Angeles, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw, edited, and provided QA/QC of paleontological technical report for a new Initial Study/Environmental Assessment (IS/EA). Report included methods and results of desktop research, museum records search, literature review, and site visit. Paleontologically sensitive geologic units: Pleistocene alluvium and Monterey Formation. Worked closely with paleontology staff (Christopher Shi). Lead agency: City of Los Angeles (CEQA). Client: Ruth Villalobos & Associates, Inc. Complete, February 2019.

Fresno Meat-Rendering Plant, City of Fresno, Fresno County, California. Paleontology Program Manager (2019). Oversaw completion and provided QA/QC of preconstruction paleontological survey of 10 acres and letter report. Paleontologically sensitive geologic units: Pleistocene nonmarine and Quaternary non-marine alluvial fan deposits. Completed for CEQA compliance (City). Worked closely with paleontology staff (Chris Shi). Client: Darling Ingredients, Inc.

Santa Ana River Trail – Phase 6 Through Green River Golf Course, Orange-San Bernardino County Line to City of Corona, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of combined PIR-PER for two possible Santa Ana River Trail (SART) alignments, a short segment linking SART – Phase 5 to SART – Phase 3, and a small staging area. Project included field surveys for paleontological resources. Completed for CEQA compliance (Riverside County Transportation Commission). Worked closely with paleontology staff (Chris Shi). Client: Michael Baker International.

Wastewater Collection and Treatment Improvements, Community of Franklin-Beachwood, Merced County, California. Paleontology Program Manager (2019). Overs**aw** preparation and complet**ed** QA/QC of paleontological resource identification letter report for the approximately 67-acre project area for CEQA compliance (Franklin County Water District). Paleontologically sensitive geologic units: Riverbank and Modesto Formations. Work**ed** closely with paleontology staff (Chris Shi). Client: Quad Knopf, Inc.

Port of Long Beach Master Plan Update, City of Long Beach, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw preparation and provided QA/QC of paleontological resource sections of the Program Environmental Impact Report (PEIR) for the Port Master Plan Update (PMPU) for CEQA compliance (Port of Long Beach). Paleontologically sensitive geologic units: Pleistocene-age sedimentary deposits of the continental shelf and possibly also Late Pleistocene- to Holocene-age young alluvium. Worked closely with paleontology staff (Chris Shi). Client: Leidos.

CEMEX Rockfield Modification Project, City of Fresno, Fresno County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for expansion of current aggregate mining and processing operations at quarry and plant sites within a 490.5-acre Project area. Paleontologically sensitive geologic units: Modesto, Riverbank, Turlock Lake, and Tulare Formations. Completed for NEPA (U.S. Army Corps of Engineers) and CEQA compliance (California Public Utilities Commission). Worked closely with paleontology staff (Chris Shi). Client: Buada Associates, Inc.

Selected Project Experience (continued)

City of Fresno Cannabis Ordinance Environmental Impact Report, Fresno County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum to assist with evaluation of the proposed regulation and permitting of commercial cannabis activities with a focus on land-use areas within the City capable of supporting cultivation, distribution, manufacturing, testing, and retail facilities with an 800-foot buffer from other cannabis retailers, schools, daycare centers, and other youth facilities. Paleontologically sensitive geologic units: Modesto, Riverbank, Tulare, and Turlock Lake Formations. Completed for CEQA compliance (City). Worked closely with paleontology staff (Scott Rohlf). Client: Quad Knopf, Inc.

Interstate 10 Eastbound Truck Climbing Lane Improvement Project, City of Yucaipa, San Bernardino County and City of Calimesa, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for improvements to a total of 3 miles of existing 6-lane eastbound I-10 by adding a truck-climbing lane (TCL) from the 16th Street Overcrossing Bridge to 0.2 mile east of the County Line Road Undercrossing Bridge by paving the existing median. Paleontologically sensitive geologic units: San Timoteo Formation and Pleistocene-age alluvial deposits, and possibly also pre-Pliocene Mill Creek Formation/Potato Sandstone. Completed for NEPA and CEQA compliance (Caltrans and San Bernardino County Transportation Authority). Worked closely with paleontology staff (Chris Shi). Client: HDR.

Sun Lakes Boulevard Realignment, City of Banning, Riverside County, California. Paleontology Program Manager (2019). Edited and approved Constraints Analysis for paleontological resources within the approximately 14-acre project area. Paleontologically sensitive geologic units: Mt. Eden and San Timoteo Formations, and Quaternary alluvial deposits. Worked closely with paleontology staff (Win McLaughlin, Chris Shi). Client: Albert A. Webb Associates, Inc.

Banning Electric Utility – Ivy 20 MVA Distribution Substation Project, City of Banning, Riverside County, California. Paleontology Program Manager (2019). Oversaw completion and provided QA/QC of paleontological resource constraints memorandum for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene alluvium. Worked closely with paleontology staff (Win McLaughlin and Chris Shi). Client: Albert A. Webb Associates, Inc.

Biola University North Dorm Project: Tennis Courts and Wastewater Treatment Area Expansion, City of La Mirada, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw preparation and providing QA/QC of paleontological resource monitoring for construction for CEQA compliance (City). Paleontologically sensitive geologic units: older Quaternary alluvium. Worked closely with paleontology staff (Chris Shi, Aimee Montenegro). Client: Biola University.

Rowland Heights Hotel and Plaza Project, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of PRIMP for CEQA compliance (County). Paleontologically sensitive geologic units: Pleistocene alluvium, Puente/Monterey Formation. Worked closely with paleontology staff (Chris Shi). Client: Envicom.

Rados Heacock Environmental Project, City of Moreno Valley, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for construction of two new industrial buildings on 37.12 acres of vacant land. Paleontologically sensitive Pleistocene-age alluvial deposits are located in the Project area. Completed for CEQA compliance (County). Worked closely with paleontology staff (Scott Rohlf). Client: Albert A. Webb Associates, Inc.

Southern California Logistics Center Project, Victorville, San Bernardino County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of PRA and review of the paleontological resource section of the PEIR for the Victorville Airport for CEQA compliance (City). Paleontologically sensitive geologic units: Pleistocene-age or older alluvial deposits possible at depth. Worked closely with paleontology staff (Chris Shi). Client: Michael Baker.

Selected Project Experience (continued)

5401 Telegraph Road Parking Structure, City of Commerce, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of WEAP training, and paleontological resource monitoring, and oversaw reporting for CEQA compliance. Paleontologically sensitive geologic units: older Quaternary alluvial deposits, but no paleontological resources were observed during construction monitoring. Worked closely with paleontology staff (Chris Shi, Jorge Mendieta). Client: Parkco Building Company.

Development of the Jacqueline Cochran Regional Airport, Thermal, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for CEQA (County) and federal (FAA) compliance. Paleontologically sensitive geologic units: Lake Cahuilla beds. Worked closely with paleontology staff (Chris Shi). Client: Mead & Hunt for Riverside County Economic Development Agency Aviation Division.

Assessor's Parcel 360-130-003, City of Menifee, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of updates for PRA following design changes for CEQA (City). Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Worked closely with paleontology staff (Chris Shi). Client: Albert A. Webb Associates for JPN Corporation.

Cannabis Cultivation Warehouse on Assessor's Parcel 314-160-004, City of Perris, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for development of 0.93 acres of vacant land. Recommended the creation of a PRIMP since the older Quaternary alluvial deposits in the project area are 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 (Chris Shi). Completed for CEQA compliance. Client: Richard Park.

Rose II Residential Development Project, Romoland, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of PRIMP for CEQA compliance (County). Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Worked closely with paleontology staff (Chris Shi). Client: Pacific Communities Builder, Inc.

Temescal Valley Riverside Clinic Investors IV, LLC Project, South of the City of Corona, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of paleontological monitoring report for CEQA compliance (County). Paleontologically sensitive geologic units: Vaqueros and Sespe Formations. Worked closely with paleontology staff (Chris Shi). Client: Riverside Medical Clinic Investors IV, LLC.

Beach Club Development, Thermal, Riverside County, California. Paleontology Program Manager (2018). Co-authored and completed QA/QC of paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene lacustrine deposits. Worked closely with paleontology staff (Chris Shi). Client: Albert A. Webb Associates for County of Riverside.

Ten West Link 500 kV Transmission Line Project near Blythe, Riverside County, California to Tonopah, Maricopa County, Arizona. Managing Principal/Paleontology Program Manager/Project Manager (2018). Oversaw, edited, 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, Scott Rohlf, and Christopher Shea). Completed for compliance with NEPA, PRPA, and CEQA. Lead agencies: BLM Palm Springs-South Coast Field Office and California Public Utilities Commission (CPUC). Client: DCR Transmission LLC.

Selected Project Experience (continued)

Central Coast Oil and Gas Leasing and Development in Alameda, Contra Costa, Fresno, Merced, Monterey, San Benito, San Joaquin, San Mateo, Santa Clara, Santa Cruz, and Stanislaus Counties, California. Principal Investigator (2018). Updated paleontology sections of Affected Environment, Environmental Consequences, and References Cited chapters for 7 alternatives covered in the *Resource Management Plan Amendment/Final Environmental Impact Statement* on public lands and split mineral estate lands administered by the BLM Central Coast Field Office. Utilized BLM's Potential Fossil Yield Classification (PFYC) system. In addition to FEIS chapters, responsible for updating Administrative Record and providing copies of primary sources cited. Completed for NEPA and CEQA compliance. Lead agencies: BLM for NEPA and California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) for CEQA. Client: Aspen Environmental Group.

Duke Development on the Northwest Corner of Alabama Street & Palmetto Avenue, City of Redlands, San Bernardino County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of paleontological resource technical memorandum on approximately 55 acres. Paleontologically sensitive geologic units: Late to Middle Pleistocene alluvial deposits (e.g., Very Old Axial-Channel deposits). Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for CEQA compliance (County). Client: Albert A. Webb Associates, Inc. for Duke Realty.

I-10 Monroe Interchange Project, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of PIR for CEQA compliance (Caltrans, District 8). Included paleontological field surveys of two design alternatives over a total of approximately 73 acres. Paleontologically sensitive geologic units: Quaternary, especially pre-Holocene, fluvial deposits and possibly also Lake Cahuilla lacustrine deposits at depth. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Client: Michael Baker.

I-215 University Parkway Interchange Improvement Project, City of San Bernardino, San Bernardino County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of updates for PIR-PER following design changes for CEQA compliance (Caltrans, District 8). Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Worked closely with paleontology staff (Scott Rohlf and Chris Shi). Client: HDR.

Madison Avenue Improvements Project, City of Murrieta, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of museum records search, online research, paleontological technical memorandum, ground-reconnaissance field survey, and PRA for CEQA compliance (City). Paleontologically sensitive geologic units: Pauba Formation and Pleistocene to Holocene alluvium. Worked closely with paleontology staff (Scott Rohlf and Chris Shi). Client: Kleinfelder.

Blythe Airport Perimeter Fence Project, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of museum records and online research for NEPA and CEQA compliance (Caltrans, District 8). Paleontologically sensitive geologic units: Pleistocene alluvium and terrace deposits. Worked closely with paleontology staff (Scott Rohlf and Chris Shi). Client: Mead & Hunt.

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 (City). Paleontologically sensitive geologic units: San Timoteo Formation and Quaternary older alluvium, but no paleontological resources were observed during construction monitoring. 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.

Selected Project Experience (continued)

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 WEAP compliance. Also oversaw coordination and completion of spot-check monitoring. Completed senior review and QA/QC for paleontology mitigation monitoring letter report. Paleontologically sensitive geologic units: older Quaternary deposits, but no paleontological resources were observed during construction monitoring. Worked closely with paleontology staff (Christopher Shea). All completed for CEQA compliance (Eastern Municipal Water District). Client: HELIX.

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 (City). Paleontologically sensitive geologic units: Middle to Late Pleistocene alluvial deposits, Late Miocene- to Early Pliocene-age Puente Formation, and Early Pliocene- to Early Pleistocene-age Fernando Formation. Worked closely with paleontology staff (Scott Rohlf). Client: GPA Consulting.

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.

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 (USFS, Superior National Forest). Client: PolyMet Mining.

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).

Selected Project Experience (continued)

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., 2021, Review of Thomas Wiewandt, *Fossils Inside Out: A Global Fusion of Science, Art & Culture*. Solicited from and submitted to *Fossil News: The Journal of Avocational Paleontology*. Volume 24.2/24.3.

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., 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." *58th Annual Meeting of the Society for American Archaeology,* St. Louis, Missouri.

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.

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

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. and Wright, H.E. Jr., 1989, "Landscape Changes Associated with Urbanization in Temperate Europe." *1st Joint Archaeological Congress*, Baltimore, Maryland. **Invited.**

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

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, "Phytoliths from Philistine Occupation Surfaces at Tel Miqne (Ekron), Israel." *51st Annual Meeting of the Society for American Archaeology,* New Orleans, Louisiana.

Selected Publications (continued)

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

Selected Presentations

Guest Speaker, "Career Planning in Environmental Science and Archaeology for STEM Students." Presentation to and discussion with Southern Illinois University-Edwardsville students and GEOPAths scholars, November 9, 2021. **Invited.**

Guest Speaker, "Is Cultural Resource Management Right for Me?" Presentation to and discussion with Chaffey College Anthropology Club (Virtual), October 29, 2021. **Invited.**

Macias, M.K., C. Shi, A. Montenegro, A. Ollendorf, 2021. "Accessioning a Large Fossil Collection from the Fairmead Landfill Locality, City of Chowchilla, Madera County, California." Presented at the Society of Vertebrate Paleontology 2021 Annual Meeting (Virtual), November 1-5, 2021.

Panelist and Co-Creator, 2021, "Planning for a Career in Mitigation Paleontology" webinar hosted by Applied EarthWorks, Inc. Hourlong panel discussion live on Zoom and livestreamed on YouTube. Moderator was Ashley Hall and other panelists were Dr. H. Gregory McDonald (BLM), Eric Scott (Cogstone Resource Management), ReBecca Hunt-Foster (National Park Service), and Crystal Cortez (San Bernardino County Museum).

Co-Creator and Quality Control, 2020, "National Fossil Day" video by Applied EarthWorks, Inc. Paleontology Program. Oversaw completion of original 5-minute-long video by paleontology staff (Aimee Montenegro, Chris Shi, and Melissa Macias). Posted to Facebook and LinkedIn; available for distribution.

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

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

Guest Speaker, 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.**

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

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

CHRISTOPHER SHI

Senior Paleontologist/Project Manager

Areas of Expertise

- Paleontological resource technical and project management
- CEQA/NEPA compliance

Years of Experience

- 12

Education

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

M.S., Geology, UCLA, 2011

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

Registrations/Certifications

- Certified Paleontologist, Orange County (2020-present)
- Qualified Paleontologist, Riverside County (2019-present)

Permits

- Field Director, California BLM Statewide Paleontological Resources Use Permit CA-21-06P
- Principal Investigator, Nevada BLM Statewide Paleontological Resources Use Permit N-090758

Classes/Training

- OSHA Excavation Competent Person Seminar, Mar. 11, 2019
- OSHA Hazardous Waste Operations Worker (HAZWOPER) Training, 40-Hour, January 20-23, 2020 and 8-Hour Refresher, January 21, 2021

Professional Experience

2020–	Senior Paleontologist/Project Manager, Applied EarthWorks, Inc., Pasadena, California.
2018–2020	Associate Paleontologist/Project Manager, Applied EarthWorks, Inc., Pasadena, California.
2016–2018	Paleontological Laboratory and Field Technician, Applied EarthWorks, Inc., Pasadena, California.
2017–2018	Lead Paleontology Monitor, Rincon Consultants, Los Angeles, California.

Technical Qualifications

Mr. Shi is a paleontologist and geologist with more than 12 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/project paleontologist/principal investigator. 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. 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's 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 Æ's lead monitor on a number of construction monitoring projects for utility, transportation, and residential and commercial development projects.

Project Experience

Pacific Topaz Tentative Tract Map 53642 Project, City of Lancaster, Los Angeles County, California. Project Paleontologist (2021). Completed ground-reconnaissance field survey. Will complete Paleontological Resource Assessment report (PRA) for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Pacific Communities Builder.

Fairmead Landfill Expansion, City of Chowchilla, Madera County, California. Principal Paleontologist/Project Manager (2020-present) and Project Manager (2019-2020). 121-acre fossil-rich landfill. Overseeing Worker Environmental Awareness Program (WEAP) training, paleontological resource monitoring for construction, and identification and preparation of approximately 4,500 fossil specimens. Completed quarterly paleontological findings reports and annual reports for 2019 and 2020, and will complete quarterly and annual reports for 2021 for CEQA compliance. Paleontologically sensitive geologic units: Turlock Lake, Riverbank, and Modesto Formations. Client: County of Madera.

Recurrent Energy Crimson Solar Project, Riverside County, California. Project Paleontologist/Paleontological Field Director (2020-present). 2,500-acre fossil-rich 350 MW solar farm. Completed Paleontological Resource Mitigation and Monitoring Plan (PRMMP), pre-construction paleontological collection survey, and monitoring of geotechnical borings and sediment screening for paleontological resources. Will conduct and oversee paleontological resource monitoring for construction for federal (BLM) and state (California Department of Fish & Wildlife) compliance. Paleontologically sensitive geologic units: Alluvial deposits of the Mule Mountains and Pleistocene to Holocene alluvium. Client: Recurrent Energy, LLC.

Owens Valley Mitigation Project, Inyo County, California. Project Paleontologist/Project Manager (2021-present). Will complete identification of 27 collected fossil plants and report on paleobotanical analyses. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium and lacustrine deposits. Client: Formation Environmental, LLC for Los Angeles Department of Water and Power.

Southern California Logistics Airport Lot 43 Warehouse Project, City of Victorville, San Bernardino County, California. Project Paleontologist/Project Manager (2021). Completed PRMMP and oversaw WEAP training for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Michael Baker.

Southern California Logistics Airport Lot 44 Distribution Center Project, City of Victorville, San Bernardino County, California. Project Paleontologist/Project Manager (2021). Completed PRMMP and WEAP training for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: ECM Management, LLC for Stirling Capital Investments/Lot 44, LLC.

Warehouse on the Southwest Corner of Rider Street and Redlands Avenue, City of Perris, Riverside County, California. Project Paleontologist (2021). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for City of Perris.

Phase 1 of the Tract 2586 Project in Santa Margarita, San Luis Obispo County, California. Project Paleontologist (2019-2021). 1,500-acre residential and agricultural development. Completed Paleontological Resource Impact Mitigation Program (PRIMP) for CEQA compliance. Paleontologically sensitive geologic units: Monterey, Santa Margarita, and Paso Robles Formations, and Pleistocene to Holocene alluvium. Client: Vineyard Oaks (2020-2021); Kirk Consulting (2019-2020).

Pacific Gas & Electric Groundwater Remediation, San Bernardino County, California. Project Paleontologist (2018-present). 30,000-acre groundwater remediation area. 2018: Completed and oversaw paleontological resource monitoring for installation of a groundwater extraction, paleontological findings reports for 2018 project field components, and 2018 annual report. 2019: Reviewed 2019 paleontological monitoring report for groundwater injection well pilot test and completed 2019 annual report. 2020: Completed all paleontological findings reports for 2020 project field components and 2020 annual report. 2021: Will complete or review all paleontological findings reports for 2021 project field components and 2021 annual report for CEQA

Project Experience (continued)

compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium and lacustrine deposits. Client: Arcadis for Pacific Gas & Electric Company.

First Street Village Mixed-Use Development Project, City of Burbank. Project Manager (2020-2021). Oversaw WEAP training and paleontological resource monitoring for construction. Completed monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: First Street Village, LLC for City of Burbank.

Pacific Hydrotech Project, Riverside County, California. Project Paleontologist (2020-2021). Oversaw ground-reconnaissance field survey and completed PRA for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for Pacific Hydrotech Corporation.

Creekside Tentative Tract Map 20274 Project, City of Victorville, San Bernardino County, California. Project Paleontologist/Project Manager (2020-2021). Oversaw WEAP training and paleontological resource monitoring for construction and completed monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Crowder Formation and Pleistocene to Holocene alluvium. Client: KB Home.

Highpark (Ponte Vista) Development Project in San Pedro, City of Los Angeles, Los Angeles County, California. Project Paleontologist (2018-2021) and Paleontological Laboratory Technician (2016-2017). 2016-2017: Completed fossil identification, bulk sediment sampling, and stratigraphic analysis. 2018-2019: Completed preparation of fossils for museum curation. 2020-2021: Completed paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: San Pedro Formation and Palos Verdes Sand. Client: iStar Financial (2017-2018); Harridge Development Group (2018-2020); SoCal San Pedro SPV 1, LLC (2020-2021).

Sycamore Hills Distribution Center, City of Riverside, Riverside County, California. Project Paleontologist (2018-2021). Completed ground-reconnaissance field survey and PRA for CEQA compliance. Paleontologically sensitive geologic units: none. Client: Ruth Villalobos & Associates, Inc. for US Army Corps of Engineers and City of Riverside.

Tentative Tract Map 30943 Project, City of San Jacinto, Riverside County, California. Project Paleontologist (2021). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: JD Pierce Company, Inc. for City of San Jacinto.

Cherry Valley Boulevard/Interstate 10 Interchange Improvement Project, City of Calimesa, Riverside County, California. Project Paleontologist (2021). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: San Timoteo Formation and Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for County of Riverside.

Mud Slough Restoration Project, Merced County, California. Project Paleontologist/Project Manager (2021). Completed paleontological technical memorandum and will oversee WEAP training for CEQA compliance. Paleontologically sensitive geologic units: Dos Palos Alluvium. Client: Summers Engineering for US Army Corps of Engineers and San Luis & Delta-Mendota Water Authority.

Battery Storage Site, California Flats Solar Project, Monterey County, California. Project Paleontologist (2021). Oversaw WEAP training and paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units: Pliocene marine deposits, Paso Robles Formation, and Pleistocene to Holocene alluvium. Client: First Solar.

Port San Luis Harbor Terrace Project, San Luis Obispo County, California. Project Paleontologist (2019-2020). Oversaw WEAP training for CEQA compliance. Paleontologically sensitive geologic units: Pismo and Atascadero Formations. Client: RTA Harbor Terrace, LLC for County of San Luis Obispo.

Bellota-Warnerville 230 kV Reconductoring Project, San Joaquin and Stanislaus Counties, California. Project Paleontologist (2019-2020). Reconductoring of 23-mile-long transmission line. Conducted ground-

Project Experience (continued)

reconnaissance field survey of private lands and completed paleontological field survey report (PFSR) for CEQA compliance. Paleontologically sensitive geologic units: Mehrten, Turlock Lake, Riverbank, and Modesto Formations, and Pleistocene to Holocene alluvium. Client: Stantec for California Public Utilities Commission.

Menifee Town Center – Parcels 13, 14, and 15 Development Project, City of Menifee, Riverside County, California. Project Paleontologist/Project Manager (2018-2020). Completed PRIMP, oversaw paleontological resource monitoring for construction, and completed paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Kristoff Commercial Real Estate for City of Menifee.

Love's Travel Center at Avenue 17 and Highway 99 Interchange, Madera County, California. Project Paleontologist/Project Manager (2018-2020). Co-authored and reviewed PRIMP, conducted WEAP training, and oversaw paleontological resource monitoring for construction. Completed paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Turlock Lake, Riverbank, and Modesto Formations. Client: Love's Travel Stops and Country Stores for County of Madera.

Coachella Valley Association of Governments Art and Music Multi-Purpose Trail Project, Riverside County, California. Project Paleontologist (2020). Completed museum records search for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium and Lake Cahuilla beds. Client: Albert A. Webb Associates.

Indio Behavioral Health Hospital Project, City of Indio, Riverside County, California. Project Paleontologist/Project Manager (2020). Completed WEAP training for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: ALPA Construction.

Interstate 10/Cherry Boulevard Interchange Project, City of Calimesa, Riverside County, California. Project Paleontologist (2020). Completed ground-reconnaissance field survey and combined paleontological identification report – paleontological evaluation report (PIR-PER) for NEPA and CEQA compliance. Paleontologically sensitive geologic units: San Timoteo Formation and Pleistocene to Holocene alluvium. Client: Michael Baker for Caltrans.

Interstate 15/State Route 74 Interchange Improvement Project, Riverside County, California. Project Paleontologist (2020). Co-authored PIR for NEPA and CEQA compliance. Paleontologically sensitive geologic units: Silverado Formation and Pleistocene to Holocene alluvium. Client: HDR for Caltrans.

Development of Plot Plan No. 180027 Contractor Storage Yard/Universal Pipeline Inc. Project, City of Perris, Riverside County, California. Project Paleontologist (2020). Completed ground-reconnaissance field survey and PRA for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Universal Pipeline, Inc. for County of Riverside.

Double Trouble at Interstate 10 Communication Site, Riverside County, California. Project Paleontologist (2020). Completed Potential Fossil Yield Classification (PFYC) memorandum for federal compliance. Paleontologically sensitive geologic units: Ocotillo Formation and Pleistocene to Holocene alluvium. Client: InterConnect Towers, LLC.

Sites 3 and 4 of the Bloomington Business Park Project, City of Commerce, San Bernardino County, California. Project Paleontologist (2020). Reviewed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Howard Industrial Partners for County of San Bernardino.

Rosewood Village Residential Project, City of Commerce, Los Angeles County, California. Project Paleontologist (2020). Co-authored and reviewed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Monterey Formation, Fernando Formation, and Pleistocene to Holocene alluvium. Client: City Ventures for City of Commerce.

Project Experience (continued)

Menifee Town Center Plot Plan No. 2018-023, Menifee Plaza Development, Precise Grading Plan GP19-060 Project, City of Menifee, Riverside County, California. Project Paleontologist (2020). Completed PRIMP for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Golden Star Investment Properties, LLC for City of Menifee.

VENTANA, Tentative Tract Map No 37884 Project, City of Indio, Riverside County, California. Project Paleontologist/Project Manager (2020). Completed ground-reconnaissance field survey and PRA for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium and Lake Cahuilla beds. Client: Ave 50 Indio, LLC for City of Indio.

Riverside County Transportation Department 6 Timber Bridges Replacement Project, Riverside County, California. Project Paleontologist (2020). Completed paleontological technical memoranda for NEPA and CEQA compliance. Paleontologically sensitive geologic units: Pinto Formation, Pleistocene to Holocene alluvium, and Palen Lake deposits. Client: WSP for RCTD and Caltrans.

Avenue 50 and Jackson Street Improvements Project, City of Indio, Riverside County, California. Project Paleontologist (2020). Completed ground-reconnaissance field survey and paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Lake Cahuilla beds. Client: Albert A. Webb Associates for City of Indio.

Port of Long Beach Master Plan Update, City of Long Beach, Los Angeles County, California. Project Paleontologist (2018-2019). Completed paleontological resource section of the PEIR for Port of Long Beach construction improvements and additions for CEQA compliance. Participated in conference call with the Port of Long Beach regarding paleontological mitigation measures. Paleontologically sensitive geologic units: Pleistocene alluvium and continental shelf deposits. Client: Leidos for City of Long Beach.

Cannabis Cultivation Warehouse on Assessor's Parcel 314-160-004, City of Perris, Riverside County, California. Project Paleontologist (2018-2019). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Richard Park for City of Perris.

Talavera Pipeline Replacement Project, City of Indio, Riverside County, California. Project Paleontologist (2018-2019). Completed review of technical memorandum, created informational brochure for WEAP, and completed WEAP training for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for Coachella Valley Water District.

Duke Perry Street and Barrett Avenue Project, City of Perris, Riverside County, California. Project Paleontologist (2018-2019). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for City of Perris.

California Flats Solar Project, Monterey County, California. Project Paleontologist (2018-2019). Oversaw paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units: Pliocene marine deposits, Paso Robles Formation, and Pleistocene to Holocene alluvium. Client: First Solar.

500 mW Athos Renewable Energy Project, Riverside County, California. Project Paleontologist (2018-2019). 3,600-acre solar farm. Completed various steps for CEQA and federal compliance. 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 PIR, and completed PRIMP. Federal compliance: completed ground-reconnaissance field survey of federal lands and completed PRA. Paleontologically sensitive geologic units: Pinto Formation Pleistocene to Holocene alluvium. Client: Aspen Environmental Group for IP Athos.

Project Experience (continued)

Rowland Heights Hotel and Plaza Project, Los Angeles County, California. Project Paleontologist/Project Manager (2019). Completed PRIMP for CEQA compliance. Paleontologically sensitive geologic units: Puente/Monterey Formation and Pleistocene to Holocene alluvium. Client: Envicom for County of Los Angeles.

Banning Electric Utility – Ivy Distribution Substation Project, City of Banning, Riverside County, California. Project Paleontologist (2019). Reviewed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for City of Banning.

Western San Bernardino County Distribution System Infrastructure Protection Program, San Bernardino County, California. Project Paleontologist (2019). Completed ground-reconnaissance field survey and PRA for the Programmatic Environmental Impact Report (PEIR) for CEQA compliance. Paleontologically sensitive geologic units: Puente Formation, Miocene conglomerates and sandstones, and Pleistocene to Holocene alluvium. Client: Dudek for Metropolitan Water District of Southern California.

Santa Ana River Trail – Phase 6 Project, City of Corona, Orange, San Bernardino, and Riverside Counties, California. Project Paleontologist (2019). Oversaw ground-reconnaissance field surveys and completed combined PIR-PER for CEQA compliance. Paleontologically sensitive geologic units: Topanga Group, Puente Formation, and Pleistocene to Holocene alluvium. Client: Michael Baker for Riverside County Transportation Commission and County of San Bernardino.

Sun Lakes Boulevard Realignment Project, City of Banning, Riverside County, California. Project Paleontologist (2019). Reviewed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for City of Banning.

Fresno Meat-Rendering Plant Relocation Project, City of Fresno, Fresno County, California. Project Paleontologist/Project Manager (2019). Oversaw ground-reconnaissance field survey and completed field survey report for CEQA compliance. Paleontologically sensitive geologic units: Riverbank and Modesto Formations. Client: Darling Ingredients for City of Fresno.

Franklin County Water District Wastewater Collection and Treatment Improvements Project, Franklin-Beachwood, Merced County, California. Project Paleontologist (2019). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Riverbank and Modesto Formations. Client: Quad Knopf for Franklin County Water District.

Development of the Jacqueline Cochran Regional Airport, Thermal, Riverside County, California. Project Paleontologist (2019). Completed paleontological technical memorandum for CEQA and federal compliance. Paleontologically sensitive geologic units: Lake Cahuilla beds. Client: Mead & Hunt for Riverside County Economic Development Agency Aviation Division.

Biola University North Dorm Project: Tennis Courts and Wastewater Treatment Area Expansion, City of La Mirada, Los Angeles County, California. Project Paleontologist/Project Manager (2019). Oversaw cultural and paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Biola University.

I-10 Eastbound Truck Climbing Lane Improvements Project, City of Yucaipa, San Bernardino County and City of Calimesa, Riverside County, California. Project Paleontologist (2019). Completed paleontological technical memorandum for CEQA and federal compliance. Paleontologically sensitive geologic units: San Timoteo Formation and Pleistocene to Holocene alluvium. Client: HDR for Caltrans and San Bernardino Transportation Authority.

CEMEX Rockfield Modification Project, Fresno County, California. Project Paleontologist (2019). Completed paleontological technical memorandum for CEQA and federal compliance. Paleontologically sensitive geologic units: Tulare, Turlock Lake, Riverbank, and Modesto Formations. Client: Buada Associates for U.S. Army Corps of Engineers and CPUC.

Project Experience (continued)

Southern California Logistics Center Project, City of Victorville, San Bernardino County, California. Project Paleontologist (2019). Completed PRA for Victorville Airport PEIR for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene and older alluvium. Client: Michael Baker for City of Victorville.

5401 Telegraph Road Parking Structure, City of Commerce, Los Angeles County, California. Project Manager (2019). Oversaw WEAP training, archaeological and paleontological resource monitoring for construction, and completed archaeological and paleontological monitoring reports for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Parkco Building Company.

Assessor's Parcel 360-130-003, City of Menifee, Riverside County, California. Project Paleontologist (2019). Completed updates for PRA following design changes for CEQA and federal compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Albert A. Webb Associates for JPN Corporation.

LA Water Wheel Project, Los Angeles County, California. Project Paleontologist (2019). Plan to divert waters from the Los Angeles River to irrigate nearby public parks. Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Monterey Formation and Pleistocene to Holocene alluvium. Client: Ruth Villalobos & Associates, Inc. for City of Los Angeles.

Rose II Residential Development Project, Romoland, Riverside County, California. Project Paleontologist (2018). Completed PRIMP for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: Pacific Communities Builder, Inc.

Temescal Valley Riverside Clinic Investors IV, LLC Project, South of the City of Corona, Riverside County, California. Project Paleontologist (2018). Completed paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Vaqueros and Sespe Formations. Client: Riverside Medical Clinic Investors IV, LLC for County of Riverside.

Beach Club Development, Thermal, Riverside County, California. Project Paleontologist (2018). Co-authored and reviewed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene lacustrine deposits. Client: Albert A. Webb Associates for County of Riverside.

I-10 Monroe Interchange Project, City of Indio, Riverside County, California. Associate Paleontologist (2018). Completed museum records search, online research, coordination of ground-reconnaissance field survey, and co-authorship of PIR-PER for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium and lacustrine deposits. Client: Michael Baker for Caltrans.

I-215 University Parkway Interchange Improvement Project, City of San Bernardino, San Bernardino County, California. Project Paleontologist (2018). Completed updates for PIR-PER following design changes for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: HDR for Caltrans.

Madison Avenue Improvements Project, City of Murrieta, Riverside County, California. Associate Paleontologist (2018). Completed museum records search, online research, paleontological technical memorandum, ground-reconnaissance field survey, and PRA for CEQA compliance. Paleontologically sensitive geologic units: Pauba Formation and Pleistocene to Holocene alluvium. Client: Kleinfelder for City of Murrieta.

Water-Main Replacement Project along the San Gorgonio River, City of Banning, Riverside County, California. Associate Paleontologist (2018). Completed review of paleontological resource monitoring report for CEQA compliance. Paleontologically sensitive geologic units: San Timoteo Formation and Pleistocene to Holocene alluvium. Client: Aspen Environmental Group for City of Banning.

Blythe Airport Perimeter Fence Project, Riverside County, California. Associate Paleontologist (2018). Completed museum records and online research for NEPA and CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and terrace deposits. Client: Mead & Hunt for Caltrans.

Project Experience (continued)

De Anza Sewer Force Main Project, City of San Jacinto, Riverside County, California. Associate Paleontologist (2018). Created informational brochure for WEAP for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene to Holocene alluvium. Client: HELIX for Eastern Municipal Water District.

Sixth Street Park, Arts, River & Connectivity (PARC) Improvements Project, City of Los Angeles, Los Angeles County, California. Associate Paleontologist (2018). Completed review of technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Puente and Fernando Formations. Client: GPA Consulting for City of Los Angeles.

Sampson Road Improvements Project in San Pedro, City of Los Angeles, Los Angeles County, California. Lead Paleontology Monitor (2017). 400-acre urban and infrastructure development. Managed WEAP for all construction crews on site. Completed paleontological resource monitoring for construction, fossil identification, sample collection, stratigraphic analysis, and geologic data collection for CEQA compliance. Paleontologically sensitive geologic units: Timms Point Silt and San Pedro Sand. Client: Jones & Stokes.

The Grove Project, City of Scotts Valley, Santa Cruz County, California. Lead Paleontology Monitor (2017). Completed paleontological resource monitoring for construction and geologic data collection for CEQA compliance. Paleontologically sensitive geologic units: Santa Margarita Formation, Santa Cruz Mudstone, and Purisima Formation. Client: City Ventures.

Crowder Canyon (SR 138) Paleontological Mitigation Project, San Bernardino County, California. Paleontological Field Technician (2017). 1.7-mile state route realignment. Completed paleontological resource monitoring of construction, fossil identification, stratigraphic analysis, and geologic data collection for CEQA compliance. Paleontologically sensitive geologic units: Crowder Formation and Pleistocene to Holocene alluvium. Client: Caltrans, District 8.

Malibu Wastewater Treatment Facility, City of Malibu, Los Angeles County, California. Paleontological Field Technician (2017). Completed paleontological resource monitoring for construction and geologic data collection for CEQA compliance. Paleontologically sensitive geologic units: Sespe Formation. Client: Myers-Banicki for City of Malibu.

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.

Selected Presentations

Applied EarthWorks, Inc. Paleontology Program, 2020, “National Fossil Day” video. Co-created 5-minute-long video by paleontology staff (Aimee Montenegro, Chris Shi, Melissa Macias, and Amy Ollendorf). Posted to Facebook and LinkedIn; available for distribution.