

Appendix G

Paleontological Resources Assessment



memorandum

date July 15, 2020

to Justin Gamble
City of Oceanside – Water Utilities
300 N Coast Hwy
Oceanside, CA 92054

from Candace Ehringer and Michael Vader
Environmental Science Associates

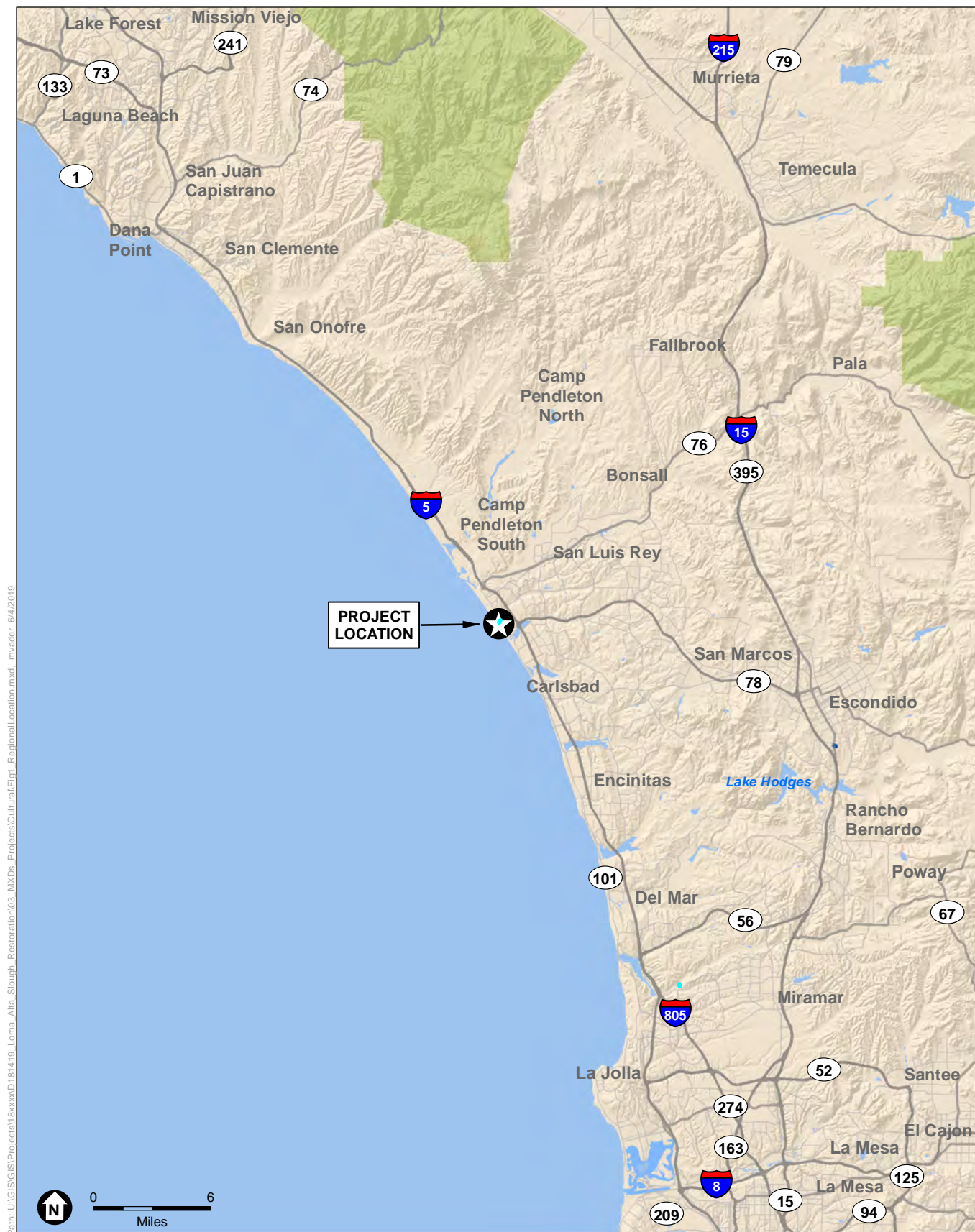
subject Paleontological Resources Assessment for the Loma Alta Slough Wetland Restoration Project,
City of Oceanside, California

The City of Oceanside (City) has retained Environmental Science Associates (ESA) to prepare a Paleontological Resources Assessment for the Loma Alta Slough Wetland Rehabilitation Project (Project) in support of an Initial Study/Mitigated Negative Declaration (ISMND) pursuant to the California Environmental Quality Act (CEQA). The Project proposes the expansion of the existing coastal wetland habitat within Loma Alta Slough to restore its functional value and accommodate public use through trails, educational signage and linkage with public transportation. Enlargement and modification of the Slough's wetlands is expected to support coastal wildlife, improve water quality, buffer peak storm flows and plan for sea level rise. The City is the lead agency pursuant to CEQA.

This paleontological resources assessment was conducted to identify unique geological features and paleontological resources that could be impacted by proposed Project activities and to assess the proposed Project area's paleontological sensitivity. This assessment is based on an analysis conducted in 2015 for the Loma Alta Slough Vector Habitat Remediation Project (Remediation Project), which encompasses the entirety of the current Project area and included a paleontological resources records search conducted by the San Diego County Natural History Museum (SDNHM) and a review of published geologic mapping and scientific literature.

Project Location and Description

The Project area is located within the City of Oceanside, in northern San Diego County (**Figure 1**). Specifically, the Project is bounded by South Pacific Street to the west, South Coast Highway to the east, the La Salina wastewater treatment plant to the north, and Loma Alta Creek and Buccaneer Beach Park to the south. The Project is located within Section 35 of the San Luis Rey 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle (**Figure 2**).



SOURCE: ESRI

Loma Alta Slough Wetland Restoration Project

Figure 1
Regional Location



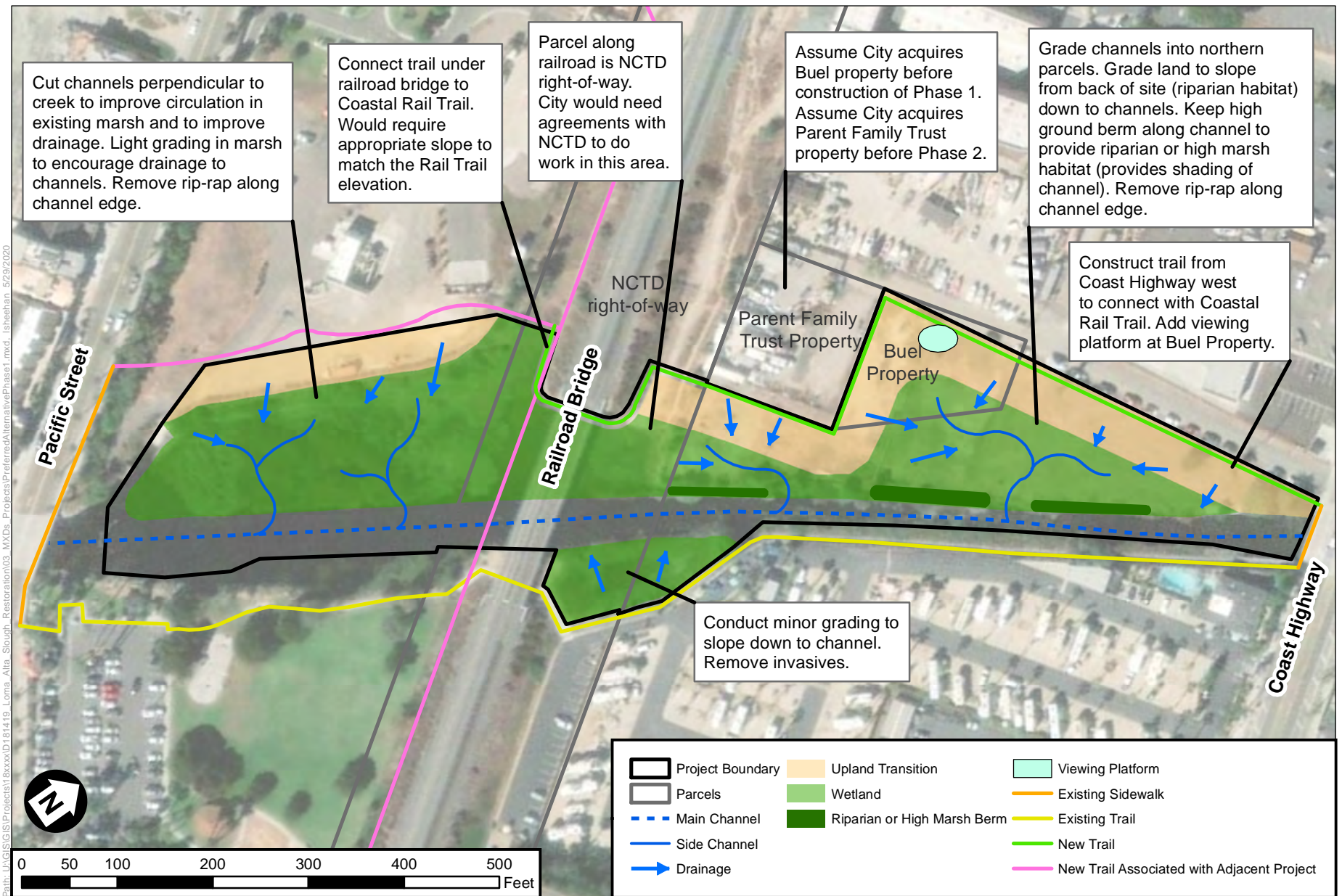
The Project would enhance the existing marsh in the Loma Alta Slough and restore marsh and transitional uplands in the adjacent properties over two phases. The Slough is a locally and regionally important natural resource that provides nesting and foraging habitat for marsh and shoreline birds. Common aquatic species likely to occur in the fresh and brackish habitats of Loma Alta Creek may include mosquitofish (*Gambusia affinis*), insect larvae, oligochaetes, clams, and snails. However, watershed urbanization, decreased sediment yield, hardening of the channel, degraded water quality, and wetland fill have degraded the health of the Slough.

Additionally, the Slough itself has been filled to create developed areas, reducing the overall area available for wetland habitat. In addition to the physical loss of wetland area, water quality issues resulting from urbanization have been ongoing since the 1960s. Currently, both Loma Alta Creek and Slough are on California's Clean Water Act 303(d) list of impaired water bodies for a variety of inhibiting constituents. Dry-weather flows from the watershed provide a continuous source of freshwater that contains fertilizers and other contaminants that reduce water quality by causing eutrophic conditions and growth of algae and bacteria. Typically, water quality problems are exacerbated when the Slough is disconnected from the Pacific Ocean by the sand berm that forms naturally at Buccaneer Beach during dry periods.

A new trail would be constructed from S. Coast Highway through the upland buffer in the northeast area. The trail would traverse the north of the Project area and continue west under the railroad bridge to connect to the future Coastal Rail Trail (as proposed under a different project, but still at a conceptual-level of design). The trail would be approximately parallel to the adjacent access road north of the Project area, with a vegetated buffer to help create a separation between the trail and the road. The vegetated buffer will likely be comprised of a selection of lower growing native plants from the upland habitat community, and potentially supplemented with other species to blend with adjacent streetscapes. An overlook would be constructed within the Buel Property to provide views of the marsh.

The Project's enhancement of the Slough would be implemented in two phases (Phases 1 and 2). The City owns all of the land in the Project area except the Parent Family Trust and Buel Family properties in the northeast area. Acquisition of the Buel parcel is expected prior to Phase 1 implementation as the City is currently in negotiations with the property owner. In Phase 1, the Project would excavate perpendicular tidal channels from the Loma Alta Creek into the existing marsh to improve drainage. East of the railroad bridge and south of the Creek, the northeastern-most, triangular parcel would be graded to improve drainage to the Creek. North of the Creek and east of the railroad, the area would be graded to marsh elevations with a 50-foot buffer separating the marsh from adjacent development. Perpendicular tidal channels would be excavated to encourage improved flushing of the new marsh. Rip-rap would be removed from some areas along the existing marsh and along the proposed marsh in the northeast of the Project area. The Phase 1 Project components are depicted in **Figure 3**.

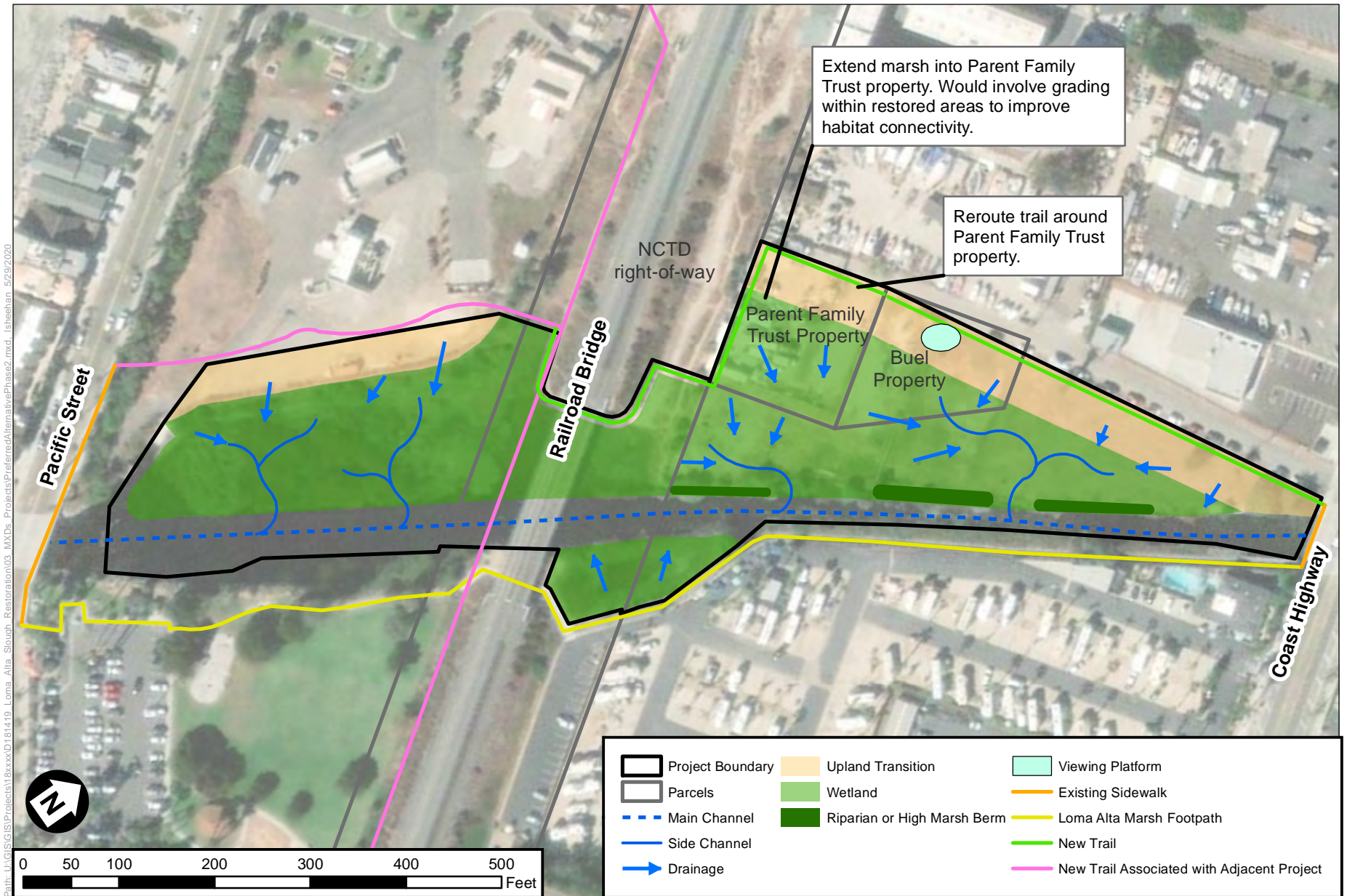
In Phase 2, the Parent Family Trust property would be graded down to marsh elevations (up to 5 feet of excavation from existing ground elevations) with a 50-foot habitat buffer on the north of the Site (**Figure 4**). The buffer area constructed in Phase 1 would be excavated down to marsh to increase the habitat connection between the properties.



NOTE: Trail layout is approximate and final design will refine this within the buffer zone.

Loma Alta Slough Wetland Restoration Project

Figure 3
Phase 1 Project



NOTE: Trail layout is approximate and final design will refine this within the buffer zone.

Loma Alta Slough Wetland Restoration Project

Figure 4
Phase 2 Project

Methods

This assessment includes a paleontological resources records search conducted by the SDNHM in 2015 as part of the Remediation Project, and a review of published geologic mapping and the scientific literature to identify unique geologic features and paleontological resources that may be impacted by Project ground disturbance and to assess the paleontological sensitivity of the Project area. The SDNHM records search results are included in **Appendix A**.

Paleontological sensitivity is defined as the potential for a geologic formation to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its “Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources,” the Society of Vertebrate Paleontology (SVP, 2010) defines four categories of paleontological sensitivity (potential) for rock units: 1) 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; 2) 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 and the presence of fossils is the exception not the rule; 3) Undetermined Potential, rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment; and 4) No Potential, rock units like high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites) that will not preserve fossil resources.

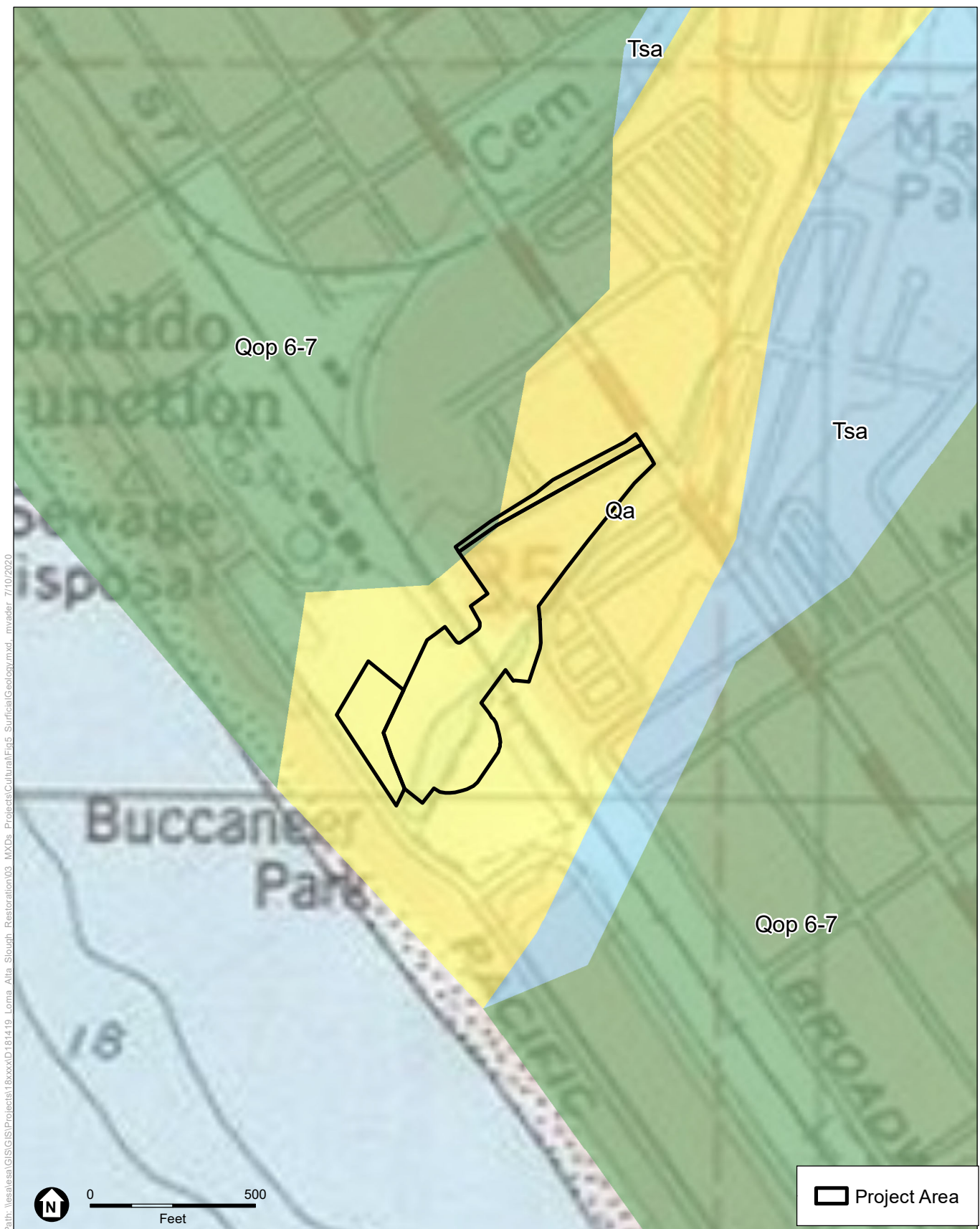
Results

Physical Setting

The Project is located within the northern Peninsular Ranges geomorphic province (Norris and Webb, 1990; Harden, 2004). This geomorphic province is characterized by northwest trending mountain ranges and valleys that extend from the tip of the Baja Peninsula to the Transverse Ranges (east to west trending mountain ranges such as the San Bernardino and San Gabriel Mountain ranges). The province varies in width from approximately 30 to 100 miles. It is bounded to the east by the Colorado Desert (Norris and Webb, 1990; Harden, 2004). Regional mountain ranges in the Peninsular Ranges geomorphic province include the Santa Ana, San Jacinto, and Santa Rosa Mountains. Geologically, these mountains are dominated by Mesozoic, plutonic igneous and metamorphic rocks that are part of the Peninsular Ranges batholith (Southern California batholith) (Jahns, 1954; Harden, 2004). In general, the intervening valleys are underlain by thick sequences of Cenozoic sedimentary rocks shed from the adjacent mountain ranges.

Geology

The surficial geology of the Project area as mapped by Kenney and Tan (2005) includes mostly Holocene-age (approximately less than 10,000 years old) alluvial flood-plain deposits (map unit Qa), as well as small portions consisting of late to middle Pleistocene-age (approximately 80,000 to 200,000 years ago) units 6 and 7 old paralic deposits (map unit Qop6-7) (**Figure 5**). The Holocene-age deposits are too young to preserve fossil resources at shallow depths, but the likelihood of encountering fossiliferous deposits increases with depth as deeper deposits may date to the late Holocene or Pleistocene. The Pleistocene-age old paralic deposits are of appropriate age to contain fossil resources.



SOURCE: Kennedy and Tan, 2005

Loma Alta Slough Wetlands Restoration Project

Figure 5
Surficial Geology

Geotechnical testing undertaken as part of the Project identified a layer of disturbed fill extending from the surface of the Project area to 5-12.5 feet below the ground surface (Taylor Group, 2020). Given the presence of artificial fill, it is unlikely the Holocene and Pleistocene-age deposits are present at surface in the Project area, but could be present below the artificial fill.

SDNHM Records Search and Literature Review

The SDNHM records search identified only one fossil locality in the vicinity of the Project: a partial proboscidean tusk recovered from unnamed Pleistocene-age deposits near Buena Vista Lagoon, located approximately 1 mile southeast of the Project (Anderson, 2015). These Pleistocene-age deposits are known to yield significant paleontological resources throughout southern California. Jefferson (1991) lists no fewer than thirty Pleistocene localities in San Diego County that have produced significant fossil vertebrates including fish, amphibians, reptiles, and mammals.

The Middle Eocene (56 million to 33.9 million years ago) Santiago Formation is mapped as close as 300 feet from the Project area (see Figure 5). Although not mapped within the Project area, geologic mapping is imprecise and there exists the possibility this formation extends into the Project given its close proximity. Fossils coming from geological units mapped as Middle Eocene Santiago Formation in northern San Diego County are now catalogued at the SDNMH under undifferentiated Sespe and Vaqueros Formations (Anderson, 2015). In general, the mainly terrestrial Sespe Formation underlies the marine Vaqueros Formation; however, in some areas (parts of Orange and San Diego counties) the transition is gradational and the contact between the geological units is blurred (Prothero and Donohoo, 2001). The Sespe and Vaqueros Formations have produced numerous scientifically significant fossil specimens in many parts of southern California and include but are not limited to mollusks and mammals (canids, oreodonts, camels, rhinoceroses, horses, entelodonts, rodents, and rabbits) (Lucas et al., 1997; Prothero and Donohoo, 2001; Calvano et al., 2008).

Paleontological Sensitivity Analysis

The literature and geologic mapping review, as well as the SDNHM records search results, were used to assign paleontological sensitivity to the geologic units within and adjacent to the Project area, following the guidelines of the SVP (2010):

- **Artificial fill** – These deposits of disturbed fill material extend from the Project area’s surface to depths of 5-12.5 feet. It is unclear as to which types of sediments the fill is derived or where it came from and so assigning an age is impossible. Given the disturbed nature of the fill it is unlikely to contain intact fossiliferous deposits. Therefore, this unit assigned **No Potential** to contain paleontological resources.
- **Alluvial flood-plain deposits (Qa)** – This unit dates to the Holocene but may be underlain at depth by older Pleistocene-aged sediments. Fossil specimens have not been identified within nearby Holocene-age sediments, but have been identified with nearby Pleistocene-age sediments. Although no fossil localities are known to originate from Holocene-age deposits in the vicinity of the Project, SVP guidelines indicate that fossils can be as young as 5,000 years old, a time frame encompassing the early Holocene. While excavation into the uppermost layers of these Holocene deposits would not impact fossils, deeper excavations into older Holocene age soils could encounter fossils. Therefore, this unit is assigned a **Low-to-High Potential** to contain paleontological resources, increasing with depth.

- **Units 6 and 7 of old paralic deposits (Qop6-7)** – The Pleistocene-age deposits are of appropriate age to preserve paleontological resources as indicated by known fossil localities originating from similar deposits throughout San Diego and Orange counties. Therefore, this unit is assigned a **High Potential** to contain paleontological resources.
- **Sespe and Vaqueros Formations** – These Miocene age formations are mapped within approximately 300 feet of the Project area, and, therefore may underlie the surficial deposits at unknown depths. These formations are known to have produced vertebrate and invertebrate fossil specimens through southern California. Therefore, this unit is assigned a **High Potential** to contain paleontological resources.

Summary and Recommendations

Project ground disturbing activities will include grading and excavations extending to depths of 7-8 feet. Geotechnical testing indicates a layer of undocumented fill extends from the surface to depths of 5-12.5 feet. Artificial fill has no paleontological potential, therefore excavations in this unit will not impact paleontological resources. However, the fill is likely underlain by Holocene to Pleistocene-age alluvial deposits (Qa) and old paralic deposits (Qop6-7), which have low-to-high and high paleontological potential, respectively. Additionally, the Miocene-age Sespe and Vaqueros Formations, which have high paleontological potential, may underlie the Project area at depth as well. Excavation into Holocene-age soils is not expected to encounter fossils at least in the uppermost layers (which may have even been removed as a result of past disturbances), but deeper excavations into older Holocene-age and Pleistocene-age alluvial and paralic deposits could uncover paleontological resources. In addition, the Sespe and Vaqueros Formations are mapped within 300 feet of the Project area and excavations that encounter this unit may uncover paleontological resources as well.

As such grading and excavations extending beyond 5 feet have the potential to intrude into older alluvial flood-plain deposits, Pleistocene-age old paralic deposits, and Sespe and Vaqueros Formations, all of which have a potential to contain paleontological resources per the SVP (2010) procedural guidelines. Therefore, there exists the potential for Project-related ground disturbance to encounter unknown and undiscovered paleontological resources underlying the minimum depths of disturbed fill. The following mitigation measures presented below are recommended to reduce potential impacts to paleontological resources to less than significant.

Mitigation Measure PAL-1: Retain Qualified Paleontologist. Prior to the start of construction activities, the City shall retain a Qualified Paleontologist that meets the standards of the Society for Vertebrate Paleontology (2010) to carry out all mitigation measures related to paleontological resources.

Mitigation Measure PAL-2: Paleontological Resources Sensitivity Training. Prior to start of any ground disturbing activities, the Qualified Paleontologist shall conduct pre-construction worker paleontological resources sensitivity training. The Qualified Paleontologist shall contribute to any construction worker cultural resources sensitivity training either in person or via a training module. The training shall include information on what types of paleontological resources could be encountered during excavations, what to do in case an unanticipated discovery is made by a worker, and laws protecting paleontological resources. All construction personnel shall be informed of the possibility of encountering fossils and instructed to immediately inform the construction foreman or supervisor if any bones or other potential fossils are unexpectedly unearthed in an area where a paleontological monitor is not present. The City shall ensure that

construction personnel are made available for and attend the training and retain documentation demonstrating attendance.

Mitigation Measure PAL-3: Paleontological Monitoring. The Qualified Paleontologist shall supervise a paleontological monitor meeting the Society for Vertebrate Paleontology standards (2010) who shall be present during all excavations exceeding 4 feet, the minimum depth of disturbed fill. Monitoring shall consist of visually inspecting fresh exposures of rock for larger fossil remains and, where appropriate, collecting wet or dry screened standard sediment samples (up to 4.0 cubic yards) of promising horizons for smaller fossil remains (SVP, 2010). Per the Society for Vertebrate Paleontology standards (2010), once 50 percent of excavations or other ground disturbing activities are complete within geologic units assigned high paleontological sensitivity and no fossils are identified, monitoring can be reduced to part-time inspections or ceased entirely if determined adequate by the Qualified Paleontologist in consultation with the City. Monitoring activities shall be documented in a Paleontological Resources Monitoring Report to be prepared by the Qualified Paleontologist at the completion of construction and shall be provided to the City within six (6) months of Project completion. If fossil resources are identified during monitoring, the report will also be filed with the San Diego County Natural History Museum.

Mitigation Measure PAL-4: Inadvertent Discoveries. If a paleontological resource is discovered during construction, the paleontological monitor shall be empowered to temporarily divert or redirect grading and excavation activities in the area of the exposed resource to facilitate evaluation of the discovery. An appropriate buffer area shall be established by the Qualified Paleontologist around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. At the Qualified Paleontologist's discretion and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock samples for initial processing and evaluation of the find. All significant fossils shall be collected by the paleontological monitor and/or the Qualified Paleontologist. Collected fossils shall be prepared to the point of identification and catalogued before they are submitted to their final repository. Any fossils collected shall be curated at a public, non-profit institution with a research interest in the materials, such as the San Diego County Natural History Museum, if such an institution agrees to accept the fossils. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, and photographs shall also be filed at the repository and/or school.

References

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- . 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*, http://www.vertpaleo.org/Impact_Mitigation_Guidelines.htm.
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Appendix A: San Diego Natural History Museum Records Search



SAN DIEGO NATURAL HISTORY MUSEUM

BALBOA PARK - SAN DIEGO SOCIETY OF NATURAL HISTORY - ESTABLISHED 1874

29 July 2015

Michael Vader
ESA | Cultural Resources
550 West C Street, Suite 750
San Diego, CA 92101

RE: Paleontological Record Search – Loma Alta Slough Vector Habitat Remediation Project
(D140376.00)

Dear Mr. Vader:

This letter presents the results of a paleontological record search conducted for the Loma Alta Slough Vector Habitat Remediation project (D140376.00), located within the Loma Alta Slough, between South Pacific Street to the southwest, and South Coast Highway to the northeast, in the City of Oceanside. The project site has an approximate footprint of 10.7 acres, with a perimeter of approximately 0.8 miles.

Published geological reports (Kennedy and Tan, 2005) reveal that the proposed project is located in areas underlain by late Holocene-age (less than 10,000 years old) alluvial flood plain deposits, and late to middle Pleistocene-age (approximately 80,000 to 200,000 years old) old paralic deposits, units 6-7. In addition, although not mapped on existing reports, late Oligocene (approximately 23 -28 million years old) deposits have been observed along the beach cliffs and road outcrops in the City of Carlsbad, and have been discovered on project sites in the City of Oceanside. The age of the deposits has been determined by the presence of the early Arikareean Land Mammal Age taxon *Sespia californica*. These deposits have been previously mapped as middle Eocene Santiago Formation and are now recorded in the San Diego Natural History Museum Paleontology database as undifferentiated Sespe Formation and Vaqueros Formation. Until a field survey can be conducted on site, it is not possible at this time to determine if units mapped as Santiago Formation are middle Eocene or late Oligocene in age. The Santiago Formation is mapped by Kennedy and Tan (2005) within 300 feet of the proposed project site, and some potential exists for it to be encountered during ground-disturbing activities, depending on depth of excavation.

Site records housed in the Department of Paleontology at the San Diego Natural History Museum (SDNHM) document one recorded fossil collecting locality (see attached abbreviated locality description) within a one mile radius of the project site (see attached map). This locality was discovered in a Pleistocene-age (approximately 10,000 to 500,000 years old) unnamed non-marine terrace deposit, and produced the fossilized partial tusk of a terrestrial vertebrate (e.g., proboscidean).

The Holocene-age alluvial flood plain deposits underlying the project area are given a low paleontological resource sensitivity, due to their young age; any biological remains found in these sediments are likely to be modern to sub-fossil. However, the underlying Pleistocene-age old paralic deposits, units 6-7 are equivalent to the Bay Point Formation in other areas of San Diego County, and are given a high paleontological resource sensitivity (Deméré and Walsh, 1993). Additionally, should they be encountered during excavation activities, the Santiago Formation is given a moderate to high paleontological sensitivity by Deméré and Walsh (1993), and the undifferentiated Sespe/Vaqueros Formation is determined to have a high paleontological sensitivity (Eisentraut and Copper, 2002).

It is suggested that any proposed excavation activities that extend deep enough to encounter previously undisturbed deposits of the old paralic deposits, units 6-7, the Santiago Formation, or the Sespe/Vaqueros Formation have the potential to cause impacts to paleontological resources preserved in these deposits. For the reasons described above, implementation of a complete paleontological resource mitigation program during construction is recommended.

The information contained within this paleontological record search should be considered private and is the sole property of the San Diego Natural History Museum. Any use or reprocessing of information contained within this document beyond the scope of the Loma Alta Slough Vector Habitat Remediation Project (D140376.00) is prohibited.

If you have any questions concerning these findings please feel free to contact me at 619-255-0320 or nanderson@sdnhm.org.

Sincerely,

A handwritten signature in black ink, appearing to read 'Nikki Anderson', with a long horizontal flourish extending to the right.

Nikki Anderson
Lead Fossil Preparator
Department of PaleoServices

Literature Cited:

- Deméré, T.A. and Walsh, S.L. 1993. Paleontological Resources, County of San Diego. Prepared for the San Diego Planning Commission: 1-68.
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SDNHM fossil localities within one mile of the Loma Alta Slough Vector Habitat Remediation Project (D140376.00)
 (Base maps USGS Topographic Maps of the Oceanside and San Luis Rey 7.5' Quadrangles, California).

0 1 Miles



DATE 07/29/15
TIME 14:10:58

SAN DIEGO NATURAL HISTORY MUSEUM
DEPARTMENT OF PALEONTOLOGY
LOCALITY LIST

PAL120

NUMBER	---LOCALITY NAME AND GEOGRAPHIC LOCATION---	-----ROCK AND TIME UNITS-ROCK TYPE-FIELD NOTES-----	-----COLLECTORS-COMPILED BY-ENTERED BY-DONOR-----
4007	I-5 and SR-78 Oceanside San Diego Co. CA U.S.A. 33°10'41"N--117°20'59"W San Luis Rey, CA 1:24000 USGS. 1968(75PR)	unnamed nonmarine terrace Cenozoic Quaternary Pleistocene Rancholabrean mdst-fluvial B.O. Riney	B.O. Riney 15 Feb 1996 B.O. Riney 13 Mar 1996 C.P. Majors 13 May 1996 SANDAG 15 Feb 1996

