Appendix K

Paleontological Resource Assessment

Stantec

Paleontological Resource Assessment for the Perris Ramona Expressway and Perris Boulevard Warehouse Project, Riverside County, California

August 4, 2023

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Executive Summary

Stantec Consulting Services Inc. (Stantec) conducted a paleontological resources assessment on behalf of HELIX Environmental Planning, Inc. to support development of the Environmental Impact Report for the Perris Ramona Expressway and Perris Boulevard Warehouse Project (the Project) on portions of an approximately 45.7 acres of land located near the intersection of Ramona Expressway and North Perris Boulevard in Perris, Riverside County, California. This Project proposes to construct and operate a warehouse building with ancillary office uses.

The proposed Project is subject to compliance with the California Environmental Quality Act (CEQA) and City of Perris requirements regarding the Project's potential impacts on paleontological resources. As part of CEQA compliance, this paleontological resources assessment was conducted to assess potential impacts of the proposed Project on paleontological resources.

This paleontological resource investigation consisted of a museum records search from the Western Science Center in Hemet, Riverside County, California of the Project area and vicinity, as well as a review of the most recent geologic mapping and relevant scientific literature. This research was used to assign paleontological potential rankings of the Society of Vertebrate Paleontology (2010) to the geologic units mapped in the Project area, either at the surface or in the subsurface. The results of this assessment indicate that two geologic units are mapped at the surface in the Project area: young alluvial valley deposits, which are assessed as having low-to-high paleontological potential, increasing with depth; and very old alluvial fan deposits, which are assessed as having high paleontological potential. Project plans for ground disturbance were not available to Stantec, and so Stantec based the impacts assessment presented here on an assumption of an unquantified amount and type of ground disturbance. Ground disturbance into geologic units with high paleontological potential may encounter paleontological resources. In order to avoid impacts to paleontological resources, Stantec recommends the following mitigation activities for the Project:

1. A paleontologist meeting professional standards as defined by Murphey et al. (2019) shall be retained to oversee all aspects of paleontological mitigation, including the development and implementation of a Paleontological Monitoring and Mitigation Plan (PMMP) tailored to the Project plans that provides for paleontological monitoring of earthwork and ground disturbing activities into undisturbed geologic units with high paleontological potential to be conducted by a paleontological monitor meeting industry standards (Murphey et al. 2019). The PMMP should also include provisions for a Worker’s Environmental Awareness Program (WEAP) training that communicates requirements and procedures for the inadvertent discovery of paleontological resources during construction, to be delivered by the paleontological monitor to the construction crew prior to the onset of ground disturbance. The PMMP should be submitted to the City of Perris Planning Division for approval prior to the initiation of ground disturbance.

2. Full time paleontological monitoring will be implemented once excavations reach 5 feet in depth in areas mapped as young alluvial valley deposits. Full time paleontological monitoring will be conducted for all ground disturbance into previously undisturbed areas mapped as very old alluvial valley deposits. The project paleontologist may reduce the frequency of monitoring should subsurface conditions indicate low paleontological potential.

3. Should a potential paleontological resource be identified in the Project area, whether by the monitor or a member of the construction crew, work should halt in a safe radius around the find (usually 50 feet) until the project paleontologist can assess the find and, if significant, salvage the fossil for laboratory preparation and curation at the Western Science Center.

Based on the findings in this study and the implementation of the above mitigation measures, the proposed Project should not cause an adverse impact to paleontological resources. Therefore, no additional paleontological resource studies are recommended or required at this time. Changes to the Project plans or locations from those assessed in this study will require additional assessment for impacts to paleontological resources.

Abbreviations

ARB/IP	Air Reserve Base/Inland Port
CEQA	California Environmental Quality Act
City	City of Perris
County	Riverside County
Ma	Million years ago
PMMP	Paleontological Monitoring and Mitigation Plan
SVP	Society of Vertebrate Paleontology
WEAP	Worker's Environmental Awareness Program
WSC	Western Science Center

Glossary

Paleontological Monitor	A person meeting or exceeding the following qualifications: B.S. or B.A. degree in geology or paleontology and one year of experience monitoring in the state or geologic province of the specific project. An associate degree and/or demonstrated experience showing ability to recognize fossils in a biostratigraphic context and recover vertebrate fossils in the field may be substituted for a degree.
Paleontological Monitoring	Full-time observation of construction activities in high potential geologic units by a paleontological monitor, under supervision of the project paleontologist.
Paleontological Resource	Any evidence of ancient life. This includes the remains of the body of an organism, such as bones, skin impressions, shell, or leaves, as well as traces of an organism's activity, such as footprints or burrows, called trace fossils, and relevant associated geologic data. Also referred to as fossils.
Project Paleontologist	An individual who is recognized in the paleontological community as a professional and can demonstrate familiarity and proficiency with paleontology in a stratigraphic context, including fossil identification and recovery, with the equivalent of the following qualifications: a graduate degree in paleontology or geology, and/or a publication record in peer reviewed journals; demonstrated competence in field techniques, preparation, identification, curation, and reporting in the state or geologic province in which the project occurs; at least two full years professional experience as assistant to a Project Paleontologist with administration and project management experience; experience collecting vertebrate fossils in the field.

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) conducted a paleontological resources assessment on behalf of the HELIX Environmental Planning, Inc. (HELIX) to support development of the Environmental Impact Report (EIR) for the Perris Ramona Expressway and Perris Boulevard Warehouse Project (the Project) on portions of an approximately 45.7 acres of land located near the intersection of Ramona Expressway and North Perris Boulevard in Perris, Riverside County, California. This Project proposes to construct and operate a warehouse building with ancillary office uses.

The proposed Project is subject to compliance with the California Environmental Quality Act (CEQA) and City of Perris requirements regarding the Project's potential impacts on paleontological resources. As part of CEQA compliance, this paleontological resources assessment was conducted to assess potential impacts of the proposed Project on paleontological resources.

1.1 PROJECT DESCRIPTION

The proposed Project involves the approval of a Development Plan to allow the construction and operation of a warehouse building with ancillary office uses on 41.1 acres and future development of commercial retail/restaurant uses within an approximately 4.6-acre portion of the Project area. Warehouse development would occur within the central portion of the Project area while the southeastern corner of the site is planned for the future commercial development. While the future commercial uses proposed on-site would be consistent with the current commercial land use and zoning designation for the property, the proposed warehouse use would require an amendment to the Perris Valley Commerce Center Specific Plan land use plan and a zone change for that portion of the site to Light Industrial, under which warehouse facilities are a permitted use. The warehouse building would include 878,500 total square feet that includes 20,000 square feet of planned office area. The future commercial development would include up to 50,094 square feet of retail/restaurant uses. The Project would provide two automobile access driveways off Perris Boulevard with right-in/right-out access only, and two truck and automobile access driveways off Perry Street with full access (no turn restrictions). The proposed warehouse site plan includes 354 automobile parking stalls, 170 truck docks, and 213 trailer parking stalls. Bike racks would also be provided. Buildings would not exceed 50 feet in height. Stormwater would be accommodated through the City’s independent development of the planned Line E storm drain system along the southern boundary of the property, for which the Project would provide a fair-share contribution for its construction. Approximately 12.1 percent of the site would be landscaped.

1.2 PROJECT LOCATION

The Project is located in the City of Perris (City), in Riverside County (County), California, near the intersection of Ramona Expressway and North Perris Boulevard (Figure 1). The Project area consists of approximately 45.7 acres and contains disturbed vacant land that was previously used for agricultural purposes. The Project area is generally bounded by Ramona Expressway to the south, North Perris Boulevard to the west, Perry Street to the north, and Redlands Avenue to the east. The Project area is generally flat with elevations ranging between 1,450 and 1,460 feet above mean sea level, with stormwater runoff generally flowing to the southeast.

The Project site is located about 1.4 miles southeast of the March Air Reserve Base/Inland Port (ARB/IP) Airport and is located within the March ARB/IP Airport Influence Area Boundary and the City's Airport Overlay Zone. The Project site is located almost entirely within Airport Compatibility Zone D (Flight Corridor Buffer) with a small portion of the site located within Zone C1 (Primary Approach/Departure Zone). Specifically, the Project area is located in an unsectioned portion of the Perris, California U.S. Geological Survey 7.5-minute series topographic quadrangle.

1.3 PALEONTOLOGICAL RESOURCES

Paleontological resources, or fossils, are any evidence of ancient life. This includes the remains of the body of an organism, such as bones, skin impressions, shell, or leaves, as well as traces of an organism's activity, such as footprints or burrows, called trace fossils. In addition to the fossils themselves, geologic context is an important component of paleontological resources, and includes the stratigraphic placement of the fossil as well as the lithology of the rock in order to assess paleoecologic setting, depositional environment, and taphonomy. Fossils are protected by federal, state, and local regulations as nonrenewable natural resources.

While CEQA does not define a significance threshold for paleontological resources, the standards of the Society of Vertebrate Paleontology (SVP) are often used in the absence of a legal definition of significance. The SVP defines significant paleontological resources as:

> 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). [SVP 2010: 11].

It should be noted that the threshold for significance varies with factors including geologic unit, geographic area, and the current state of scientific research, and may also vary between different agencies (Murphey et al. 2019). Numerous paleontological studies have developed criteria for the assessment of significance for fossil discoveries (e.g., Eisentraut and Cooper 2002, Murphey et al. 2019,

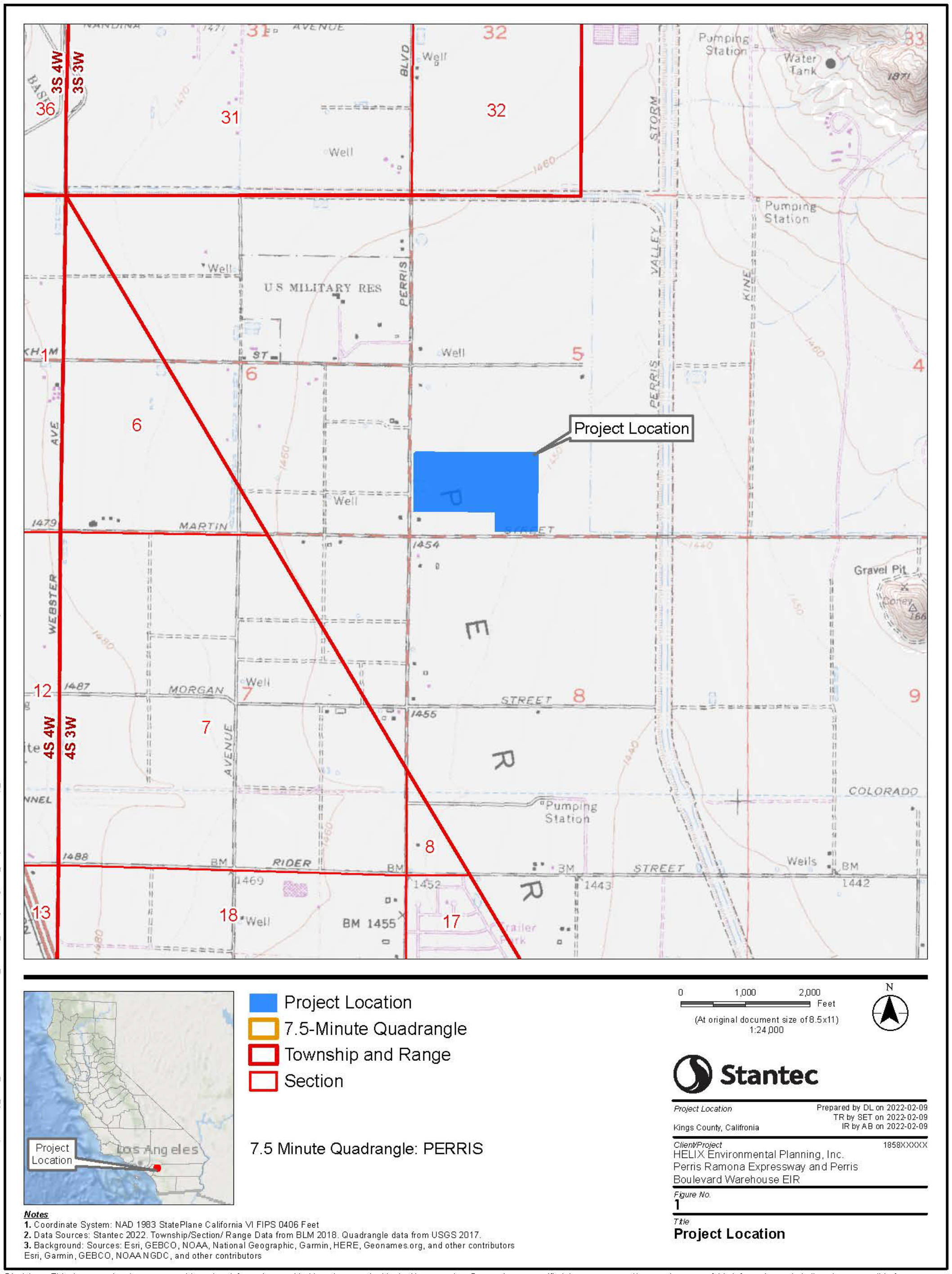

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Figure 1. Project location

Murphey and Daitch 2007, Scott and Springer 2003). In general, these studies assess fossils as significant if one or more of the following criteria apply:

- The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct.
- The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events, through biochronology or biostratigraphy and the correlation with isotopic dating.
- The fossils provide ecological data, such as the development of biological communities, the interaction between paleobotanical and paleozoological biotas, or the biogeography of lineages.
- The fossils demonstrate unusual or spectacular circumstances in the history of life.
- The fossils provide information on the preservational pathways of paleontological resources, including taphonomy, diagenesis, or preservational biases in the fossil record.
- The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.
- The fossils inform our understanding of anthropogenic affects to global environments or climate.

A geologic unit known to contain significant paleontological resources is considered sensitive to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit will either disturb or destroy fossil remains directly or indirectly. This definition of sensitivity differs fundamentally from the definition for archaeological resources as follows:

> It is extremely important to distinguish between archaeological and paleontological (fossil) resource sites when defining the sensitivity of rock units. The boundaries of archaeological sites define the areal extent of the resource. Paleontological sites, however, indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontological potential in each case. [SVP 2010: 2].

Many archaeological sites contain features that are visually detectable on the surface. In contrast, fossils are often contained within surficial sediments or bedrock and are therefore not observable or detectable unless exposed by erosion or human activity.

In summary, in the absence of observable paleontological resources on the surface, paleontologists must assess the potential of geologic units as a whole to yield paleontological resources based on their known potential to produce significant fossils elsewhere. Monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if these remains are significant, successful mitigation and salvage efforts may be undertaken to prevent adverse impacts to these resources.

2.0 REGULATORY FRAMEWORK

California and Riverside County have enacted multiple laws and regulations that provide for the protection of paleontological resources. This investigation was conducted to meet these requirements regarding paleontological resources on the lands proposed for development.

2.1 STATE OF CALIFORNIA

2.1.1 California Environmental Quality Act

CEQA (Public Resources Code Sections 21000 et seq) requires that before approving most discretionary projects, the Lead Agency must identify and examine any significant adverse environmental effects that may result from activities associated with such projects. As updated in 2016, CEQA separates the consideration of paleontological resources from cultural resources (Public Resources Code Section 21083.09). The Appendix G checklist (Title 14, Division 6, Chapter 3, California Code of Regulations [CCR] 15000 et seq.) requires an answer to the question, "Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" Under these requirements, Stantec has conducted a paleontological resources assessment to determine impacts of the proposed project on paleontological resources within the Project area.

2.1.2 Public Resources Code

The California Public Resources Code (PRC) (Chapter 1.7, Sections 5097 and 30244) includes additional state-level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, define the removal of paleontological sites or features from state lands as a misdemeanor, and prohibit the removal of any paleontological site or feature from state land without permission of the applicable jurisdictional agency.

2.2 LOCAL REGULATIONS

2.2.1 City of Perris

The City of Perris (2005) has developed paleontological sensitivity mapping that divides the City into five regions for the purpose of developing paleontological mitigation recommendations. The Project is located in Area 1 and Area 4 on this map (City of Perris 2005: Exhibit CN-7). The Conservation Element of the

City of Perris (2005) General Plan includes a Goal for the protection of historical, archaeological and paleontological sites (Goal IV). This goal is supported by Policy IV.A, which requires compliance with state and federal regulations to ensure preservation of significant historical, archaeological, and paleontological resources. There are several implementation measures for this policy, the following of which pertain to paleontological resources:

- IV.A.1 For all private and public projects involving new construction, substantial grading, or demolition, including infrastructure and other public service facilities, staff shall require appropriate surveys and necessary site investigations in conjunction with the earliest environmental document prepared for a project.
- IV.A.4 In Area 1 and Area 2 shown on the Paleontological Sensitivity Map (Exhibit CN-7), paleontologic monitoring of all projects requiring subsurface excavations will be required once any excavation begins. In Areas 4 and 5, paleontologic monitoring will be required once subsurface excavations reach five feet in depth, with monitoring levels reduced if appropriate, at the discretion of a certified Project Paleontologist.
- IV.A.6 Create an archive for the City wherein all surveys, collections, records and reports can be centrally located.

3.0 PROFESSIONAL STANDARDS

The SVP (2010), the Bureau of Land Management (2016) and a number of scientific studies (Eisentraut and Cooper 2002, Murphey et al. 2019, Scott and Springer 2003) have developed guidelines for professional qualifications, conducting paleontological assessments, and developing mitigation measures for the protection of paleontological resources. These guidelines are broadly similar, and include the use of museum records searches, scientific literature reviews, and, in some cases, field surveys to assess the potential of an area to preserve paleontological resources. Should that potential be high, accepted mitigation measures include paleontological monitoring, data recordation of all fossils encountered, collection and curation of significant fossils and associated data, and in some cases screening of sediment for microfossils.

This study has been conducted in accordance with these guidelines and the recommendations provided herein meet these standards.

4.0 GEOLOGIC SETTING

The Project area is located in the Peninsular Ranges geomorphic province. The Peninsular Ranges formed as a volcanic island arc collided with the west coast of North America and was accreted onto the margin of the continent, resulting in the expansion of the continent westward. The Peninsular Ranges are part of a larger subduction zone that extends all along western North America, with this particular geomorphic province extending from the Los Angeles Basin in the north to Baja in the south, and extending to Santa Catalina, Santa Barbara, San Nicolas, and San Clemente Islands on the west and the Colorado Desert on the east (Norris and Webb 1990). The core of the Peninsular Ranges formed as the core of a magmatic arc in the Mesozoic that resulted from active subduction along the Pacific Plate boundary (Harden 2004).

The plutonic rock that forms the core of the Peninsular Ranges was emplaced in the west 140 Ma to 105 million years ago (Ma) and consists of mafic plutonic rocks, while the eastern batholith was emplaced 99 Ma to 92 Ma and consist of silica-rich granodiorites and tonalities (Kimbrough et al. 2001). These plutonic rocks intruded into the older rocks of a Paleozoic carbonate platform, heavily metamorphosing them (Harden 2004). There was volcanic activity associated with the subduction zone as well, with the Santiago Peak Volcanics deposited from 130 – 120 Ma as primarily andesitic and silicic flows, that were then metamorphosed by the ongoing batholith emplacement (Fife et al. 1967). Later in the Cretaceous, marine sedimentary rocks accumulated over the plutons and volcanic rocks, deposited as turbidity currents in what was an ocean at the time (Kimbrough et al. 2001). These rocks are in turn overlain by more recent sedimentary deposits leading up to the present day, that have been heavily uplifted and faulted by tectonic activity throughout the Cenozoic. These deposits were marine through the Eocene and then shifted to terrestrial volcanic and sedimentary strata by the Oligocene and lower Miocene (Powell 1993).

Locally, the Project area is in the Perris Valley, a truncated upland, or peneplain, located in the central portion of the Perris Block, a relatively structurally stable core of Cretaceous granitic rocks and the older, intruded metasediments of the Paleozoic carbonates bounded on the west by the Chino Fault and on the east by the San Jacinto Fault Zone (Kistler et al. 2003). The Perris Valley is surrounded by highlands, the closest of which are the San Jacinto Mountains to the west of the Project area, which have been shedding sediment into the Valley as they have been uplifted. The Perris Valley can be characterized as small granitic mountains and uplands surrounded by broad alluvial plains.

5.0 METHODOLOGY

The paleontological resource assessment reported herein consisted of a records search from the Western Science Center (WSC) as well as a review of the relevant scientific literature and the most recent geologic mapping. To assess if paleontological resources are likely to be encountered in any given area, the paleontological potential of the geologic units present in the area is assessed. Paleontological potential of a geologic unit consists of both (a) the potential for yielding abundant vertebrate fossils or for yielding significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data (SVP 2010). Unlike archaeological resources that often have a limited aerial extent, paleontological resources may occur throughout a geologic unit, and so paleontological potential is assessed for the unit as a whole. Provided below is the methodology used during the current study to assess the potential of the Project to impact paleontological resources.

5.1 RECORDS SEARCH

A records search of the Project area and vicinity was requested from the WSC on February 10, 2022, with the results received from the WSC on February 23, 2022. The search returned the closest known paleontological localities of the WSC to the Project area from geologic units that are present at the Project area, either at the surface or in the subsurface.

5.2 SCIENTIFIC LITERATURE REVIEW

In order to assess the paleontological potential of the Project area, the most recent geologic mapping was consulted to identify all geologic units present at the surface or likely present in the subsurface. The scientific literature was then consulted to determine the history of each of these units for preserving paleontological resources.

5.3 PALEONTOLOGICAL RESOURCES ASSESSMENT

The results of the museum records search and the scientific literature review were used to assign the paleontological potential rankings of the SVP (2010) to the geologic units present in the Project area. These rankings are designed to inform the development of appropriate mitigation measures for the protection of paleontological resources and are widely accepted as industry standards in paleontological mitigation (Murphey et al. 2019, Scott and Springer 2003). These rankings are as follows:

> **High Potential.** Rock 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. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations that are temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.), some volcaniclastic formations (e. g., ashes or tephras), and some low-grade metamorphic rocks.
>
> **Undetermined Potential**. Rock units for which little information is available in the literature or museum records concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study and field work is necessary to determine if these rock units have high or low potential to contain significant paleontological resources.

Low Potential. Rock units that are poorly represented by fossil specimens in institutional collections or, based on general scientific consensus, only preserve fossils in rare circumstances (e. g., basalt flows or Recent colluvium) have low paleontological potential.

No Potential. Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites).

5.4 PALEONTOLOGICAL RESOURCES IMPACTS ASSESSMENT

Impacts to paleontological resources can be classified as direct, indirect, or cumulative. Impacts can also be considered as adverse impacts or as positive impacts. Direct adverse impacts on paleontological resources are the result of damage or destruction of these nonrenewable resources by surface disturbing actions including construction excavations. Therefore, in areas that contain paleontologically sensitive geologic units, ground disturbance has the potential to adversely impact paleontological resources, by damaging or destroying them and rendering them permanently unavailable to science and society. Positive direct impacts, however, may result when paleontological resources are identified during construction and the appropriately documented and salvaged, thus ensuring the specimens are protected for future study and education.

Indirect adverse impacts typically include those effects which result from the continuing implementation of management decisions and resulting activities, including normal ongoing operations of facilities constructed within a given project area. They also occur as the result of the construction of new roads and trails in areas that were previously less accessible. This increases public access and therefore increases the likelihood of the loss of paleontological resources through vandalism and unlawful collecting, thus constituting an adverse indirect impact. Human activities that increase erosion also cause indirect impacts to surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Cumulative adverse impacts can result from incrementally minor but collectively significant actions taking place over time. The incremental loss of paleontological resources over time from construction-related surface disturbance or vandalism and unlawful collection would represent a significant cumulative adverse impact because it would result in the destruction of non-renewable paleontological resources and the associated irretrievable loss of scientific information.

Positive impacts can result from the preservation of significant paleontological resources identified during construction, a direct impact, or following Project activities, an indirect impact. By successfully identifying, salvaging, and curating significant paleontological resources in a federally accredited repository, they are preserved in perpetuity and may contribute to scientific understanding and public education and awareness.

The impact assessment conducted here takes into consideration all planned project activities in terms of aerial and subsurface extents, including the possibility of subsurface geologic units having a different paleontological potential than surficial units. For example, younger surficial sediments (alluvium, lacustrine, eolian, etc.) have low potential to preserve paleontological resources due to their age; yet sediments increase in age with depth and so these surficial deposits often overly older units that have high paleontological potential. In areas with this underlying geologic setting surficial work may be of low risk for impacting paleontological resources while activities that require excavations below the depth of the surficial deposits would be at greater risk of impacting paleontological resources. For this reason the impact assessment takes into consideration both the surface and subsurface geology, and is tailored to Project activities as much as possible.

6.0 RESULTS

The results of the paleontological potential assessment are described below.

6.1 PROJECT AREA GEOLOGY

Geologic mapping by Morton et al. (2003) indicates the surface of the project area consists of two geologic units: young alluvial valley deposits, present in the eastern Project area; and very old alluvial fan deposits, present in the western Project area (Figure 2). These geologic units range in age from the Recent to the middle to early Pleistocene (up to 11,700 years old) (Figure 2) and are described below.

> **Young alluvial valley deposits (Qya in Figure 2).** Young alluvial valley deposits are mapped at the surface in the eastern half of the Project area (Morton et al. 2003). These sediments consist of unconsolidated silty sand that dates to the Holocene and late Pleistocene (Morton et al. 2003), deposited roughly during the last 129,000 years. These sediments are likely underlain by very old alluvial valley deposits (described below), which are mapped at the surface in the western Project area and therefore may be present at shallow depths in the subsurface in areas mapped as young alluvial valley deposits.
>
> **Very old alluvial fan deposits (Qvof in Figure 2).** Very old alluvial fan deposits are mapped at the surface in the western half of the Project area (Morton et al. 2003) and are likely present in the subsurface across the entire Project area, underlying young alluvial valley deposits in the eastern Project area at an unknown but possibly shallow depth. These sediments are similar to the young alluvial valley deposits in lithology but tend to be well indurated and moderately to well dissected with duripans and silcretes present in some layers (Morton et al. 2003). These sediments date from the middle to early Pleistocene (Morton et al. 2003), deposited from 129,000 years to 2.5 Ma.

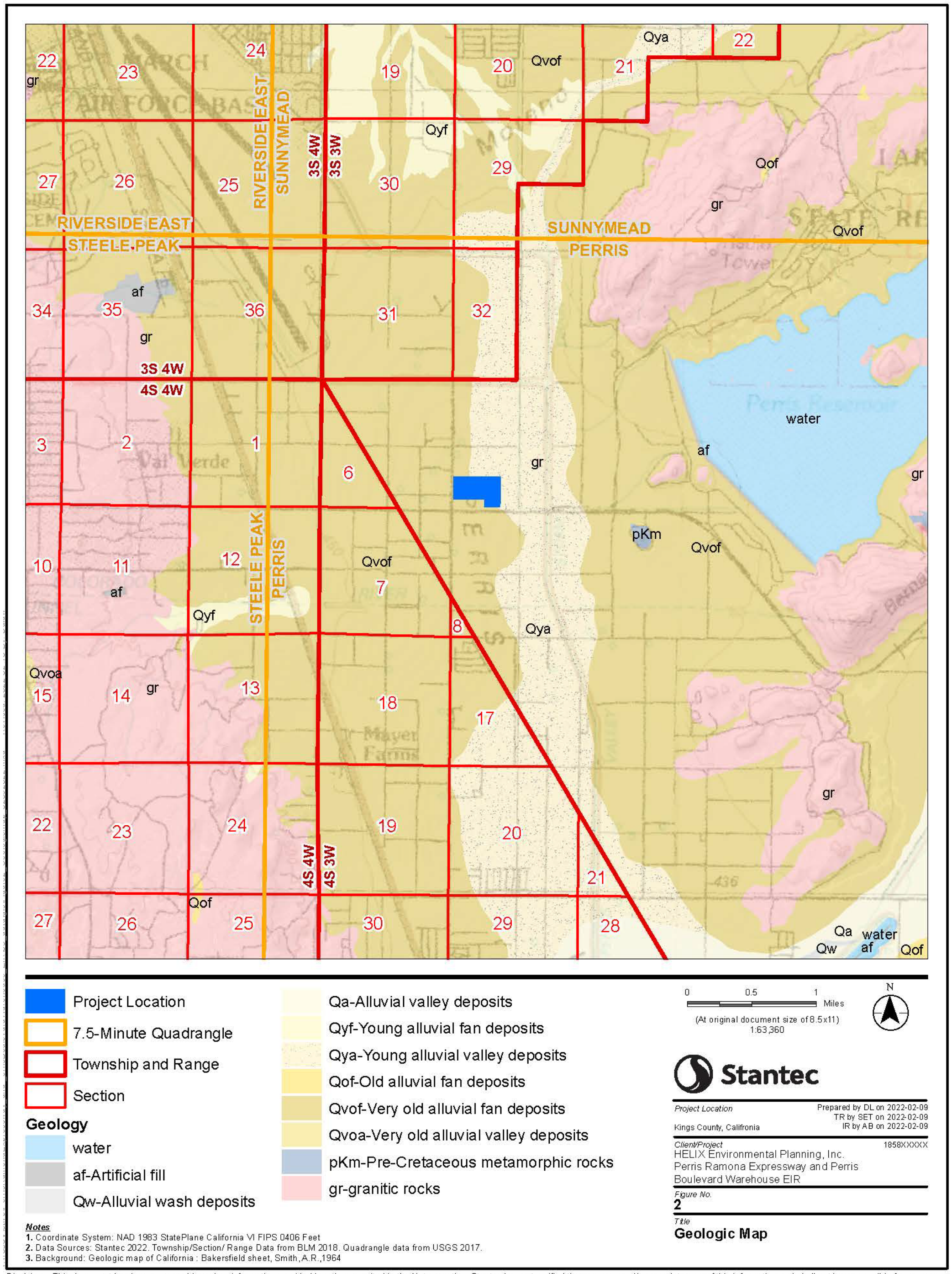

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Figure 2. Geologic map of the Project area

6.2 PALEONTOLOGICAL POTENTIAL OF GEOLOGIC UNITS IN THE PROJECT AREA

In order to assess the potential of the geologic units present at the surface or in the subsurface to preserve paleontological resources, Stantec conducted a review of the relevant scientific literature and requested a records search from the WSC. The results of this investigation are described below for each of the geologic units in the Project area (Table 2).

Young alluvial valley deposits (Qya in Figure 2). Young alluvial valley deposits present in the Project area date from the Holocene to the latest Pleistocene, and as such they may be up to 129,000 years in age. As defined by the SVP (2010), paleontological resources must be over 5,000 years in age, corresponding to the middle part of the Holocene. Therefore, the young alluvial valley deposits in the Project area are too young at the surface to preserve paleontological resources but increase in age with depth, such that deeper layers are expected to exceed 5,000 years in age and therefore be of an age to preserve paleontological resources.

The WSC indicated they do not have any localities documented from within one mile of the Project area (WSC 2022). A review of the scientific literature indicates that across Riverside County and neighboring Los Angeles County indicates that Pleistocene fossils representing a rich Ice Age fauna are often found in similar sediments. These include animals still found in North America today, such as deer, bison, sheep, and horses; creatures now absent in North America, such as camels, lions, cheetahs, and sloths; and extinct creatures such as mammoths, dire wolves, and saber-toothed cats (Jefferson 1991 a and b, Graham and Lundelius 1994, McDonald and Jefferson 2008, Miller 1971, Reynolds and Reynolds 1991). In addition to these iconic large animals, a wide variety of small animals can be preserved as well, including reptiles such as frogs, salamanders, snakes (Hudson and Brattstrom 1977), and birds (Collins et al. 2018, Jones et al. 2008; Miller 1937, 1941). These fossils are important for recreating the history of Southern California, in particular studying climate change (e.g., Roy et al. 1996), extinction (e.g., Barnosky et al. 2004, Jones et al. 2008, Sandom et al. 2014, Scott 2010), and paleoecology (e.g., Connin et al. 1998).

An exceptional example of fossil preservation in Pleistocene-aged sediments is located about 15 miles southeast of the Project area, where nearly 100,000 identifiable fossil specimens representing 105 vertebrate, invertebrate, and plant species were collected from over 2,000 individual localities during the construction of the dam at Diamond Valley Lake (Springer et al. 2009), and are now housed at the WSC in Hemet, California. This site represents the second largest late Pleistocene fossil assemblage, after the La Brea Tar Pits in Los Angeles, known from the American southwest (Springer et al. 2009).

Given the extensive record of significant fossils recovered from the older layers of alluvial sediments, the young alluvial valley deposits in the Project area are here assessed as having low-to-high paleontological potential, increasing with depth. The exact depth at which the transition from low to high paleontological potential occurs in the subsurface of the eastern Project area is unknown. However, given the presence of very old alluvial fan deposits at the surface in the western Project area, high potential sediments may be quite close to the surface. Research on the distribution of Pleistocene localities in the region indicates these sediments may be present at depths of 5 feet below ground surface (bgs) (Jefferson et al. 1991a, b; Miller 1971; Reynolds 1989; Reynolds and Reynolds 1991).

Very old alluvial fan deposits (Qvof in Figure 2). Very old alluvial fan deposits date from the middle to early Pleistocene, deposited from 129,000 years to 2.5 Ma, making this unit old enough to preserve paleontological resources. These sediments are similar to the deeper, Pleistocene-aged layers of the young alluvial valley deposits described above, and as such preserve the same types and abundance of fossils. Given this extensive record of significant fossils recovered from Pleistocene-aged alluvial sediments, this unit is assessed as having high paleontological potential.

Table 1 Paleontological potential of geologic units within the Project area

Geologic Unit (map abbreviation)	Age	Occurrence within Project area	Paleontological Potential*
Young alluvial valley deposits (Qya)	Holocene – late Pleistocene	Surface, eastern Project area	Low to high, increasing with depth
Very old alluvial fan deposits (Qvof)	Middle – early Pleistocene	Surface, western Project area; subsurface, entire Project area	High

**ranking based on the SVP (2010) classifications*

6.3 PALEONTOLOGICAL RESOURCES IMPACTS ASSESSMENT

The paleontological potential assessment presented above indicates that the Project area includes two geologic units: young alluvial valley deposits, which are assessed as having low-to-high paleontological potential, increasing with depth and are found at the surface in the eastern Project area; and very old alluvial fan deposits, which are assessed as having high paleontological potential and are mapped at the surface in the western Project area and present in the subsurface throughout the Project area. Should paleontological resources preserved in the high potential very old alluvial fan deposits be impacted by Project activities it would constitute a direct adverse impact under CEQA. Therefore, an impacts assessment was conducted to evaluate planned Project activities and their likelihood to pose an adverse impact to paleontological resources.

The Project plans to construct and operate a warehouse building with ancillary office uses. While Project plans were not available for inclusion in this assessment, this work will likely include ground disturbance in some form. Activities that require ground disturbance that will extend into geologic units with high paleontological potential are at risk of posing an adverse impact to paleontological resources.

Following construction, operation of the facility is not anticipated to involve further ground disturbance into previously undisturbed sediments, and so is unlikely to risk impacting paleontological resources.

Because this Project has the potential to cause direct adverse impacts to paleontological resources, Stantec has developed recommendations for mitigating these impacts, presented below.

7.0 RECOMMENDATIONS AND MANAGEMENT CONSIDERATIONS

As part of the current paleontological assessment, a records search from the WSC and a review of geologic mapping and the scientific literature were conducted in order to assess the potential of the geologic units in the Project area to preserve paleontological resources.

Project activities may include ground disturbance. This assessment indicates that geologic units with high paleontological potential are present at the surface in the western Project area and in the subsurface in the eastern Project area at undetermined depths. For the eastern Project area, no mitigation is recommended for activities under 3 feet bgs in depth. Spot checks are recommended for excavations between 3 feet and 5 feet bgs, with full time monitoring recommended once high potential sediments are encountered, or excavation depths reach 5 feet bgs. In the western Project area full time monitoring is recommended for all ground disturbance that exceeds the depth of previous disturbance. These recommendations are summarized in Table 2.

Table 2. Summary of paleontological potential and mitigation recommendations

Location within Project Area	Geology	Paleontological Potential	Mitigation Recommendations
Eastern Project area	Young alluvial valley deposits overlying very old alluvial fan deposits	0-5 feet: low Over 5 feet: high	0-5 feet: Monitoring not needed Over 5 feet: fulltime monitoring
Western Project area	Very old alluvial fan deposits	High	Fulltime monitoring

**ranking based on the SVP (2010) classifications*

Should project-related activities encounter paleontological resources, the damage or destruction of those resources would constitute an adverse impact under CEQA. In order to adhere to State and County-wide guidelines regarding paleontological resources, Stantec recommends the following:

1. A paleontologist meeting professional standards as defined by Murphey et al. (2019) shall be retained to oversee all aspects of paleontological mitigation, including the development and implementation of a Paleontological Monitoring and Mitigation Plan (PMMP) tailored to the Project plans that provides for paleontological monitoring of earthwork and ground disturbing activities into undisturbed geologic units with high paleontological potential to be conducted by a paleontological monitor meeting industry standards (Murphey et al. 2019). The PMMP should also include provisions for a Worker's Environmental Awareness Program (WEAP) training that communicates requirements and procedures for the inadvertent discovery of paleontological resources during construction, to be delivered by the paleontological monitor to the construction crew prior to the onset of ground disturbance. The PMMP should be submitted to the City of Perris Planning Division for approval prior to the initiation of ground disturbance.

2. Full time paleontological monitoring will be implemented once excavations reach 5 feet in depth in areas mapped as young alluvial valley deposits. Full time paleontological monitoring will be conducted for all ground disturbance into previously undisturbed areas mapped as very old alluvial valley deposits. The project paleontologist may reduce the frequency of monitoring should subsurface conditions indicate low paleontological potential.

3. Should a potential paleontological resource be identified in the Project area, whether by the monitor or a member of the construction crew, work should halt in a safe radius around the find (usually 50 feet) until the project paleontologist can assess the find and, if significant, salvage the fossil for laboratory preparation and curation at the Western Science Center.

These recommendations meet the standards of the SVP (2010) and conform to industry best practices (e.g., Murphey et al. 2019; Scott and Springer 2003). Based on the findings in this study the proposed Project will not cause an adverse impact to paleontological resources with the incorporation of the above mitigation recommendations. Therefore, no additional paleontological resources studies are recommended or required at this time. Should the Project location or plans change, this assessment will need to be revised to address those changes.

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APPENDIX A

Western Science Center Paleontological Records Search Results

WESTERN SCIENCE CENTER

February 23, 2022

Stantec
Alyssa Bell, Ph.D.
300 N Lake Avenue, #400
Pasadena, CA 91101

Dear Dr. Bell,

This letter presents the results of a record search conducted for the Ramona Expressway and Perris Boulevard Warehouse Project in the city of Perris, Riverside County, California. The project area is located south of Markham Street, east of Perris Boulevard, west of Redlands Avenue and north of Ramona Expressway in Section 5, Township 4 South, Range 3 West on the *Perris, California* USGS 7.5 minute quadrangle.

The geologic units underlying this project are mapped entirely as alluvial fan and valley deposits dating from the early Pleistocene to Holocene epoch (Morton, Bovard and Alvarez, 2003). Pleistocene alluvial units are considered to be of high paleontological sensitivity. While the Western Science Center does not have localities within the project area or within a 1 mile radius, there are multiple fossil localities in similarly mapped sediments from throughout Riverside County. Pleistocene alluvial units are known to produce megafauna including mastodons (*Mammut pacificus*), mammoths (*Mammuthus columbi*), horses (*Equus sp*.), sabertooth cats (*Smilodon fatalis* and *Smilodon gracilis*) and many others.

Any fossils recovered from the Ramona Expressway and Perris Boulevard Warehouse Project area would be scientifically significant. Excavation activity associated with development of the area has the potential to impact the paleontologically sensitive Pleistocene units and it is the recommendation of the Western Science Center that a paleontological resource mitigation plan be put in place to monitor, salvage, and curate any recovered fossils associated with the current study area.

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