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PALEONTOLOGICAL RESOURCE TECHNICAL REPORT FOR THE MARKHAM STREET EXTENSION PROJECT, RIVERSIDE COUNTY, CALIFORNIA

August 15, 2022

PALEONTOLOGICAL RESOURCE ASSESSMENT FOR THE MARKHAM STREET EXTENSION PROJECT, RIVERSIDE COUNTY, CALIFORNIA

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Technical Report No. 22-60
County Project No. D1-0078

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August 15, 2022

MANAGEMENT SUMMARY

The County of Riverside Transportation Department (County) is proposing improvements to Markham Street by extending the roadway between Roosevelt Street and Wood Road for approximately 1.3 miles in the community of Woodcrest in Riverside County, California. PaleoWest, LLC (PaleoWest) was contracted by HDR Engineering, Inc. to conduct a paleontological resource assessment of the proposed Markham Street Extension Project (Project) in compliance with the California Environmental Quality Act (CEQA). The County is the Lead Agency under CEQA for the Project.

This report summarizes the methods and results of the paleontological resource assessment. The investigation consisted of a search of museum collection records maintained by the Western Science Center (WSC), consultation with the County of Riverside paleontological sensitivity map, and a comprehensive literature and geologic map review. The purpose of the literature review and museum record search was to identify the geologic unit(s) underlying the Project area and to determine whether previously recorded paleontological localities occur either within the Project area or within the same geologic unit(s) elsewhere. Using the results of the literature review and museum record search, the paleontological resource potential of the Project area was determined in accordance with Society of Vertebrate Paleontology guidelines (2010). Published geologic mapping indicates the Project area is entirely underlain by quartz diorite. No vertebrate fossil localities have been previously recorded directly within the Project area. Furthermore, there are no known fossil localities within one mile of the Project area.

The findings of the assessment indicate that the Project area has no paleontological sensitivity. The likelihood of impacting scientifically significant vertebrate fossils during Project construction is low. Based on these results, no Paleontological Resources Mitigation Plan, survey, or construction monitoring is recommended.

In the unlikely event that there is an unanticipated discovery of a paleontological resource during construction, all work must halt within 50 feet until a qualified paleontologist can evaluate the find. Work may resume immediately outside of the 50-foot radius. If the find is determined to be significant, the qualified paleontologist will formulate appropriate mitigation measures after consultation with the County.

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1. INTRODUCTION

The County of Riverside Transportation Department (County) is proposing improvements to Markham Street by extending the roadway between Roosevelt Street and Wood Road in the community of Woodcrest in Riverside County, California. PaleoWest, LLC (PaleoWest) was contracted by HDR Engineering, Inc. to conduct a cultural resource assessment of the proposed Markham Street Extension Project (Project) in compliance with the California Environmental Quality Act (CEQA); the County is the Lead Agency under CEQA. This technical report summarizes the findings of the assessment.

1.1 PROJECT LOCATION AND DESCRIPTION

The proposed Project consists of a 1.3-mile-long section of Markham Street and adjacent properties between Roosevelt Street and Wood Road in the community of Woodcrest in Riverside County (Figure 1-1). The Project encompasses Riverside County lands in Sections 30–32, Township 3 South, Range 4 West and unsectioned areas of the El Sobrante de San Jacinto Land Grant, San Bernardino Baseline and Meridian (SBBM), as depicted on the Steele Peak, CA 7.5' U.S. Geological Survey (USGS) topographic quadrangle (Figure 1-2). The elevation of the Project area ranges from approximately 1,520 to 1,605 feet above mean sea level.

The County is considering implementing improvements to extend portions of Markham Street. The purpose of the Project is to improve traffic circulation systems within the community of Woodcrest. Markham Street, in its ultimate classification, is designated as a secondary highway per the Riverside County General Plan (2015). The Project would construct a roadway section consisting of two lanes with one lane in each direction, Class II bike lanes, and a sidewalk on the south side of Markham Street.

1.2 PURPOSE OF INVESTIGATION

The purpose of this investigation is to: (1) identify the geologic units within the Project area and assess their paleontological resource potential; (2) determine whether the Project has the potential to impact known scientifically significant paleontological resources; (3) provide Project-specific management recommendations for paleontological resources mitigation, as necessary; and (4) demonstrate CEQA compliance. All work was conducted in accordance with professional standards and guidelines set forth by the Society of Vertebrate Paleontology (SVP) guidelines (2010) and meets the requirements of CEQA and all other state and local laws and regulations described in Section 2 (Regulatory Framework) section.

1.3 PERSONNEL

This report was prepared by Senior Paleontologist Kate Zubin-Stathopoulos, M.S. with Quality Assurance review by Jessica DeBusk, MBA. Project mapping was completed by GIS Specialist Brian Spelts, B.A. Copy editing was performed by Production Specialist Kris Stelter.

Figure 1-1. Project Vicinity Map.

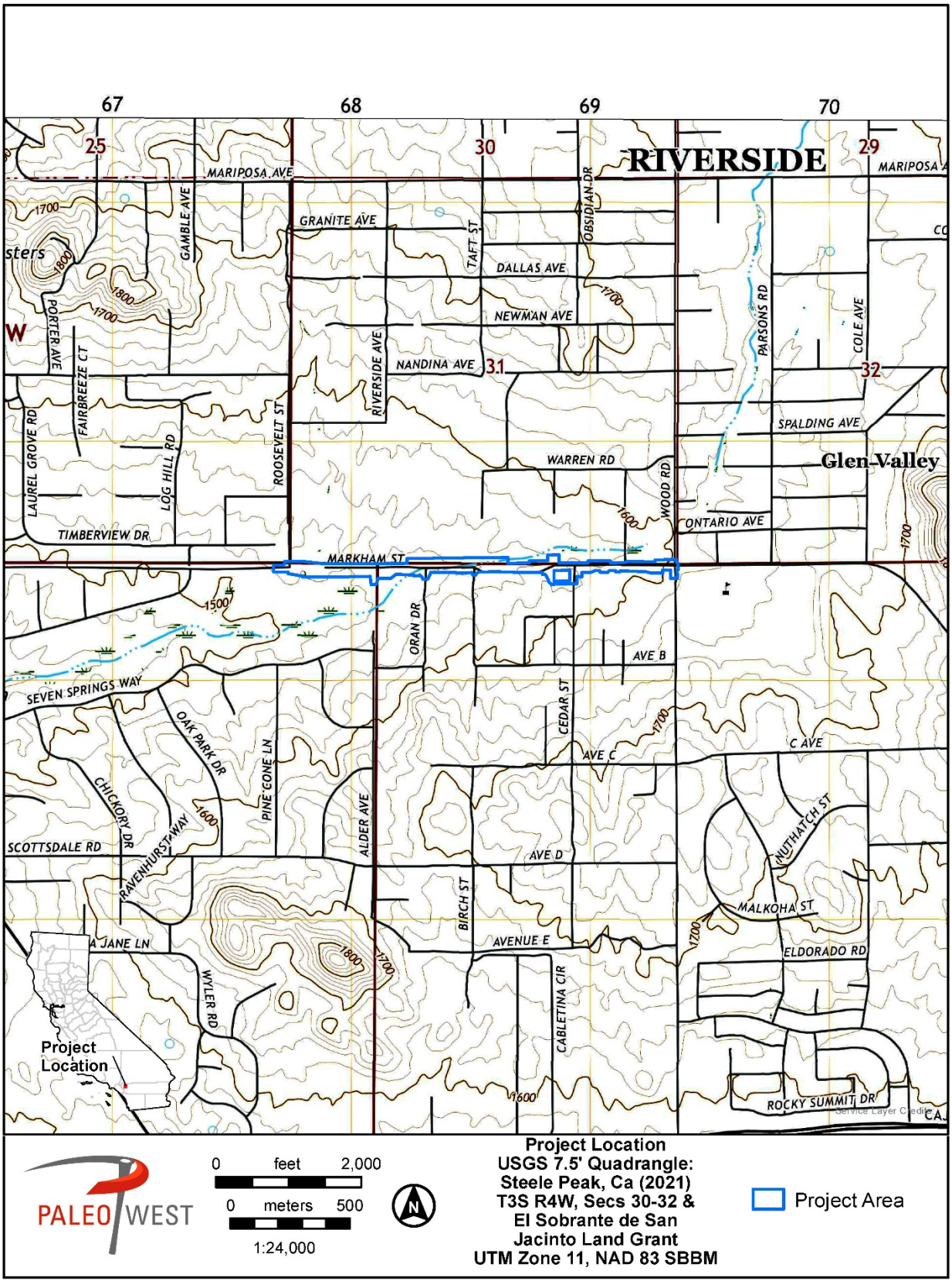

Figure 1-2. Project Location Map.

2. REGULATORY FRAMEWORK

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

2.1 STATE

2.1.1 California Environmental Quality Act

CEQA requires that public agencies and private interests identify the potential environmental consequences of their projects on any object or site of significance to the scientific annals of California (Division I, California Public Resources Code [PRC] Section 5020.1 [b]). Appendix G in Section 15023 provides an Environmental Checklist of questions (PRC 15023, Appendix G, Section VII, Part f) that includes the following: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?"

CEQA does not define "a unique paleontological resource or site." However, the Society of Vertebrate Paleontology (SVP) has provided guidance specifically designed to support state and Federal environmental review. The SVP broadly defines significant paleontological resources as follows (SVP 2010, page 11):

> Fossils and fossiliferous deposits consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).

Significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, diagnostically important, or are common but have the potential to provide valuable scientific information for evaluating evolutionary patterns and processes, or which could improve our understanding of paleochronology, paleoecology, paleo-phylogeography, or depositional histories. New or unique specimens can provide new insights into evolutionary history; however, additional specimens of even well represented lineages can be equally important for studying evolutionary pattern and process, evolutionary rates, and paleophylogeography. Even unidentifiable material can provide useful data for dating geologic units if radiometric dating is possible. As such, common fossils (especially vertebrates) may be scientifically important, and therefore considered significant.

2.1.2 California Public Resources Code

Section 5097.5 of the Public Resources Code (PRC) states:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical

feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

As used in this PRC section, "public lands" means lands owned by, or under the jurisdiction of, the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, public agencies are required to comply with PRC 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

2.2 LOCAL

Paleontological resources are addressed under the Multipurpose Open Space (OS) Element of the Riverside County General Plan (2015), policies OS 19.6 to 19.9, which states the following:

OS 19.6 Whenever existing information indicates that a site proposed for development has high paleontological sensitivity as shown on Figure OS-8, a paleontological resource impact mitigation program (PRIMP) shall be filed with the County Geologist prior to site grading. The PRIMP shall specify the steps to be taken to mitigate impacts to paleontological resources.

OS 19.7 Whenever existing information indicates that a site proposed for development has low paleontological sensitivity as shown on Figure OS-8, no direct mitigation is required unless a fossil is encountered during site development. Should a fossil be encountered, the County Geologist shall be notified and a paleontologist shall be retained by the project proponent. The paleontologist shall document the extent and potential significance of the paleontological resources on the site and establish appropriate mitigation measures for further site development.

OS 19.8 Whenever existing information indicates that a site proposed for development has undetermined paleontological sensitivity as shown on Figure OS-8, a report shall be filed with the County Geologist documenting the extent and potential significance of the paleontological resources on site and identifying mitigation measures for the fossil and for impacts to significant paleontological resources prior to approval of that department.

OS 19.9 Whenever paleontological resources are found, the County Geologist shall direct them to a facility within Riverside County for their curation, including the Western Science Center in the City of Hemet.

3. PALEONTOLOGICAL SENSITIVITY AND SIGNIFICANCE CRITERA

Paleontological resources are the remains of prehistoric animal and plant life and as such, they are nonrenewable resources. Any adverse impacts to paleontological resources have the potential to be significant under CEQA guidelines and may require mitigation. This assessment follows guidelines and significance criteria specified by the *SVP Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP, 2010).

3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES AND SIGNIFICANCE CRITERIA

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

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

3.2 PROFESSIONAL STANDARDS AND SVP CATEGORIES OF PALEONTOLOGICAL RESOURCE SENSITIVITY

On non-federal lands and in the absence of specific agency guidelines, most professional paleontologists in California adhere to SVP guidelines (2010). These guidelines establish detailed protocols for the assessment of the paleontological resource potential (i.e., "sensitivity") of a project area and outline measures to follow to mitigate adverse impacts to known or unknown fossil resources during project development. To prevent project delays, SVP highly recommends that the owner or developer retain a qualified professional paleontologist in the advance planning phases of a project to conduct an assessment and to implement paleontological mitigation during construction, as necessary.

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

If a project area is determined to have high or undetermined potential for paleontological resources following the initial assessment, then SVP recommends that a Paleontological Resources Mitigation Plan (PRMP) be developed and implemented during the construction

Table 3-1. Paleontological Sensitivity Categories

Resource Potential*	Criteria	Mitigation Recommendations
High Potential (sensitivity)	Rock units from which significant vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a high potential for containing significant non-renewable fossiliferous resources. These units include but are not limited to, sedimentary formations and some volcanic formations which contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas which contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas which may contain new vertebrate deposits, traces, or trackways are also classified as significant.	Typically, a field survey (dependent on field conditions) as well as onsite construction monitoring will be required. Any significant specimens discovered will need to be prepared, identified, and curated into a museum. A final report documenting the significance of the finds will also be required.
Low Potential (sensitivity)	Sedimentary rock units that are potentially fossiliferous but have not yielded fossils in the past or contain common and/or widespread invertebrate fossils of well documented and understood taphonomic, phylogenetic species and habitat ecology. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils prior to the start of construction. Generally, these units will be poorly represented by specimens in institutional collections and will not require protection or salvage operations. However, as excavation for construction gets underway it is possible that significant and unanticipated paleontological resources might be encountered and require a change of classification from Low to High Potential and, thus, require monitoring and mitigation if the resources are found to be significant.	Mitigation is not typically required.
Undetermined Potential (sensitivity)	Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.	A field survey is required to further assess the unit's paleontological potential.
No Potential	Rock units of metamorphic or igneous origin are commonly classified as having no potential for containing significant paleontological resources.	No mitigation required.

*Adapted from SVP (2010)

phase of a project. The mitigation plan describes, in detail, when and where paleontological monitoring will take place and establishes communication protocols to be followed if an unanticipated fossil discovery is made during project development. If significant fossil resources are known to occur within the boundary of the project and have not been collected, then the plan will outline the procedures to be followed prior to any ground-disturbing activities (i.e., preconstruction salvage efforts or avoidance measures, including fencing off a locality). Should microfossils be known to occur in the geologic unit(s) underlying the project area or suspected to occur, then the plan will describe the methodology for matrix sampling and screening.

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

4. METHODS AND RESULTS

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

In this section, the methods and results of the background literature and data review that were undertaken as part of the paleontological resource assessment are described. This is followed by a characterization of the paleontological resource potential of the Project area. Based on the findings of no paleontological sensitivity during the desktop analysis, a field survey of the Project area was determined to be unwarranted per SVP (2010) recommendations and County's (2015) Policies OS 19.6 to 19.9 (see Section 2.2).

4.1 METHODS

The background literature and data review included the following: (1) a geologic map review to determine the mapped geologic units within the Project area; (2) a Western Science Center (WSC) museum record search to locate any previously documented fossil localities within the Project area or within a one-mile radius; (3) consultation with the County of Riverside paleontological sensitivity map; and (4) a literature search.

The geologic mapping was completed using the 1:24,000 scale map by Diblee and Minch (2003). The record search was performed at the WSC with the paleontological sensitivity map accessed to determine the County's assignment of levels of paleontological sensitivity of the geological formations within the Project area (County of Riverside, 2015). The literature review included peer-reviewed scientific literature of the same geologic units that underly the Project area.

4.2 RESULTS

The Project area is in the northwestern portion of the Peninsular Ranges geomorphic province. Northwest trending mountain ranges and valleys following faults branching from the San Andreas Fault distinguish the Peninsular Ranges province. The Peninsular Ranges are bound to the east by the Colorado Desert and extend north to the San Bernardino – Riverside County line, west into the submarine continental shelf, and south to the California state line (Norris and Webb 1976). Locally, the Project is southwest of the foothills of the San Bernardino Mountains with the Jurupa Mountains to the northwest (MacKevett, 1950). The Jurupa Mountains are predominantly composed of crystalline igneous rocks and heavily metamorphosed metasedimentary rocks. Alluvium and eolian deposits fill in low spots and stream beds surrounding the Jurupa Mountains (MacKevett, 1950).

Based on geologic mapping of the Project area (Dibblee and Minch, 2003), there is one igneous bedrock unit mapped within the Project area consisting of quartz diorite (qdi) (Figure 4-1 and Figure 4-2). Igneous rocks are crystalline or non-crystalline rocks that form through the cooling

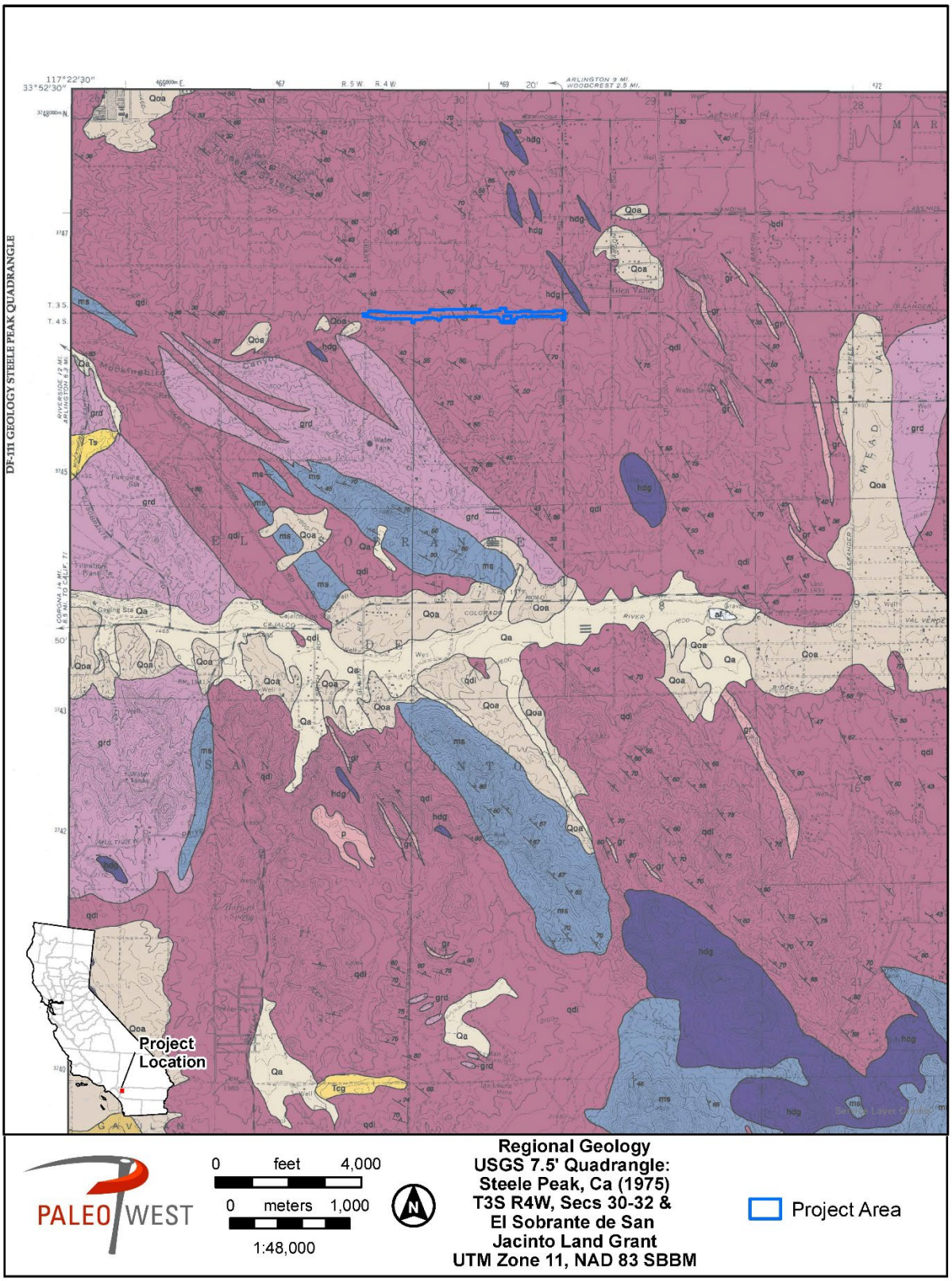

Figure 4-1. Regional Geologic Map. qdi mapped within the Project area = Quartz Diorite (No Sensitivity), modified from Dibblee and Minch (2003).

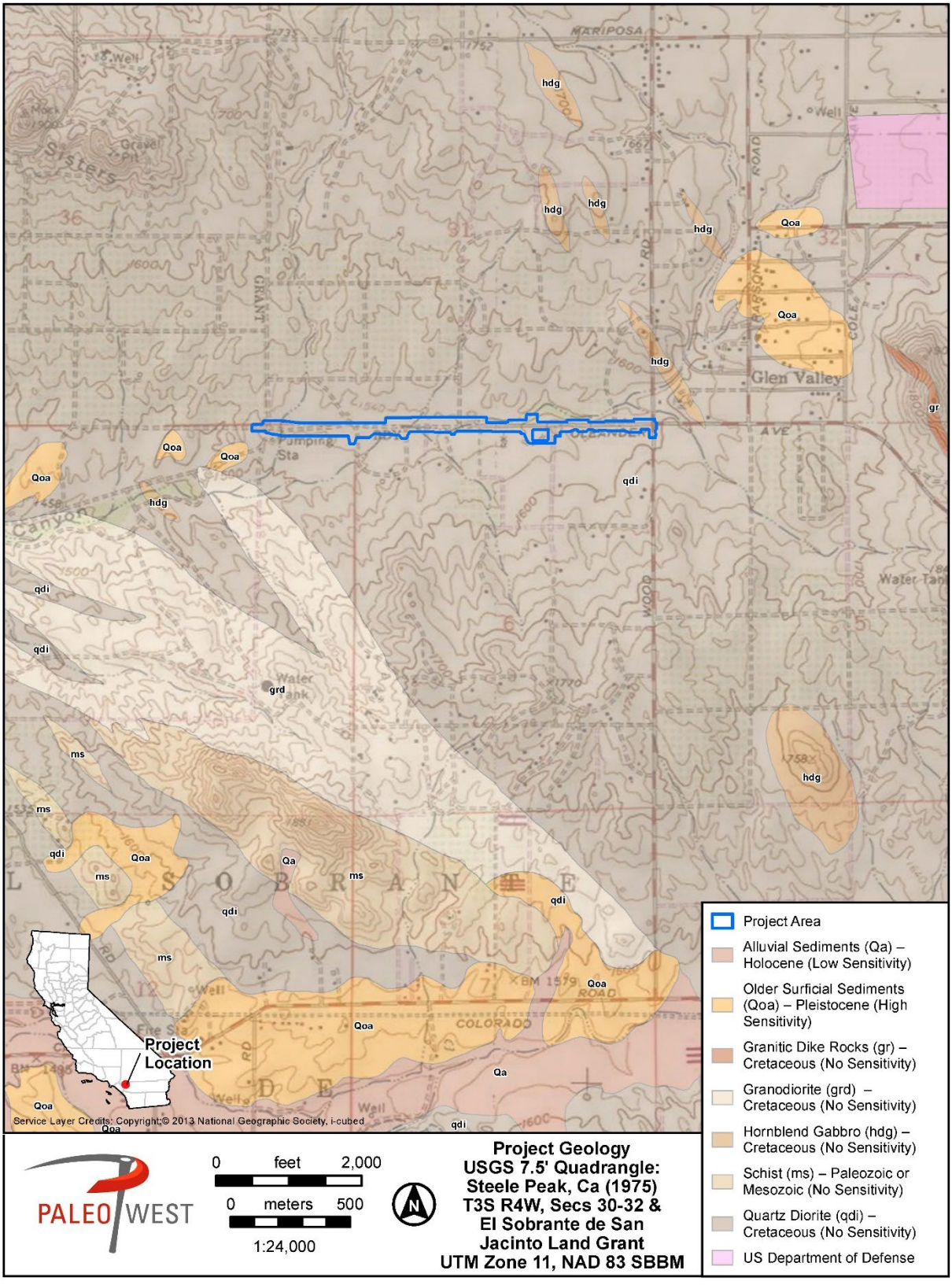

Figure 4-2. Geologic Map (1:24,000) with paleontological sensitivity, modified from Diblee and Minch (2003).

and subsequent solidification of lava or magma. Intrusive (plutonic) igneous rocks form below slow cooling of magma beneath the earth's crust. The formation of extrusive or intrusive the earth's surface, and extrusive (volcanic) rocks form on the earth's surface. Lava and magma are formed by the melting of pre-existing plutonic rocks in the earth's crust or mantle due to increases in temperature, changes in pressure, or changes in geochemical composition.

The quartz diorite mapped in the Project area is an intrusive (plutonic) igneous rock formed by cooling magma in the Earth's subsurface. The extremely high temperatures present during subsurface magma cooling prevent the preservation of fossils. As such, plutonic igneous rocks have no paleontological sensitivity per SVP guidelines (SVP, 2010). The County's paleontological sensitivity map indicates that the entirety of the Project area has a low sensitivity, which is based on information from previous field surveys and documentation that demonstrates low potential for containing significant paleontological resources subject to adverse impacts (County of Riverside, 2015).

The WSC found there were no previously recorded fossil localities in their records directly within the Project area or within one mile of the Project area. As such, WSC recommends that the entirety of the Project area be considered not sensitive for paleontological resources (Radford, 2022). The detailed results of the record search can be found in Appendix A. (Note: A geologic map included with the WSC recommendations in Appendix A identifies the geologic unit in the Project area as Cretaceous tonalite, a rock with a higher quartz mineral composition, but otherwise similar to the quartz diorite described in this report).

4.3 DETERMINATION OF PALEONTOLOGICAL RESOURCE POTENTIAL WITHIN THE PROJECT AREA

This report utilizes the SVP paleontological sensitivity classification (2010) to assess paleontological sensitivity and the level of effort required to manage potential impacts to significant fossil resources. Using this system, the sensitivity of geologic units was determined based on the relative abundance and risk of adverse impacts to vertebrate fossils and significant invertebrates and plants. As a result of the paleontological resource record and literature search and geologic map review, SVP rankings were assigned for the geologic units within the Project area. Based on the mapped geology at the surface of the Project area and the results of the record search, the Project area is determined to have no paleontological sensitivity per SVP (2010) guidelines and recommendations made by the WSC (Radford, 2022). As the likelihood of impacting scientifically significant vertebrate fossils during Project construction is low, a Paleontological Resources Mitigation Plan, survey, or construction monitoring is not recommended.

5. CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

This paleontological resource assessment is based on the results of a museum record search conducted at the WSC, consultation with the County's paleontological sensitivity map, and a comprehensive literature and geologic map review. Based on this analysis and in accordance with SVP guidelines (2010), there is no potential for fossils to be present at the surface of the Project area, or at depth since one geologic unit consisting of crystalline basement rock is mapped within the entirety of the Project area.

The following management recommendations have been developed in accordance with SVP guidelines. If implemented, these measures will satisfy the requirements of CEQA.

Based on the record search, which shows no localities within the Project area or within one mile of the Project area, and the literature review it has been determined the Project area has no paleontological sensitivity and the likelihood of impacting scientifically significant vertebrate fossils during Project construction is low. No Paleontological Resources Mitigation Plan, survey, or construction monitoring is recommended.

In the unlikely event that there is an unanticipated discovery of a paleontological resource during construction, all work must halt within 50 feet until a qualified paleontologist can evaluate the find. Work may resume immediately outside of the 50-foot radius. If the find is determined to be significant, the qualified paleontologist will formulate appropriate mitigation measures after consultation with the County.

6. REFERENCES

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Appendix A.
Record Search Report

WESTERN SCIENCE CENTER

PaleoWest
Kate Zubin-Stathopoulous
308 E. Simpson Street, Suite 102
Lafayette, CO 80026

January 20, 2022

Dear Ms. Zubin-Stathopoulous,

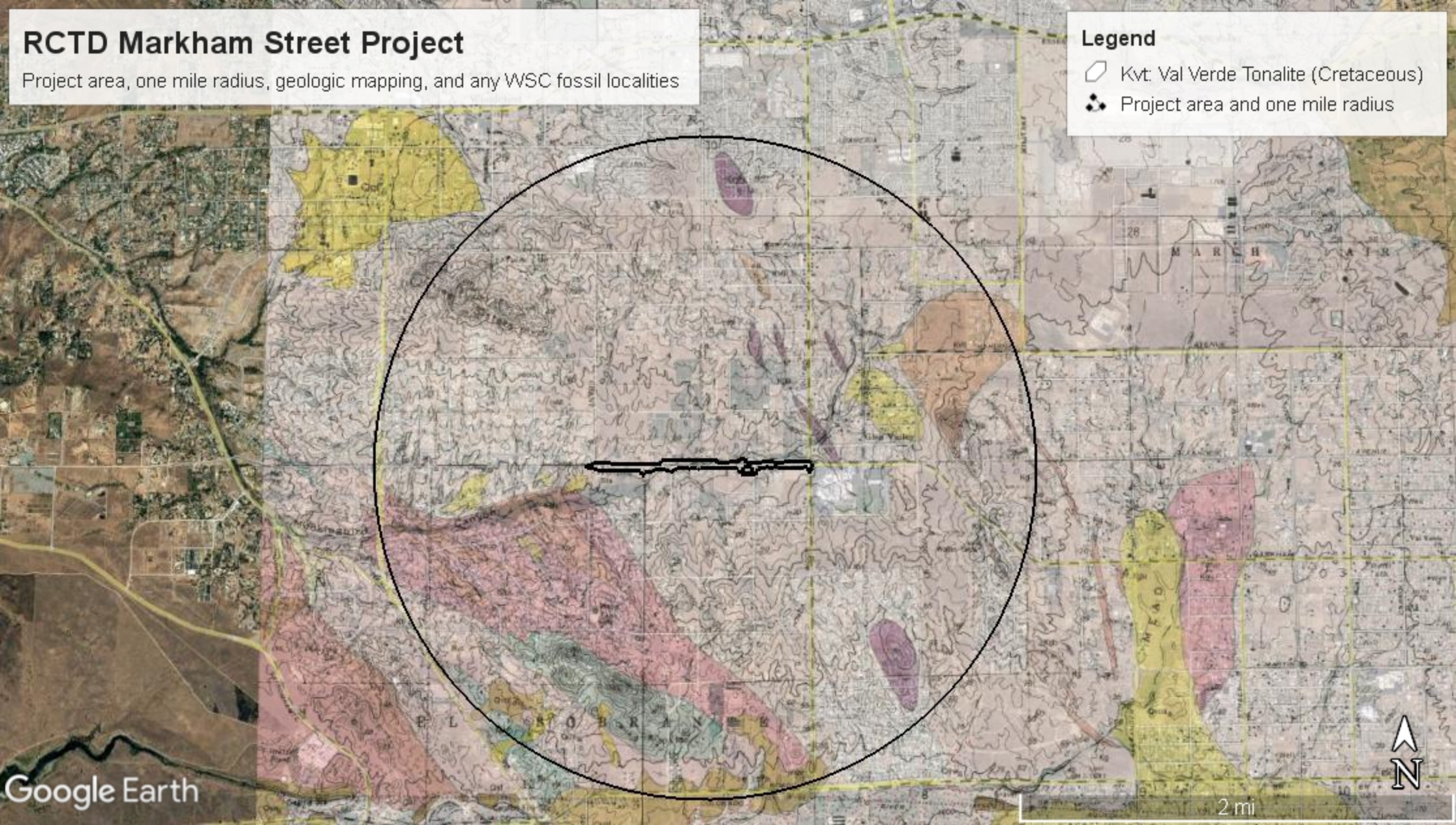
This letter presents the results of a record search conducted for the RCTD Markham Street Project in Riverside County, California. The project site is located along Markham Street between Wood Road and Roosevelt Street in Section 30-32, Township 3 South, Range 4 West on the *Steele Peak, CA* USGS 7.5 minute quadrangle.

The geologic units underlying this project are mapped entirely as Val Verde tonalite deposits dating from the Cretaceous period (Morton, Alvarez, & Diep, 2002). A map showing geologic mapping for the area has been included for your reference. Cretaceous tonalite units are considered to be of low paleontological sensitivity and are not know to produce fossil material within the region. The Western Science Center does not have localities within the project area or within a one-mile radius.

Given the geologic makeup of the project area, it is unlikely that fossil material will be present. If you have any questions or would like further information, please feel free to contact me at dradford@westerncentermuseum.org

Sincerely,

Darla Radford
Collections Manager


RCTD Markham Street Project
Project area, one mile radius, geologic mapping, and any WSC fossil localities
Legend
Kvt: Val Verde Tonalite (Cretaceous)
Project area and one mile radius
Google Earth
2 mi
N

PALEOWEST

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