PALEOSERVICES
SAN DIEGO NATURAL HISTORY MUSEUM

Paleontological Resources Technical Report

LS Power Grid California
Power Santa Clara Valley
Santa Clara County, California

October 24, 2023 (revised March 27, 2024)

Prepared for:

LS Power Development, LLC
Chesterfield, Missouri

Under contract to:

kp environmental
1038 Dewitt Avenue
Encinitas, California 92024

Prepared by:

Department of PaleoServices
San Diego Natural History Museum
P.O. Box 121390
San Diego, California 92112-1390

Katie M. McComas, M.S., Paleontological Report Writer & GIS Specialist
Thomas A. Deméré, Ph.D., Principal Paleontologist

thenat | SAN DIEGO NATURAL HISTORY MUSEUM

Executive Summary

This Paleontological Resources Technical Report was prepared for the proposed LS Power Grid California ("LS Power") Power Santa Clara Valley project ("Proposed Project"), located in the City of San José and unincorporated Santa Clara County, California. The purpose of this report is to identify and summarize existing conditions of paleontological resources that potentially occur within the Proposed Project area, identify individual Proposed Project construction elements that may negatively impact paleontological resources, and provide recommendations to minimize any potential negative impacts.

The Proposed Project includes the construction of two new substations and associated transmission lines between the existing Pacific Gas and Electric Company's (PG&E) San Jose B substation and the existing PG&E Metcalf substation.

The Proposed Project site lies within the Santa Clara Valley, a depositional basin receiving sediment derived primarily from erosion of the Santa Cruz Mountains to the west and south, with minor amounts of sediment derived from the Diablo Range to the northeast, and opening to the northwest into the south end of the San Francisco Bay. Based on published geologic mapping, the Proposed Project area is underlain by an assortment of Holocene-age alluvial and fluvial deposits and serpentinite of the Jurassic-age Coast Range ophiolite complex. Based on published literature, the Holocene-age alluvial and fluvial deposits in the Santa Clara Valley transition at relatively shallow depths into older Pleistocene-age alluvial deposits. In addition, a geotechnical feasibility study of the proposed Skyline terminal site identified fill measuring up to seven feet thick within the proposed Skyline terminal site. While not formally mapped in the Proposed Project area, artificial fill related to development and road construction in the area also undoubtedly underlies other Proposed Project components.

The results of the paleontological records searches and literature review indicate that fossils have not been documented from these geologic units within a one-mile radius of the Proposed Project site. However, two Pleistocene vertebrate fossil localities have been documented approximately four miles northwest of the Skyline terminal site, along the Guadalupe River north of the San José Mineta International Airport. These localities produced a partial skull and skeletal elements of a juvenile mammoth (*Mammuthus columbi*) and dental and skeletal elements of a variety of land mammals (the horse *Equus* sp., the extinct pronghorn *Capromeryx?*, the extinct camel *Camelops* sp., the bison *Bison* sp., Harlan's ground sloth [*Paramylodon harlani*], and an unidentified proboscidean). Additional Pleistocene-age vertebrate fossils have been documented in other locations within the Santa Clara Valley at depths as shallow as seven feet below ground surface (bgs).

Following the paleontological potential criteria developed by the Society of Vertebrate Paleontology, Pleistocene-age alluvial deposits assigned a high paleontological potential. Holocene-age alluvial and fluvial deposits are assigned a low paleontological potential, while artificial fill and rocks of the Coast Range ophiolite complex are assigned no paleontological potential. Accordingly, any Proposed Project-related earthwork that extends greater than approximately seven feet bgs has the potential to impact paleontological resources preserved within Pleistocene-age alluvial deposits. Development and implementation of a project-specific Paleontological Resources Mitigation and Monitoring Plan (PRMMP), as outlined in APM PALEO-1, is recommended to mitigate potentially adverse impacts to paleontological resources during construction through the recovery and conservation of any fossils that are unearthed during construction. In addition, APM PALEO-2 is provided to account for possible inadvertent discoveries made during construction.

Contents

1.0 Introduction

1.1 Proposed Project Description

LS Power Grid California, LLC ("LS Power"), a designated California Public Utility, is proposing the Power Santa Clara Valley Project ("Proposed Project"). The Proposed Project includes the construction of two new substations and associated transmission lines between the existing Pacific Gas and Electric Company's (PG&E) San Jose B Substation and the existing PG&E Metcalf Substation. The Proposed Project is located in the City of San José and an unincorporated area in the County of Santa Clara, California (Figure 1).

Proposed Project components are described below and depicted in Figure 2.

1.1.1 Substations

The northern site is the proposed Skyline terminal, which is located west of State Route 87 (SR-87) and south of Coleman Avenue, approximately one mile south of the San José Mineta International Airport. Specifically, the proposed Skyline terminal site consists of approximately 10.6 acres and is located on the corner of Santa Teresa Street and Ryland Street, immediately south of the existing PG&E San Jose B substation. The Skyline terminal site is located within the City of San José.

The southern site is the proposed Grove terminal which is located in the vicinity of the existing Metcalf substation, which is located along Monterey Road, about 0.2 mile west of U.S. Route 101 and approximately 0.65 mile south of the existing Metcalf substation. The proposed Grove terminal site is located along Monterey Road and consists of approximately 13.7 acres. San José and the County of Santa Clara jurisdictional boundaries transverse across the four parcels that consist of the proposed Grove terminal site.

The proposed substations (the Skyline terminal and the Grove terminal) would convert alternating current (AC) to direct current (DC) or the reverse. To facilitate this conversion, each new substation would include Voltage Source Converter (VSC) HVDC equipment, an AC switchyard using gas-insulated switchgear (GIS) in a breaker-and-a-half (BAAH) configuration, and converter transformers including an on-site spare.

All major substation equipment (e.g., VSC HVDC equipment, GIS, power transformers, cooling equipment, etc.) would be installed on concrete foundations. Foundations are planned to be a combination of deep, reinforced drilled shafts foundations and slab foundations with spread footings. Below-ground work would include the construction of the foundations for the substation equipment and oil containment for transformers. The depth of ground disturbance is anticipated to be up to 50 feet for the substation equipment (drilled shafts) foundations.

Each transformer would have an oil containment system consisting of an impervious, lined, open or stone-filled sump area around the transformer. The maximum amount of oil required for the transformers would be approximately 25,000 gallons for each of the three transformers. Transformer oil containment basins are designed to contain the oil volume of the transformers plus a 25-year, 24-hour storm event. The tallest structures within the substations would be the take-off towers or lightning shielding masts with an approximate 100-foot height.

The main components of the two proposed substations are described below.

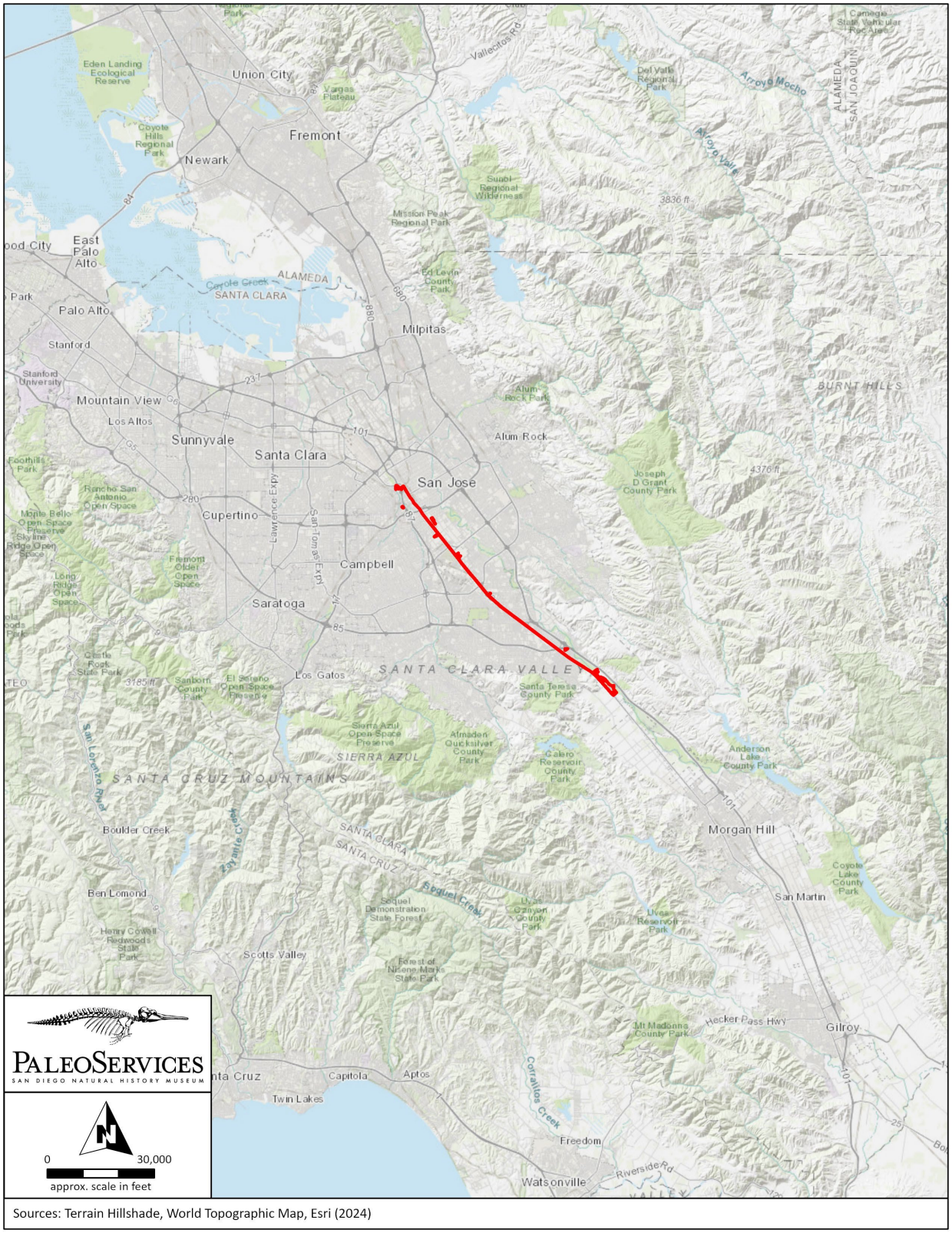

Figure 1. Proposed Project vicinity map.

Figure 2. Proposed Project detail map.

Skyline Terminal

The proposed Skyline terminal site would be constructed immediately south of the existing San Jose B substation within a 10.6-acre site (Assessor Parcel Numbers [APNs] 259-23-020 and 259-23-024) currently owned by LS Power. Construction of the Skyline terminal would permanently disturb a total area of approximately 4.5 acres. The proposed Skyline terminal would include 115 kV GIS, bus-work, and termination equipment as well as three single-phase 320/115 kV transformers with an on-site spare.

The new Skyline terminal would be interconnected with the existing PG&E San Jose B substation via a new short, single circuit, overhead 115 kV AC connection; as the proposed Skyline terminal is located adjacent to PG&E's San Jose B substation. The existing San Jose B substation needs to be rebuilt in order to create a new point of interconnection for the Proposed Project. As such, PG&E would construct a new 115 kV switchyard using GIS equipment in a BAAH configuration.

Grove Terminal

The proposed Grove terminal would be constructed approximately 0.65 mile south of the existing Metcalf substation within a 13.7-acre site (APNs 725-14-008, 725-14-009, 725-14-014, and 725-14-015) that would be owned by LS Power. Construction of the Grove terminal would permanently disturb a total area of approximately eight acres. The property is currently being used as an orchard and has a perimeter fence, well, a deteriorating outbuilding, and a radial electric distribution line. These existing facilities would be removed, and the well would be capped per regulations.

The proposed Grove terminal would include 500 kV GIS, bus-work, and termination equipment as well as three single-phase 500/115 kV transformers with an on-site spare.

To provide a point of interconnection for the new 500 kV transmission line (see below), PG&E needs to add electrical infrastructure to support the termination of the new transmission line within the Metcalf substation. PG&E would add a new 500 kV bay with the associated grounding, conduits and wiring, foundations, support structures, bus-work, breakers, disconnect switches, jumpers, and protection and control equipment to the existing 500 kV substation yard.

1.1.2 Transmission Lines

The proposed Grove to Skyline +/-320 kV DC transmission line is located mainly within the City of San José and will connect the new Grove terminal to the new Skyline terminal. The transmission line will be located within existing roadways such as Bassett Street, Little Market Street, Market Street, First Street, and Monterey Road. The new 500 kV Grove to Metcalf AC transmission is located within Monterey Road and Coyote Creek Road, within the City of San José and County of Santa Clara. Approximately 324 feet would be located on the Grove terminal site, 3,330 feet of this alignment would be constructed underground on Santa Clara County land within the County of Santa Clara, and approximately 4,735 feet would be located underground within Coyote Ranch Road within the County of Santa Clara. The new San Jose B to Skyline 115 kV transmission line is located in the City of San José, on the proposed Skyline terminal site and span overhead across the fence to the adjacent PG&E San Jose B substation to the north.

The typical depth for the underground transmission line duct banks is approximately five to six feet, with the top of the duct bank being located approximately three to four feet beneath the surface. The splice vaults would be approximately ten feet deep. LS Power would install cables in the duct bank once the duct bank and splice vaults are installed. Cable installation activities would occur at all splice vault locations and near the substation termination structures. Splice vaults would generally be installed along the transmission line alignment about every 1,500 to 3,000 feet to facilitate installation of the underground cables.

Grove to Skyline 320 kV DC Transmission Line

The Proposed Project includes a new Grove to Skyline +/-320 kV DC transmission line connecting the proposed Skyline terminal to the proposed Grove terminal. This +/-320 kV DC transmission line would be approximately 13 miles in length and would be constructed underground, almost entirely within existing public right-of-way (ROW). The +/-320 kV DC underground transmission line would be encased with a duct bank proposed to have five smaller internal ducts: three eight-inch ducts for conductor (with two ducts for the installed transmission cable and one duct as a spare) and two two-inch ducts for fiber optic cables.. The minimum depth for the top of the duct bank would be approximately three feet, with the top of the duct bank varying between approximately three to 10 feet beneath the surface. The typical width for the underground duct bank would be approximately three feet or less. The splice vaults would be approximately ten feet deep.

After construction, all road surfaces would be restored to their original condition, matching thickness and type in kind or in compliance with local requirements.

Skyline to San Jose B 115 kV Station Tie Line

A new 115 kV station tie line would be constructed to connect the proposed Skyline terminal to the existing, rebuilt and expanded PG&E San Jose B substation. This transmission line would be a short, single circuit, overhead segment. This new transmission line could be as short as one span because the proposed Skyline terminal is located adjacent to PG&E's San Jose B substation. The proposed Skyline to San Jose B 115 kV station tie line would be rated at 796 MVA.

Metcalf to Grove 500 kV Transmission Line

The Proposed Project would also construct a new 500 kV AC transmission line connecting the existing PG&E Metcalf substation to the proposed Grove terminal. The proposed 500 kV AC transmission line would consist of approximately 1.2 miles of underground alignment. The 500 kV underground transmission line would be encased within a duct bank proposed to have seven smaller internal ducts: four eight-inch ducts for conductor, (with three ducts for the installed XLPE cable and one duct as a spare), and three two-inch ducts with two for fiber optic cables and one for a ground wire.. A duct bank would generally be used everywhere, except where trenchless crossings are required. The Metcalf to Grove 500 kV transmission line would include one horizontal directional drill (HDD) crossing under Coyote Creek. The typical depth for the 500 kV underground transmission duct bank is approximately six feet, with the top of the duct bank being located approximately three to four feet beneath the surface. The splice vaults would be approximately ten feet deep.

1.1.3 Access Roads

The existing and primary access to the Proposed Project locations for both construction and operations and maintenance would be from existing public roads. The existing and primary access to the Skyline terminal site for both construction and operation and maintenance would be from Santa Teresa Street and Ryland Street via an existing gravel access road. No improvements are expected to be required along Santa Teresa Street and Ryland Street, but the existing gravel access road would be improved to have a width of 20 feet and graded to accommodate construction, as well as operation and maintenance (O&M) vehicles.

The existing and primary access to the Grove terminal for both construction and operations and maintenance would be from Monterey Road. A new approximately 300-foot long access road would be constructed to the north of the existing private dirt road to provide access to the Grove terminal from Monterey Road. The new access road would require a new approach at Monterey Road, have a width of 20 feet, and be graded to accommodate construction, as well as O&M vehicles.

The Proposed Project also includes new permanent access roads, which would provide internal access within each new substation site. The internal access road would create a gravel or rocked internal road that would loop around each new substation. The new road within the Skyline terminal substation site would be approximately 20 feet wide and approximately 1,900 feet long. The new road within the Grove terminal site would be approximately 20 feet wide and approximately 2,000 feet long. Construction of this internal access road would include grading and rocking per the final Proposed Project design. Permanent gates would be installed at both new substation driveways along the perimeter wall that would align with the internal access road.

1.1.4 Laydown Yards and Staging Areas

The Proposed Project includes 12 potential temporary construction laydown yards (including the yards within the two substation sites) resulting in a total area of approximately 70 acres. The staging areas would be located along the project alignment. The staging areas would be fenced and/or gated during the construction phase of the Proposed Project.

Preparation of the staging area would involve clearing, grubbing, and limited grading depending on site conditions. Gravel may be used to line the ground at the staging area to avoid the creation of unsafe conditions and unnecessary sediment transport off site. Perimeter fencing would be installed around the outer limits of the work area and lighting would also be installed for security purposes.

1.1.5 Other Potentially Required Facilities

An existing radial overhead distribution line located on the proposed Grove terminal site would need to be relocated. Approximately three wooden poles associated with this radial distribution line are located on the proposed Grove terminal site. These wooden poles would be removed utilizing a line truck or similar equipment with an attached boom. The entire wood pole (above-ground and below-ground portions) would be removed.

A new overhead distribution line would be installed to provide power for construction from the existing distribution line located along Monterey Road on the western boundary of the Grove terminal site. The distribution line would be installed on approximately three wood poles (up to approximately 24-inches in diameter) that would be placed on the southern side of the Proposed Project's access road and into the Grove terminal. A new permanent distribution line would be installed underground and would connect to the terminal during O&M.

A new underground distribution line would be installed to provide power for construction from the existing distribution line located along Ryland Street on the northern boundary of the Skyline terminal site. The distribution line would be installed underground until it reaches the auxiliary transformer within the Skyline terminal site. The distribution line would also serve the Skyline terminal during O&M.

At the existing San Jose B substation, existing facilities would be rebuilt and expanded to allow the interconnection of the proposed Skyline to San Jose B 115 kV station tie line. Because the existing San Jose B substation presently has a straight bus configuration with four existing transmission line connections and lacks space for the proposed Skyline to San Jose B 115 kV station tie line, the existing substation would be rebuilt in order to create a bay position for the proposed Skyline to San Jose B 115 kV station tie line. Much of the existing air insulated 115 kV switchyard at the existing PG&E San Jose B substation would be removed, and PG&E would convert the existing San Jose B substation to a GIS BAAH configuration. The new GIS configuration would include five BAAH bays. The GIS enclosure is expected to be approximately 150 feet long by 85 feet wide by 31 feet tall. The new GIS equipment and controls required to monitor and protect the electrical equipment would be located within a new enclosure that would be located on the proposed Skyline terminal site. Other work would involve installation of typical

substation equipment, including structural yard steel, bus work/fittings, conduits, and grounding as well as underground 115 kV cable. The existing and new fence would be modified or installed per PG&E's substation standards and security requirements. Modifications at the existing San Jose B substation would also be made to bus work, disconnect switches, circuit breakers, steel support structures, and communication systems. While this work is not part of LS Power's Proposed Project, it is considered a connected project for purposes of CEQA compliance.

The existing Metcalf substation facilities would be modified to allow the interconnection of the new Metcalf to Grove 500 kV transmission line. LS Power's scope for the new Metcalf to Grove 500 kV transmission line connection between the proposed Grove terminal and the existing Metcalf substation is proposed to stop at a dead-end structure located within the northwestern boundary of the existing Metcalf substation property line. PG&E would be responsible for bringing the new circuit from that point to the new bay within the existing Metcalf substation. The required work at the substation would include installation of a new 500 kV bay with two new 500 kV circuit breakers, five new 500 kV breaker disconnect switches, one new 500 kV line disconnect switch, three new 500 kV line capacitor coupled voltage transformers (CCVTs), two new dead-end structures, and typical substation equipment, including bus work, conduits, grounding, and communication systems. Additionally, the existing substation security wall would be required to be extended/relocated approximately 100 feet to the north.

The existing well on the Metcalf substation site would remain in place and utilized for the Proposed Project. However, PG&E would be responsible for constructing a new water line that would provide a new water source and connect to the existing PG&E Metcalf substation. The new waterline would connect to the Metcalf substation via a proposed 10-inch water line that would leave the Metcalf substation and travel north on Metcalf Road to a 16-inch water main in Malech Road. The waterline would include a 0.37-mile 10-inch water line that would travel north on Metcalf Road to the intersection of Malech Road and Metcalf Road.

1.2 Scope of Work

The Proposed Project site is located in an area underlain by native geologic units that are undisturbed at depth. For this reason, an assessment of paleontological resources was undertaken to determine whether construction of the Proposed Project has the potential to negatively impact paleontological resources. This report is intended to summarize existing paleontological resource data in the vicinity of the Proposed Project site, discuss the significance of these resources, examine potential Proposed Project-related impacts to paleontological resources, and, if necessary, suggest mitigation measures to reduce any potential impacts to paleontological resources to less than significant levels. This report was written by Katie M. McComas and Thomas A. Deméré of the Department of PaleoServices, San Diego Natural History Museum (SDNHM).

1.3 Definition of Paleontological Resources

As defined here, paleontological resources (i.e., fossils) are the buried remains and/or traces of prehistoric organisms (i.e., animals, plants, and microbes). Body fossils such as bones, teeth, shells, leaves, and wood, as well as trace fossils such as tracks, trails, burrows, and footprints, are found in the geologic units/formations within which they were originally buried. The primary factor determining whether an object is a fossil or not is not how the organic remain or trace is preserved (e.g., "petrified"), but rather the age of the organic remain or trace. Although typically it is assumed that fossils must be older than ~11,700 years (i.e., the generally accepted end of the last glacial period of the Pleistocene Epoch), organic remains older than recorded human history and/or older than middle Holocene (about

5,000 radiocarbon years) are now also considered to represent fossils (Society of Vertebrate Paleontology [SVP], 2010).

Fossils are considered important scientific and educational resources because they serve as direct and indirect evidence of prehistoric life and are used to understand the history of life on Earth, the nature of past environments and climates, the membership and structure of ancient ecosystems, and the pattern and process of organic evolution and extinction. In addition, fossils are considered to be non-renewable resources because typically the organisms they represent no longer exist. Thus, once destroyed, a particular fossil can never be replaced.

Finally, paleontological resources can be thought of as including not only the actual fossil remains and traces, but also the fossil collecting localities and the geologic units containing those localities. The locality includes both the geographic and stratigraphic context of fossils—the place on the earth and stratum (deposited during a particular time in earth's history) from which the fossils were collected. Localities themselves may persist for decades, in the case of a fossil-bearing outcrop that is protected from natural or human impacts, or may be temporarily exposed and ultimately destroyed, as is the case for fossil-bearing strata uncovered by erosion or construction. Localities are documented with a set of coordinates and a measured stratigraphic section tied to elevation detailing the lithology of the fossil-bearing stratum as well as overlying and underlying strata. This information provides essential context for any future scientific study of the recovered fossils.

1.3.1 Definition of Significant Paleontological Resources

The California Environmental Quality Act (CEQA, Public Resources Code Section 21000 et seq.) dictates that a paleontological resource is considered significant if it "has yielded, or may be likely to yield, information important in prehistory or history" (Section 15064.5, [a][3][D]). The Society of Vertebrate Paleontology (SVP) has further defined significant paleontological resources as consisting of "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" (SVP, 2010).

1.4 Regulatory Framework

Paleontological resources are considered scientifically and educationally significant nonrenewable resources; they are protected under a variety of laws, regulations, and ordinances. The Proposed Project is located within Santa Clara County, California, primarily within the city limits of the City of San José. As such, state and local regulations are applicable to the Proposed Project.

1.4.1 State: California Environmental Quality Act

The California Environmental Quality Act (CEQA, Public Resources Code Section 21000 et seq.) addresses paleontological resources in the context of an environmental review for a discretionary state or local agency action. Guidelines for the Implementation of CEQA are included in the California Code of Regulations (CCR), sections 15000 *et seq*. Within the CCR, paleontological resources are specifically addressed in the Environmental Checklist (CCR Section 15023, Appendix G): "Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature."

CEQA does not provide a definition for a "unique paleontological resource" in the Environmental Checklist (CCR Section 15023, Appendix G), nor does it include specific guidelines for the mitigation of paleontological resources under Section 15126.4, Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects. Therefore, most CEQA lead agencies follow the definitions and guidelines provided by SVP (2010), which are in line with industry standards (e.g., Murphey et al., 2019; and see Section 1.3.1). The SVP (2010) additionally provides criteria for determining the significance of

paleontological resources (see sections 1.3.1 and 2.2), and for appropriate measures to minimize impacts to paleontological resources. As advised by SVP (2010), impacts to paleontological resources can be minimized to a level below the threshold of significance through: 1.) the permanent preservation of a fossil locality and its contained fossil resources or 2.) the implementation of a paleontological mitigation program that would reduce any adverse impacts to a level below the threshold of significance through the salvage and permanent storage of any salvaged fossils in an established scientific institution.

1.4.2 Local: Santa Clara County

The Santa Clara County General Plan (1995–2010) addresses paleontological resources under the umbrella of Resource Conservation, with Goal 5 (Heritage Resources Protected). Goal 5.1 specifically addresses paleontological resources with the stated goal of the "Protection and preservation of heritage resources both natural (e.g. heritage trees; and paleontological resources) and cultural (e.g. historic sites and structures, and archeological sites)." The General Plan notes that Heritage Resources have scientific value, with "the potential to increase our knowledge of the natural world," but does not outline any specific policies for the protection of paleontological resources.

1.4.3 Local: City of San José

The City of San José's 2040 General Plan addresses paleontological resources in Chapter 3: Environmental Leadership. Under Goal ER-10 (Archaeology and Paleontology), Policy ER-10.1 states: "For proposed development sites that have been identified as archaeologically or paleontologically sensitive, require investigation during the planning process in order to determine whether potentially significant archeological or paleontological information may be affected by the project and then require, if needed, that appropriate mitigation measures be incorporated into the project design." Policy ER-10.3 additionally states: "Ensure that City, State, and Federal historic preservation laws, regulations, and codes are enforced, including laws related to archaeological and paleontological resources, to ensure the adequate protection of historic and pre-historic resources."

2.0 Methods

2.1 Paleontological Literature Review and Records Searches

Paleontological records searches of the paleontological collections at the SDNHM and University of California Museum of Paleontology (UCMP) were conducted in order to identify any known fossil collection localities in the vicinity of the Proposed Project site. In addition, a literature review was conducted to gain a greater understanding of the geologic history of the area surrounding the Proposed Project site, as well as to determine the types of fossils that the specific geologic units underlying the Proposed Project site have produced. The literature review included examination of relevant published geologic maps and reports, peer-reviewed papers, and other relevant literature (e.g., field trip guidebooks, unpublished theses and dissertations, archived paleontological mitigation reports). This approach was followed in recognition of the direct relationship between paleontological resources and the geologic units within which they are entombed. Knowing the geologic history of a particular area and the fossil productivity of geologic units that occur in that area, it is possible to predict where fossils may or may not be encountered.

2.2 Paleontological Resource Assessment Criteria

The Society of Vertebrate Paleontology (SVP, 2010) has developed mitigation guidelines for paleontological resources that conform with industry standards (Murphey et al., 2019) and were developed with input from a variety of federal and state land management agencies. As described in Section 1.4.1, use of the SVP (2010) guidelines is common practice by CEQA lead agencies.

The SVP (2010) guidelines recognize that significant paleontological resources are considered to include not only actual fossil remains and traces, but also the fossil collecting localities and the geologic units containing those fossils and localities, and thus evaluate paleontological potential (or paleontological sensitivity) of individual geologic units within a project area. Paleontological potential is determined based on the existence of known fossil localities within a given geologic unit, and/or the potential for future fossil discoveries, given the age and depositional environment of a particular geologic unit. The SVP guidelines include four classes of paleontological potential: High Potential, Undetermined Potential, Low Potential, or No Potential (SVP, 2010). A summary of the criteria for each paleontological potential ranking is outlined below.

2.2.1 High Potential

Geologic units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Geologic units classified as having high potential include, but are not limited to, some volcaniclastic formations (e. g., ashes or tephras), some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and geologic units temporally or lithologically suitable for the preservation of fossils (e. g., deposits aged middle Holocene and older consisting of fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological potential includes both the potential for yielding abundant or significant vertebrate fossils or for yielding significant invertebrate, plant, or trace fossils, as well as the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Geologic units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and geologic units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

2.2.2 Undetermined Potential

The definition for undetermined potential provided by SVP (2010) has been expanded for the purposes of this report in order to add more information related specifically to the management of paleontological resources in the context of mitigation paleontology. Geologic units are assigned an undetermined potential if there is little information available concerning their paleontological content, geologic age, and depositional environment. Further field study of the specific formation is necessary to determine if these geologic units have high or low potential to contain significant paleontological resources. For planning purposes, this class of resource potential represents a conservative assessment that assumes an undetermined geologic unit is fossiliferous until proven otherwise.

In the context of mitigation paleontology, gaining additional information about a geologic unit assigned an undetermined potential in order to refine the resource potential ranking (e.g., to high potential or low potential) can be accomplished in several ways depending on the nature of the geologic unit and whether it is exposed at the surface. Field surveys (e.g., a pre-construction survey as part of a paleontological resource assessment) can be conducted when a geologic unit is well exposed at the ground surface, allowing paleontologists to physically search for fossils while also studying the

stratigraphy of the unit. In cases where the geologic unit is not exposed at the surface (e.g., is covered by disturbed areas such as concrete or agricultural topsoil, or occurs in the subsurface underlying another geologic unit), strategically located excavations into subsurface stratigraphy may be conducted to gain additional information (e.g., geotechnical investigation boreholes or trenches). Paleontological monitoring of excavations into a geologic unit with an undetermined potential as part of a paleontological monitoring program may also allow for refinement of the resource potential ranking of the unit over the course of the monitoring program. In this case, the results of the monitoring program are used to routinely reevaluate the resource potential ranking of the geologic unit.

2.2.3 Low Potential

Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some geologic units have low potential for yielding significant fossils. Such geologic units will be poorly represented by fossil specimens in institutional collections, or, based on general scientific consensus, only preserve fossils in rare circumstances where the presence of fossils is an exception not the rule, e. g. basalt flows or Recent colluvium. Geologic units with low potential typically will not require impact mitigation measures to protect fossils.

2.2.4 No Potential

Geologic units with no potential are either entirely igneous in origin and therefore do not contain fossil remains, or are moderately to highly metamorphosed and thus any contained fossil remains have been destroyed. Artificial fill materials also have no potential, because the stratigraphic and geologic context of any contained organic remains (i.e., fossils) has been lost. For projects encountering only these types of geologic units, paleontological resources can generally be eliminated as a concern, and no further action taken.

2.3 Paleontological Impact Analysis

Direct impacts to paleontological resources occur when earthwork operations cut into the geologic units within which fossils are buried and physically destroy the fossil remains. As such, only those project-related excavations that will disturb potentially fossil-bearing geologic units have the potential to significantly impact paleontological resources. As described above, potentially fossil-bearing geologic units are those rated with a high potential. Taking a conservative approach, geologic units with an undetermined potential are also considered to be potentially fossil-bearing until proven otherwise. Although impact avoidance is possible through relocation of a proposed action, paleontological monitoring during construction is typically recommended to reduce any negative impacts to paleontological resources to less than significant levels.

The purpose of the impact analysis is to determine which (if any) of the Proposed Project-related earthwork activities may disturb potentially fossil-bearing geologic units, and where and at what depths these impacts are likely to occur. The paleontological impact analysis involved analysis of available Project documents and comparison with geological and paleontological data gathered during the records searches and literature review.

3.0 Results

The Proposed Project site is located in the central portion of the Coast Ranges Geomorphic Province of California (California Geological Survey, 2002). The Coast Ranges are characterized by a more or less continuous linear series of northwest-trending mountain ranges and intervening valleys that dominate

the coastal region of California from the Topatopa Mountains in Ventura County to the Klamath Mountains near the Oregon border. The Coast Ranges are characterized by complex geologic structural features that today are largely dominated by the San Andreas Fault Zone and related northwest trending faults and folds.

The Proposed Project site lies within the Santa Clara Valley, a depositional basin receiving sediment derived primarily from erosion of the Santa Cruz Mountains to the west and south, with minor amounts of sediment derived from the Diablo Range to the northeast. To the northwest, this depositional basin opens into the south end of San Francisco Bay (Anderson et al., 2016). Several northwest-trending faults border the Santa Clara Valley—the San Andreas fault transects the Santa Cruz Mountains to the southwest of the valley, and the Calaveras and Hayward faults extend along its northeastern margin bordering the Diablo Range. The Santa Cruz Mountains to the southwest of the San Andreas fault consist of granitic and mafic crystalline basement rocks, while the basement rocks to the northeast of the fault consist of accreted Franciscan Complex rocks overlain by rocks of the Coast Range ophiolite and Mesozoic marine clastic rocks (Wentworth et al., 1999). During the Pleistocene and Holocene, a series of transgressive sedimentary sequences of alluvial fan, alluvial flood plain, alluvial delta, and bay deposits have filled the Santa Clara Valley with sediment over the course of at least 800,000 years (Andersen et al., 2016). Today, numerous rivers and streams draining from the surrounding mountain ranges have incised the surficial Pleistocene and Holocene deposits and transported the eroded sediments into San Francisco Bay.

As mapped by Wentworth et al. (1999), the Proposed Project alignment is underlain by an assortment of Holocene-age alluvial and fluvial deposit, as well as serpentinite of the Jurassic-age Coast Range Ophiolite complex (Figure 3). Based on published literature, the Holocene-age alluvial and fluvial deposits in this region transition at relatively shallow depths into older Pleistocene-age alluvial deposits. In addition, a geotechnical feasibility study of the proposed Skyline terminal site identified artificial fill measuring up to seven feet thick within the proposed Skyline terminal site (Langan Treadwell Rollo, 2016). While not formally mapped along the Proposed Project alignment, artificial fill related to previous development and road construction in the area also undoubtedly underlies other Proposed Project components.

3.1 Paleontological Literature Review and Records Searches

3.1.1 Artificial fill

The extent of artificial fill is not mapped within the Proposed Project area, though it was documented within the proposed Skyline terminal site in a 2016 geotechnical feasibility study (Langan Treadwell Rollo, 2016), and is likely present elsewhere within the Proposed Project area. Artificial fill consists of previously disturbed deposits associated with human activities and is often composed of sedimentary materials mined in close vicinity to a project site (e.g., adjacent hillslopes). However, artificial fill can also be imported to a project site and may be from a distant location. Artificial fill is typically used to change the topography of a location, such as during the creation of flat housing pads, level roadbeds, or earthen sound berms.

Because artificial fill has been previously disturbed and likely imported to its current location, any fossils found in these deposits have lost their original stratigraphic context, and are thus not considered to be scientifically significant.

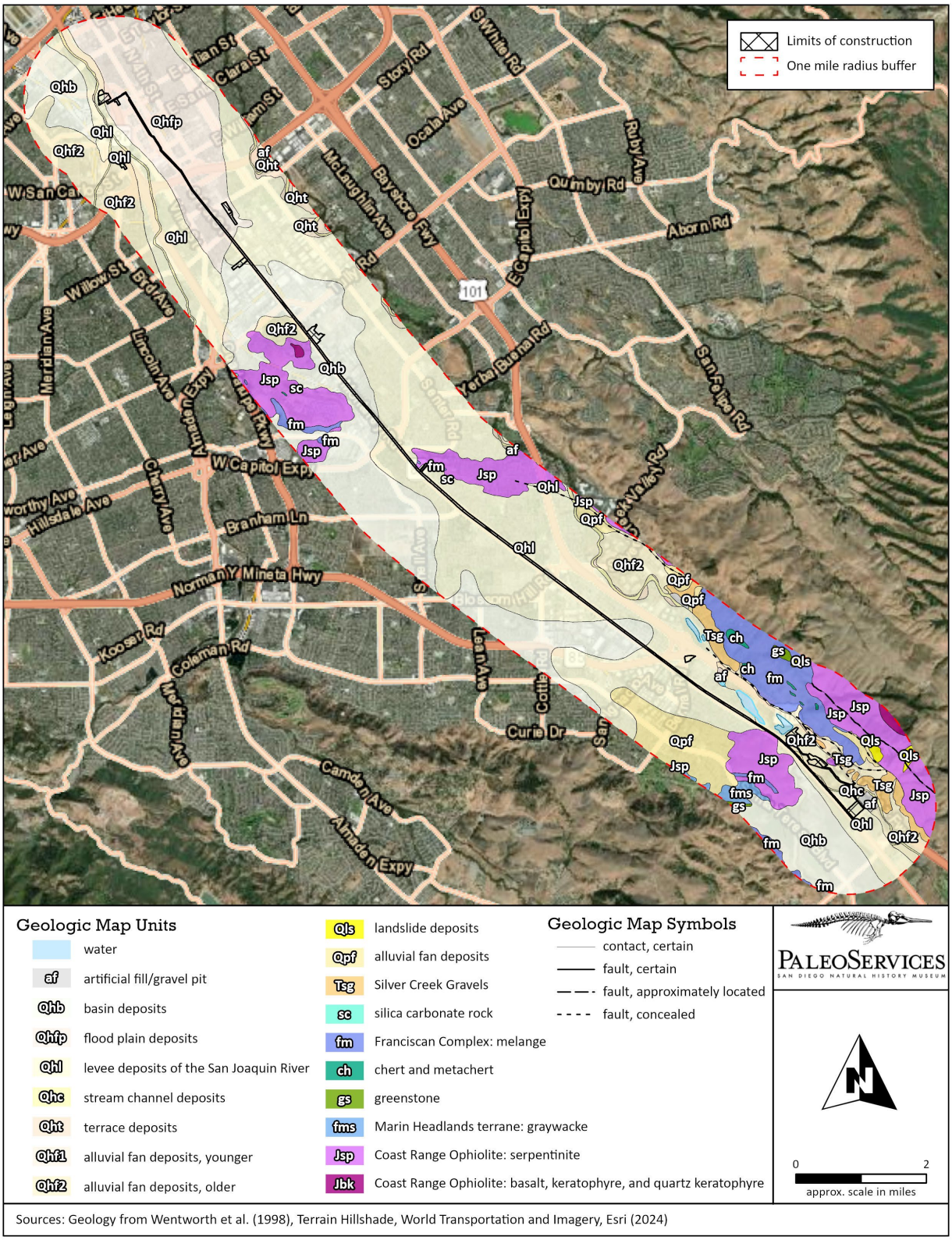

Figure 3. Overview geologic map of the Proposed Project alignment and vicinity.

3.1.2 Holocene alluvial and fluvial deposits

Holocene-age (generally less than 11,700 years old) sediments deposited in a variety of settings underlie the majority of the Proposed Project alignment at the surface (as mapped by Helley et al., 1994 and Wentworth et al., 1999). The mapped Holocene units include: basin deposits (associated with low-lying deposition alongside levees or flood plain deposits), natural levee deposits associated with the San Joaquin River, flood plain deposits, stream channel deposits, and alluvial fan deposits. Dibblee and Minch (2005), in contrast, map the entirety of this area as Holocene alluvial valley deposits, with low-sloping alluvial fan gravel and sand located near the foothills. The Holocene-age sediments in this area are generally unconsolidated and range in composition from clay, silty clay, clayey silt, and sandy silt to silty sand, sand, and sandy gravel with minor cobbles and boulders, depending on their depositional setting.

The records searches at the SDNHM and UCMP found no documented fossil collection localities from Holocene alluvial or fluvial deposits within a one-mile radius of Proposed Project components (SDNHM paleontological collections data; UCMP paleontological collections data).

The Holocene age of these deposits generally suggests that they are too young to contain fossil remains. However, it has been well documented in the south San Francisco Bay region that Pleistocene-age sedimentary deposits are present in the relatively shallow subsurface in this area (Maguire and Holroyd, 2016). The occurrence of Pleistocene-age fossils in the San Francisco Bay region is described in greater detail in the following section.

3.1.3 Pleistocene alluvial deposits

Pleistocene-age alluvial deposits are not mapped at the surface along the Proposed Project alignment, but prior discoveries of late Pleistocene-age (approximately 129,000 to 11,700 years old) fossil vertebrates within the Santa Clara Valley indicate that these deposits underlie Holocene-age alluvial and fluvial deposits at relatively shallow depths (Maguire and Holroyd, 2016). Maguire and Holroyd (2016) describe the fossil-bearing deposits in the Santa Clara Valley as variably consisting of silty sand hardpan with clay-lined cracks, silty sand, sand with lenses of clay, mud, and sandy gravel. As described by Helley et al. (1994), Pleistocene alluvial deposits exposed more broadly in the Santa Clara Valley consist of "a fining upward section of alluvial gravel, sand, silt, and clay overlain at the distal margin by estuarine mud" that is capped by a thick clayey soil horizon, over which Holocene sediments were deposited.

The records searches at the SDNHM and UCMP found no documented fossil collection localities from Pleistocene alluvial deposits within a one-mile radius of Proposed Project components (SDNHM paleontological collections data; UCMP paleontological collections data).

More broadly, however, Pleistocene-age vertebrate fossils have been documented within the Santa Clara Valley, as summarized by Maguire and Holroyd (2016). The nearest recorded Pleistocene vertebrate fossil localities are located approximately four miles northwest of the Skyline terminal site, along the Guadalupe River north of the San José Mineta International Airport (UCMP V99597 and UCMP V99891). These localities produced a partial skull and skeletal elements of a juvenile mammoth (*Mammuthus columbi*; discovered eroding out of the riverbed at a depth of 11 feet below the surface of the modern flood plain) and dental and skeletal elements of a variety of land mammals including horse (*Equus* sp.), pronghorn (*Capromeryx?* sp.), camel (*Camelops* sp.), bison (*Bison* sp.), Harlan's ground sloth (*Paramylodon harlani*), and an unidentified proboscidean. These vertebrate fossil remains were discovered in a mud layer approximately 20 to 40 feet downstream from the mammoth. Additional fossils have been recovered in Sunnyvale including a partial pelvis of mammoth (*Mammuthus* sp.) discovered at a depth of nine feet below ground surface [bgs] and remains of *Bison* sp., *Camelops* sp., *Equus* sp., an unidentified bear (Ursidae), squirrel (*Urocitellus beldingi*), and pocket gopher (*Thomomys*

sp.) discovered at unknown depths during sewer line excavations). Pleistocene-age fossils reported from Mountain View include remains of *Bison* sp., *Camelops* sp., deer *Odocoileus* sp., *Equus* sp., *Mammuthus columbi*, *Paramylodon harlani*, kangaroo rat (*Dipodomys* sp. cf. *D. heermanni*), and an unidentified geomyid rodent, all discovered at a depth of 23 feet bgs during landfill excavations). Pleistocene-age fossils reported from Palo Alto include remains of *Equus* sp., a felid, rabbit, squirrel, pack rat *Neotoma* sp., and harvest mouse *Reithrodontomys* sp., all discovered at unknown depths across several sites. Additional Bay Area Pleistocene fossil discoveries include a tusk of *Mammuthus* sp. discovered at a depth of seven feet bgs near Corte Madera Creek; and a humeral diaphysis of *Bison* sp. discovered at a depth of 22 feet bgs on the Stanford University campus during excavation for the Molecular and Genetic Medicine building. The 1909 recovery of a mastodon tooth *Mammut* sp. discovered at a depth of 33 feet bgs in the Santa Clara Valley has also been reported, but the actual location of the discovery site is unknown. Finally, an upper molar of *Bison* sp. was discovered at a depth of two feet bgs west of Milpitas near the Coyote Creek channel—however, the age of this occurrence is described as "Recent or Pleistocene" and is therefore only tentatively included here. Taken together with radiocarbon dates ranging from ~23,000 to 13,000 years old obtained from charcoal associated with two of the fossil localities, the mammalian taxa recovered from these localities indicate a late Rancholabrean North American Land Mammal Age (NALMA), which extends from ~240,000 to 11,700 years ago (Maguire and Holroyd, 2016).

3.1.4 Jurassic Coast Range Ophiolite complex - serpentinite

The Coast Range Ophiolite is a complex geologic unit representing oceanic crust and upper mantle rocks that formed during the Jurassic (170–155 million years ago) in association with an ancient sea floor spreading center (Bailey et al. , 1970; Dickinson et al., 1996). These rocks were subsequently accreted to the North American continental margin during closure of a forearc basin and underthrusting by rocks of the Franciscan subduction complex. The portion of the Coast Range Ophiolite underlying the Proposed Project alignment is mapped by both Wentworth et al. (1999) and Dibblee and Minch (2005) as serpentinite that has been hydrothermally metamorphosed from ultramafic igneous rocks. These rocks underlie two short segments of the Monterey Road to Skyline 320 kV DC transmission line: just west of staging yard 4 and just west of Metcalf Road.

The records searches at the SDNHM and UCMP found no documented fossil collection localities from rocks of the Coast Range Ophiolite complex within a one-mile radius of Proposed Project components (SDNHM paleontological collections data; UCMP paleontological collections data).

The plutonic igneous protolith and subsequent metamorphism of these rocks preclude the possible presence of identifiable fossil remains. Plutonic igneous rocks do not preserve fossils because they crystallize at extremely high temperatures and pressures several miles below the earth's surface in conditions that do not support complex life. The mineral composition of these rocks would have then altered during serpentinization, which is an exothermic process resulting from the absorption of water into ultramafic rocks and the oxidation of their component minerals.

3.2 Paleontological Resource Potential Analysis

Following the SVP (2010) criteria for determining paleontological potential, as outlined in Section 2.2, each of the geologic units present within the Proposed Project construction limits has been assigned a paleontological potential, as summarized in Table 1 below and depicted in Figure 4. Holocene alluvial and fluvial deposits are assigned a low potential based on their relatively young geologic age, but, as noted above in Sections 3.1.2 and 3.1.3, these deposits may be underlain at shallow depths by Pleistocene alluvial deposits. Pleistocene alluvial deposits are assigned a high paleontological potential based on the documented recovery of vertebrate fossil remains from these deposits at several locations

in the Santa Clara Valley. Because the depths of previously documented Pleistocene-age fossils in the Santa Clara Valley range between seven and 33 feet bgs, it is suggested that the Holocene–Pleistocene transition within the Proposed Project construction limits could occur at depths as shallow as seven feet bgs. Finally, artificial fill and rocks of the Coast Range ophiolite complex are both assigned no paleontological potential.

Table 1. Summary of paleontological potential of the geologic units underlying the Proposed Project site.

Geologic unit	Age (years old)	Paleontological potential
Artificial fill	Recent	No potential
Holocene alluvial and fluvial deposits	Holocene (less than 11,700)	Low potential
Pleistocene alluvial deposits	Late Pleistocene (129,000 to 11,700)	High potential
Coast Range ophiolite complex	Jurassic (170–155 million)	No potential

3.3 Paleontological Impact Analysis

As discussed above, the vast majority of the Proposed Project area is underlain by Holocene-age alluvial and fluvial deposits, which likely transition at depths as shallow as seven feet bgs to Pleistocene-age alluvial deposits. Two short segments of the Grove to Skyline 320 kV DC transmission line are underlain by serpentinized rocks of the Coast Range Ophiolite complex. In addition, artificial fill measuring up to seven feet thick is present within the Skyline terminal site and is also likely present elsewhere in the Proposed Project area in association with previous development and roadway construction. Impacts to paleontological resources may occur only during excavations that will disturb Pleistocene-aged alluvial deposits. Therefore, excavations extending less than seven feet deep in areas mapped as Holocene alluvial and fluvial deposits are unlikely to impact paleontological resources, while excavations extending greater than about seven feet bgs in these areas have the potential to impact paleontological resources. Excavations within rocks of the Coast Range Ophiolite complex or artificial fill will not impact paleontological resources.

Project components and construction methods, as currently proposed, will require varying degrees of ground disturbance, ranging from no or only superficial ground disturbance, to shallow excavation, to deeper excavation. The anticipated ground disturbance associated with each Proposed Project component and its potential to impact paleontological resources is outlined below and summarized in Table 2.

3.3.1 Substations

Earthwork proposed for substation construction at both the Skyline terminal and Grove terminal includes excavation for foundations, which will be constructed as a combination of deep, reinforced drilled shaft foundations and slab foundations with spread footings, and excavation for an oil containment system around the transformer.

- Grading and excavation for slab foundations supported on spread footings is anticipated to be shallow in nature and unlikely to impact paleontological resources.
- Excavation for deep, reinforced drilled shaft foundations is anticipated to extend up to 50 feet deep and excavation for the oil containment systems may also extend deeper than seven feet bgs. This deeper excavation has the potential to result in impacts to paleontological resources that can be successfully mitigated.

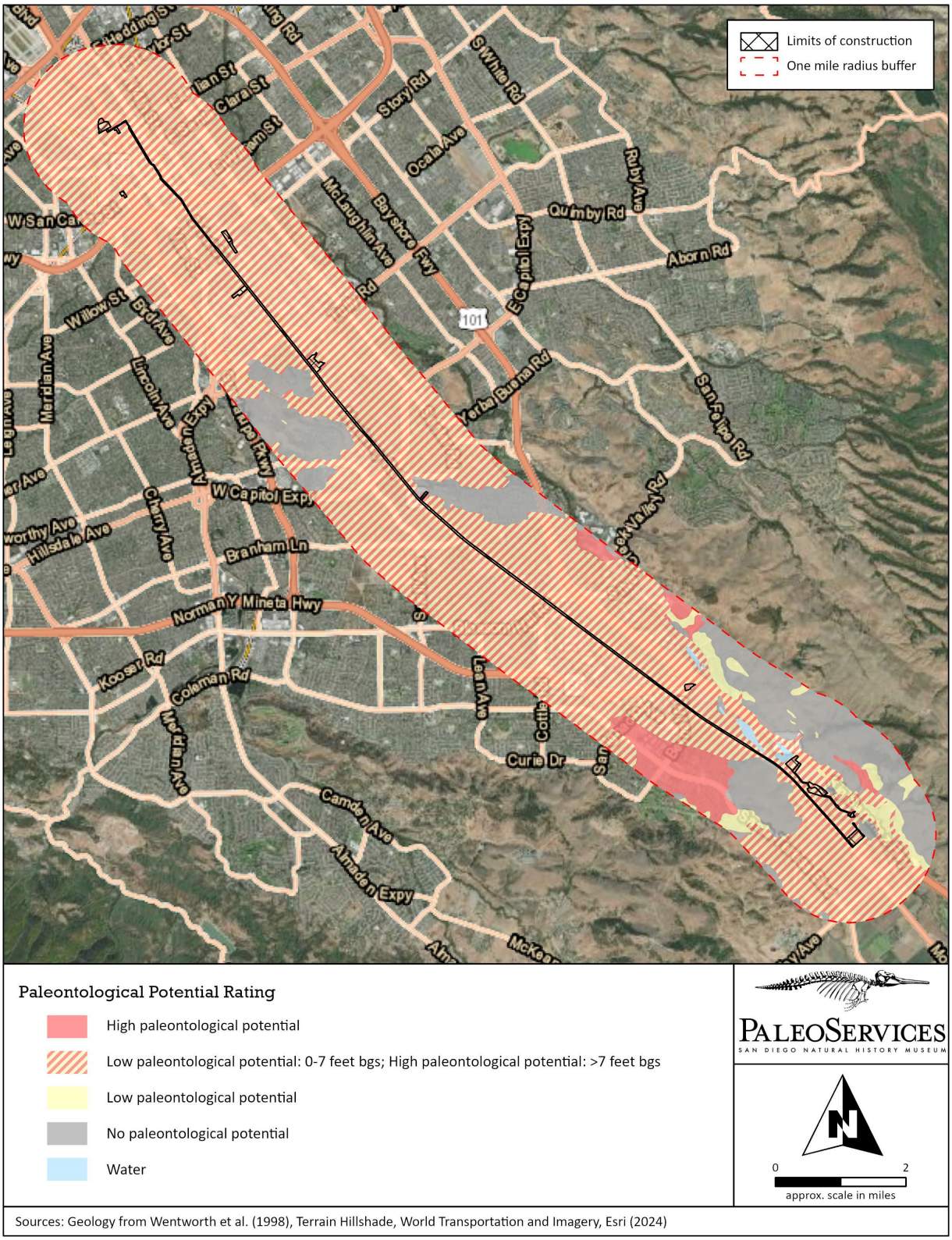

Figure 4. Paleontological potential map of the Proposed Project alignment and vicinity.

Table 2. Summary of anticipated ground disturbance associated with Proposed Project components and paleontological monitoring recommendations for this work.

Proposed Project component	Anticipated ground disturbance	Monitoring recommended?
Substations		
Grading and excavation for slab foundations or footings in new substations	Shallow excavation (<7 feet deep)	No
Excavation for transformer oil containment basins	Deeper excavation possibly extending >7 feet bgs	**Yes, if >7 feet bgs**
Excavation for drilled shaft foundations	Deep augering (up to 50 feet deep)	**Yes**
Grove terminal site: Removal of existing structures, perimeter fence, and capping of existing well	Minimal ground disturbance within previously disturbed deposits	No
Transmission Lines		
Trenching for underground transmission line duct bank	Shallow trenching (<5 feet deep)	No
Excavation for splice vaults	Deeper trenching (10 feet deep)	**Yes**
Jack-and-bore/HDD trenchless horizontal boring/drilling	Horizontal boring at depths of 10 feet or more	No, monitoring not feasible
Excavation of sending/receiving pits for trenchless techniques	Deeper excavation (10 to 15 feet deep)	**Yes**
Skyline to San Jose B 115 kV station tie line: installation of two TSPs	Deeper augering (15 to 60 feet deep)	**Yes**
Metcalf to Grove 500 kV transmission line: installation of steel substation termination structure	Deeper augering (15 to 60 feet deep)	**Yes**
Access Roads		
Access road widening and grading	Shallow grading (<7 feet deep)	No
Laydown Yards and Staging Areas		
Limited grading	Superficial and/or shallow grading (<7 feet deep)	No
Other Potentially Required Facilities		
Grove terminal: Removal of three existing wood poles	Excavation in previously disturbed deposits	No
Grove terminal: Installation of three new wood poles	Deeper augering (up to 20 feet deep)	**Yes**
Skyline terminal: trenching for new underground distribution line	Shallow trenching (<4 feet deep)	No
Modification of existing PG&E San Jose B and Metcalf substation facilities	Deeper augering (up to 50 feet deep)	**Yes**

At the proposed Grove terminal site, ground disturbance associated with removal of the existing structures and perimeter fence and capping of the existing well is anticipated to be shallow in nature and unlikely to impact paleontological resources.

3.3.2 Transmission Lines

Earthwork proposed for the underground portions of the Grove to Skyline 320 kV DC transmission line and the Metcalf to Grove 500 kV transmission line is anticipated to require open cut excavation of trenches measuring three feet wide by five feet deep and excavation for the installation of splice vaults measuring ten feet deep by eight feet wide by and 30 to 40 feet long.

- Trenching for underground transmission duct bank is anticipated to be limited to five feet or less in depth and is unlikely to impact paleontological resources.
- Excavation for splice vaults is anticipated to extend up to eight or nine feet in depth. This work has the potential to result in impacts to paleontological resources that can be successfully mitigated.

For the Grove to Skyline 320 kV DC transmission line, trenchless construction methods are proposed for several locations, and may involve the use of jack-and-bore or horizontal directional drilling (HDD) construction techniques to install conduit. The jack-and-bore technique involves concurrently pushing a casing pipe through the trenchless crossing and removing the spoils inside the casing with a rotating auger, with sending and receiving pits located on either side of the features to be crossed. The sending pit for the jack-and-bore will measure approximately 15 by 40 feet and the receiving pit will measure approximately 15 by 25 feet. HDD installation uses an auger with a drill and spray nozzle on the end to bore to a specific depth and route under an obstruction, with sending and receiving pits located on either side of the features to be crossed. The sending pit for the HDD will measure approximately ten by ten feet and the receiving pit will measure approximately ten by ten feet.

- For both the jack-and-bore and HDD techniques, horizontal boring/drilling eliminates the ability to observe the geographic and stratigraphic context of spoils produced during excavation for conduit. For this reason, impacts to paleontological resources are possible *but* cannot feasibly be mitigated.
- Excavation of the sending and receiving pits is anticipated to extend ten to 15 feet bgs. This work has the potential to result in impacts to paleontological resources that can be successfully mitigated.

For the Skyline to San Jose B 115 kV Station tie line, installation of two tubular steel poles is anticipated. The hole excavated for each pole is anticipated to measure approximately five to ten feet in diameter and 15 to 60 feet deep. This work has the potential to result in impacts to paleontological resources that can be successfully mitigated.

For the Metcalf to Grove 500 kV transmission line, the line will enter the substation underground and transition above ground at a steel substation termination structure installed on a concrete pier foundation. Excavation associated with this structure is anticipated to measure five to ten feet in diameter and approximately 15 to 60 feet deep. Excavation will extend to depths of 15 to 60 feet deep. This work has the potential to result in impacts to paleontological resources that can be successfully mitigated. One HDD crossing is planned under Coyote Creek. As outlined above, horizontal drilling may result in impacts to paleontological resources, but these impacts cannot feasibly be mitigated. However, the excavation of sending and receiving pits at either end of the HDD crossing has the potential to result in impacts to paleontological resources that can be successfully mitigated.

3.3.3 Access Roads

The Proposed Project will utilize existing access roads and also require construction of new access roads. Improvement of existing access roads and construction of new access roads may involve widening and grading of roads to accommodate construction equipment and O&M vehicles. This work is anticipated to be relatively shallow and is unlikely to impact paleontological resources.

3.3.4 Laydown Yards and Staging Areas

Preparation of laydown yards and staging areas is anticipated to involve clearing, grubbing, and limited grading. This work is anticipated to be superficial and/or shallow in nature and is unlikely to impact paleontological resources.

3.3.5 Other Potentially Required Facilities

Relocation of the existing overhead distribution line at the proposed Grove terminal site would involve removal of the above-ground and below-ground portions of three existing wood poles and installation of three new wood poles.

- Removal of the existing wood poles is anticipated to require some excavation primarily within backfilled deposits that were previously disturbed during pole installation, and is therefore unlikely to impact paleontological resources.
- Installation of the new wood poles to be direct buried is anticipated to require excavations extending up to 20 feet deep. This work has the potential to result in impacts to paleontological resources that can be successfully mitigated.

Installation of a new underground distribution line on the northern boundary of the Skyline terminal site is anticipated to require trenching measuring two feet wide and four feet deep. This work will be relatively shallow and is unlikely to impact paleontological resources.

Modification of the existing PG&E San Jose B and Metcalf substation facilities will require earthwork associated with construction of drilled and pier foundations, which could extend up to 50 feet deep. This work has the potential to result in impacts to paleontological resources that can be successfully mitigated.

4.0 Recommendations & Conclusions

For the Proposed Project, earthwork extending greater than seven feet bgs has the potential to impact paleontological resources preserved within Pleistocene-age alluvial deposits (Table 2, Figure 4). Development and implementation of a project-specific Paleontological Resources Mitigation and Monitoring Plan (PRMMP), as outlined in Applicant Proposed Measure (APM) PALEO-1 below, is recommended to mitigate potentially adverse impacts to paleontological resources during construction through the discovery, recovery, and conservation of any fossils that are unearthed during construction. APM PALEO-2 is recommended to account for any inadvertent discoveries made when a paleontological monitor is not on site.

Standard elements of a PRMMP include a description of the project earthwork to be monitored for paleontological resources (e.g., specific areas, depths of excavation, and/or project components), proposed methods for paleontological monitoring, procedures for fossil discoveries and determining the significance of a discovery, proposed field methods for fossil salvage, proposed laboratory methods for

preparation and curation of recovered fossils, reporting requirements, and a curatorial agreement with a designated regional repository.

The following measures are recommended for the Proposed Project. Implementation of these measures will reduce potential adverse impacts to paleontological resources to less that significant through the recovery and conservation of fossils that are unearthed during construction.

APM PALEO-1: Prior to the start of construction, a Qualified Paleontologist shall be retained to prepare and oversee the Paleontological Resources Mitigation and Monitoring Plan (PRMMP) for the Proposed Project. The PRMMP shall contain monitoring procedures, define areas and types of earthwork to be monitored, and provide methods for determining the significance of fossil discoveries. The PRMMP shall direct that a qualified paleontological monitor (working under the supervision of the Qualified Paleontologist) shall monitor all excavations or grading at depths exceeding seven feet bgs where potentially fossil-bearing alluvial deposits of Pleistocene age may be present. The duration and timing of paleontological monitoring shall be determined by the Qualified Paleontologist based on the construction plans and construction schedule, and may be modified based on the initial results of monitoring. The PRMMP shall state that any fossils that are collected shall be prepared to the point of curation, identified to the lowest reasonable taxonomic level, and curated into a recognized professional repository (e.g., SDNHM, UCMP), along with associated field notes, photographs, and compiled fossil locality data. Donation of the fossils shall be accompanied by financial support for initial specimen curation and storage.

Following the completion of the above tasks, the Qualified Paleontologist shall prepare a final mitigation report that outlines the results of the mitigation program. This report shall include discussions of the methods used, stratigraphic section(s) exposed, fossils collected, and significance of recovered fossils. The report shall be submitted to appropriate agencies, as well as to the designated repository.

APM PALEO-2: If paleontological resources are encountered during ground disturbing activities when the Qualified Paleontologist (or paleontological monitor) is not on site (an inadvertent discovery), earthwork within the vicinity of the discovery shall immediately halt, and the Qualified Paleontologist should evaluate the significance of the fossil discovery. If the fossil discovery is deemed significant, the fossil shall be recovered using appropriate recovery techniques based on the type, size, and mode of preservation of the unearthed fossil. Earthwork may resume in the area of the fossil discovery once the fossil has been recovered and the Qualified Paleontologist deems the site has been mitigated to the extent necessary.

5.0 References

Andersen, D.W., N.C. Shostak, K.M. Locke, N.P. Ramstetter, and E.P. Metzger. 2016. Composition of sediment records late Quaternary paleogeographic evolution of Santa Clara Valley, California. Geosphere 12(2), doi:10.1130/GES01259.1.

Bailey, E.H., M.C. Blake, Jr., and D.L. Jones. 1970. On-land Mesozoic oceanic crust in California Coast Ranges. U.S. Geological Survey Professional Paper 700-C: 70–81.

California Geological Survey. 2002. California Geomorphic Provinces. CGS Note 36. https://www.conservation.ca.gov/cgs/Documents/Publications/CGS-Notes/CGS-Note-36.pdf.

City of San José. 2011. Envision San José 2040 General Plan. Accessible at: https://www.sanjoseca.gov/home/showpublisheddocument/22359/637928744399330000.

Dibblee, T.W., and J.A. Minch. 2005. Geologic map of the San Jose East quadrangle, Santa Clara County, California. Dibblee Geological Foundation, Dibblee Foundation Map DF-155, scale 1:24,000.

Dickinson, W.R., C.A. Hopson, and J.B. Saleeby. 1996. Alternate origins of the Coast Range Ophiolite (California): introduction and implications. GSA Today 6: 1-10.

Helley, E.J., R.W. Graymer, G.A. Phelps, P.K. Showalter, and C.M. Wentworth. 1994. Quaternary geology of Santa Clara Valley, Santa Clara, Alameda, and San Mateo Counties, California. U.S. Geological Survey Open-File Report OF-94-231, scale 1:50,000.

Langan Treadwell Rollo. 2016. Geotechnical Feasibility Study, Rail Yard Place – 200 Ryland Street, San Jose, California, Langan Project No.: 770632401. Prepared for Insight Rail Yard, LLC, dated 23 August 2016.

Maguire, K.C., and P.A. Holroyd. 2016. Pleistocene vertebrates of Silicon Valley (Santa Clara County, California). PaleoBios 33: 1–14.

Murphey, P.C., G.E. Knauss, L. H. Fisk, T.A. Deméré, and R.E. Reynolds. 2019. Best practices in mitigation paleontology. San Diego Society of Natural History, Proceedings 47: 1-43.

SDNHM paleontological collections data, accessed by K. McComas on 1 June 2023.

Santa Clara County. 1994. Santa Clara County General Plan. Accessible at: https://plandev.sccgov.org/ordinances-codes/general-plan.

SVP. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf

UCMP paleontological collections data, accessed by P. Holroyd on 15 June 2023.

Wentworth, C.M., M.C. Blake, Jr., R.J. McLaughlin, and R.W. Graymer. 1999. Preliminary Geologic Map of the San Jose 30 X 60 Minute Quadrangle, California: A Digital Database. U.S. Geological Survey, Open File Report OF-98-795. Scale 1:100,000.