

# **Paleontological Resources Assessment of the Ponte Vista Project, San Pedro area, Los Angeles, California**

Prepared for

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February 2011

**PALEONTOLOGICAL RESOURCES ASSESSMENT OF THE PONTE VISTA PROJECT,  
SAN PEDRO, LOS ANGELES, CALIFORNIA**

**SWCA PROJECT NUMBER 16985**

**SUBMITTED TO:**

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Los Angeles, California 90067

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**CONFIDENTIAL: SUBJECT TO ATTORNEY/CLIENT PRIVILEGE, WORK PRODUCT DOCTRINE  
AND JOINT DEFENSE PRIVILEGE.**

## **EXECUTIVE SUMMARY**

### **PURPOSE AND SCOPE**

SWCA Environmental Consultants (SWCA) was retained by Jeffer Mangels Butler & Mitchell LLP (JMBM) to conduct paleontological resources services for the Ponte Vista site located in the city of Los Angeles, Los Angeles County, California. The scope of paleontological services included a comprehensive literature review and museum records search, a field survey, and preparation of this technical report of findings that includes project-specific recommended mitigation measures.

### **DATES OF INVESTIGATION**

The museum records search was performed on November 24, 2010. The field survey was performed on October 22, 2010. This technical report was completed in February 2011.

### **RESULTS OF THE INVESTIGATION**

According to geologic mapping by Schoellhamer et al. (1954) and museum collection records (McLeod, 2010) the project area is immediately underlain by Pleistocene age (1.8 million years ago [Ma] to 10,000 years before present [BP]) San Pedro Sand and Palos Verdes Sand and Holocene age (10,000 years BP to Recent) Quaternary alluvium. Museum collection records maintained by the Natural History Museum of Los Angeles County (LACM) indicate that at least ten fossil localities yielding scientifically significant vertebrate specimens have been documented nearby the project area within the same geologic deposits underlying the project area (McLeod, 2010).

Two fossil localities were discovered and documented during the course of the field survey. The first, JLD102210-01 yielded sparse invertebrate fossils and the second, JLD102210-02 yielded abundant marine invertebrates (mostly mollusks) and vertebrate fossils including one horse tooth fragment (*Equus* sp.) and a complete shark tooth (probable *Carcharodon* sp.) No fossils were collected during the field survey.

The combined results of the literature review, museum records search, and field survey indicate that the geologic deposits underlying much of the project area are determined to have a high paleontological sensitivity. Therefore, project-related ground disturbances may result in an adverse impact to nonrenewable fossil resources unless proper mitigation measures are implemented.

### **RECOMMENDATIONS**

SWCA recommends that a qualified paleontologist be retained to design and implement a paleontological monitoring and mitigation program prior to and during any ground-disturbing activities related to the development of the project. In addition, it is recommended that prior to ground disturbance the vertebrate fossils observed at locality JLD102210-02 be collected. A bulk sample of the matrix (approximately 2,000 pounds) containing the invertebrate specimens should also be collected and screened. All fossils recovered during pre-construction mitigation and during the paleontological monitoring and mitigation program should be prepared, stabilized, identified, and permanently curated in an approved repository or museum (such as the LACM).

### **DISPOSITION OF DATA**

This report will be filed with JMBM. A copy will be retained at SWCA, along with all other records relating to the project.

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## **1.0 INTRODUCTION**

This report presents the findings of a comprehensive literature review, museum records search, and field survey conducted for the Ponte Vista project located in San Pedro, Los Angeles County, California. This study was performed to evaluate the paleontological sensitivity of the project area and vicinity, assess potential project-related impacts on paleontological resources, and provide recommendations for project-specific mitigation measures. This study was conducted in accordance with the professional guidelines established by the Society of Vertebrate Paleontology (SVP) (1995) and meets the requirements of the California Environmental Quality Act (CEQA).

### **1.1 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES**

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered nonrenewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are an important scientific and educational resource because they are used to:

- Study the phylogenetic relationships between extinct organisms, as well as their relationships to modern groups;
- Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including biases in the fossil record;
- Reconstruct ancient environments, climate change, and paleoecological relationships;
- Provide a measure of relative geologic dating, which forms the basis for biochronology and biostratigraphy, and which is an independent and supporting line of evidence for isotopic dating;
- Study the geographic distribution of organisms and tectonic movements of landmasses and ocean basins through time;
- Study patterns and processes of evolution, extinction, and speciation; and
- Identify past and potential future human-caused effects to global environments and climates (Murphey and Daitch, 2007).

## 2.0 RESOURCE ASSESSMENT GUIDELINES

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under federal (National Environmental Policy Act [NEPA]), state (CEQA), and local (City of Los Angeles) laws and regulations. This study satisfies project requirements in accordance with CEQA (13 Public Resources Code [PRC] 2100 et seq.) and PRC Section 5097.5 (Stats. 1965, c. 1136, p. 2792). This analysis also complies with guidelines and significance criteria specified by the SVP (1995).

### 2.1 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Fossils are classified as nonrenewable scientific resources and are protected by various laws, ordinances, regulations, and standards (LORS) across the country. The SVP (1995) has established professional standards for the assessment and mitigation of adverse impacts to paleontological resources. This paleontological assessment was conducted in accordance with the LORS that are applicable to paleontological resources within the project area.

### 2.2 PROFESSIONAL STANDARDS

The SVP has established standard guidelines (SVP, 1995) that outline professional protocols and practices for the conducting of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines. Most state regulatory agencies with paleontological LORS accept and use the professional standards set forth by the SVP.

#### 2.2.1 Significance

As defined by the SVP (1995:26), **significant nonrenewable paleontological resources** are defined as:

...Fossils and fossiliferous deposits here restricted to vertebrate fossils and their taphonomic and associated environmental indicators. This definition excludes invertebrate or paleobotanical fossils except when present within a given vertebrate assemblage. Certain invertebrate and plant fossils may be defined as significant by a project paleontologist, local paleontologist, specialists, or special interest groups, or by lead agencies or local governments.

As defined by the SVP (1995:26), **significant fossiliferous deposits** are defined as:

A rock unit or formation which contains significant nonrenewable paleontologic resources, here defined as comprising one or more identifiable vertebrate fossils, large or small, and any associated invertebrate and plant fossils, traces and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways, or nests and middens which provide datable material and climatic information). Paleontologic resources are considered to be older than recorded history and/or older than 5,000 years BP [before present].

Based on the significance definitions of the SVP (1995), all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate fossils are relatively uncommon, and only rarely will a fossil locality yield a statistically significant number of specimens of

the same genus. Therefore, every vertebrate fossil found has the potential to provide significant new information on the taxon it represents, its paleoenvironment, and/or its distribution. Furthermore, all geologic units in which vertebrate fossils have previously been found are considered to have high sensitivity. Identifiable plant and invertebrate fossils are considered significant if found in association with vertebrate fossils or if defined as significant by project paleontologists, specialists, or local government agencies.

A geologic unit known to contain significant fossils is considered to be “**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. Paleontologic 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 paleontologic potential in each case [SVP, 1995].

Many archaeological sites contain features that are visually detectable on the surface. In contrast, fossils are contained within surficial sediments or bedrock, and are therefore not observable or detectable unless exposed by erosion or human activity. In summary, paleontologists cannot know either the quality or quantity of fossils prior to natural erosion or human-caused exposure. As a result, even in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce significant fossils elsewhere within the same geologic unit (both within and outside of the study area), a similar geologic unit, or based on whether the unit in question was deposited in a type of environment that is known to be favorable for fossil preservation. 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 in order to prevent adverse impacts to these resources.

### 2.3 PALEONTOLOGICAL SENSITIVITY

Paleontological sensitivity is defined as the potential for a geologic unit 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 SVP (1995:23) established four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential:

- **High Potential.** Rock units from which vertebrate or significant invertebrate fossils or suites of plant fossils have been recovered and are considered to have a high potential for containing significant non-renewable fossiliferous resources. These units include, but are not limited to, sedimentary formations and some volcanic formations that contain significant non-renewable paleontologic resources anywhere within their geographical extent and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical, and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic

data. Areas that contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant.

- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections.
- **Undetermined Potential.** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials.
- **No Potential.** Metamorphic and granitic rock units do not yield fossils and therefore have no potential to yield significant non-renewable fossiliferous resources.

For geologic units with high potential, full-time monitoring is generally recommended during any project-related ground disturbance. For geologic units with low potential, protection or salvage efforts will not generally be required. For geologic units with undetermined potential, field surveys by a qualified vertebrate paleontologist should be conducted to specifically determine the paleontologic potential of the rock units present within the study area.

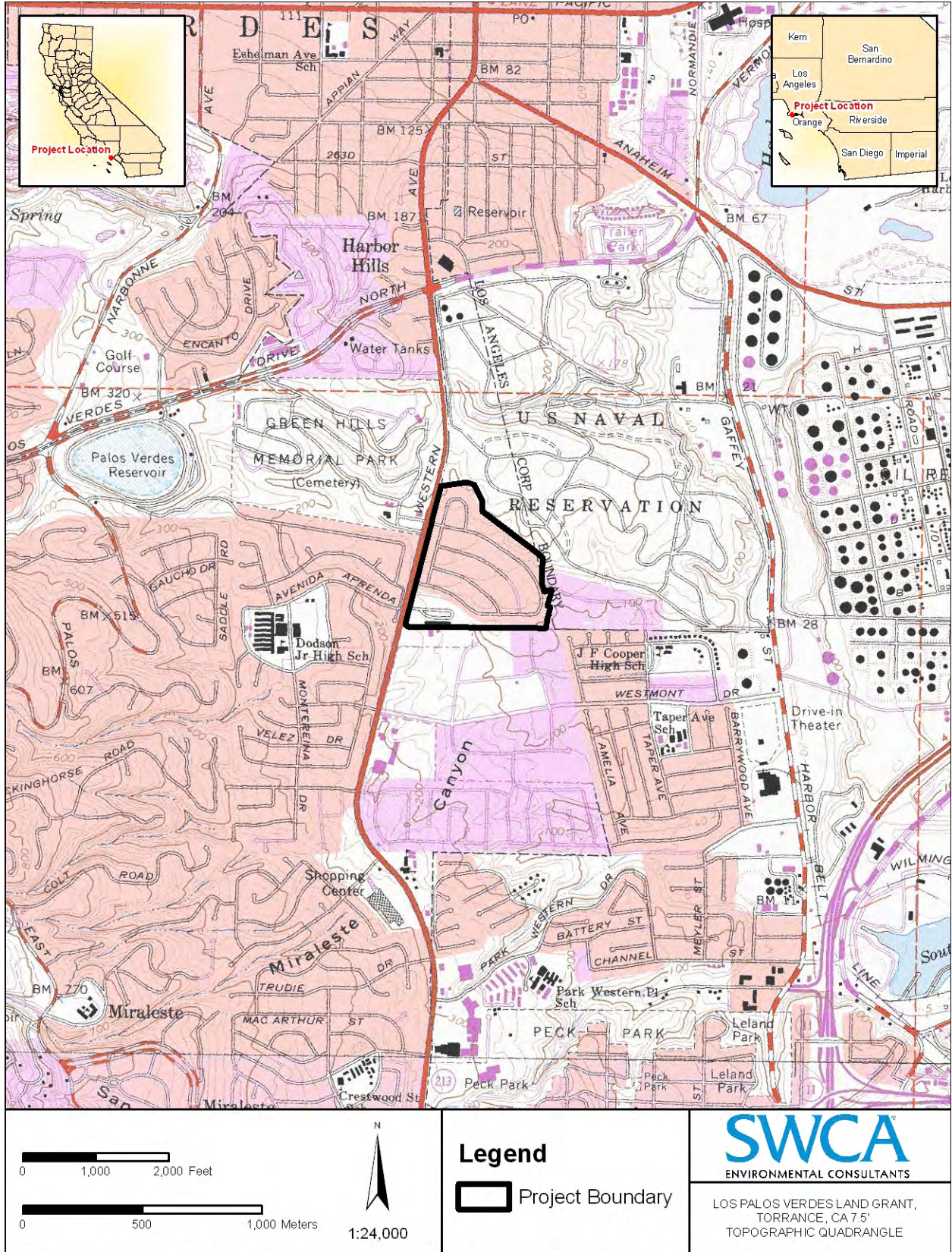
### 3.0 PROJECT LOCATION AND DESCRIPTION

The project area consists of a 61.5-acre lot containing 245 vacant single-family residential units (duplexes) located on John Montgomery Drive, John Stroat Place, Robert Stockton Place, and Samuel Dupont Avenue. The project area is located on the east side of SR 213 (South Western Avenue), between Agajanian Drive to the north and Fitness Drive to the south, in the San Pedro port district of the City of Los Angeles, Los Angeles County, California. The Los Angeles County Assessor's Office parcel identification number is 7442-001-012. Figure 1 shows the project location on the U.S. Geologic Survey (USGS) Torrance, California 7.5-minute quadrangle; and Figure 2 shows an aerial photograph of the project area.

The proposed project involves 100 percent redevelopment of the project area. The first phase of the project would involve demolition of 245 former U.S. Navy homes, a 2,161 square foot community center, and a 3,454 square foot retail convenience facility, originally built in 1963 to house personnel stationed at the Long Beach Naval Shipyard. The housing complex has been closed since 1999. New construction for the proposed project includes 1,135 housing units consisting of a combination of single-family, duplex, townhome, flat, and apartment units. Up to 392 of these units may be rental units. Landscaped common areas, recreation areas, and parks (excluding roads) will account for approximately nine percent of the project area. The proposed project will also incorporate internal open space and recreational areas including an approximately 2.8-acre park, 1.3-acre community clubhouse and pool/recreation area, and 0.7-acre network of open space and trails. In addition, an access road will be constructed to connect Mary Star of the Sea High School with South Western Avenue.

### 4.0 PROJECT PERSONNEL

SWCA Paleontology Lead Jessica DeBusk reviewed published and unpublished literature and museum records, conducted the field survey, and authored this technical report. Geographic Information Systems (GIS) Specialist Emily Kochert produced graphics. Samantha Murray assisted with the field survey and edited and formatted this report. Cara Corsetti, Qualified Paleontologist and SWCA Office Principal, provided quality assurance and quality control (QA/QC) review of this report.



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Figure 1. Project Location Map



**Figure 2. Aerial Map of the Project Area**

## **5.0 METHODS**

Due to the nature of the fossil record, paleontologists cannot know either the quality or the quantity of fossils present in a given geologic unit prior to natural erosion or human-caused exposure. Therefore, in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce scientifically significant fossils elsewhere within the same geologic unit (both within and outside of the study area) or a unit representative of the same depositional environment.

### **5.1 MUSEUM RECORDS SEARCH**

A detailed review of museum collections records was performed by the Vertebrate Paleontology division of the LACM to (1) determine whether there are any known fossil localities in or near the project area, (2) identify the geologic units present in the project area, and (3) determine the paleontological sensitivity ratings of those geologic units in order to assess potential impacts to nonrenewable paleontological resources. Published and unpublished literature and geologic maps were reviewed, and mitigation measures specific to this project were developed in accordance with the SVP's professional standards and guidelines (1995).

Geologic units were assigned a paleontological sensitivity rating based on the museum records search, literature review, and field survey. For the area underlying the Project area, a geologic map (Figure 3) and paleontological sensitivity map (Figure 4) were created.

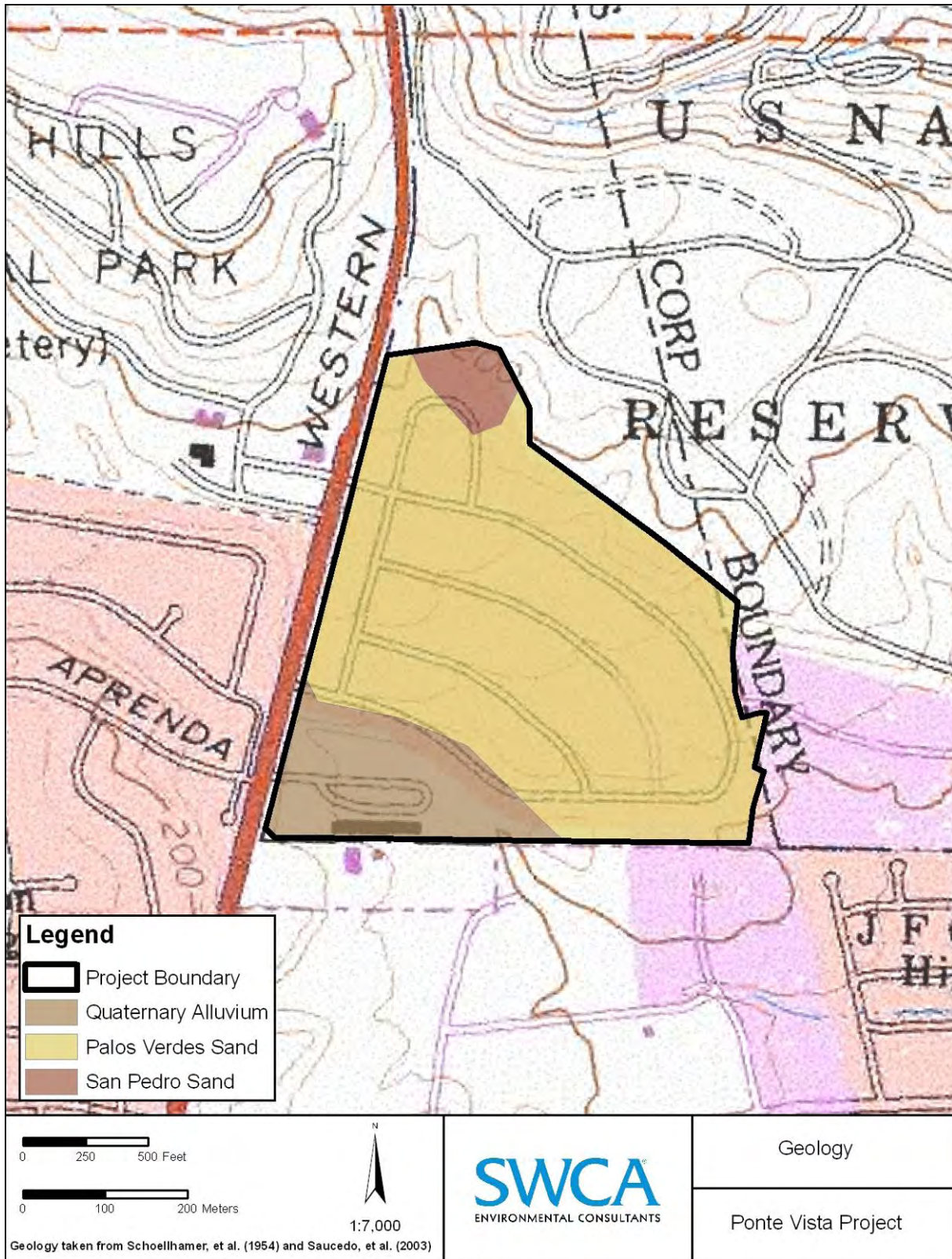
### **5.2 FIELD SURVEY**

A pedestrian reconnaissance survey of the project area was performed on October 22, 2010. The purpose of the fieldwork was to inspect the study area for surface fossils and exposures of potentially fossil-bearing geologic units and to determine areas in which fossil-bearing geologic units could be exposed during project-related ground disturbances.

## **6.0 GEOLOGY AND PALEONTOLOGY**

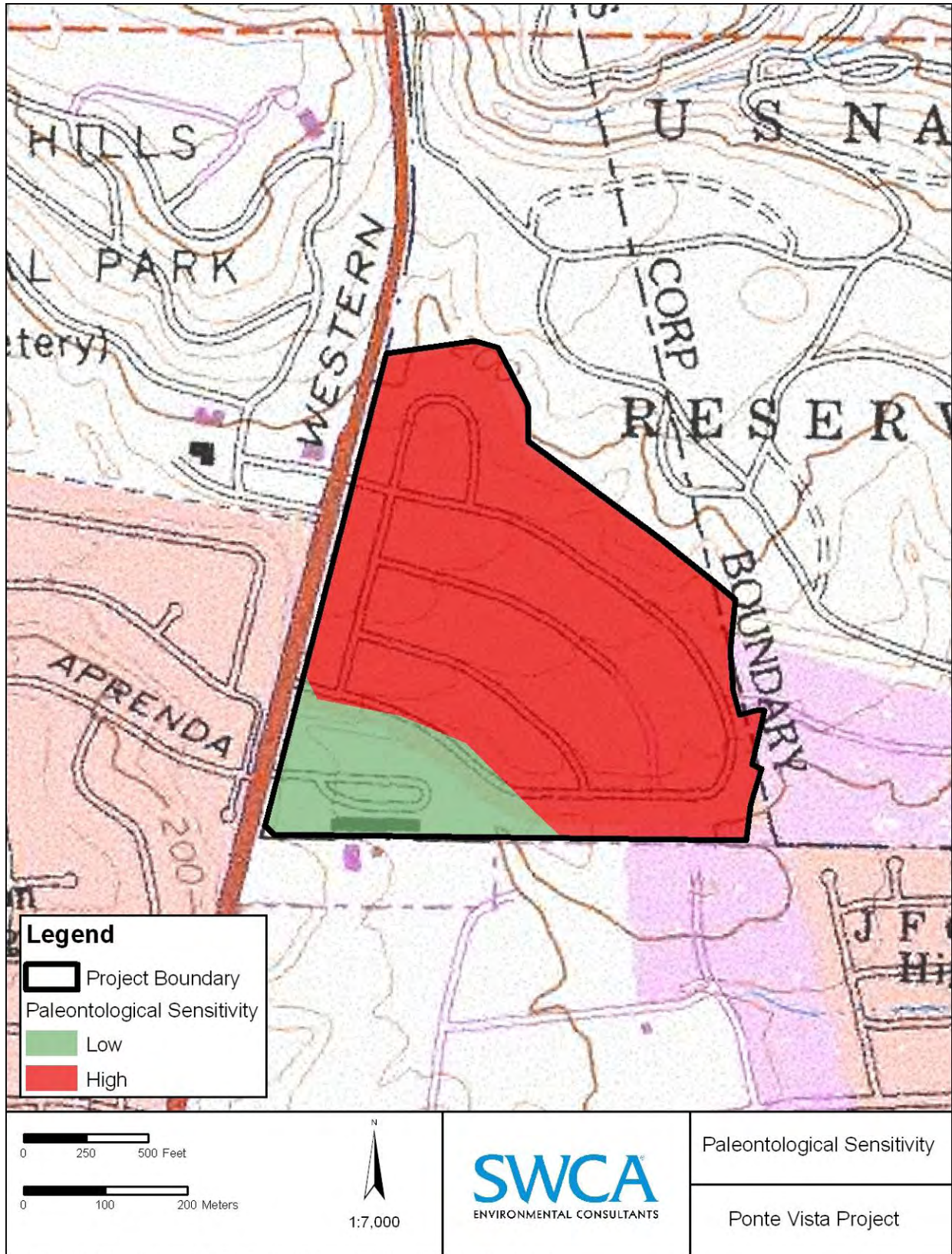
### **6.1 GEOLOGIC SETTING**

The project area is in the northeast part of the Palos Verdes Hills, located on the southwestern block of the Los Angeles basin. This structural block is bounded to the east by the northwest-southeast trending Newport-Inglewood Fault system, and much of the western portion is submerged with the exception of Santa Catalina Island. The most prominent land-tied topographic feature of this block is the Palos Verdes Hills peninsula. Each of the four structural blocks comprising the Los Angeles basin are underlain by different basement rock, and have unique subsequent depositional histories resulting from regional tectonic forces. The basement rock of the southwestern block is composed of Catalina Schist, a mixture of greywacke, chert, basaltic volcanic, and gabbroic mélange of Early Cretaceous to Late Jurassic age. The Catalina Schist outcrops in a small area near the center of Palos Verdes Hills and on Santa Catalina Island. Overlying these Mesozoic rocks are marine clastic sediments ranging from Miocene to Pleistocene in age (Reed & Hollister, 1936).



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Figure 3. Geologic Map



**Figure 4. Paleontological Sensitivity Map**

According to geologic mapping by Schoellhamer et al. (1954) and museum collection records (McLeod, 2005) the project area is immediately underlain by Pleistocene age (1.8 million years ago [Ma] to 10,000 years before present [BP]) San Pedro Sand and Palos Verdes Sand, and younger Quaternary age (Holocene) (10,000 years BP to Recent) alluvium. These geologic deposits, and their paleontological sensitivity, are discussed in more detail below.

## 6.2 SAN PEDRO SAND

The San Pedro Sand is early Pleistocene (Hallian stage) (1.8 - 0.78 million years ago [Ma]) in age and consists of yellow to light brown and gray, cross-bedded to massive, poorly consolidated marine pebble gravel, sand, and silty sand (Blake, 1991). The pebbles are derived mostly from Miocene hard siliceous shale and limestone. Deposition of these materials occurred at depths of between about 60 to 300 feet in what was mostly a deltaic environment (Jacobs, 2005). This formation can be up to 422 feet thick. In the past, the San Pedro sands were broken up into two distinct horizons, the Upper and Lower San Pedro Series, distinguished by a prominent unconformity (Arnold and Arnold, 1902). The Lower San Pedro Series consists largely of gray sandstone, and Arnold and Arnold (1902) noted that these sands were deposited in a nearshore environment. The Lower San Pedro Series has been the main focus of research and is currently referred to as the San Pedro Sand (Woodring *et al.*, 1946). The Upper San Pedro Series, consisting of a bed of lime-hardened gravel overlain by a thick layer of fine-grained sand (Arnold and Arnold, 1902), is now known as the Palos Verdes Sand (Woodring *et al.*, 1946).

One of the most interesting aspects of the San Pedro Sand is the environmental change that it records. As the Pliocene transitioned into the Pleistocene, California's climate began to grow warmer, and this change is reflected in the faunas found within the San Pedro Sand. Arnold and Arnold (1902) noted that the fauna found there is a transitional fauna "from the boreal or suboreal fauna of the late Pliocene to the semi-tropical fauna [of the later Pleistocene.]" As the climate of California began to warm, the waters in which the San Pedro sands were being deposited in were growing shallower, thus causing the water in the area to become noticeably warmer. This increase in temperature is evidenced by examining those species in the San Pedro sands that still have extant relatives. The number of species that are today found only south of San Pedro (warm waters) increases in the San Pedro sands as the number of species that are today found only north of San Pedro (cold waters), decreases (Arnold and Arnold, 1902).

The San Pedro Sand contains two informally recognized members that can be seen at various locations around the town of San Pedro: the Timms Point Silt and the Lomita Marl (Woodring *et al.*, 1946). (While these rock units have been referred to as formations in the past, Woodring *et al.* (1946) found justification for classifying them as members of the San Pedro Sand, but they did not do so formally in their report for the sake of preventing confusion at the time.) The Timms Point Silt consists of brown silty sand and sandy silt and can contain pebbles. The Lomita Marl consists of calcareous rocks and sand and contains a variety of shells and organics. Both of these units are found at the base of the San Pedro sand, and these layers were actually uplifted and somewhat eroded prior to the deposition of the San Pedro sand, indicated by the twenty-five degree dip of the Lomita marl (thirteen degrees more than the dip of the San Pedro sand) (Jacobs *et al.*, 2000), and the lateral gradation of the San Pedro sand into the Timms Point silt and the Lomita marl at some locations (Woodring *et al.*, 1946).

The abundance of fossil specimens known from the San Pedro Sand is one of the major reasons for the importance of this unit. Marine invertebrates comprise the vast majority of paleontological discoveries, and include three species of foraminifera, four species of bryozoans and many other groups (Miller, 1930, Woodring *et al.*, 1946). Mollusks are by far the most abundant and diverse type of fossil from the San Pedro Sand, with as many as 242 species found at one locality (Oldroyd, 1924). Approximately 500 total species are recognized from the Lomita marl, Timms Point silt, and Palos Verdes sand combined (Woodring, 1952). Other marine invertebrates found in the San Pedro sand include crabs, of which there

are at least eleven different species in six genera, and three different species of sea urchins (Oldroyd, 1924).

Fragmentary remains of marine vertebrates are well known in the San Pedro Sand, and include primarily fish, rays, and sharks. Vertebrae, teeth, and (fish) otoliths make up a majority of these remains. The most abundant species of fish is *Cymatogaster aggregate*, the shiner perch (based on total number of remains collected and identified by Fitch, 1967). However, the most diverse family of fish is the Cottidae, with six distinct genera being identified from the San Pedro sands (Fitch, 1967). Rays are a fairly abundant part of the fauna of the San Pedro sand, the most abundant being *Myliobatis californicus*, the large bat ray that can still be found swimming in waters between the Oregon coast and the Gulf of California (Fitch, 1967). The teeth of the giant shark *Carcharodon*, a genus related to the great white, have also been found (Jordan and Hannibal, 1923).

Nineteen species of birds have been reported from this rock unit, including many taxa still found in the area today. These include cormorant, ducks, sea eagle, and quail. Of particular interest are the remains of the first fossil gull from California (Miller, 1930) and the remains of one extinct species of bird, the diving goose *Chendytes lawi* (Howard, 1948). While it is clear that there was quite a variety of avian life present in San Pedro during the Pleistocene, bird bones are rarely preserved which makes their fossil remains particularly important (Miller, 1930).

Terrestrial vertebrate remains have also been found in the San Pedro Sand, albeit in smaller but still impressive quantities. Unsurprisingly, turtle shell fragments likely belonging to relatives of the common mud turtle have been collected (Miller, 1930). Some teeth attributed to *Equus cf. occidentalis* have been found in a thick section of the San Pedro Sand near the Gaffey anticline (Woodring, 1952). Finally, remains identified as belonging to bison, camel, saber-toothed tiger, ground sloth, elephant, rodent, and whale have all been found in the San Pedro Sand. Thus, a moderately diverse assemblage of terrestrial vertebrates is preserved in these marine sediments. Miller (1930) suggests that this is a result of a variety of environment types, including ocean, lagoon, grass land, rocky point, and fresh water tule marsh, in very close proximity to each other, such as can be seen at Point Mugu in Ventura County today.

The San Pedro Sand underlies the northwest corner of the project area (See Figure 3) (Schoellhamer, et al., 1954). Due to its proven potential to yield scientifically significant fossils, it is considered to have a high paleontological sensitivity (See Figure 4).

### **6.3 PALOS VERDES SAND**

The Palos Verdes Sand was deposited nearly 130,000 years ago (middle to late Pleistocene) following a period of erosion, and is the youngest marine terrace in the San Pedro area (Arnold and Arnold, 1902). The Palos Verdes sand was originally identified by Arnold and Arnold (1902) as the “upper San Pedro series,” but was officially renamed as the Palos Verdes Sand by Woodring *et al.* (1946). This rock unit consists of a bed of lime-hardened gravel overlain by a thick layer of fine-grained sand, silty sand, and silt (Arnold and Arnold, 1902, Woodring *et al.*, 1946). It ranges in thickness from a few inches to up to fifteen feet, and is locally sloping seaward (Miller, 1971).

The Palos Verdes Sand is well known for containing a diverse assemblage of fossils including terrestrial vertebrates, marine vertebrates and marine invertebrates in particular. The invertebrate fauna found within this rock unit is shallow water fauna (Woodring, 1952) with approximately 250 species, about twenty of which are north of their present range by up to one hundred miles. The fossils found within the Palos Verdes Sand are often referred to as belonging to the “San Pedro fauna” due to their close association with that rock unit and the fauna within it (Miller, 1971, McLeod, 2005). The Palos Verdes Sand were

deposited in a sublittoral environment in warm water that was up to about 90 feet deep (Valentine, 1961, Jacob, 2005).

The Palos Verdes Sand is mapped within the majority of the project area (See Figure 3) (Schoellhamer, et al., 1954). Due to its proven potential to yield scientifically significant fossils, it is considered to have a high paleontological sensitivity (See Figure 4).

#### 6.4 QUATERNARY ALLUVIUM

Quaternary alluvium of Holocene age consists variously of unconsolidated clay, sand, gravel, and pebbles and is generally deposited as fluvial and alluvial deposits from surrounding higher elevations and local drainages. Although Holocene-aged sediments often contain the remains of modern organisms, they are too young to contain significant paleontological resources. However, paleontologically sensitive non-marine terrace deposits of Pleistocene age may be present at an unknown depth. Non-marine terrace deposits within the Palos Verdes peninsula consist of poorly consolidated sandy loam and loamy clay, and include sand and pebble gravels that are derived from the cliff that originally backed each terrace as it was being deposited and debris being washed down from highlands further inland. The terraces reach a thickness of up to one hundred feet, although most aren't thicker than fifty feet, with a decreasing thickness as one moves seaward (Woodring et al., 1946). Regionally and locally these deposits have yielded an abundance of terrestrial vertebrate fossils (McLeod, 2005).

Quaternary alluvium of Holocene age is mapped within the southwest corner of the project area (See Figure 3). As stated above, Holocene alluvium is unlikely to contain fossils and is therefore considered to have a low paleontological sensitivity (See Figure 4). However, potentially underlying Pleistocene age non-marine terrace deposits are considered to have a high paleontological sensitivity.

**Table 1. Geologic Units Within the Study Area**

| Age   | Geologic Unit       | Typical Fossil Types   | Paleontological Resource Potential (Sensitivity) |
|---|---------------------|--|--|
| Holocene (10,000 years ago to Present)                            | Quaternary alluvium | None   | Low to High (increasing with depth)              |
| Middle to Late Pleistocene (130,000 years ago)                    | Palos Verdes Sand   | Terrestrial vertebrates, marine invertebrates, marine vertebrates                      | High   |
| Early Pleistocene (1.8 to million years ago to 780,000 years ago) | San Pedro Sand      | Marine invertebrates, microfossils, marine vertebrates, birds, terrestrial vertebrates | High   |

### 7.0 ANALYSIS AND RESULTS

#### 7.1 MUSEUM RECORDS SEARCH

The Vertebrate Paleontology section of the LACM performed a paleontological collections records search to locate fossil localities within a at least a one-mile radius of the project area. Museum records indicate that at least ten vertebrate fossil localities yielding scientifically significant vertebrate specimens have been documented nearby the project area and within Late Pleistocene sediments, Palos Verdes Sand, and San Pedro Sand (McLeod, 2010). The museum records search results are summarized in Table 2.

**Table 2.** Previously Recorded Vertebrate Fossil Localities in the Vicinity of the Project Site

| Locality Number and Approximate Location  | Geologic Formation         | Taxa                           | Common Name                 |
|---|----------------------------|--------------------------------|-----------------------------|
| LACM (CIT) 484; directly south of the project area on the eastern side of Western Avenue north of Westmont Drive                                | Late Pleistocene sediments | <i>Mirounga angustirostris</i> | Elephant seal               |
| LACM 3200; directly west of the northern part of the project area in Green Hills Memorial Park  | Late Pleistocene sediments | <i>Paramylodon</i>             | Ground sloth                |
|   |                            | <i>Bison</i>                   | Bison                       |
| LACM 1228; further northwest of LACM 3200 in Green Hills Memorial park  | Late Pleistocene sediments | Camelidae                      | camel                       |
|   |                            | <i>Bison</i>                   | Bison                       |
| LACM 4205; due east of the project area and west of Gaffey  | Late Pleistocene sediments | <i>Mammuthus</i>               | Mammoth                     |
|   |                            | <i>Equus</i>                   | Horse                       |
| LACM 3268; on the east side of Gaffey nearby LACM 4205  | Late Pleistocene sediments | Osteichthyes                   | Bony fish                   |
|   |                            | <i>Mammuthus</i>               | Mammoth                     |
| LACM 3262; just south of the project area, approximately along 3 <sup>rd</sup> Street Road between Gaffey Street and the Harbor Freeway (I-110) | Palos Verdes Sand          | <i>Clemmys</i>                 | Pond turtle                 |
|   |                            | Aves                           | Bird                        |
|   |                            | Carnivora                      | Carnivore (mammalian)       |
| LACM 3270; same as LACM 3262 but stratigraphically below  | San Pedro Sand             | <i>Eschrichtius</i>            | Gray whale                  |
| LACM 1809; at the intersection of Anaheim Street and Gaffey Street  | Late Pleistocene sediments | Aves                           | Bird                        |
| LACM 1158; at the intersection of Anaheim Street and Gaffey Street  | Late Pleistocene sediments | <i>Equus</i>                   | Horse                       |
|   |                            | <i>Bison</i>                   | Bison                       |
|   |                            | Invertebrates                  | Unknown                     |
| LACM 1055; at the intersection of Anaheim Street and Gaffey Street  | Late Pleistocene sediments | <i>Chendytes lawi</i>          | An extinct flightless goose |
| Source: McLeod, 2010  |                            |                                |                             |

## 7.2 FIELD SURVEY

A pedestrian field survey of the project area was performed on October 22, 2010. Ground visibility throughout much of the project area was limited because it is improved with residential housing (now abandoned), paved roads, and sidewalks (Photograph 1) or obscured by vegetation (Photograph 2). All areas of exposed sediment were closely examined, with a focus on the slope adjacent to the north-northeast boundary of the project area (Photographs 3 and 4).

Areas mapped as Palos Verdes Sand and San Pedro Sand were intensely surveyed when visibility and accessibility were feasible, as these units are deemed paleontologically sensitive. However, the vast majority of the project area was not intensely surveyed due to the aforementioned existing structures and lack of rock outcrops. See Figure 5 for survey coverage map.



**Photograph 1. Overview of project area, looking south to southeast from northwest corner, showing limited ground visibility**



**Photograph 2. View looking southeast along southwest portion of the project area.**



**Photograph 3. View of slope along northern project boundary, looking west.**



**Photograph 4. View of slope along the northeast to eastern project boundary, looking west.**



Figure 5. Survey Coverage Area

### 7.2.1 Fossil Localities

Two fossil localities were discovered within the project boundaries during the course of the field survey (Appendix A: Confidential Locality Map and Appendix B: Confidential Locality Forms). The first locality, JLD102210-01, was discovered in the northwest portion of the project area. Sparse clams, oysters, and clam borings were observed in grayish-white diatomaceous sandstone. All fossil specimens were discovered ex-situ as float and appear to be derived from the higher elevations outside and to the north of the project area. Further, the poor preservation of the fossils and lithologic composition of the rock fragments suggests that the fossils are derived from the nearby Miocene age Monterey Formation and not the underlying San Pedro Sand. Due to the poor preservation quality and the lack of provenience for this locality, it is considered non-significant..

The second locality, JLD102210-02, was discovered in the northeastern portion of the project area (See Appendix A: Confidential Locality Map and Appendix B: Confidential Locality Forms). At this locality, abundant marine invertebrate fossils (mostly mollusks) were discovered within a light brown to reddish orange brown, medium to fine grained, moderate to well sorted loosely consolidated sand. Additionally, a horse tooth fragment (*Equus.*) and complete shark tooth (probable *Carcharodon* ) were discovered at this locality. The locality measured approximately 20 square feet along an engineered embankment and extended outside the boundaries of the project. According to geologic mapping (Schoellhamer et al., 1954), this locality is within the Palos Verde Sand; however, the lithologic composition of the deposit and its apparent stratigraphic thickness suggest that it could be the San Pedro Sand. Further analysis of the invertebrate fauna and stratigraphic measurements are warranted to determine.

No fossils were collected at either locality; however, it is highly recommended that the vertebrate specimens observed at locality JLD102210-02 are collected and that a scientific sample of the invertebrate material be collected prior to any ground disturbance at the project site (See Recommended Mitigation Measures).

## 8.0 CONCLUSIONS

The destruction of fossils as a result of human-caused ground disturbance has a significant cumulative impact, as it makes biological records of ancient life permanently unavailable for study by scientists. Implementation of proper mitigation measures can, however, reduce the impacts to the paleontological resources to below the level of significance. The project area is, in part, underlain by geologic deposits determined to have a high paleontological sensitivity rating; therefore, any project-related ground disturbances (such as mass grading, excavation, and/or trenching) within areas underlain by the San Pedro Sand and Palos Verdes Sand are likely to result in adverse impacts to significant paleontological resources unless proper mitigation measures are implemented. Project-related ground disturbances within younger Quaternary alluvium are less likely to affect paleontological resources and should be monitored on a part-time basis to ensure that no underlying sensitive units (i.e. Pleistocene age deposits) are impacted.

## RECOMMENDED MITIGATION MEASURES

The following mitigation measures have been developed in accordance with the SVP (1995) standards and the City of Los Angeles guidelines and meet the paleontological requirements of CEQA. These mitigation measures have been used throughout California and have been demonstrated to be successful in protecting paleontological resources while allowing timely completion of construction.

- A. Prior to ground disturbance, the vertebrate fossils observed at locality JLD102210-02 should be collected. A bulk sample of the matrix (approximately 2,000 pounds) containing the invertebrate

specimens should also be collected and screened. Following matrix sampling, this area should be closely monitored during construction grading to ensure the recovery of any additional scientifically significant fossil specimens.

- B. A Qualified Paleontologist will be retained to produce a Paleontological Monitoring and Mitigation Plan for the proposed project and to supervise monitoring of construction excavations. Paleontological resource monitoring will include inspection of exposed rock units during active excavations within sensitive geologic sediments. The monitor will have authority to temporarily divert grading away from exposed fossils to professionally and efficiently recover the fossil specimens and collect associated data.
- C. All project-related ground disturbances that could potentially affect the San Pedro Sand and Palos Verdes Sand will be monitored by a qualified paleontological monitor on a full-time basis, as these geologic deposits are determined to have a high paleontological sensitivity. Part-time monitoring should be conducted in all project-related ground disturbances affecting younger Quaternary alluvium.
- D. At each fossil locality, field data forms will be used to record pertinent geologic data, stratigraphic sections will be measured, and appropriate sediment samples will be collected and submitted for analysis.
- E. Recovered fossils will be prepared to the point of curation, identified by qualified experts, listed in a database to facilitate analysis, and repositied in a designated paleontological curation facility.
- F. The Qualified Paleontologist will prepare a final monitoring and mitigation report to be filed with the lead agency, the project applicant, and the repository.

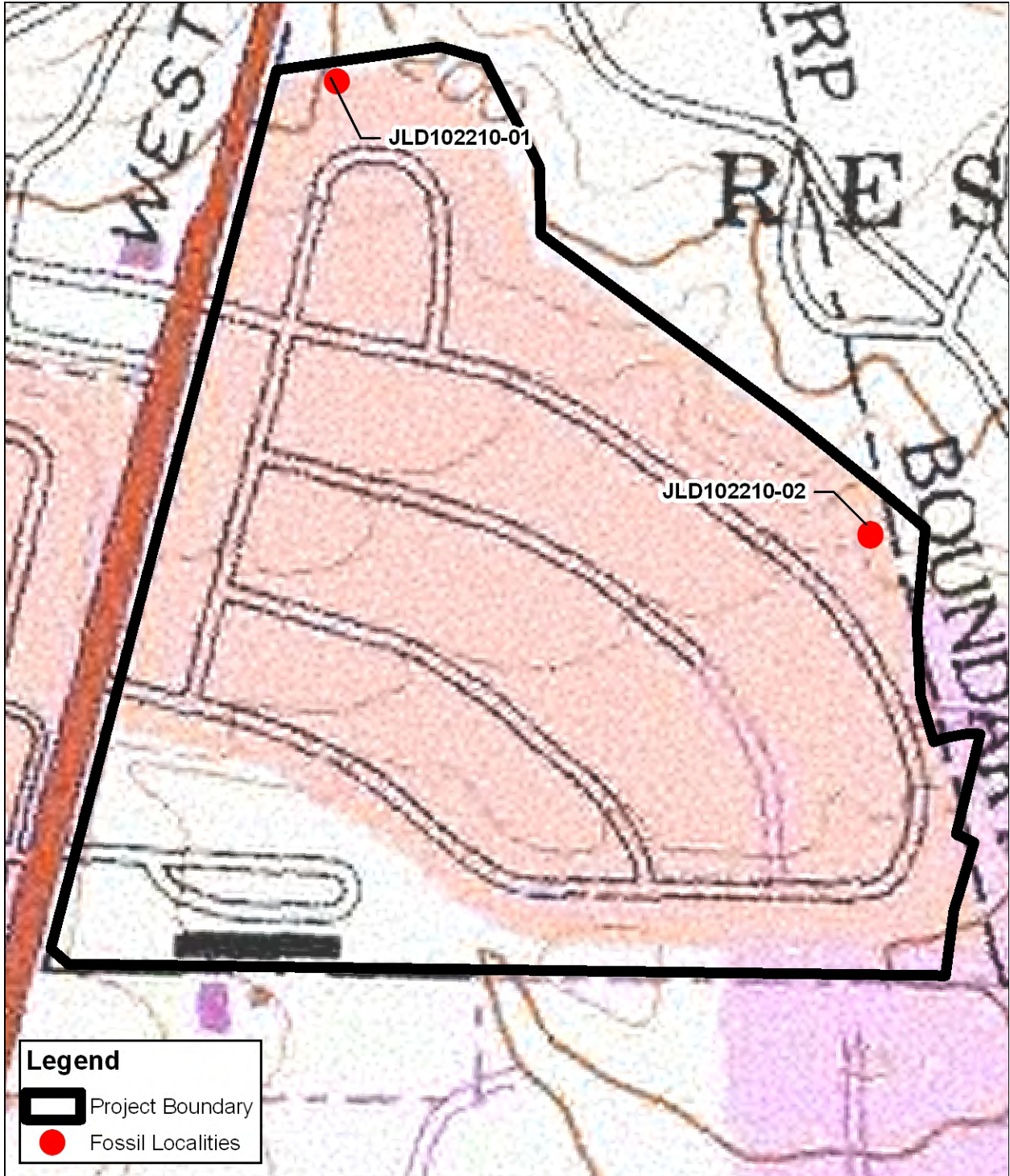
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**Appendix A: Confidential Locality Map**



|  |         |  |                     |
|--|---------|--|---------------------|
|  |         |  | Fossil Localities   |
|  | 1:4,000 |  | Ponte Vista Project |

Path: P:\16000-16999\16985 - Ponte Vista\GIS Graphics\MXD\Paleo\FossilLocations.mxd, 10/28/10, ekoheri

## **Appendix B: Confidential Locality Forms**

|                                |   |                                  |   |
|--------------------------------|---|----------------------------------|---|
| <b>JLD102210-01</b>            |   |                                  |   |
| <b>PLSS Location:</b>          | Section 2, Township 5 South, Range 14 West  |                                  |   |
| <b>UTM (NAD83):</b>            | Zone 11; 3737592 mN / 378834 mE   |                                  |   |
| <b>Location Description:</b>   | North of John Montgomery Drive and East of Western Avenue, San Pedro, CA                |                                  |   |
| <b>Elevation:</b>              | 197 feet  |                                  |   |
| <b>Permit:</b>                 | N/A   |                                  |   |
| <b>Repository:</b>             | N/A   |                                  |   |
| <b>Land Ownership:</b>         | Private   | <b>1<sup>st</sup> Collector:</b> | Jessica DeBusk  |
| <b>Field Number:</b>           | JLD102210-01  | <b>Project Number:</b>           | 16985   |
| <b>Locality Name:</b>          | None  | <b>Other Locality No's:</b>      | None  |
| <b>Map Names(s):</b>           | USGS Torrance, CA 7.5' Topographic Quadrangle   |                                  |   |
| <b>Formation:</b>              | Monterey Formation?   |                                  |   |
| <b>Member:</b>                 | N/A   |                                  |   |
| <b>Era:</b>                    | Cenozoic  |                                  |   |
| <b>Period:</b>                 | Tertiary  |                                  |   |
| <b>Series-Epoch:</b>           | Miocene   |                                  |   |
| <b>Lithologies:</b>            | Grayish white diatomaceous sandstone float  |                                  |   |
| <b>Stratigraphic Position:</b> | unknown   |                                  |   |
| <b>Fossil Types (s):</b>       | Vertebrate <input type="checkbox"/>   | Plant <input type="checkbox"/>   | Invertebrate <input checked="" type="checkbox"/> Trace <input type="checkbox"/> |
| <b>Fossil ID/Description:</b>  | Clams, oysters, and clam borings  |                                  |   |
| <b>Specimen Number</b>         | N/A   |                                  |   |
| <b>In Situ or Float:</b>       | In-Situ <input type="checkbox"/> Ex-Situ <input checked="" type="checkbox"/>            | <b>Fossils Collected:</b>        | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>             |
| <b>Collection Methodology:</b> | Observed during field survey, not collected   |                                  |   |
| <b>Client:</b>                 | JMBM, LLP 1900 Avenue of the Stars, 7 <sup>th</sup> Floor Los Angeles, California 90067 |                                  |   |
| <b>Photos:</b>                 | See following page  |                                  |   |
| <b>Comments:</b>               | None  |                                  |   |



**Photograph 5. Oyster observed at Locality JLD102210-01**



**Photograph 6. Poorly preserved clam observed at Locality JLD102210-01**

|                                |  |                                  |   |
|--------------------------------|--|----------------------------------|---|
| <b>JLD102210-02</b>            |  |                                  |   |
| <b>PLSS Location:</b>          | Section 1, Township 5 South, Range 14 West   |                                  |   |
| <b>UTM (NAD83):</b>            | Zone 11; 3737294 mN / 379185 mE  |                                  |   |
| <b>Location Description:</b>   | North of John Montgomery Drive and East of Western Avenue, San Pedro, CA   |                                  |   |
| <b>Elevation:</b>              | 165 feet   |                                  |   |
| <b>Permit:</b>                 | N/A  |                                  |   |
| <b>Repository:</b>             | N/A  |                                  |   |
| <b>Land Ownership:</b>         | Private  | <b>1<sup>st</sup> Collector:</b> | Jessica DeBusk and Samantha Murray  |
| <b>Field Number:</b>           | JLD102210-02   | <b>Project Number:</b>           | 16985   |
| <b>Locality Name:</b>          | None   | <b>Other Locality No's:</b>      | None  |
| <b>Map Names(s):</b>           | USGS Torrance, CA 7.5' Topographic Quadrangle  |                                  |   |
| <b>Formation:</b>              | Palos Verdes Sand? (possibly San Pedro Sand)   |                                  |   |
| <b>Member:</b>                 | N/A  |                                  |   |
| <b>Era:</b>                    | Cenozoic   |                                  |   |
| <b>Period:</b>                 | Quaternary   |                                  |   |
| <b>Series-Epoch:</b>           | Late Pleistocene   |                                  |   |
| <b>Lithologies:</b>            | Light brown to reddish orange brown, medium to fine grained, moderate to well sorted, loosely consolidated sand        |                                  |   |
| <b>Stratigraphic Position:</b> | unknown  |                                  |   |
| <b>Fossil Types (s):</b>       | Vertebrate <input checked="" type="checkbox"/>   | Plant <input type="checkbox"/>   | Invertebrate <input checked="" type="checkbox"/> Trace <input type="checkbox"/> |
| <b>Fossil ID/Description:</b>  | Vertebrate ( <i>Equus</i> sp. tooth, <i>Carcharodon</i> sp.?, tooth), clams, oysters, misc. other marine invertebrates |                                  |   |
| <b>Specimen Number</b>         | N/A  |                                  |   |
| <b>In Situ or Float:</b>       | In-Situ <input checked="" type="checkbox"/> Ex-Situ <input type="checkbox"/>   | <b>Fossils Collected:</b>        | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>             |
| <b>Collection Methodology:</b> | Observed during field survey, not collected  |                                  |   |
| <b>Client:</b>                 | JMBM, LLP 1900 Avenue of the Stars, 7 <sup>th</sup> Floor Los Angeles, California 90067                                |                                  |   |
| <b>Photos:</b>                 | See following page   |                                  |   |
| <b>Comments:</b>               | None   |                                  |   |



**Photograph 7. Horse tooth (*Equus* sp.) discovered at Locality JLD102210-02**



**Photograph 8. Shark tooth (probable *Carcharodon* sp.) discovered at Locality JLD102210-02**



**Photograph 9. Fence line along property boundary at Locality JLD102210-02.**



**Photograph 10. Overview of Locality JLD102210-02.**