APPENDIX F
CULTURAL AND PALEONTOLOGICAL RESOURCES
VENICE PUMPING PLANT
DUAL FORCE MAIN PROJECT EIR

STATE CLEARINGHOUSE NUMBER: 2003031001
INTRODUCTION

Greenwood and Associates has conducted an archaeological investigation for the proposed construction of the Venice Pumping Plant Dual Force Main Project in the community of Marina del Rey (MDR) in the City of Los Angeles.

PROJECT DESCRIPTION

The City of Los Angeles, Department of Public Works has identified a need to prepare California Environmental Quality Act (CEQA) documentation in support of advancing the final engineering design and construction of the Venice Pumping Plant (VPP) No. 646 located at 140 Hurricane Avenue in the community of Venice to an existing junction structure to the North Outfall Sewer (NOS) located near the intersection of Pacific Avenue and Waterview Street in the community of Playa del Rey (Figure 1).

The VPP Dual Force Main Project is proposed as a solution to expanding existing capacity of the 48-inch diameter Coastal Interceptor Sewer (CIS) force main by constructing an additional 54-inch diameter dual force main. The proposed 54-inch sewer will be constructed in a 76-inch steel casing. Given an ever-increasing need to accommodate wastewater flows, three distinct site-location alternatives are identified for CEQA assessment (Figure 2). They are:

1. The approximately 10,000-foot VPP-Pacific Avenue-Waterview Street junction structure;

2. The approximately 10,000-foot VPP-Marquesas Way-Via Marina-Pacific Avenue/Waterview Street junction structure; and

3. The approximately 10,000-foot VPP-Venice Beach/Dockweiler State Beach existing 20-foot wide sewer easement-Waterview Street junction structure. This alignment will be located within the existing 20-foot easement for the existing line and offset to the east by an as-yet undetermined number of feet.

Since all three alternatives include crossing the Marina del Rey Channel and Ballona Creek, micro-tunneling is the only construction method being considered. The two tunnel boring locations situated in the south side of the MDR Channel/Ballona Creek will be launching sites; the three boring locations situated on the north side of the MDR Channel will be receiving sites. Site Alternative 2 also includes crossing the Venice Grand Canal. Micro-tunneling is the only construction method being considered for obvious environmental protection reasons. Three boring locations will flank the Grand Canal crossing from the VPP to and including the intersection of Via Dolce and Via Marina in MDR.

The method of construction to be utilized for all land portions of the project will be open excavation (cut-and-cover).
Figure 1. Vicinity Map (USGS Venice Quadrangle).
The alignment along Dockweiler Beach is open beach with residential units, apartments, condos, and single family residences on the east side (Figure 3). The housing is on the beach with some areas of sidewalk meeting the sand. The beach extends outward 900 feet west to the ocean. The Least Tern nesting area is present just north of the Marina del Rey Channel. The nesting area is rectangular and fenced with chainlink and barbed wire with clumps of vegetation present. The rest of the beach is manicured and contains volleyball courts, drainage pipes, and trash containers at selected points. The Dockweiler Beach alignment is covered with sand.

South of the Channel

The combined alternatives south of the Marina del Rey channel include residential units, park areas, parking areas, sand dunes, commercial structures, and eroded bluffs near the southern terminus. The alignment follows Pacific Avenue which turns northeast at Culver Boulevard and transitions to Vista del Mar. A large residential unit is currently being constructed west of Vista del Mar near Surf Street. The beach area alignment is sand, two cement curvilinear paths, and sand dunes.

BACKGROUND

The following summary is based on the literature search conducted at the South Central Coastal Information Center, California State University, Fullerton for the Venice Dual Force Main project. It is designed both to indicate the potential for the presence of cultural resources within the project area, and to provide a context for any cultural data that may be present within the study area.

Prehistory

The archaeological record indicates that sedentary populations occupied the coastal and inland regions of California more than 9,000 years ago. Early periods were characterized by processing of hard seeds with the mano and milling stone and the use of the atlatl (dart throwers) to bring down large game, e.g., deer. Villages were typically around permanent water sources that allowed exploitation of a variety of different habitats for food. In the later periods, prior to the arrival of Europeans, the bow and arrow was in use, beads were being
used as money, trade and social networks had evolved, and the mortar and pestle were used to process acorns.

For the Ballona Lagoon area, one of the more significant research questions was the seeming lack of permanent village sites in the resource rich environment. Excavations at the Admiralty Site, CA-LAN-47, near the northeastern edge of Marina del Rey harbor, revealed that the Ballona area “appears to have been visited by small groups on short-term forays that targeted a wide spectrum of the region’s abundant resources” (Altschul et al. 1992:376). It was theorized that “the dynamic nature of the ecosystem may have been so volatile that long-term dependence on the resources of the Ballona may have been perceived as too risky to base a sedentary subsistence strategy” and “exploited only on an opportunistic basis” (Altschul et al. 1992:375).

The Admiralty site is only one of several prehistoric sites located along the lower reaches of Ballona and Centinela creeks. Analysis of dated components suggests that a distinct break in settlement patterns occurs between Middle and Late Periods. During the Middle Period, settlement was restricted to bluff tops while Late Period usage appears to be limited and confined to the margin of the wetlands. This shift was probably triggered by environmental causes. As sedimentation increased in the Ballona, the open lagoon was transformed into a resource-rich estuary and marsh (Altschul et al. 1992:416).

Significant excavations have been carried out in the search area along the bluffs of Ballona Creek. Van Horn and his associates conducted a number of excavations at a series of sites (CA-LAN-59, -61, -63, -64, and -206) in the Del Rey Hills (Murray and Van Horn 1983; Van Horn 1984, 1987; Van Horn and Murray 1984, 1985). Brian Dillon conducted excavations in the Del Rey Hills at CA-LAN-61 and LAN-1018 (1982). In 1961 Keith Johnson investigated a portion of CA-LAN-47 and found numerous artifacts including harpoons, bone tools, choppers, hammerstones, and other items. Multiple burials were also encountered. Dillon (et al. 1988) did additional excavations on another part of CA-LAN-47 and found dense concentrations of artifactual and faunal materials. Statistical Research conducted data recovery where Dillon worked and recovered significant archaeological data, which led researchers to believe that the site was a series of temporary camps that were established along the lagoon at various times throughout the year when resources became available (Grenda et al. 1994:35). Excavation of a major burial ground (>300 individuals) is on-going in the area north of Lincoln Boulevard at the site of the Playa Vista housing development. These investigations serve to highlight the sensitivity of the area for archaeological materials.

Ethnography

Based on their association with the Spanish Mission establishment of San Gabriel Archangel, the Native American people described as inhabiting the region surrounding the project area are known as Gabrieliño. These people were hunters and gatherers with permanent villages, specialized processing sites, formal cemeteries, and trade networks with local and non-local groups. It is believed that initially they practiced a seasonal
strategy, moving from location to location exploiting various food resources, but with technological advances they were able to maintain permanent year round villages with reliance on acorns and marine resources. At the time of European contact, the Gabrielino occupied an area that included the watersheds of the Los Angeles, San Gabriel, and Santa Ana rivers, the Los Angeles Basin, the coast from Orange County’s Aliso Creek north to Topanga Canyon, and the Channel Islands of Santa Catalina, San Clemente, and San Nicholas (Bean and Smith 1978; Kroeber 1953; McCawley 1996). Several chronological frameworks have been developed for the Gabrielino region including those by Wallace (1955) and Warren (1968) and later, McCawley (1996).

Spanish Period

The Spanish Period of American history witnessed exploration of the New World from 1541 to 1769. Spanish explorers were searching for wealth, conquest, and adventure. After conquering the Aztecs in Central America, sailing expeditions undertaken by Hernando Cortes and his men surveyed and roughly recorded the coastlines of the western shores of the Pacific Ocean and the Gulf of California. Inland expeditions were undertaken by Coronado, de Alarcón, and Diaz through Arizona, New Mexico, Texas, and Kansas. Diaz explored the east side of the Colorado River in 1541, entering California in what is now Imperial County (Whitehead 1978). In 1542, Juan Rodrigues Cabrillo undertook a voyage along the Pacific coastline from Puerto de Navidad in Mexico to San Diego, reaching the Channel Islands and as far north as Monterey. Cabrillo met with the Native Americans living along the coast and ventured inland for a short distance. Native Americans related stories to Cabrillo that other contact with Spanish explorers along the Colorado River had resulted in violence and they were afraid of him and his men. Cabrillo died in 1543 and was buried on San Miguel Island. Bartolome Ferrelo continued the voyage to Gold Beach, Oregon and returned to Navidad when his ships needed repairs. Sebastian Vizcaino, backed by the Crown and Church, repeated much of Cabrillo’s journey 60 years later. He brought with him four priests, who accurately recorded the coastline and bays and noted all aspects of the land and its peoples. Exploration ceased until Gaspar de Portolá’s arrival in the area in 1769 (Whitehead 1978).

California had been claimed by Spain during the sixteenth century as part of the empire it was establishing in the New World. Fearing an invasion of the territory by Russians, Carlos III, King of Spain, ordered that settlements be made in Alta California (Whitehead 1978). To solidify their claims, the Spanish government fortified San Diego and Monterey and started to establish Mission outposts. In conjunction with the founding of the Missions, the Spanish governor of California, Felipe de Neve, ordered the establishment of several pueblos to provide food and goods to the presidios that would protect Alta California. One of these locations was Los Angeles, founded by colonists from Sinaloa and Sonora on September 4, 1781. With abundant good land, the town prospered and grew and by 1840, it was the largest settlement in California (Costello and Wilcox 1978:18). Grants of land were made to individuals who had made contributions to the Crown through service in the government or army or through other means. The lands granted, referred to as ranchos, really represented grazing rights for cattle. These individuals also purchased land around the center of the pueblo to establish homes to use when in town.
San Gabriel Mission was founded in September 1771. Padres baptized Native American Indians, calling them neophytes, and used their labor to produce items for trade and provide food. “San Gabriel Mission was recognized as the richest of the missions” (Black 1975:xvii), trading in hides and cattle. Records were kept by each Mission for all baptisms and marriages and it is from these records that we learn much of what occurred.

**Mexican Period**

Mexico declared independence from Spain in 1821, and the Los Angeles City Council was formed in 1822. Mission lands during the Mexican period were to be held in trust for the Indians. “The missions had never held title to the land” (Black 1975:190). Political maneuvering by the Spanish grantees, men like Tiburcio Tapia and Antonio Maria Lugo, forced a weak Governor Figueroa to issue “Provisional Regulations” allowing them to occupy the land (Black 1975).

The project area is in the southwest corner of the Rancho La Ballona that stretched inland from the ocean into what is now Palms and Culver City. The rancho contained 13,920 acres and was a land grant issued by the Mexican governor in 1839 to Ygnacio and Augustin Machado and Felipe and Tomas Talamantes (Cowan 1977:18). The early landowners who had accumulated great tracts of land to graze cattle were known as “Beef Barons” (Whitehead 1987:315). They grew quite rich and supported large families and large numbers of employees, many of them Native Americans. Commonly, they hired a majordomo to oversee the daily operations of the rancho. At the conclusion of the Mexican period, the Treaty of Guadalupe in 1848 specified “that Mexican citizens in the territory were guaranteed their property rights” (Black 1975:215).

**American Period**

Alta California became a state in 1850 with Monterey as the capital. It was during the American Period that men from the eastern and midwestern states settling in California found the means to acquire great wealth in a relatively short time, often by marrying the daughters of the Beef Barons. During the 1860s, the population grew rapidly, partly because many of the old rancho families lost title to their land, leaving a vacuum which was promptly filled by settlers from central and eastern United States. At Ballona Lagoon in the 1860s, squatters had set up a shack and supplied food, drink, and boats to duck hunters.

Moses Wicks, a land speculator believed the area had investment potential and purchased the property around the inlet of Ballona Lagoon. His intentions were to develop a harbor site that would compete with the Southern Pacific’s monopoly on coastal traffic through San Pedro, Wilmington, and Santa Monica. The Santa Fe Railroad saw promise in this scheme and agreed to run track to the development. Wicks raised $300,000 and started dredging the harbor (Altschul et al. 1992:68). The first train arrived at Port Ballona on August 24, 1887 (Figure 4). Round the clock dredging, massive tides that swept the sand back into the harbor, storms, and hard soils eventually bankrupted the company and the plan failed (Playadelrey.com 2004).
In 1902, another investment firm announced the formation of the Beach Land Company which had teamed with Henry Barbour. Barbour owned 1,000 acres around the lagoon and renamed the community Playa del Rey (Figure 5). The intent was to develop a Venetian style resort. Sherman and Clark, who owned the Los Angeles Pacific Electric trolley line, extended it to the new resort. This led to an increase in lot sales but it never became a viable enterprise. The trolley company built the $200,000 Hotel del Rey with 50 guest rooms and a restaurant. A fishing pier, an incline railroad, boat course, a motordrome, grandstands, and other amenities drew in the crowds. In the early 1900s, a combination of natural and man-made disasters destroyed these attractions and the area settled into decline (Playadelrey.com 2004).

The Ohio Oil Company hit a wildcat well east of Venice's Grand Canal in 1929, and drilling began throughout the area south of Washington Boulevard and west of Lincoln Boulevard. By the end of 1930, Playa del Rey, with more than 50 wells, was the fourth largest oil field in California (naid.sppsr.ucla.edu/venice/articles 2004) and by the end of 1931, there were 325 active oil wells in the Ballona Lagoon area. The 1923(1940) USGS Venice 7.5' quadrangle map depicts many of these wells (Altschul et al. 1991:69). At first, wells were located on artificially constructed islands in the wetlands, but increasing production led to the demand for channelization of the lower course of Ballona Creek,
completed by 1935. Otherwise, the area was subjected to little development by its primarily oil company owners.

A California State Division of Mines map (Gay and Hoffman 1954:Plates 5 and 6) shows the Playa del Rey oilfield extending southeast from Santa Monica Bay across the southern part of the city of Venice and into the Del Rey Hills. As of May 1, 1953, the Del Rey field had produced more than 56 million barrels of oil and 56 million cubic feet of gas since its inception in 1929 (Gay and Hoffman 1954:578-579).

The oil demands of World War II depleted most of the Playa del Rey wells, and they were dismantled during the 1950s and 1960s (Altschul et al. 1991:76). By 1953, there were 103 wells remaining (Gay and Hoffman 1954:578-579). Since 1942, natural gas has been piped into the depleted oil fields. Southern California Gas records indicate that billions of cubic feet of natural gas are being stored at pressures of 1700 pounds psi and above (www.saveballona.org).

In 1938 the Army Corps of Engineers channelized Ballona Creek which resulted in a loss of much of the lagoon. Dredging for the yacht harbor at Marina del Rey began in 1961. More of the lagoon was lost in the early 1960s when the entrance channel was cut for Marina del Rey.

Moses Wicks’ dream of a harbor was studied several times and eventually revived by Chamber of Commerce President, Larry Norman. The problem of storms causing severe wave action was corrected by the construction of a breakwater at the channel mouth in January 1965 (Marinadelrey.com). Norman secured the funds and approvals, and the harbor was dedicated in April of 1965. After its official dedication in 1965, the marina became a huge success, raising property values and attracting residential and commercial development (Altschul et al. 1992:87-88). The character of the area changed from industrial to resort/residential.

The most current USGS Venice 7.5’ quadrangle map [1964(1981)] depicts a remaining oil field within the Ballona Lagoon portion of the project area, as well as a few oil and gas wells on either side of Ballona Creek less than 1 mile inland from Dockweiler State Beach.

LITERATURE AND ARCHIVAL REVIEW

A review of available literature, archaeological site archives, and relevant historical maps was conducted at the South Central Coastal Information Center on July 14, 2004 by Linda Rehberger of Greenwood and Associates. The search area for the archival research was one-half mile around the boundaries of the project area to encompass any potential minor changes in design and provide a broader context to evaluate the sensitivity of any cultural resources encountered (Tables 1 and 2). Some of the sites in Table 1 were encountered in surveys that overlap the VPP but which are not located in this project area.
One archaeological site, CA-LAN-66, was recorded within or adjacent to the project area. It is located at the south end of Trolley Way, near Surf Street under what was the Westport Beach Club. The site was originally located by R. F. Van Valkenburgh and then informally recorded by Malcolm Farmer in 1936. Rozaire and Belous completed an archaeological site record in 1950 and the site was designated as CA-LAN-66. The record indicates that the "grounds of the Westport Beach Club are completely covered so that it is impossible to locate any signs of Indian occupation there" (Rozaire and Belous 1950). Vista del Mar is noted as being on the east side, possibly obscuring the remains. Van Valkenburgh was a noted archaeologist and it is probable that the site was of prehistoric origin. In 1980, another survey was conducted at the Westport Beach Club and no archaeological materials were observed (Singer 1980a). The Singer investigation focused on finding the site and confidence was high that it was destroyed sometime before 1950. It was reported that "the buildings and facilities which exist today are not the same as those which stood on the grounds in 1936, or in 1950 for that matter" (Singer 1980a:5). Monitoring was recommended if any ground disturbing activities were initiated. A State Parks archaeologist did a survey along Dockweiler State Beach and mapped the site location, as previously recorded, but made no comments about it (Woodward 1987). No follow-up reports were on file at the South Central Coastal Information Center.

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<td>Compilation of Archaeological Site Information</td>
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Historical maps consulted:

USGS Redondo Beach 15' Quadrangle, 1896, no structures.

USGS Redondo Beach 15' Quadrangle, 1944, 3 structures north of Ballona Creek; many structures south of Ballona Creek.
Persons/Organizations Contacted

Ms. Barbara Whitney, President, California Associations of Museums, Los Angeles.
Dr. Christopher Donnan, Director, Fowler Museum of Cultural History, UCLA.
Dr. Jerome Selmer, Executive Director, Southwest Museum, Los Angeles.
Mr. Jeffrey Rudolph, Executive Director, California Museum of Science and Industry, Los Angeles.
Dr. William Lee, Director, Los Angeles Maritime Museum, San Pedro.
Supervising Ranger, Malibu Lagoon State Beach, Malibu.
Ms. Louise Gabriel, President, Santa Monica Historical Society and Museum, Santa Monica.
Mr. Lawrence Jelinek, American Historical Association, Los Angeles.
Banning Residence Museum, Wilmington.
History and Heritage Committee, American Society of Civil Engineers, Los Angeles.
Dr. Thomas Andrews, Director, Historical Society of Southern California.
Dr. William Estrada, El Pueblo de Los Angeles Historic Park, Los Angeles.
Electric Railway Historical Association of Southern California.
Society of Architectural Historians, Los Angeles.

Native American Groups/Interested Parties

Native American Heritage Commission, Rob Wood, Sacramento.
Samuel Dunlap, Temecula.
Los Angeles City/County Native American Indian Committee, Ron Andrade, Los Angeles.
Ti’At Society, Cindi Alvitre, Reseda.
Gabrielino Tongva Indians of California Tribal Council, John Tomy Rosas, Marina del Rey.
Gabrielino/Tongva Tribal Council, Anthony Morales, San Gabriel.
Craig Torres, Santa Ana.
Coastal Gabrielino Diegueno, Jim Velasques, Riverside.
Gabrielino/Tongva Council/Gabrielino Tongva Nation, Santa Monica.
Gabrielino Band of Mission Indians of California, Susan Frank, Beaumont.
Gabrielino Tongva Indians of California Tribal Council, Robert Dorame, Culver City.
Gabrielino Tongva Indians of California Tribal Council, Mercedes Dorame, Malibu.

RESULTS OF THE INVESTIGATION

Archival Research

The archival research indicated that one archaeological site, CA-LAN-66, was present within the project alignment south of the Marina del Rey channel. Two previous investigations had concluded that the site had been destroyed (Rozaire and Belous 1950; Singer 1980a) by development.
The area surrounding the project alignments can be characterized as highly sensitive for archaeological sites with six known archaeological sites (CA-LAN-47, -66, -1118, -1716, -1970, and -100116) within a half mile of the project alignments.

**Persons Contacted**

The Native American Heritage Commission (Wood 2004) reported that the “Village of Sa’aanga, including recorded archaeological sites CA-LAN-63, -64, -65, -203, 204, and 206a are in the vicinity” of the Venice Pumping Plant Project. These sites are in the Del Rey hills and are outside of this record search boundary. Johnson (1991) believed that Sa’aanga was not a village but either a Gabrielino placename or a Gabrielino settlement of Indian laborers associated with one of the Spanish/Mexican ranchos in the Ballona vicinity.

**Field Survey**

The field survey was conducted on July 26 and 29, 2004 by John M. Foster, RPA. The record search for the project area indicated that the general area was sensitive for archaeological resources. The project area was surveyed by zigzaging the alignments, checking all open ground, and examining erosional cuts, rodent burrows, and construction sites along the way.

**Alternatives North of the Channel**

**Pacific Avenue Alignment**

Marine shell was noted in planters and isolated sections of open ground.

**Dockweiler Beach Alignment**

Marine shell was noted in beach sand along the entire alignment.

**Marquesas Way-Via Marina**

Marine shell was noted in planters, street median (Figure 6), and isolated sections of open ground.

![Figure 6. Shell Fragments in Median on Via Marina.](image-url)
Alternatives South of the Channel

Pacific Avenue Alignments

The location of the recorded archaeological site, CA-LAN-66, was intensively examined for evidence of cultural remains. Based on the mapping of the site on the USGS Venice Quadrangle, it would appear that the majority of the site is under a housing development in construction. Previous investigations (Rozaire and Belous 1950; Singer 1980a) had failed to find any evidence of the site and had reasoned it had been destroyed by development. During the field survey, the site location was visited. The site area is under active construction for multiple residential units. The only area that was accessible was a small triangular section of open ground around a utility pole at Vista del Mar and the northwestern corner of the new housing development (Figure 7). Three fragments of weathered shell were observed, two unidentifiable pieces of marine shell and one piece of Amiantis callosa.

The survey of the rest of the alignment encountered weathered shell in every location where soil could be observed including a small hill at the southern terminus of the alignment.

Dockweiler Beach Alignment

Marine shell was noted in beach sand along the entire alignment.

The presence of marine shell can be indicative of cultural activities and its prevalence within the project area warranted research into its origin. The archival research had identified several surveys that have been conducted within 0.5 mile of the project area. Many of these studies encountered marine shell which provided identifications (Table 3).
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<td>Amiantis callosa</td>
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<td>Chama arcana</td>
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Extremely weathered fragments of clam shell were encountered in one survey and the investigator thought their condition suggested old or beach rolled specimens, possibly fossils (Singer 1980b:3). No artifacts or bones were observed and no obvious soil discoloration. In an earlier report, Singer had encountered shell species west of Via Marina. He reported that “these shells appear to be relatively fresh...not associated with any prehistoric or early historic features,” and “the shells are of all sizes and do not appear to be human food remains” (Singer 1979:6).

In another survey where shellfish remains were observed, it was the opinion of the investigator that the shell was brought in with fill, although he indicated that the parcel investigated was 3-4 feet below adjacent properties (Rosen 1979). Dr. Charles Rozaire
conducted a survey on Via Dolce, just west of Via Marina, and noted “presence of shellfish remains in concentrations referred to as midden” and “the area in question does have evidence of shell ranging from a few scatterings to heavy concentrations, the latter being in the southeast portion.” He believed that the “occurrence of these shells is the result of dredging, dumping and leveling and natural causes rather than due to ancient man’s occupation” (Rozaire 1974). He noted that there was an absence of the “usual cultural debris such as stone flakings and food bone refuse in addition to any artifacts.”

North of the project area, Dillon reported finding concentrations of shell species. He noted that “this combination of shellfish populations does not normally occur in nature (Dillon 1982). As supporting evidence, he indicated that no man-made artifacts were found in association with the shells and that the most common food source of these Indians, mussels, was not found, while Cerithidea californica was not eaten by these Indians. Rozaire’s report (1974) was cited as evidence of dumping, filling, and leveling of the area.

In the only excavation conducted within the harbor area of Marina del Rey, the Admiralty Site yielded considerable quantities of shellfish. Seven major species of economic value were reported: Chione californiensis, Chione undatella, Chione fluctafraga, Ostrea lurida, Argopecten aequisulcatus, Protothaca staminea, and Tresus nuttalli. Pismo clam, abalone, mussel, and white venus, which are uncommon in lagoons, were found in such small numbers that they are a minor component of the analysis. Seventeen species of noneconomic mollusks were recovered from the site but in such small amounts that they would not have been a focus of shellfish collecting activities (Altschul et al. 1992:293).

CONCLUSIONS

The archival research indicated the presence of one recorded archaeological site, CA-LAN-66 within the project area. Various studies of the site area failed to document any shellfish remains, artifacts, or other cultural features. Two of the studies (Rozaire and Belous 1950; Singer 1980a) concluded that the site had probably been destroyed. The area was resurveyed in this investigation and three fragments of weathered shell were observed adjacent to Vista del Mar. Van Valkenburgh, who had originally identified the site, was a respected archaeologist and it is likely that he had found some evidence of prehistoric usage. What is clear is that the mapped boundaries of the resource have been repeatedly built over, probably destroying most of it or at least seriously affecting its integrity. The three fragments of shell found adjacent to Vista del Mar may indicate survival of archaeological remains or simply be part of the pervasive “background shell” present throughout the project area.

Based on the analysis of shellfish remains by various investigators, it is likely that the pervasive scattering of marine shell is the result of dredging, dumping, and leveling as postulated by Rozaire (1974). The history of the project area demonstrates that the area has been significantly modified through various construction efforts including development of Port Ballona in 1887 and culminating in the creation of Marina del Rey in the 1960s. The absence of artifacts, archaeological features, and ecofacts typical of prehistoric
occupation or usage are the key components that would distinguish whether or not the shellfish remains are cultural. While the area has been the scene of significant development, the discovery of the Admiralty Site, CA-LAN-47, with its assemblage of prehistoric tools, human burials, and food remains is a cautious reminder that there are prehistoric sites in the immediate area.

EVALUATION OF IMPACTS

According to CEQA Guidelines, impacts are defined as those results that are directly attributable to the project and which occur at the same time and place. Direct impacts are those that may result from the immediate disturbance of resources, whether from vegetation removal, demolition of structures, earth-moving activities, or excavation. A project with an effect that may cause a substantial adverse change in the qualities that contribute to the significance of an historical or prehistoric resource is a project that may have an effect on the environment (CEQA 15064.5[b]). Substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of the resource would be materially impaired.

Since project development will entail surface and subsurface disturbance of the ground, the proposed development of the sewer alignment has the potential to cause a significant impact on unknown cultural resources. The potential for permanent effects to occur to cultural resources would be related to such project activities as grading, cutting and filling, excavation, trenching, augering, pile driving, utility installation, landscaping, or other pre-construction or construction process which disturbs, removes, or destroys an historic property. Permanent effects may also be caused by damage or disturbance of previously unknown resources that are unexpectedly encountered during subsurface activities or construction. For deposits or features that will be buried or covered by new construction, the effect will be lack of access of these resources for research or public interpretation.

CA-LAN-66

One archaeological site is recorded in the vicinity of the southern alignment at Vista del Mar. The location of the site has been repeatedly impacted by development. It is possible that if the location retains any integrity, then remnants may be present under pavement of Vista del Mar. However, in our opinion, there is insufficient evidence that a cultural resource is present and no impacts are expected.

RECOMMENDATIONS

The preferred mitigation for impacts to cultural resources is preservation by avoiding areas where cultural resources are known to exist, wherever possible. When avoidance cannot be achieved, alternate measures such as surface collection and/or subsurface data recovery of significant sites must be implemented. If previously unknown cultural resources are encountered during site clearance and preparation, or during project
construction, and they cannot be avoided, then contingency measures must be in place to react promptly to protect these resources and ameliorate the impacts to a level of not significant.

There are two recommendations that can be made:

1. Monitor all construction in the vicinity of CA-LAN-66 by an archaeologist qualified to recognize and assess both prehistoric and historical resources; and

2. Develop a contingency plan for addressing unanticipated new discoveries; evaluate and report any additional resources encountered either through monitoring or trenching.
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SECTION 1

INTRODUCTION

1.1 BACKGROUND

Paleontologic resources include fossil remains, fossil sites, associated specimen data and corresponding geologic and geographic site data, and the fossil-bearing strata. This technical report summarizes the results of the paleontologic resource inventory/impact assessment conducted by Paleo Environmental Associates, Inc. (PEAI), in support of the proposed Venice Pumping Plant Dual Force Main Project environmental impact report (EIR). The City of Los Angeles, the CEQA lead agency for the project, has required this inventory/impact assessment be conducted because of the potential for fossil sites and remains being encountered by earth-moving activities associated with project construction.

1.2 PERSONNEL

This technical report was prepared by Dr. E. Bruce Lander, a paleontologist with PEAI, Altadena, California. Dr. Lander has a Ph.D. degree in paleontology and has conducted research, authored published scientific contributions, and prepared environmental impact review documents on the paleontologic resources of California in support of other major construction projects, including a number of major earth-moving projects in the project site vicinity. Dr. Lander conducted the literature review, archival search, and field survey for this report.
SECTION 2

ENVIRONMENTAL SETTINGS

The Venice Pumping Plant Dual Force Main Project consists of three alignments (Marquesas Way/Via Marina, Pacific Avenue, Dockweiler Beach) that lie in the Venice Beach-Marina del Rey and Dockweiler Beach-Playa del Rey areas of Los Angeles and cross the Marina del Rey inlet channel and Ballona Creek (see Figure 1). The project site occupies the unsurveyed portion of Township 2 South, Range 15 West of the San Bernardino Base and Meridian. Topographic map coverage of the project site is provided at a scale of 1:24,000 by the United States Geological Survey (USGS) Venice Quadrangle, California—Los Angeles Co., 7.5 Minute Series (Topographic) (1964, photorevised 1981). Except for portions of the Dockweiler Beach Alignment and where the three alignments cross the Marina del Rey inlet channel and Ballona Creek, the entire project site is covered by urban development, mostly roadways. One alignment will be selected for construction.

Paleontologic resources of the project site include sedimentary or stratigraphic rock units that immediately underlie the surface and have a potential for yielding particular types of fossil remains because they have yielded similar fossil remains at previously recorded fossil sites near the project site. Fossils, the remains or indications of once-living organisms, are a very important scientific resource because of their use in 1) documenting the evolution of particular groups of organisms, 2) reconstructing the environments in which they lived, 3) and in determining the ages of the strata in which they occur and of the geologic events that resulted in the deposition of the sediments constituting these strata.

2.1 METHODS

The following tasks were conducted to develop a baseline paleontologic resource inventory of the project site by rock unit, and to assess the potential paleontologic productivity and the paleontologic/scientific importance of each rock unit, these assessments being based on the fossil remains previously recorded from the rock unit in the project site vicinity. These tasks were completed in compliance with Society of Vertebrate Paleontology (SVP, 1995) guidelines for assessing the scientific importance of the paleontologic resources in an area of potential environmental effect.

2.1.1 Stratigraphic Inventory

Geologic maps and reports covering the surficial geology of the project site were reviewed 1) to determine the rock units present at the project site, particularly those rock units known to be fossiliferous, and 2) to delineate their respective areal distributions.

2.1.2 Paleontologic Resource Inventory

Published and unpublished geologic and paleontologic literature was reviewed to document the number and locations of previously recorded fossil sites at and near the project site from each rock unit present at the project site, and the types of fossil remains the rock unit has produced locally. The literature review was supplemented by an archival search conducted at the Natural History Museum of Los Angeles County Vertebrate Paleontology Department (LACMVP) for additional information regarding the occurrences of fossil sites and remains at and near the project site. A field survey of the project site was conducted 1) to determine the condition of any previously recorded site at the project site, 2) to document the presence of any unrecorded fossil site, and 3) to substantiate the presence of strata suitable for containing fossil remains.

2.1.3 Paleontologic Resource Assessment Criteria

The paleontologic importance (high, moderate, low, none, undetermined) of a rock unit present at the project site is the measure most amenable to assessing the scientific importance of the paleontologic resources of the project site because the areal distribution of a rock unit can be delineated on a topographic map. The paleontologic importance of a rock unit reflects 1) its potential paleontologic productivity and 2) the scientific importance of the fossils it has produced locally.
The potential paleontologic productivity (high, moderate, low, none, undetermined) of a rock unit present at the project site is based on the abundance/densities of fossil specimens and/or unrecorded/previously recorded fossil sites in exposures of the unit at and near the project site. Exposures of a specific rock unit at the project site are most likely to yield fossil remains representing particular species in quantities similar to those previously recorded from the unit at and near the project site, or to contain fossil sites at similar densities. The criteria for establishing the potential paleontologic productivity of a rock unit present at the project site are described below.

1) High potential: rock unit contains comparatively high density of unrecorded/previously recorded fossil sites and has produced numerous fossil remains at and/or near project site, and is very likely to yield additional similar remains at project site.

2) Moderate potential: rock unit contains relatively moderate density of unrecorded/previously recorded fossil sites and has produced some fossil remains at and/or near project site, and is somewhat likely to yield additional similar remains at project site.

3) Low potential: rock unit contains no or comparatively low density of previously recorded fossil sites and has yielded very few or no fossil remains near project site, and is not likely to yield any remains at project site.

4) Undetermined potential: rock unit has limited or no exposure at and/or near project site, is poorly studied, contains no previously recorded fossil site, and has produced no fossil remains near project site. However, in project site region, same or correlative and/or lithologically similar rock unit contains sufficient recorded fossil sites to suggest rock unit at project site has at least a moderate potential for containing unrecorded fossil sites (note: elsewhere in California, exposures of rock units with few or no previously recorded fossil sites have recently proven abundantly fossiliferous during surveying, monitoring, or processing of fossiliferous rock samples as part of mitigation programs for other earth-moving projects).

5) No potential: unfossiliferous artificial fill and igneous and high-grade metamorphic rock units with no potential for containing any unrecorded fossil site or yielding any fossil remains.

A fossil specimen is considered scientifically highly important if it is 1) identifiable, 2) complete, 3) well preserved, 4) age diagnostic, 5) useful in environmental reconstruction, 6) a type or topotypic specimen, 7) a member of a rare species, 8) a species that is part of a diverse assemblage, and/or 9) a skeletal element different from, or a specimen more complete than those now available for its respective species. Identifiable fossil land mammal remains, for example, are considered scientifically highly important because of their potential use in providing very accurate age determinations and environmental reconstructions for the rock units in which they occur. The geologic age of some fossil mollusk and land mammal and plant remains can be determined by carbon-14 dating analysis. Moreover, land mammal and plant remains are comparatively rare in the fossil record.

Using the definitions presented above, the paleontologic or scientific importance of a rock unit present at the project site would be assessed using the following criteria.

1) High importance: rock unit has comparatively high potential for containing unrecorded fossil sites and for yielding scientifically important fossil remains at project site similar to those previously recorded from rock unit at and/or near project site.

2) Moderate importance: rock unit has relatively moderate potential for containing unrecorded fossil sites and for yielding scientifically important fossil remains at project site similar to those previously recorded from rock unit near project site.

3) Low importance: rock unit has comparatively low potential for containing any unrecorded fossil site or for yielding any scientifically important fossil remains at project site.

4) Undetermined importance: rock unit for which too few data are available from project site and vicinity
to allow an accurate assessment of its potential for containing any unrecorded fossil site or for yielding any scientifically important fossil remains at project site.

5) No importance: unfossiliferous artificial fill and igneous and high-grade metamorphic rock units having no potential for containing any unrecorded fossil site or for yielding any fossil remains.

Note, however, that any fossil site containing identifiable fossil remains and the fossil-bearing strata are considered highly important paleontologically, regardless of the paleontologic or scientific importance of the rock unit in which the site and strata occur.

The following tasks were completed to establish the paleontologic importance of each rock unit present at the project site.

1) The scientific importance of fossil remains recorded from a rock unit present at the project site was assessed.

2) The potential paleontologic productivity of the rock unit was assessed, based on the density of fossil remains and/or previously recorded and newly documented fossil sites it contains at and/or near the project site.

3) The paleontologic importance of the rock unit was assessed, based on its documented and/or potential fossil content at the project site.

This method of resource assessment is the most appropriate for an areal paleontologic resource investigation of the project site because discrete levels of paleontologic importance can be delineated on a topographic/geologic map.

2.2 RESULTS

2.2.1 Stratigraphic Inventory

The project site lies on the western shelf of the Cenozoic Los Angeles Basin (Wright, 1991), which, in turn, is situated at the northwestern corner of the Peninsular Ranges Province, where major linear geographic features (mountains, valleys) and the underlying geologic structures (faults, folds) trend in a northwesterly direction (see Jahns, 1954). The western shelf is composed of sedimentary or stratigraphic rock units consisting of late Cenozoic marine and stratigraphically overlying nonmarine strata reflecting the final filling of the basin and its accompanying emergence above sea level.

Regional surficial geologic mapping of the project site and vicinity is provided by Jennings (1962) at a scale of 1:250,000. Larger-scale (1:31,680) geologic mapping of the area by Poland and others (1959) indicates that the project site is underlain by three Quaternary rock units. In ascending stratigraphic order, these rock units include the Pleistocene marine Palos Verdes Sand and Holocene dune sand, which form the lower portion of the bluff at the southeastern corner of the project site; and by Holocene coastal deposits, which underlie the remaining flat-lying portion of the project site. A surficial geologic map of the project site is presented at a scale of 1:24,000 in Figure 1.

2.2.2 Paleontologic Resource Inventory and Assessment by Rock Unit

An inventory of the paleontologic resources of the rock units present at the project site is presented below, and the scientific importance of these resources is assessed. Although neither the literature review, the archival search, nor the field survey conducted for this inventory documented any previously recorded fossil site as occurring at the project site, a number of previously recorded fossil sites were documented as occurring in areas mapped as being underlain by these rock units near the project site. The fossil remains from some of these fossil sites were uncovered as a result of earth-moving activities associated with other major construction projects.

2.2.2.1 Palos Verdes Sand.—Although no previously recorded fossil site is reported as occurring in the Palos Verdes Sand at the project site, abundant fossilized remains representing a taxonomically highly diverse assemblage
consisting of more than 300 species of Pleistocene marine invertebrates, a number of marine vertebrate species, and one land mammal species, was recovered at a fossil site in the Palos Verdes Sand at LACMVP fossil site 1024 (= Natural History Museum of Los Angeles County Invertebrate Paleontology Department (LACMIP) fossil site 59), approximately 1.7 miles east of the project site at the intersection of Lincoln Boulevard and Cabora Drive, which overlies the North Outfall Sewer. This fossil site was discovered as a result of trenching for the sewer. The taxa represented by the fossil remains recovered at the fossil site include bryozoans (moss animals), tusk shells, snails, clams, barnacles, crabs, sand dollars, sea urchins, sharks, rays, fishes, birds, seals, porpoises, and a gopher (Jefferson, 1991a; Lander, 1990, 2003; Miller and DeMay, 1942; Willett, 1937). LACMVP fossil site 1024 is the type locality for one of the extinct species of bird. Poland and others (1959) considered the fossil-bearing interval to be a sandstone layer constituting the lower 6 feet of the Palos Verdes Sand. Two additional fossil sites that yielded the fossilized shells of marine clams occur along Lincoln Boulevard, very near the previous fossil site (Lander, 1990, 2003).

The occurrence of several previously recorded fossil sites near the project site suggests that there is probably a high potential for additional similar, scientifically highly important fossil remains at the project site being encountered by earth-moving activities at unrecorded fossil sites in the Palos Verdes Sand. Identifiable fossil remains recovered from this rock unit at the project site would be particularly important if they represented a new or rare species; geologic (temporal) and/or geographic range extension; new taxonomic record for the rock unit; age-diagnostic species; and/or a skeletal element different from, or a specimen more complete than those now available for its respective species. Moreover, the recovery of remains representing environmentally sensitive species would be critical in paleoenvironmental and habitat reconstruction. Finally, the remains would contribute to a more comprehensive documentation of the diversity of animal life that existed at and near the project site during the Pleistocene Epoch.

2.2.2.2 Dune Sand.—Although no previously recorded fossil site is reported as occurring in the dune sand at the project site, fossilized remains representing an extinct species of elephant might have been recovered from this rock unit at LACM fossil site 3264, which was encountered at a depth of 25 feet below previous grade approximately 2.4 miles east-southeast of the project site at Los Angeles International Airport. However, the fossil site also might have been in the stratigraphically underlying terrace cover, which is mapped with the Palos Verdes Sand and has yielded the fossilized bones and teeth of extinct species of land mammals, including mastodon, mammoth, horse, bison, and rabbit, near the airport at LACM fossil sites 1180, 3789, 4942, and 7332 (Jefferson, 1991b; Miller, 1971). These sites were encountered at depths 13.5 to 16 feet below previous grade. The occurrence of fossilized remains representing an extinct species of Pleistocene bison (Bison), which defines the beginning of the Rancholabrean North American Land Mammal Age (NALMA) (Savage, 1951), indicates that the terrace cover is Rancholabrean in age.

The possible occurrence of only one previously recorded fossil site near the project site suggests that there is an undetermined (but probably no more than moderate) potential for additional similar, scientifically highly important fossil remains at the project site being encountered at depth by earth-moving activities at unrecorded fossil sites in the dune sand. However, any identifiable fossil remains recovered from this rock unit at the project site would be particularly important if they represented a new or rare species; geologic (temporal) and/or geographic range extension; new taxonomic record for the rock unit; age-diagnostic species; and/or a skeletal element different from, or a specimen more complete than those now available for its respective species. Moreover, there is a potential for encountering land mammal remains representing species rarely if ever recorded from the rock unit or the immediate project site vicinity. In addition, the recovery of remains representing age-diagnostic species or whose age can be determined by carbon-14 dating analysis would be critical in determining if the rock unit is assignable partly to the Rancholabrean NALMA or is entirely Holocene in age, while the remains of environmentally sensitive species would be critical in paleoenvironmental and habitat reconstruction. The remains also would contribute to a more comprehensive documentation of the diversity of animal life that existed at and near the project site during the Pleistocene and/or Holocene Epochs. Finally, land mammal remains also are scientifically highly important because such remains are comparatively rare in the fossil record.

The potential for fossil remains being encountered at and very near the surface is considered to be only low because any remains encountered at such shallow depths probably would be too young to be considered fossilized.

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2 to 31 feet below previous grade in 28 borings from Playa Vista, immediately east of the project site, and fossilized wood was encountered in one of the borings at a depth nearly 70 feet below previous grade (Converse Consultants, Inc., 1981; Lander, 1990, 2003; LeRoy Crandall and Associates, 1988).

During the field survey conducted in support of this inventory, the shells of marine snails and clams of presumed Holocene age were observed on the embankment above Ballona Lagoon. However, it was not possible to determine if the shells were derived from undisturbed strata (if any) exposed along the embankment, or were in spoils excavated from the lagoon.

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SECTION 1

INTRODUCTION

1.1 BACKGROUND

Paleontologic resources include fossil remains, fossil sites, associated specimen data and corresponding geologic and geographic site data, and the fossil-bearing strata. This technical report summarizes the results of the paleontologic resource inventory/impact assessment conducted by Paleo Environmental Associates, Inc. (PEAI), in support of the proposed Venice Pumping Plant Dual Force Main Project environmental impact report (EIR). The City of Los Angeles, the CEQA lead agency for the project, has required this inventory/impact assessment be conducted because of the potential for fossil sites and remains being encountered by earth-moving activities associated with project construction.

1.2 PERSONNEL

This technical report was prepared by Dr. E. Bruce Lander, a paleontologist with PEAI, Altadena, California. Dr. Lander has a Ph.D. degree in paleontology and has conducted research, authored published scientific contributions, and prepared environmental impact review documents on the paleontologic resources of California in support of other major construction projects, including a number of major earth-moving projects in the project site vicinity. Dr. Lander conducted the literature review, archival search, and field survey for this report.
SECTION 2

ENVIRONMENTAL SETTING

The Venice Pumping Plant Dual Force Main Project consists of three alignments (Marquésas Way/Via Marina, Pacific Avenue, Dockweiler Beach) that lie in the Venice Beach-Marinada del Rey and Dockweiler Beach-Playa del Rey areas of Los Angeles and cross the Marinada del Rey inlet channel and Ballona Creek (see Figure 1). The project site occupies the unsurveyed portion of Township 2 South, Range 15 West of the San Bernardino Base and Meridian. Topographic map coverage of the project site is provided at a scale of 1:24,000 by the United States Geological Survey (USGS) Venice Quadrangle, California—Los Angeles Co., 7.5 Minute Series (Topographic) (1964, photorevised 1981). Except for portions of the Dockweiler Beach Alignment and where the three alignments cross the Marinada del Rey inlet channel and Ballona Creek, the entire project site is covered by urban development, mostly roadways. One alignment will be selected for construction.

Paleontologic resources of the project site include sedimentary or stratigraphic rock units that immediately underlie the surface and have a potential for yielding particular types of fossil remains because they have yielded similar fossil remains at previously recorded fossil sites near the project site. Fossils, the remains or indications of once-living organisms, are a very important scientific resource because of their use in 1) documenting the evolution of particular groups of organisms, 2) reconstructing the environments in which they lived, 3) and in determining the ages of the strata in which they occur and of the geologic events that resulted in the deposition of the sediments constituting these strata.

2.1 METHODS

The following tasks were conducted to develop a baseline paleontologic resource inventory of the project site by rock unit, and to assess the potential paleontologic productivity and the paleontologic/scientific importance of each rock unit, these assessments being based on the fossil remains previously recorded from the rock unit in the project site vicinity. These tasks were completed in compliance with Society of Vertebrate Paleontology (SVP, 1995) guidelines for assessing the scientific importance of the paleontologic resources in an area of potential environmental effect.

2.1.1 Stratigraphic Inventory

Geologic maps and reports covering the surficial geology of the project site were reviewed 1) to determine the rock units present at the project site, particularly those rock units known to be fossiliferous, and 2) to delineate their respective areal distributions.

2.1.2 Paleontologic Resource Inventory

Published and unpublished geologic and paleontologic literature was reviewed to document the number and locations of previously recorded fossil sites at and near the project site from each rock unit present at the project site, and the types of fossil remains the rock unit has produced locally. The literature review was supplemented by an archival search conducted at the Natural History Museum of Los Angeles County Vertebrate Paleontology Department (LACMVP) for additional information regarding the occurrences of fossil sites and remains at and near the project site. A field survey of the project site was conducted 1) to determine the condition of any previously recorded site at the project site, 2) to document the presence of any unrecorded fossil site, and 3) to substantiate the presence of strata suitable for containing fossil remains.

2.1.3 Paleontologic Resource Assessment Criteria

The paleontologic importance (high, moderate, low, none, undetermined) of a rock unit present at the project site is the measure most amenable to assessing the scientific importance of the paleontologic resources of the project site because the areal distribution of a rock unit can be delineated on a topographic map. The paleontologic importance of a rock unit reflects 1) its potential paleontologic productivity and 2) the scientific importance of the fossils it has produced locally.
The potential paleontologic productivity (high, moderate, low, none, undetermined) of a rock unit present at the project site is based on the abundance/densities of fossil specimens and/or unrecorded/previously recorded fossil sites in exposures of the unit at and near the project site. Exposures of a specific rock unit at the project site are most likely to yield fossil remains representing particular species in quantities similar to those previously recorded from the unit at and near the project site, or to contain fossil sites at similar densities. The criteria for establishing the potential paleontologic productivity of a rock unit present at the project site are described below.

1) High potential: rock unit contains comparatively high density of unrecorded/previously recorded fossil sites and has produced numerous fossil remains at and/or near project site, and is very likely to yield additional similar remains at project site.

2) Moderate potential: rock unit contains relatively moderate density of unrecorded/previously recorded fossil sites and has produced some fossil remains at and/or near project site, and is somewhat likely to yield additional similar remains at project site.

3) Low potential: rock unit contains no or comparatively low density of previously recorded fossil sites and has yielded very few or no fossil remains near project site, and is not likely to yield any remains at project site.

4) Undetermined potential: rock unit has limited or no exposure at and/or near project site, is poorly studied, contains no previously recorded fossil site, and has produced no fossil remains near project site. However, in project site region, same or correlative and/or lithologically similar rock unit contains sufficient recorded fossil sites to suggest rock unit at project site has at least a moderate potential for containing unrecorded fossil sites (note: elsewhere in California, exposures of rock units with few or no previously recorded fossil sites have recently proven abundantly fossfillerous during surveying, monitoring, or processing of fossfillerous rock samples as part of mitigation programs for other earth-moving projects).

5) No potential: unfossiliferous artificial fill and igneous and high-grade metamorphic rock units with no potential for containing any unrecorded fossil site or yielding any fossil remains.

A fossil specimen is considered scientifically highly important if it is 1) identifiable, 2) complete, 3) well preserved, 4) age diagnostic, 5) useful in environmental reconstruction, 6) a type or toptotypic specimen, 7) a member of a rare species, 8) a species that is part of a diverse assemblage, and/or 9) a skeletal element different from, or a specimen more complete than those now available for its respective species. Identifiable fossil land mammal remains, for example, are considered scientifically highly important because of their potential use in providing very accurate age determinations and environmental reconstructions for the rock units in which they occur. The geologic age of some fossil mollusk and land mammal and plant remains can be determined by carbon-14 dating analysis. Moreover, land mammal and plant remains are comparatively rare in the fossil record.

Using the definitions presented above, the paleontologic or scientific importance of a rock unit present at the project site would be assessed using the following criteria.

1) High importance: rock unit has comparatively high potential for containing unrecorded fossil sites and for yielding scientifically important fossil remains at project site similar to those previously recorded from rock unit at and/or near project site.

2) Moderate importance: rock unit has relatively moderate potential for containing unrecorded fossil sites and for yielding scientifically important fossil remains at project site similar to those previously recorded from rock unit near project site.

3) Low importance: rock unit has comparatively low potential for containing any unrecorded fossil site or for yielding any scientifically important fossil remains at project site.

4) Undetermined importance: rock unit for which too few data are available from project site and vicinity
to allow an accurate assessment of its potential for containing any unrecorded fossil site or for yielding any scientifically important fossil remains at project site.

5) No importance: unfossiliferous artificial fill and igneous and high-grade metamorphic rock units having no potential for containing any unrecorded fossil site or for yielding any fossil remains.

Note, however, that any fossil site containing identifiable fossil remains and the fossil-bearing strata are considered highly important paleontologically, regardless of the paleontologic or scientific importance of the rock unit in which the site and strata occur.

The following tasks were completed to establish the paleontologic importance of each rock unit present at the project site.

1) The scientific importance of fossil remains recorded from a rock unit present at the project site was assessed.

2) The potential paleontologic productivity of the rock unit was assessed, based on the density of fossil remains and/or previously recorded and newly documented fossil sites it contains at and/or near the project site.

3) The paleontologic importance of the rock unit was assessed, based on its documented and/or potential fossil content at the project site.

This method of resource assessment is the most appropriate for an areal paleontologic resource investigation of the project site because discrete levels of paleontologic importance can be delineated on a topographic/geologic map.

2.2 RESULTS

2.2.1 Stratigraphic Inventory

The project site lies on the western shelf of the Cenozoic Los Angeles Basin (Wright, 1991), which, in turn, is situated at the northwestern corner of the Peninsular Ranges Province, where major linear geographic features (mountains, valleys) and the underlying geologic structures (faults, folds) trend in a northwesterly direction (see Jahns, 1954). The western shelf is composed of sedimentary or stratigraphic rock units consisting of late Cenozoic marine and stratigraphically overlying nonmarine strata reflecting the final filling of the basin and its accompanying emergence above sea level.

Regional surficial geologic mapping of the project site and vicinity is provided by Jennings (1962) at a scale of 1:250,000. Larger-scale (1:31,680) geologic mapping of the area by Poland and others (1959) indicates that the project site is underlain by three Quaternary rock units. In ascending stratigraphic order, these rock units include the Pleistocene marine Palos Verdes Sand and Holocene dune sand, which form the lower portion of the bluff at the southeastern corner of the project site; and by Holocene coastal deposits, which underlie the remaining flat-lying portion of the project site. A surficial geologic map of the project site is presented at a scale of 1:24,000 in Figure 1.

2.2.2 Paleontologic Resource Inventory and Assessment by Rock Unit

An inventory of the paleontologic resources of the rock units present at the project site is presented below, and the scientific importance of these resources is assessed. Although neither the literature review, the archival search, nor the field survey conducted for this inventory documented any previously recorded fossil site as occurring at the project site, a number of previously recorded fossil sites were documented as occurring in areas mapped as being underlain by these rock units near the project site. The fossil remains from some of these fossil sites were uncovered as a result of earth-moving activities associated with other major construction projects.

2.2.2.1 Palos Verdes Sand.— Although no previously recorded fossil site is reported as occurring in the Palos Verdes Sand at the project site, abundant fossilized remains representing a taxonomically highly diverse assemblage...
consisting of more than 300 species of Pleistocene marine invertebrates, a number of marine vertebrate species, and one land mammal species, was recovered at a fossil site in the Palos Verdes Sand at LACMVP fossil site 1024 (= Natural History Museum of Los Angeles County Invertebrate Paleontology Department (LACMIP) fossil site 59), approximately 1.7 miles east of the project site at the intersection of Lincoln Boulevard and Cabrillo Drive, which overlies the North Outfall Sewer. This fossil site was discovered as a result of trenching for the sewer. The taxa represented by the fossil remains recovered at the fossil site include bryozoans (moss animals), tusk shells, snails, clams, barnacles, crabs, sand dollars, sea urchins, sharks, rays, fishes, birds, seals, porpoises, and a gopher (Jefferson, 1991a; Lander, 1990, 2003; Miller and DeMay, 1942; Willett, 1937). LACMVP fossil site 1024 is the type locality for one of the extinct species of bird. Poland and others (1959) considered the fossil-bearing interval to be a sandstone layer constituting the lower 6 feet of the Palos Verdes Sand. Two additional fossil sites that yielded the fossilized shells of marine clams occur along Lincoln Boulevard, very near the previous fossil site (Lander, 1990, 2003).

The occurrence of several previously recorded fossil sites near the project site suggests that there probably is a high potential for additional similar, scientifically highly important fossil remains at the project site being encountered by earth-moving activities at unrecorded fossil sites in the Palos Verdes Sand. Identifiable fossil remains recovered from this rock unit at the project site would be particularly important if they represented a new or rare species; geologic (temporal) and/or geographic range extension; new taxonomic record for the rock unit; age-diagnostic species; and/or a skeletal element different from, or a specimen more complete than those now available for its respective species. Moreover, the recovery of remains representing environmentally sensitive species would be critical in paleoenvironmental and habitat reconstruction. Finally, the remains would contribute to a more comprehensive documentation of the diversity of animal life that existed at and near the project site during the Pleistocene Epoch.

2.2.2.2 Dune Sand.—Although no previously recorded fossil site is reported as occurring in the dune sand at the project site, fossilized remains representing an extinct species of elephant might have been recovered from this rock unit at LACM fossil site 3264, which was encountered at a depth of 25 feet below previous grade approximately 2.4 miles east-southeast of the project site at Los Angeles International Airport. However, the fossil site also might have been in the stratigraphically underlying terrace cover, which is mapped with the Palos Verdes Sand and has yielded the fossilized bones and teeth of extinct species of land mammals, including mastodon, mammoth, horse, bison, and rabbit, near the airport at LACM fossil sites 1180, 3789, 4942, and 7332 (Jefferson, 1991b; Miller, 1971). These sites were encountered at depths 13.5 to 16 feet below previous grade. The occurrence of fossilized remains representing an extinct species of Pleistocene bison (Bison), which defines the beginning of the Rancholabrean North American Land Mammal Age (NALMA) (Savage, 1951), indicates that the terrace cover is Rancholabrean in age.

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The potential for fossil remains being encountered at and very near the surface is considered to be only low because any remains encountered at such shallow depths probably would be too young to be considered fossilized.

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2 to 31 feet below previous grade in 28 borings from Playa Vista, immediately east of the project site, and fossilized wood was encountered in one of the borings at a depth nearly 70 feet below previous grade (Converse Consultants, Inc., 1981; Lander, 1990, 2003; LeRoy Crandall and Associates, 1988).

During the field survey conducted in support of this inventory, the shells of marine snails and clams of presumed Holocene age were observed on the embankment above Ballona Lagoon. However, it was not possible to determine if the shells were derived from undisturbed strata (if any) exposed along the embankment, or were in spoils excavated from the lagoon.

The occurrence of numerous previously recorded fossil sites near the project site suggests that there is a high potential for additional similar, scientifically highly important fossil remains at the project site being encountered by earth-moving activities at unrecorded fossil sites in the coastal deposits. Identifiable fossil remains recovered from this rock unit at the project site would be particularly important if they represented a new or rare species; geologic (temporal) and/or geographic range extension; new taxonomic record for the rock unit; age-diagnostic species; and/or a skeletal element different from, or a specimen more complete than those now available for its respective species. Moreover, the recovery of remains representing age-diagnostic species or whose age can be determined by carbon-14 dating analysis would be critical in determining if the rock unit is partly Pleistocene or entirely Holocene in age, while the remains of environmentally sensitive species would be critical in paleoenvironmental and habitat reconstruction. In addition, the remains of environmentally sensitive species would be critical in paleoenvironmental and habitat reconstruction. Finally, the remains would contribute to a more comprehensive documentation of the diversity of animal life that existed at and near the project site during the Pleistocene and/or Holocene Epochs.

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SECTION 3

ENVIRONMENTAL IMPACTS

3.1 CONSTRUCTION PHASE IMPACTS

Paleontologic resources, including an undetermined number of fossil remains and unrecorded fossil sites; associated specimen data and corresponding geologic and geographic site data; and the fossil-bearing strata, could be adversely affected by (i.e., would be sensitive to) the significant direct and indirect environmental impacts resulting from earth-moving activities associated with project construction in the selected alignment.

Direct impacts would result mostly from earth-moving activities (primarily trenching and boring for pipeline) in previously undisturbed strata. Although earth-moving activities would be comparatively short term, the possible accompanying loss of some fossil remains, unrecorded fossil sites, associated specimen data and corresponding geologic and geographic site data, and the fossil-bearing strata is a potentially significant long-term adverse environmental impact.

Easier access to fresh exposures of fossiliferous strata and the accompanying potential for unauthorized fossil collecting by construction personnel, rock hounds, and amateur and commercial fossil collectors could result in the loss of some additional fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data. The loss of these additional paleontologic resources is another potentially significant long-term (but indirect) environmental impact.

3.1.1 Significance Criteria

The following tasks were conducted in compliance with SVP (1995) guidelines for assessing the significance of construction-related adverse environmental impacts on paleontologic resources, or the paleontologic sensitivity of a particular rock unit to adverse impacts.

The paleontologic significance (high, moderate, low, none, undetermined) of the potential adverse impacts of earth-moving activities on the paleontologic resources of each rock unit present at the project site was assessed and reflects the paleontologic or scientific importance/impact sensitivity of the rock unit, which, in turn, primarily reflects the potential for fossil remains and fossil sites being encountered by these activities. Note, however, that any impact on a fossil site and the fossil-bearing strata would be considered highly significant paleontologically, regardless of the paleontologic importance of the rock unit in which the site and strata occur. For example, trenching in an area underlain by a moderately important rock unit would have only a moderate potential for the disturbance or burial of fossil remains and sites (i.e., the rock unit would be moderately sensitive to adverse impacts). Although the accompanying loss of any fossil remains and site would be a highly significant impact paleontologically, the impact of earth-moving activities would be considered only moderately significant because of the moderate potential for the loss of paleontologic resources. This method of impact assessment is most appropriate to an areal paleontologic resource investigation of the project site because discrete levels of paleontologic impact sensitivity/significance can be delineated on a topographic/geologic map of the project site.

A paleontologic resource impact sensitivity assessment of the project site is presented below and on the geologic map of the project site included as Figure 1.

3.1.2 Impact Assessment

3.1.2.1 Palos Verdes Sand.—The Palos Verdes Sand has yielded abundant fossil remains at several previously recorded fossil sites near the project site. For this reason, adverse environmental impacts on the paleontologic resources of the Palos Verdes Sand that would result from earth-moving activities at the project site would be considered to be of high paleontologic significance because there probably is a high potential for the loss of scientifically important fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data as a result of these activities.
3.1.2.2 **Dune Sand.**—The dune sand possibly has yielded fossil remains at only one previously recorded fossil site near the project site. For this reason and because this fossil site was encountered at depth, adverse environmental impacts on the paleontologic resources of the dune sand that would result from earth-moving activities at the project site would be considered to be of undetermined (but probably no more than moderate) paleontologic significance at depth because the potential for the loss of scientifically important fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data as a result of these activities is undetermined.

On the other hand, any adverse environmental impact on the paleontologic resources of the dune sand that would result from earth-moving activities at and near the surface probably would be considered to be of low significance because the dune sand probably is too young at and near the surface to contain remains old enough to be considered fossilized.

3.1.2.3 **Coastal Deposits.**—The coastal deposits have yielded fossil remains at numerous previously recorded fossil sites near the project site. For this reason and because these fossil sites were encountered at depth, adverse environmental impacts on the paleontologic resources of the coastal deposits that would result from earth-moving activities at the project site would be considered to be of high paleontologic significance at depth because there probably is a high potential for the loss of scientifically important fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data as a result of these activities.

On the other hand, any adverse environmental impact on the paleontologic resources of the coastal deposits that would result from earth-moving activities at and near the surface probably would be considered to be of low significance because the coastal deposits probably are too young at and near the surface to contain remains old enough to be considered fossilized.

3.2 **OPERATIONAL PHASE**

There would be no impact on paleontologic resources during the operational phase of the project if there were no earth-moving activity.

3.3 **CUMULATIVE IMPACTS**

Development of the project site, in combination with other projects in the region where a project site is underlain by the Palos Verdes Sand might lead to the progressive loss of fossil-bearing strata in these rock units that could be prospected for fossil remains and unrecorded fossil sites. The loss of these additional paleontologic resources is another potentially significant long-term adverse environmental impact.
SECTION 4

MITIGATION MEASURES

4.1 CONSTRUCTION PHASE

The following measures comprise a paleontologic resource impact mitigation program that would reduce, to an insignificant level, the direct, indirect, and cumulative adverse environmental impacts on paleontologic resources that might accompany earth-moving activities (primarily trenching and boring for pipeline) associated with project construction in the selected alignment. The program would allow for the recovery of some scientifically highly important fossil remains, should any be encountered by these activities, as well as associated specimen data and corresponding geologic and geographic site data; their preservation in a recognized museum repository; and their availability for future study by qualified scientific investigators. These specimens and data otherwise might have been lost to the earth-moving activities and unauthorized fossil collecting. Specimen recovery would be allowed under CEQA Appendix G (5.c).

4.1.1 Mitigation Program Design Criteria

The recommended level and type of mitigation effort in a particular area of the project site reflects the paleontologic importance/impact sensitivity of the rock unit underlying the area and the corresponding potential for fossil remains being encountered by earth-moving activities at the project site, the type of rock comprising the rock unit, the type or earth-moving activity, and the magnitude of the impact that would occur in the area. For example, trenching in an area underlain by a paleontologically highly important rock unit or one containing a fossil site would require more intensive paleontologic construction monitoring than trenching in an area underlain by a rock unit of moderate, low, or undetermined paleontologic importance. Monitoring would not be required in an area underlain by artificial fill or a rock unit of no paleontologic importance (unless a rock unit of higher importance would be encountered at depth), or one in which a rock unit would be buried, but not otherwise disturbed. No rock sample would be processed if the rock were too coarse grained or resistant to breaking down in water.

The discovery and subsequent recovery of fossil remains as part of the mitigation program might result in a slight delay of some earth-moving activities. However, the mitigation measures presented below have been designed to eliminate or reduce any delay to the greatest extent possible by 1) ensuring that a paleontologic construction monitor would be present when and where fossil remains were most likely to be uncovered by earth-moving activities; 2) allowing for the rapid recovery of fossil remains, should any be encountered by these activities, and associated specimen and site data; and 3), if necessary, diverting the activities temporarily around a newly discovered fossil site until the remains had been removed by the monitor and the activities allowed to proceed through the site. Similar paleontologic resource impact mitigation programs usually have resulted in no delay of earth-moving activities.

4.1.2 Beneficial Environmental Effects of Mitigation Program

If the paleontologic resource impact mitigation program detailed below were implemented, earth-moving activities at the project site might produce some beneficial effects. The fresh exposure of fossil-bearing strata would allow for the discovery of an undetermined number of unrecorded fossil sites and the recovery of some scientifically highly important fossil remains that otherwise might not even have been exposed without these activities. Moreover, these remains and associated specimen data and corresponding geologic and geographic site data, instead of being lost to earth-moving activities or to unauthorized fossil collecting, would be preserved in a museum repository, where they would be made available to qualified scientific investigators for future study. There also is the potential that some of these remains might represent new or rare species; new geologic or geographic records; and/or skeletal elements different from, or specimens more complete than those now available for their respective species. Finally, these remains would provide a more comprehensive paleontologic resource inventory of the project site and vicinity than is now available or would have been available without the project.

4.1.3 Qualifications of Paleontologist Conducting Mitigation Program

All mitigation measures presented below should be directed by a vertebrate paleontologist approved by the City of
Los Angeles and LACMVP. The paleontologist should have substantial experience designing and conducting paleontologic resource impact mitigation programs in areas underlain by fossil-bearing strata. The paleontologic monitor and other paleontologic staff working under the direction of the paleontologist should have experience monitoring earth-moving activities, recovering large vertebrate fossil specimens, and recovering and processing large samples of fossiliferous rock or sediment.

4.1.4 Compliance with Lead Agency and Professional Society Guidelines

The mitigation measures described below would be in compliance with any City of Los Angeles environmental guideline and with SVP (1995, 1996) standard guidelines for mitigating adverse construction-related impacts on paleontologic resources. The paleontologist would ensure implementation of these measures and verify the effectiveness of the measures. The results of the program would be summarized in a final technical report of results and findings submitted to the City of Los Angeles.

4.1.5 Mitigation Measures

The literature review, archival search, and field survey, as well as a review of the geologic maps covering the project site, indicated that the project site is underlain partly by paleontologically highly sensitive strata, in which earth-moving activities associated with project construction would have a high potential for encountering fossil remains (see Figure 1). Mitigation measures that would be implemented in a particular area of the project site are based on the sensitivity of the underlying rock unit and include paleontologic construction monitoring, which would be conducted in conjunction with other measures provided below.

4.1.5.1 Task 1—Retention of Paleontologist.—Prior to construction, the services of a qualified vertebrate paleontologist approved by the City of Los Angeles and LACMVP will be retained to implement the mitigation program during earth-moving activities at the project site.

4.1.5.2 Task 2—Museum Storage Agreement.—The paleontologist will develop a formal agreement with a recognized museum repository, such as the LACMVP or LACMIP, regarding the final disposition and permanent storage and maintenance of any fossil remains and the archiving of associated specimen data and corresponding geologic and geographic site data that might be recovered as a result of the mitigation program, and the level of treatment (preparation, identification, curation, cataloguing) of the remains that would be required before the entire mitigation program fossil collection would be accepted by the repository for storage.

4.1.5.3 Task 3—Pre-construction Coordination.—The paleontologist or monitor will coordinate with the appropriate construction contractor personnel to provide information regarding lead agency requirements for the protection of paleontologic resources. Contractor personnel also will be briefed on procedures to be followed in the event that a fossil site or remains are encountered by earth-moving activities, particularly when the monitor is not on site. The briefing will be presented to new contractor personnel as necessary. Names and telephone numbers of the monitor and other appropriate mitigation program personnel will be provided to the appropriate contractor personnel.

4.1.5.4 Task 4—Paleontologic Monitoring and Fossil/Sample Recovery.—Earth-moving activities will be monitored by the monitor only in those areas of the project site where these activities will disturb previously undisturbed strata. Monitoring will be conducted on a full-time basis in areas underlain by the Palos Verdes Sand and, once the activities have reached a depth 5 feet below grade, on a full-time basis in areas underlain by the coastal deposits and on a half-time basis in areas underlain by the dune sand. If fossil remains are encountered by these activities, monitoring will be increased to full time, if appropriate, at least in the vicinity of the fossil site where the area is underlain by the fossil-bearing rock unit. If no fossil remains are found once 50 percent of earth-moving activities have been completed in an area underlain by a particular rock unit, with City of Los Angeles approval, monitoring can be reduced or suspended in that area.

Monitoring will consist of visually inspecting debris piles and freshly exposed strata for larger fossil remains, and periodically dry test screening sediment, rock, and debris for smaller fossil remains. As soon as practicable, the monitor will recover all vertebrate fossil specimens, a representative sample of invertebrate or plant fossils, or any
fossiliferous rock sample that can be recovered easily. If recovery of a large or unusually productive fossil occurrence is warranted, earth-moving activities will be diverted temporarily around the fossil site and a recovery crew will be mobilized as necessary to remove the occurrence as quickly as possible. If not on site when a fossil occurrence is recovered by these activities, the activities will be diverted temporarily around the fossil site and the monitor called to the site to evaluate and, if warranted, recover the occurrence. If the fossil site is determined too unproductive or the fossil remains not worthy of recovery, no further action will be taken to preserve the fossil site or remains, and earth-moving activities will be allowed to proceed through the site immediately. The location and proper geologic context of any fossil occurrence will be documented, as appropriate. Any recovered rock sample will be processed to allow for the recovery of smaller fossil remains.

Rock samples will be processed to allow for the recovery of smaller fossil remains that normally are too small to be observed by the monitor. No more than 6,000 pounds (12,000 pounds total) of rock will be processed from either the Palos Verdes Sand or coastal deposits.

4.1.5.5 Task 5—Final Laboratory Tasks.—All fossil specimens recovered from the project site as a result of the mitigation program, including those recovered as the result of processing fossiliferous rock samples, will be treated (prepared, identified, curated, catalogued) in accordance with designated museum repository requirements. Small rock samples from the Palos Verdes Sand, dune sand, and coastal deposits will be submitted to commercial laboratories for microfossil, pollen, or radiometric (carbon-14) dating analysis.

4.1.5.6 Task 6—Reporting.—The monitor will maintain daily monitoring logs that include the particular tasks accomplished, the earth-moving activity monitored, the location where monitoring was conducted, the rock unit encountered, fossil specimens recovered, and associated specimen data and corresponding geologic and geographic site data. A final technical report of results and findings will be prepared by the paleontologist in accordance with any City of Los Angeles requirement.

4.2 OPERATIONAL PHASE

No mitigation measure would be necessary during the operational phase if there were no earth-moving activity.

4.3 ENVIRONMENTAL COMPLIANCE

The project will comply with any applicable environmental law, ordinance, regulation, or standard regarding paleontologic resources during earth-moving activities associated with project construction.

Paleontologic resources, including fossil remains, associated specimen data and corresponding geologic and geographic site data, fossil sites, and the fossil-bearing strata, are a limited, nonrenewable, and very sensitive scientific and educational resource and, particularly with regard to fossil sites, are afforded protection under the following state environmental legislation (see California Office of Historic Preservation, 1983).

California Environmental Quality Act of 1970 (CEQA) (Division 13, California Public Resources Code; 21000 et seq.).—Requires that a public agency or private interest identify the environmental consequences of its proposed project on any object or site of significance to the scientific annals of California (Division I, Public Resources Code: 5020.1 [b]).

Guidelines for the Implementation of CEQA, as amended May 10, 1980, and March 29, 1999 (Title 14, Chapter 3, California Administrative Code; 15000 et seq.).—Define procedures, types of activities, persons, and public agencies required to comply with CEQA, and include definitions of significant impacts on a fossil locality (Section 15023, Appendix G [5.c]).

California Public Resources Code, Section 5097.5 (Statute 1965, Chapter 1136, Paragraph 2792).—Defines any unauthorized disturbance or removal of a fossil locality or remains on public land as a misdemeanor.

California Public Resources Code, Section 30244.—Requires reasonable mitigation of adverse environmental impacts that result from development of public land and affect paleontologic resources.
Angeles, also have developed environmental guidelines for protecting paleontologic resources in areas under their respective jurisdictions. Under its guidelines, a CEQA lead agency can require the completion of a paleontologic resource impact assessment of an area to be adversely impacted by a discretionary project deemed nonexempt under its guidelines. As part of such an assessment, the agency can require the compilation of a paleontologic resource inventory and the mapping of fossil-bearing rock units and previously recorded and newly documented fossil sites by a qualified paleontologist in the area to be affected, an evaluation of the scientific importance of these resources, a determination of the adverse environmental impacts that might arise from the project and an appraisal of their significance, and the formulation of measures to mitigate these impacts to an insignificant level. The City of Los Angeles has required that such an assessment be conducted in support of the proposed Venice Pumping Plant Dual Force Main Project EIR because earth-moving activities associated with project construction might result in the loss of fossil remains and unrecorded fossil sites. This paleontologic resource assessment technical report, particularly with regard to the mitigation measures presented above, is in compliance with SVP (1995, 1996) standard measures for assessing the scientific importance of paleontologic resources in an area of potential environmental effect, developing measures to mitigate significant adverse construction-related environmental impacts on these resources, and with conditions for the acceptance of a paleontologic resource impact mitigation program fossil collection by a museum repository.
SECTION 3

ENVIRONMENTAL IMPACTS

3.1 CONSTRUCTION PHASE IMPACTS

Paleontologic resources, including an undetermined number of fossil remains and unrecorded fossil sites; associated specimen data and corresponding geologic and geographic site data; and the fossil-bearing strata, could be adversely affected by (i.e., would be sensitive to) the significant direct and indirect environmental impacts resulting from earth-moving activities associated with project construction in the selected alignment.

Direct impacts would result mostly from earth-moving activities (primarily trenching and boring for pipeline) in previously undisturbed strata. Although earth-moving activities would be comparatively short term, the possible accompanying loss of some fossil remains, unrecorded fossil sites, associated specimen data and corresponding geologic and geographic site data, and the fossil-bearing strata is a potentially significant long-term adverse environmental impact.

Easier access to fresh exposures of fossiliferous strata and the accompanying potential for unauthorized fossil collecting by construction personnel, rock hounds, and amateur and commercial fossil collectors could result in the loss of some additional fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data. The loss of these additional paleontologic resources is another potentially significant long-term (but indirect) environmental impact.

3.1.1 Significance Criteria

The following tasks were conducted in compliance with SVP (1995) guidelines for assessing the significance of construction-related adverse environmental impacts on paleontologic resources, or the paleontologic sensitivity of a particular rock unit to adverse impacts.

The paleontologic significance (high, moderate, low, none, undetermined) of the potential adverse impacts of earth-moving activities on the paleontologic resources of each rock unit present at the project site was assessed and reflects the paleontologic or scientific importance/impact sensitivity of the rock unit, which, in turn, primarily reflects the potential for fossil remains and fossil sites being encountered by these activities. Note, however, that any impact on a fossil site and the fossil-bearing strata would be considered highly significant paleontologically, regardless of the paleontologic importance of the rock unit in which the site and strata occur. For example, trenching in an area underlain by a moderately important rock unit would have only a moderate potential for the disturbance or burial of fossil remains and sites (i.e., the rock unit would be moderately sensitive to adverse impacts). Although the accompanying loss of any fossil remains and site would be a highly significant impact paleontologically, the impact of earth-moving activities would be considered only moderately significant because of the moderate potential for the loss of paleontologic resources. This method of impact assessment is most appropriate to an areal paleontologic resource investigation of the project site because discrete levels of paleontologic impact sensitivity/significance can be delineated on a topographic/geologic map of the project site.

A paleontologic resource impact sensitivity assessment of the project site is presented below and on the geologic map of the project site included as Figure 1.

3.1.2 Impact Assessment

3.1.2.1 Palos Verdes Sand.—The Palos Verdes Sand has yielded abundant fossil remains at several previously recorded fossil sites near the project site. For this reason, adverse environmental impacts on the paleontologic resources of the Palos Verdes Sand that would result from earth-moving activities at the project site would be considered to be of high paleontologic significance because there probably is a high potential for the loss of scientifically important fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data as a result of these activities.
3.1.2.2 **Dune Sand.**—The dune sand possibly has yielded fossil remains at only one previously recorded fossil site near the project site. For this reason and because this fossil site was encountered at depth, adverse environmental impacts on the paleontologic resources of the dune sand that would result from earth-moving activities at the project site would be considered to be of undetermined (but probably no more than moderate) paleontologic significance at depth because the potential for the loss of scientifically important fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data as a result of these activities is undetermined.

On the other hand, any adverse environmental impact on the paleontologic resources of the dune sand that would result from earth-moving activities at and near the surface probably would be considered to be of low significance because the dune sand probably is too young at and near the surface to contain remains old enough to be considered fossilized.

3.1.2.3 **Coastal Deposits.**—The coastal deposits have yielded fossil remains at numerous previously recorded fossil sites near the project site. For this reason and because these fossil sites were encountered at depth, adverse environmental impacts on the paleontologic resources of the coastal deposits that would result from earth-moving activities at the project site would be considered to be of high paleontologic significance at depth because there probably is a high potential for the loss of scientifically important fossil remains, unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data as a result of these activities.

On the other hand, any adverse environmental impact on the paleontologic resources of the coastal deposits that would result from earth-moving activities at and near the surface probably would be considered to be of low significance because the coastal deposits probably are too young at and near the surface to contain remains old enough to be considered fossilized.

3.2 **OPERATIONAL PHASE**

There would be no impact on paleontologic resources during the operational phase of the project if there were no earth-moving activity.

3.3 **CUMULATIVE IMPACTS**

Development of the project site, in combination with other projects in the region where a project site is underlain by the Palos Verdes Sand might lead to the progressive loss of fossil-bearing strata in these rock units that could be prospected for fossil remains and unrecorded fossil sites. The loss of these additional paleontologic resources is another potentially significant long-term adverse environmental impact.
SECTION 4

MITIGATION MEASURES

4.1 CONSTRUCTION PHASE

The following measures comprise a paleontologic resource impact mitigation program that would reduce, to an insignificant level, the direct, indirect, and cumulative adverse environmental impacts on paleontologic resources that might accompany earth-moving activities (primarily trenching and boring for pipeline) associated with project construction in the selected alignment. The program would allow for the recovery of some scientifically highly important fossil remains, should any be encountered by these activities, as well as associated specimen data and corresponding geologic and geographic site data; their preservation in a recognized museum repository; and their availability for future study by qualified scientific investigators. These specimens and data otherwise might have been lost to the earth-moving activities and unauthorized fossil collecting. Specimen recovery would be allowed under CEQA Appendix G (5.c).

4.1.1 Mitigation Program Design Criteria

The recommended level and type of mitigation effort in a particular area of the project site reflects the paleontologic importance/impact sensitivity of the rock unit underlying the area and the corresponding potential for fossil remains being encountered by earth-moving activities at the project site, the type of rock comprising the rock unit, the type or earth-moving activity, and the magnitude of the impact that would occur in the area. For example, trenching in an area underlain by a paleontologically highly important rock unit or one containing a fossil site would require more intensive paleontologic construction monitoring than trenching in an area underlain by a rock unit of moderate, low, or undetermined paleontologic importance. Monitoring would not be required in an area underlain by artificial fill or a rock unit of no paleontologic importance (unless a rock unit of higher importance would be encountered at depth), or one in which a rock unit would be buried, but not otherwise disturbed. No rock sample would be processed if the rock were too coarse grained or resistant to breaking down in water.

The discovery and subsequent recovery of fossil remains as part of the mitigation program might result in a slight delay of some earth-moving activities. However, the mitigation measures presented below have been designed to eliminate or reduce any delay to the greatest extent possible by 1) ensuring that a paleontologic construction monitor would be present when and where fossil remains were most likely to be uncovered by earth-moving activities; 2) allowing for the rapid recovery of fossil remains, should any be encountered by these activities, and associated specimen and site data; and 3), if necessary, diverting the activities temporarily around a newly discovered fossil site until the remains had been removed by the monitor and the activities allowed to proceed through the site. Similar paleontologic resource impact mitigation programs usually have resulted in no delay of earth-moving activities.

4.1.2 Beneficial Environmental Effects of Mitigation Program

If the paleontologic resource impact mitigation program detailed below were implemented, earth-moving activities at the project site might produce some beneficial effects. The fresh exposure of fossil-bearing strata would allow for the discovery of an undetermined number of unrecorded fossil sites and the recovery of some scientifically highly important fossil remains that otherwise might not even have been exposed without these activities. Moreover, these remains and associated specimen data and corresponding geologic and geographic site data, instead of being lost to earth-moving activities or to unauthorized fossil collecting, would be preserved in a museum repository, where they would be made available to qualified scientific investigators for future study. There also is the potential that some of these remains might represent new or rare species; new geologic or geographic records; and/or skeletal elements different from, or specimens more complete than those now available for their respective species. Finally, these remains would provide a more comprehensive paleontologic resource inventory of the project site and vicinity than is now available or would have been available without the project.

4.1.3 Qualifications of Paleontologist Conducting Mitigation Program

All mitigation measures presented below should be directed by a vertebrate paleontologist approved by the City of
Los Angeles and LACMVP. The paleontologist should have substantial experience designing and conducting paleontologic resource impact mitigation programs in areas underlain by fossil-bearing strata. The paleontologic monitor and other paleontologic staff working under the direction of the paleontologist should have experience monitoring earth-moving activities, recovering large vertebrate fossil specimens, and recovering and processing large samples of fossiliferous rock or sediment.

4.1.4 Compliance with Lead Agency and Professional Society Guidelines

The mitigation measures described below would be in compliance with any City of Los Angeles environmental guideline and with SVP (1995, 1996) standard guidelines for mitigating adverse construction-related impacts on paleontologic resources. The paleontologist would ensure implementation of these measures and verify the effectiveness of the measures. The results of the program would be summarized in a final technical report of results and findings submitted to the City of Los Angeles.

4.1.5 Mitigation Measures

The literature review, archival search, and field survey, as well as a review of the geologic maps covering the project site, indicated that the project site is underlain partly by paleontologically highly sensitive strata, in which earth-moving activities associated with project construction would have a high potential for encountering fossil remains (see Figure 1). Mitigation measures that would be implemented in a particular area of the project site are based on the sensitivity of the underlying rock unit and include paleontologic construction monitoring, which would be conducted in conjunction with other measures provided below.

4.1.5.1 Task 1—Retention of Paleontologist.—Prior to construction, the services of a qualified vertebrate paleontologist approved by the City of Los Angeles and LACMVP will be retained to implement the mitigation program during earth-moving activities at the project site.

4.1.5.2 Task 2—Museum Storage Agreement.—The paleontologist will develop a formal agreement with a recognized museum repository, such as the LACMVP or LACMIP, regarding the final disposition and permanent storage and maintenance of any fossil remains and the archiving of associated specimen data and corresponding geologic and geographic site data that might be recovered as a result of the mitigation program, and the level of treatment (preparation, identification, curation, cataloging) of the remains that would be required before the entire mitigation program fossil collection would be accepted by the repository for storage.

4.1.5.3 Task 3—Pre-construction Coordination.—The paleontologist or monitor will coordinate with the appropriate construction contractor personnel to provide information regarding lead agency requirements for the protection of paleontologic resources. Contractor personnel also will be briefed on procedures to be followed in the event that a fossil site or remains are encountered by earth-moving activities, particularly when the monitor is not on site. The briefing will be presented to new contractor personnel as necessary. Names and telephone numbers of the monitor and other appropriate mitigation program personnel will be provided to the appropriate contractor personnel.

4.1.5.4 Task 4—Paleontologic Monitoring and Fossil/Sample Recovery.—Earth-moving activities will be monitored by the monitor only in those areas of the project site where these activities will disturb previously undisturbed strata. Monitoring will be conducted on a full-time basis in areas underlain by the Palos Verdes Sand and, once the activities have reached a depth 5 feet below grade, on a full-time basis in areas underlain by the coastal deposits and on a half-time basis in areas underlain by the dune sand. If fossil remains are encountered by these activities, monitoring will be increased to full time, if appropriate, at least in the vicinity of the fossil site where the area is underlain by the fossil-bearing rock unit. If no fossil remains are found once 50 percent of earth-moving activities have been completed in an area underlain by a particular rock unit, with City of Los Angeles approval, monitoring can be reduced or suspended in that area.

Monitoring will consist of visually inspecting debris piles and freshly exposed strata for larger fossil remains, and periodically dry test screening sediment, rock, and debris for smaller fossil remains. As soon as practicable, the monitor will recover all vertebrate fossil specimens, a representative sample of invertebrate or plant fossils, or any...
fossiliferous rock sample that can be recovered easily. If recovery of a large or unusually productive fossil occurrence is warranted, earth-moving activities will be diverted temporarily around the fossil site and a recovery crew will be mobilized as necessary to remove the occurrence as quickly as possible. If not on site when a fossil occurrence is uncovered by these activities, the activities will be diverted temporarily around the fossil site and the monitor called to the site to evaluate and, if warranted, recover the occurrence. If the fossil site is determined too unproductive or the fossil remains not worthy of recovery, no further action will be taken to preserve the fossil site or remains, and earth-moving activities will be allowed to proceed through the site immediately. The location and proper geologic context of any fossil occurrence will be documented, as appropriate. Any recovered rock sample will be processed to allow for the recovery of smaller fossil remains.

Rock samples will be processed to allow for the recovery of smaller fossil remains that normally are too small to be observed by the monitor. No more than 6,000 pounds (12,000 pounds total) of rock will be processed from either the Palos Verdes Sand or coastal deposits.

4.1.5.5 Task 5—Final Laboratory Tasks.—All fossil specimens recovered from the project site as a result of the mitigation program, including those recovered as the result of processing fossiliferous rock samples, will be treated (prepared, identified, curated, catalogued) in accordance with designated museum repository requirements. Small rock samples from the Palos Verdes Sand, dune sand, and coastal deposits will be submitted to commercial laboratories for microfossil, pollen, or radiometric (carbon-14) dating analysis.

4.1.5.6 Task 6—Reporting.—The monitor will maintain daily monitoring logs that include the particular tasks accomplished, the earth-moving activity monitored, the location where monitoring was conducted, the rock unit encountered, fossil specimens recovered, and associated specimen data and corresponding geologic and geographic site data. A final technical report of results and findings will be prepared by the paleontologist in accordance with any City of Los Angeles requirement.

4.2 OPERATIONAL PHASE

No mitigation measure would be necessary during the operational phase if there were no earth-moving activity.

4.3 ENVIRONMENTAL COMPLIANCE

The project will comply with any applicable environmental law, ordinance, regulation, or standard regarding paleontologic resources during earth-moving activities associated with project construction.

Paleontologic resources, including fossil remains, associated specimen data and corresponding geologic and geographic site data, fossil sites, and the fossil-bearing strata, are a limited, nonrenewable, and very sensitive scientific and educational resource and, particularly with regard to fossil sites, are afforded protection under the following state environmental legislation (see California Office of Historic Preservation, 1983).

California Environmental Quality Act of 1970 (CEQA) (Division 13, California Public Resources Code: 21000 et seq.).—Requires that a public agency or private interest identify the environmental consequences of its proposed project on any object or site of significance to the scientific annals of California (Division I, Public Resources Code: 5020.1 [b]).

Guidelines for the Implementation of CEQA, as amended May 10, 1980, and March 29, 1999 (Title 14, Chapter 3, California Administrative Code: 15000 et seq.).—Define procedures, types of activities, persons, and public agencies required to comply with CEQA, and include definitions of significant impacts on a fossil locality (Section 15023, Appendix G [5.c]).

California Public Resources Code, Section 5097.5 (Statute 1965, Chapter 1136, Paragraph 2792).—Defines any unauthorized disturbance or removal of a fossil locality or remains on public land as a misdemeanor.
California Public Resources Code, Section 3024d.—Requires reasonable mitigation of adverse environmental impacts that result from development of public land and affect paleontologic resources.
Angeles, also have developed environmental guidelines for protecting paleontologic resources in areas under their respective jurisdictions. Under its guidelines, a CEQA lead agency can require the completion of a paleontologic resource impact assessment of an area to be adversely impacted by a discretionary project deemed nonexempt under its guidelines. As part of such an assessment, the agency can require the compilation of a paleontologic resource inventory and the mapping of fossil-bearing rock units and previously recorded and newly documented fossil sites by a qualified paleontologist in the area to be affected, an evaluation of the scientific importance of these resources, a determination of the adverse environmental impacts that might arise from the project and an appraisal of their significance, and the formulation of measures to mitigate these impacts to an insignificant level. The City of Los Angeles has required that such an assessment be conducted in support of the proposed Venice Pumping Plant Dual Force Main Project EIR because earth-moving activities associated with project construction might result in the loss of fossil remains and unrecorded fossil sites. This paleontologic resource assessment technical report, particularly with regard to the mitigation measures presented above, is in compliance with SVP (1995, 1996) standard measures for assessing the scientific importance of paleontologic resources in an area of potential environmental effect, developing measures to mitigate significant adverse construction-related environmental impacts on these resources, and with conditions for the acceptance of a paleontologic resource impact mitigation program fossil collection by a museum repository.
SECTION 6

LITERATURE CITED


