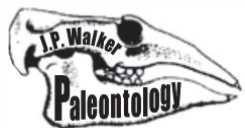


Paleontological Review



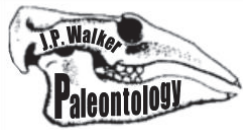
**Paleontological Review Port of Redwood City Ferry
Terminal Project
Redwood City, San Mateo County, California**

Prepared: May 2025

Prepared By:

A handwritten signature in black ink, appearing to read 'J.P. Walker', followed by a long, horizontal, slightly wavy line.

This Paleontological Mitigation Plan was prepared to conform to the standards of the Society of Vertebrate Paleontologists (SVP) Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.



Introduction

The proposed Port of Redwood City Ferry Terminal project (“The Project”) is located at the northern end of Seaport Boulevard in Redwood City, San Mateo County. “The Project” is located on a 9.2-acre site located at the northern end of Seaport Boulevard where Westpoint Slough and Redwood Creek meet. “The Project” consists of a ferry terminal, Bay Trail extension, and future visitor-serving uses including a proposed hotel.

The proposed landward facilities for the terminal include: a parking lot with 250 spaces for ferry users, transit stops for bus and shuttle services, a pile-supported ferry terminal with piles up 120 feet to be placed on the land and in the water, electric utilities for the adjustable boarding ramp lift system, lighting, and vessel lay berth shore power. Potable water is needed for hose bibs on the float and a fire water system, consistent with Redwood City Fire Department requirements. Communication utilities would be provided to operate the security system, public address system, and Clipper card readers.

Additionally, an approximately 60-foot-wide corridor along Seaport Boulevard and approximately 10 to 13 feet of land on either side of the roadway from the entrance of the Pacific Shores Center to the entrance of the site would be modified for vehicle, pedestrian, and bicycle access to the site of “The Project”. A 1,000 square foot maintenance building would also be constructed within the Pacific Shores Center.

The hotel will not exceed three stories, similar to the adjacent Pacific Shores Center. According to information provided to us by the Port, the Pacific Shores Center development required piles at least 60 feet deep.

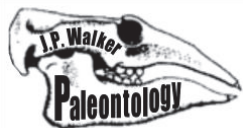
Regional Geology and Paleontology

Geology

The surficial geology of the area under and surrounding the site is characterized by Artificial Fill on the surface that is in turn underlain by Holocene Bay Muds. Nearby outcrops suggest that the Bay Muds are underlain a very thin Holocene alluvium layer less than a meter thick. Its presence in the subsurface under the project site cannot be confirmed but if it is present at all, it is very unlikely to be a significant presence. Below the possible Holocene Alluvium are alluvial deposits of Pleistocene age that will extend down to basement rock, far deeper than any work associated with this project.

Paleontology

A review of the University of California Museum of Paleontology (UCMP) and the US Geological Survey (USGS) collections shows that Pleistocene deposits in the area have produced 7 paleontological specimens. These include: *Equus* sp. (horse), *Camelops* sp.(camel/lama) and *Bison* (buffalo). Additionally, the author of this report has collected *Camelops* and *Equus* from



Pleistocene Alluvium and Bay Mud deposits respectively. A bear tooth was also collected from the Holocene Bay Muds (C. Powel pers. com.).

Site Geology and Paleontological Potential

As noted above, the site and adjacent area is developed and sits on Artificial Fill of unknown depth. Below this sits Bay Muds which in turn overlie Pleistocene age alluvium (Pampeyan, 1993).

Site Geology

Mapping shows the area as Artificial Fill (Figure 1). This mapping also depicts Holocene Bay Mud surrounding the site and underneath the site (Pampeyan, 1993). We have no reports on the depth of the Artificial Fill. The thickness of the bay mud is estimated to be 20 feet (McDonald and others, 1978). It should be noted that there is considerable error associated with the thickness of the Bay Muds. Below the Bay Muds are Pleistocene age alluvium equivalent to the units containing the paleontological finds noted above. Field work by the author, about two miles away, shows a very thin Holocene alluvium layer less than a meter thick. Its presence in the subsurface under the project site can not be confirmed but if it is present at all, it is very unlikely to be a significant presence.

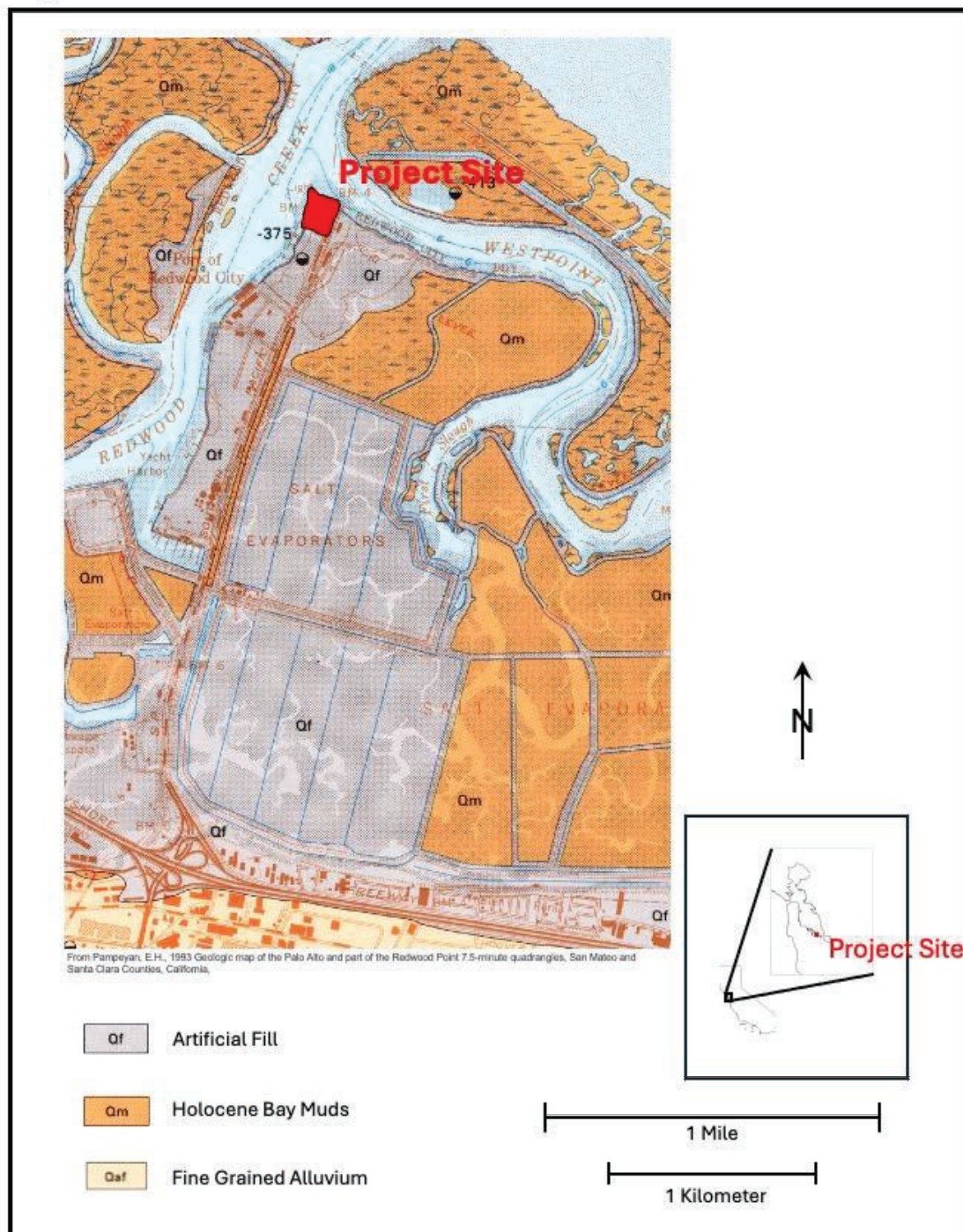
Paleontological Potential

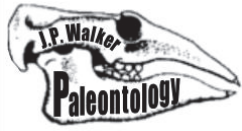
The Artificial Fill and the Bay Muds that underlie the project site are considered to have no and low potentials, respectively, for containing significant paleontological finds. In contrast, the underlying Pleistocene alluvium is considered to have a high potential for significant paleontological finds. The equivalent Pleistocene age deposits have yielded significant paleontological finds, the closest Pleistocene age fossil was collected 2 miles away, other locations are about 3.5 to 4.5 miles from “The Project” site. The Society of Vertebrate Paleontologists (SVP) Guidelines definition of High, Low, and No potential are given below.

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. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcanoclastic formations (e. g., ashes or tephra), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units 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.). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few 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. Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

Figure 1





Low Potential

Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be 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, e. g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.

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). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources

It is expected that most construction activity will be relatively shallow and therefore confined to the Artificial Fill. Building foundations and potentially some utilities trenches may exceed the depth of the Artificial Fill and will possibly intersect the Holocene Bay Muds.

The potentially largest impact is the placement of piles for the hotel and ferry terminal. The piles will probably intersect the Pleistocene alluvium. There are a large number of variables to be considered, e.g. the depth to the Pleistocene is poorly constrained. The depths and number of piles, and methods of placement are all unknown. When these variables can be better constrained the recommended protection measures can be calculated.

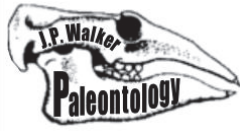
Recommended Protection Measures

Monitoring Program

A Paleontological Mitigation Plan should be prepared by qualified paleontologist with suitable experience. The paleontologist should review a set of finalized plans and geotechnical reports to determine the details of a Paleontological Mitigation Plan (PMP). The focus of a Paleontological Mitigation Plan would be centered on the depth and number of piles and the depth of the Pleistocene alluvium at the site. The degree that construction impacts the Pleistocene units will determine the degree of monitoring needed for the project. A reasonable working assumption is that drilling more than 20 feet below ground surface will need monitoring.

Worker Awareness Training

If impact to the underlying Pleistocene alluvium is minimal, Worker Awareness Training is all that would be recommended. Worker Awareness Training for construction personnel involved with excavation work in case of an unexpected paleontological discovery should include identification of potential paleontological material, the procedures to follow, and the correct personnel to contact in the event of a possible discovery. Training will help avoid delays in construction and the associated costs. Training can be done on site during a “tool-box” session or remotely.



Procedure in Case of Significant Paleontological Finds

If a paleontological find is made and the find is determined to be significant, work should be redirected around the location of the find while it is stabilized and removed. The specimen will then be cleaned to the point necessary for identification and then curated at a museum meeting SVP Guidelines. A brief report will be made and submitted with the specimen(s) to the museum. In the event of a potentially significant paleontological resource discovery, the following procedures will be followed:

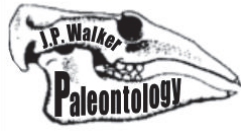
- The Project Paleontologist will conduct a preliminary evaluation of the paleontological resources to determine if additional mitigation (e.g., collection, curation and monitoring) is required. The initial phase of this may be done remotely via photographs and or video.
- Work may continue once the potential resource has been salvaged and moved to a designated collection area away from the construction zone.

The Paleontologist (or a designated monitor) will maintain detailed field notes recording dates, times, locations within the project site, and activities undertaken, especially the details of fossil finds and their geologic contexts. Written records of specific locations and geologic contexts of each observed specimen location will be supplemented by field photographs showing specimens *in situ*, field number(s), and appropriate ruler or other scale objects within the field of view. Global Positioning System (GPS) determinations of latitude and longitude or Universal Transverse Mercator (UTM) coordinates will be noted for each collected specimen or concentrated locality. Geologic and geographic relationships of fossil localities to visible features within the enclosing geologic formation, such as changes in color or grain size, will also be noted.

Screen Washing

Many significant vertebrate fossils (e.g., small mammal, bird, reptile, amphibian, or fish remains) often are too small to be readily visible in the field but are nonetheless important and worthy of attention. The potential discovery of macrovertebrates at this project site would also suggest the potential for microvertebrates as well. Potential microvertebrates would be sampled by collecting an adequate quantity of sedimentary matrix. To avoid construction delays, these samples will be transported to an offsite location for processing as described below.

Recovery of microvertebrate fossils will be accomplished by screenwashing bulk samples of fossil-bearing sedimentary matrix. The matrix is placed into water-filled five-gallon plastic buckets to soak for no less than 15 minutes with stirring. The slurry is then poured onto nested 20 (0.84 mm openings) and 30 (0.59 mm) mesh stainless steel screens placed in water-filled troughs. Manual agitation of the screens forces the fine clays and silts through the mesh and concentrates the coarser sand and fossil material on the screens. The screens are then placed at a tilt facing the sun to dry. Once dry, the coarse concentrate is transferred into plastic sample bags and labeled with all pertinent site locality data. Screenwashed concentrates can be further concentrated by the use of heavy liquids (e.g., zinc bromide and/or tetrabromoethane) to concentrate particles of equal density. Generally, fossil bones and teeth sink along with heavy



mineral grains (e.g., magnetite) while lighter quartz and feldspar mineral grains float. This separation process produces a very rich concentration of fossil remains, typically isolated teeth of small mammals (e.g., rodents).

Screen washing and picking will be conducted in parallel with monitoring so that assessments may be made as to the utility of screen washing; negative finds may lead to stopping of bulk sample collection and screening.

Preparation and Curation of Fossils

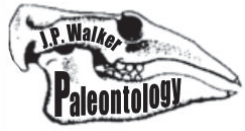
Any significant fossils recovered during “The Project” activities will be cleaned to the point of preliminary identification and stabilized for storage and transport to their curation location. The final curation agreement will be included with the Paleontological Mitigation Report. Because the cost of curation is usually dictated by volume, all excess matrix should, to the greatest extent possible, be removed from the fossil during the preliminary analysis or pre-curation preparation. Only significant diagnostic fossils need to be curated.

Documentation

At the conclusion of monitoring, a Paleontological Mitigation Report shall be prepared by the Project Paleontologist documenting implementation of the approved PMP. The report will adhere to SVP Guidelines, and will include discussions of:

- Project effects
- Regulatory requirements
- Purpose of mitigation
- Regional geologic context
- Project stratigraphy
- Stratigraphic and geographic distribution of paleontological resources
- Field and laboratory methods and procedures
- Paleontological significance

The report, in the event significant fossil resources are found, will also include geological cross-sections and stratigraphic sections, where appropriate, depicting fossil discovery localities and excavated rock units, maps showing “The Project” geology and location of discovered fossil localities, and appropriate photographs or illustrations depicting site conditions and the field context of collecting localities. An itemized listing of catalogued fossil specimens, complete descriptions of all fossil collecting localities, and a signed curation agreement with the approved paleontological repository will be included as appendices to the report.



References

McDonald, S. D., Nichols, D. R., Wright, N. A. and Atwater, B., 1978. Map showing thickness of young bay mud, southern San Francisco Bay, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-976, scale 1:125000

Pampeyan, E. H., 1993. Geologic map of the Palo Alto and part of the Redwood Point 7.5-minute quadrangles, San Mateo and Santa Clara Counties, California: U.S. Geological Survey Miscellaneous Investigations Series Map I-2371, scale: 1:24,000

Society of Vertebrate Paleontology (SVP), 2010, Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources: Society of Vertebrate Paleontology, 11 p.

University of California Museum of Paleontology database: <http://www.ucmp.berkeley.edu>