Woodside Natural Gas Inc.
OceanWay Secure Energy
Los Angeles, California

Exhibit B
Topic Report 4 – Cultural Resources

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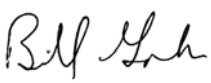

Reviewed By: William Gorham, Ph.D. ENSR

ENSR Corporation
August 2007
Document No: WNG TR4

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Acronyms and Abbreviations

A.D.	Anno Domini
AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effects
ARMR	Archaeological Resource Management Reports
AUV	Autonomous Underwater Vehicle
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHL	California State Historical Landmarks
cm	Centimeter
CM	Conservation Measure
CRHR	California Register of Historical Resources
CSLC	California State Lands Commission
DPR	Department of Parks and Recreations
DWP	Deepwater Port
ESA	Environmentally Sensitive Area
ft	Feet/foot
GPS	Global Positioning System
HDD	Horizontal directional drilling
HRI	Historic Resources Inventory
Hz	Hertz
IGIF	Inert Gas Injection Facility
kHz	Kilohertz
km	Kilometer
km^2	Square kilometer
LAX	Los Angeles International Airport
LNG	Liquefied Natural Gas
m	Meter
MLD	Most Likely Descendant
MLLW	Mean Lower Low Water
MMS	Minerals Management Service

Acronyms and Abbreviations (Cont'd)

NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
nT	Nanotesler
OceanWay	OceanWay Secure Energy Project
OHP	Office of Historic Preservation
PA	Programmatic Agreement
PHI	California Points of Historic Interest
PLEM	Pipeline End Manifold
RCTS	Receiving and Custody Transfer Station
RLNGC	Regasification LNG Carriers
ROV	Remotely Operated Vehicle
ROW	Right-of-way
SCCIC	South Central Coast Information Center
SCG	Southern California Gas Company
SCV	Submerged Combustion Vaporizer
SPM	Single point mooring
SSS	Sidescan sonar
STL	Submerged turret loading
TCP	Traditional cultural property
UPRR	Union Pacific Railroad
USC	United States Code
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
Woodside	Woodside Natural Gas Inc.

4.0 Cultural Resources

Woodside Natural Gas Inc. (Woodside) is proposing to bring natural gas into Southern California by using specially designed Liquefied Natural Gas (LNG) carriers that are equipped with regasification equipment on board, termed Regasification LNG Carriers (RLNGCs). At the offshore end of the deepwater port (DWP), the RLNGC will pick up a single point mooring (SPM) buoy, regasify the LNG using ambient air as a heating medium, and deliver the natural gas into dual subsea pipelines to shore. Woodside has named this project the OceanWay Secure Energy Project (OceanWay).

The port site will be located in the Santa Monica Basin, in approximately 3,000 feet (ft; 900 meters [m]) of water, over 21 miles[1] (34 kilometers [km]) from the nearest point on the mainland, and approximately 18 miles (29 km) from the western end of Santa Catalina Island. There will be two SPM buoys at the port site, located approximately 12,000 ft (3,600 m) apart. Each buoy will be connected to a subsea pipeline by a set of risers attached to a Pipeline End Manifold (PLEM) located on the seabed. The two PLEMs, one for each SPM buoy, will connect to separate but interconnected 24 inch (nominal 600 millimeter [mm]) outside diameter pipelines, and the two pipelines will be laid in parallel on the seafloor, nearly all the way to the shore.

The port site will be approximately 27 miles (44 km) southwest of Los Angeles International Airport (LAX) outside the 12 nautical mile (NM) limits of U.S. territorial waters of the West Coast and coastal islands. The landfall for the pipeline will be at the northern end of LAX and will be accomplished using horizontal directional drilling (HDD) with a seaward HDD of approximately 4,000 ft (1,200 m). The use of this technology will allow the pipelines to be placed beneath the seabed out to approximately 3,000 ft (900 m) from the shoreline in a water depth of approximately 37 ft (11 m) and will avoid disturbance to the beach. The overall length of the offshore pipeline route from the PLEM locations to the shoreline is approximately 35 miles (56 km). The two onshore pipelines will run approximately 4 miles (6 km) from the shoreline beneath the coastal dunes and under city streets to the Receiving and Custody Transfer Station (RCTS). The twin pipelines will be installed using conventional HDD methods approximately 2,500 feet (750 m) under the dunes and Pershing Drive from the shore crossing HDD drilling location to a receiving site within the secure area of LAX property. From the terminus of the dune crossing HDD, the pipelines will be installed using conventional trenching for the majority of the distance to the RCTS with boring at major intersections. Woodside has purchased a 3-acre (1.2 hectare) commercial property that includes an existing 57,000 square foot (5,300 square meter) warehouse / office building that will serve as the RCTS site. Downstream of the RCTS the gas distribution pipeline will continue exclusively under city streets and will begin as a single 36 inch (nominal 900 mm) pipeline extending approximately 0.25 miles (0.4 km) to the first tie-in point with the existing natural gas transmission grid of Southern California Gas Company (SCG). If market demand supports further expansion, the distribution pipeline will continue from the first tie-in point as a 24 inch (nominal 600 mm) diameter pipeline and extend an additional distance of approximately 12 miles (19 km), consisting of an 11 mile (18 km) mainline and 1 mile (1.6 km) lateral tying into the gas grid at two more locations for a total of three tie-ins. An Inert Gas Injection Facility (IGIF), comprised of nitrogen generation and compression equipment for Wobbe number control, will be housed inside the existing warehouse on the RCTS site.

Exhibit A/Project Description provides a comprehensive description of the proposed Project and should be consulted for additional Project-specific information and figures.

This Topic Report identifies the cultural resources that may potentially be affected by the proposed DWP and associated pipelines and discusses the present condition of these resources. It discusses and presents the results of investigations designed to document the presence and nature of, and the potential for encountering,

[1] Note: mileages are presented as statute miles unless noted as nautical miles (NM).

cultural resources within the Project area. It outlines the regulatory setting and describes potential impacts and conservation measures for the construction, installation, and operation of the DWP to limit or eliminate impacts to cultural resources.

Woodside has conducted offshore surveys that have concluded that there are 3 possible shipwrecks located in close proximity (200 to 240 m) and 11 other areas of possible shipwrecks, boats, or potential cultural artifacts along the offshore pipeline routes. Similarly Woodside has examined site records and conducted site-specific surveys in onshore areas subject construction ground-disturbing activities, and has found no potential for impacts to known cultural resources. If onshore sites of cultural, religious, or traditional significance to Native American tribes are identified as a result of consultation, impacts will be avoided or mitigated through further consultation with Gabrielino Native American tribal groups and individuals. During Project construction, a previously unidentified site could be encountered and damaged. Woodside will have an Unanticipated Discoveries Plan in place during Project construction which will detail the immediate actions and notifications required if a discovery is made. The Project, when operational, will result in no disturbance to the ground surface. Based on this consideration, Woodside does not anticipate that cultural resources will be affected by either offshore or onshore operations.

4.1 Environmental Setting

The proposed OceanWay DWP will be located offshore of southern California, in the Santa Monica Basin. The onshore pipeline will be entirely within city streets. Details of the cultural resources offshore and onshore are presented in the following subsections.

4.1.1 Cultural Resource Definitions

Cultural resources are defined as those areas of the marine and terrestrial environment that possess historical, cultural, archaeological, or paleontological[2] significance, including sites, structures, or objects significantly associated with or representative of earlier people, cultures or human activities and events. Cultural resources in the marine environment may generally be categorized into prehistoric and historic sites and artifacts: inundated cities, harbors, and shore installations, including light houses, wharves, and historic landings, shipwrecks, and downed aircraft remains. Cultural resources in the terrestrial environment may generally be categorized into prehistoric and historic sites and artifacts: lithic scatters, seasonal camps, fire-cracked rock, hearths, rock alignments, trails, rock art, railroad grades, canals, roads, landscape alterations, and architecture. Cultural resources are a class of resources given due consideration in the anticipation and assessment of impacts from major developments. Cultural resources may be of federal, state, or local significance.

A cultural resource is evaluated as significant at the federal and state levels if it retains integrity of deposit and satisfies one of the following conditions: is associated with a nationally, regionally, or locally important event; is associated with a nationally, regionally, or locally important person; is representative of a period or style or represents a work of a master craftsman; or has potential to provide data important for addressing major research questions; and, in most instances, is more than 50 years of age. Local significance criteria generally follow federal and state significance criteria of with an emphasis on local importance.

A unique archaeological resource is defined in the California State Public Resources Code as “an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria: contains information needed to answer important research questions and that there is a demonstrable public interest in

[2] Note that paleontological resources are discussed in Topic Report 6/Geological Resources.

that information; has a special and particular quality such as oldest of its type or best available example of its type; or is directly associated with a scientifically recognized important prehistoric or historic event or person."

Ethnographic resources are associated with the cultural practices, beliefs, and traditional history of a community. Examples of ethnographic resources include: places in oral histories or myths, such as a particular rock formations, the confluence of two rivers, or a rock cairn; large areas, such as landscapes and viewscapes; sacred sites and places used for religious practices; social or traditional gathering areas, such as dance areas; natural resources, such as plant materials or clay deposits used for arts, crafts, or ceremonies; and places and natural resources traditionally used for non-ceremonial uses, such as trails or camping locations. The components of an ethnographic resource can be man-made, natural, or both.

Other ethnographic resources also may need to be considered in consultation and coordination with Native American tribes. These can be sacred areas, traditional use areas, or other areas of traditional concern that may require consideration under the American Indian Religious Freedom Act of 1978 (AIRFA) as having an Executive Order 13007, or other guidelines and regulations addressing Native American rights or trust responsibilities.

If a resource has been identified, through Native American consultation and coordination, as having importance in traditional cultural practices and the continuing cultural identity of a community, it may be considered a traditional cultural property (TCP). The term "traditional cultural property" first came into use within the federal legal framework for historic preservation and cultural resource management, in an attempt to categorize historic properties containing traditional cultural significance (Parker and King 1989). "Traditional cultural significance" refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property derives its significance from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include: a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world; or a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice.

4.1.2 Project Area

The physical characteristics of the Project areas for the offshore and onshore components are described below.

4.1.2.1 Offshore Component

The Project area is located offshore of El Segundo within the Santa Monica Bay. The Santa Monica Bay is a large concave portion of the coast that has extensive sandy beaches. In Santa Monica Bay, the shelf varies from less than 1 mile (2 km) wide at Point Mugu on the north and Palos Verdes on the south, to a maximum of 12 miles (20 km) in the middle (USDOI/MMS 1987). Nardin et al. (1978) indicate that the widening of the shelf is attributed to the Palos Verdes Fault Zone and adjacent folding. The Project area lies within the inferred sub aerially exposed continental borderland circa 18,000 years ago (Johnson 1983).

Three submarine canyons, Dume, Santa Monica, and Redondo, cut into the shelf. Redondo and Dume are considered active and reach to within 1,500 ft (0.5 km) of the shore. On the shelf leading into Redondo Canyon, are three large buried channels that were back-filled with sediments during the Flandrian Transgression (Osborne et al. 1980). Fluctuations in sea level during the transgression resulted in the complex wave-cut platform that is seen in Santa Monica Bay (Nardin et al. 1981). Marine post-Wisconsin sediments cover the shelf in Santa Monica Bay. The thickest accumulations of those sediments – up to 92 ft (28 m) – occur as linear patches that parallel the shoreline. The only outcrops in this area are in the walls of

the submarine canyons, on the outer shelf off Santa Monica, and at the rocky foreshores of Palos Verdes Peninsula and the Point Dume headland (USDOI/MMS 1987).

The 16 mile (26 km) coast north of the Project area between Santa Monica and Point Dume is characterized as rocky shoreline with steep cliffs rising abruptly from the waters edge and ascending gradually within 3 to 4 miles (5 to 7 km) to the summits of the Santa Monica Mountain Range, about 3,000 ft (900 m) high. The seaward termination of this range is at Point Mugu, 14 miles (23 km) west of Point Dume.

The proposed pipeline route includes coastal submerged lands deeded to the Cities of Los Angeles and El Segundo (mean high tide line to 3 NM [5.6 km] offshore) and offshore waters above the continental shelf from 3 NM (5.6 km) offshore to the two PLEMs in a water depth of approximately 3,000 ft (900 m). There will be a pipeline jumper connecting the PLEMs creating a continuous pipeline loop to shore. Two Single Point Moorings (SPMs) will be anchored 12,000 ft (3,650 m) apart straddling the two PLEMs. Locations of the SPMs are listed below.

SPM - NE 33°41'52" N to 11°48'33"W
SPM - SW 33°39'58" N to 118°49'15" W

Nearshore the pipeline crosses the shoreline below Dockweiler State Beach in the City of Los Angeles just north of El Segundo, Los Angeles County, California. Dockweiler State Beach is located south of the Marina del Rey channel, del Rey lagoon, and Playa del Rey.

The pipeline route crosses Santa Monica Bay and several offshore basins, ridges, and escarpments located on the California Borderland before reaching the edge of the continental shelf.

The route has been selected to avoid several marine features: Santa Monica and Point Dume Canyons; areas under consideration as part of the Channel Islands National Marine Sanctuary; explosives dumping areas; fisheries associated with the Tanner/Cortes Banks; and contaminated sediments in Santa Monica Bay associated with the Palos Verdes Shelf and the Hyperion Sewage outlet.

The study area for this Project includes those areas extending from the shoreline to 27 miles (44 km) offshore of LAX. The prehistoric and historic maritime activities in Southern California provide the context for review and analysis of the existing and future geophysical survey data of the Project area. See **Figure 5-1, Exhibit A/Project Description** for route map.

4.1.2.2 Onshore Component

The onshore pipeline route is located entirely within the Los Angeles Basin from its land fall at LAX to its ultimate tie-in point in South Gate, as shown in **Figure 5-2** in **Exhibit A/Project Description**. The onshore route will be approximately 16 miles (26 km) long in total length and, after crossing the coastal dunes between Vista del Mar and Pershing Drive, will run entirely within both wide and narrow city streets to several tie-in points with the SCG natural gas distribution system downstream of the RCTS/IGIF. The Project area surrounding the proposed route, which is located within the low-lying, densely populated Los Angeles Basin, ranges in elevation from approximately 10 ft (3 m) onshore to 237 ft (72 m) near Century Boulevard and Western Avenue, to 126 ft (38 m) at its terminus at Otis Avenue and Santa Ana Street. Much of the Los Angeles Basin is a broad alluvial plain that stretches from Santa Monica to Newport Beach in Orange County.

The majority of the land uses abutting the streets that comprise the route are residential, commercial, and light industrial. Because much of this is covered by either concrete or asphalt, it was not surveyed on foot. Private (residential) property was also not surveyed on foot.

The west end of the proposed route, from Vista del Mar to Pershing Drive, was a former neighborhood built in the 1930s and demolished in the 1960s for the expansion of LAX. Although currently fenced, survey access was acquired.

Westchester Parkway is bounded on both sides by LAX property to 600 ft (183 m) west of Sepulveda Boulevard, at which point commercial property begins. Commercial properties are found to Aviation Boulevard. At Aviation Boulevard, Westchester Parkway becomes Arbor Vitae Street. Arbor Vitae Street is a built environment, predominantly single family residential properties, with some commercial properties.

Prairie Avenue consists of residential properties on the west side of the street, with Hollywood Park Racetrack and Casino and the Great Western Forum on the east side of the street.

Manchester Boulevard consists of predominantly commercial properties with some residential. The Inglewood Park Cemetery is located along the north side of Manchester Boulevard, from Prairie Avenue to West Boulevard.

Firestone Boulevard consists of predominantly commercial properties with some residential.

California Street to Santa Ana Street consists of predominantly residential properties, transitioning into commercial and light industrial, and ending in light industrial.

4.1.2.3 Area of Potential Effects

In accordance with Title 36 of the Code of Federal Regulations (CFR), Part 800, the Area of Potential Effects (APE) for the OceanWay Project will be the anchorage area around the PLEMs, the offshore and onshore pipeline right-of-way (ROW), and undisturbed pipeline laydown areas.

4.1.3 Cultural Setting

The following discussions provide background information regarding the offshore and onshore cultural developments and settings for the Project area.

4.1.3.1 Prehistoric Maritime Sites and Artifacts

At the height of the Wisconsin glaciation, approximately 18,000 to 24,000 years ago, sea level was as much as 394 ft (120 m) lower than it is at present (Milliman and Emory 1968). At that time, the California shoreline in the vicinity of the study was near the edge of the continental shelf, approximately 6 NM (7 statute miles or 11 km) offshore from the present shoreline (uncorrected for local offshore deposition or uplift rates). This is twice the 3 NM (5.6 km) jurisdiction limit. Human populations have been on the California coast for at least the past 13,000 years (Johnson 1999) and are known to have occupied and exploited the products of the littoral zone for much of that time (Jones 1992). Sea level 11,000 years ago was at about 150 ft (46 m) below its present level. It is reasonable to assume that their occupation sites within this zone were inundated as sea level rose (the Holocene transgression) inland across the shelf, with a brief regression between 12,000 and 11,000 years ago, until stabilizing between 7,000 and 9,000 years ago (Nardin et al. 1981; Richards 1971; Bloom 1977). Sea level reached its present elevation about 3,500 years ago. Conditions for preservation of these submerged sites vary with site type and local topography, but it is generally believed that in certain protected environments some sites will have survived the encroaching seas of the post-Wisconsin transgression (Shepard 1964, Bickel 1978).

It is not presently known when prehistoric Native Americans first occupied this area, although human remains have been dated in the general Los Angeles area at 11,000 years ago. These earliest inhabitants were big game hunters who exploited Pleistocene mega fauna (e.g., mammoth). However, climatic change and human predation resulted in the extinction of these animals. Inevitably, this led to a change in subsistence strategies

from a big game hunting-oriented economy to a small game hunting (e.g., deer and rabbits) and plant gathering economy. This era is known as the Early Period or the Milling Stone Horizon (6000-1800 B.C.), and is exemplified by plant processing implements (such as milling stones and *manos*) used in a seed gathering economy that included wild vegetal resources such as sage (*Salvia* sp.) and acorns (*Quercus* sp.), and was augmented by the gathering of shellfish.

The Middle Period or Intermediate Horizon (1500 B.C. – Anno Domini [A.D.] 500) revealed major structural shifts in the range of resource exploitation and spatial organization. Although this period is marked by a continuation of activities from the previous periods, there is an increase in hunting and the exploitation of coastal resources, and a decrease in plant processing. During this time period, the inland sites were still adapted to a Milling Stone economy, but showed evidence of a transition toward a more varied resource base.

Prehistoric settlement patterns projected offshore suggest culturally sensitive locations occur near the confluence of perennial streams and where these streams traverse a coastal bluff or beach (Stright 1987). Estuary topography in the form of bay mouth bars, tombolos, and backshore beaches, as well as nearby bluffs, are also sensitive locations for the potential survival of buried prehistoric archaeological occupation and activity sites.

The Late Horizon (A.D. 500-1769) continues to the Spanish Period. All the integral aspects of the cultural system (i.e., population density, social complexity, site diversity, and size of the interaction sphere) from these previous periods are greatly amplified during the Late Horizon. A greater number of more specialized and diversified sites are seen in terms of their location and function. The Spanish and Missionization periods (A.D. 1769-1830) led to a disruption of the traditional aboriginal systems, a general decline in population, and eventually, the cultural extinction of many southern California native groups.

The Project corridor is located within the area occupied by the Gabrielinos and is, therefore, considered sensitive for the occurrence of inundated prehistoric sites. The Gabrielinos were hunters and gatherers who exploited plant and animal resources with specialized tools and procurement strategies. Many archaeological sites reflect these specific activities, such as seasonal dispersion of the population to exploit a variety of resources. Villages usually were situated along the coast, in canyons, or on alluvial fans near adequate sources of food and water. Structures varied in size from brush shelters to dome-shaped houses, with size depending on the needs of the individual family.

The occurrence of drowned Pleistocene sub aerial sites of human occupation during periods of lowered sea level, within the environs of the majority of the offshore study area, are unknown. Future geotechnical studies incorporating the acquisition of continuous cores suitable to environmental reconstruction, together with high-resolution sub-bottom profiler studies and other analytical techniques are being conducted in April through June 2006 and are expected to provide evidence of such relic landforms that may contain data useful to the discovery and investigation of prehistoric human presence in these submerged landscapes.

4.1.3.2 Prehistoric Watercraft

Native Americans in the study area have used a wide range of watercraft for transportation and for obtaining resources.

Much is known of Native American boating practices in the study area. In addition to the simpler vessel types in use, the presence of the very inviting offshore Channel Islands inspired the use of a more complicated watercraft design, the stitched-plank canoe or *tomol*. Vizcaino (Mathes 1969) wrote the following description without noting the precise California location of his observation, other than south of Monterey: "They have vessels of pinewood very well made, in which they go to sea with fourteen paddle-men on each side, with great dexterity—even in very stormy weather." Since human occupation of the Santa Barbara Channel Islands is known for at least the last 13,000 years, contact between these islands and the mainland coast would have required the use of fairly sophisticated watercraft. As it is doubtful these islands were ever connected to the

mainland, even by the formation of sills at a lowered Pleistocene sea level (Johnson 1977, 1983), knowledge of small boat construction and handling, as well as safe voyaging techniques for crossing considerable distances of open water, were imperative.

After establishment of the Spanish Mission system, by request of the Franciscan Padres, the Chumash were known to navigate their tomols around the northern Channel Islands of Anacapa, Santa Cruz, Santa Rosa, and San Miquel (Hudson and Blackburn 1979, Cunningham 1989). Tomols were also used by the Mission Padres to procure otter pelts by trading with the Channel Islands and to ferry goods to and from foreign trading vessels (Hudson et al. 1978).

The balsa reed bundle craft used by the Gabrielino throughout the Los Angeles County area has an even greater distribution along the California coast. The balsa boat was used both in ocean and inland water navigation (Hudson 1976; Moriarty 1968). It is reasonable, therefore, to assume that during the 13,000 years of navigation, some native vessels may have been inundated, stranded, or capsized in the study area.

Due to the fragile nature of these craft, in terms of construction methods and perishable materials used, it is unlikely that evidence of such vessels has been preserved in the near shore environment.

4.1.3.3 Historic Exploration, Settlement, and Commerce

The written history of the area of Santa Monica Bay began in 1542 when Juan Rodriguez Cabrillo discovered the beautiful, sweeping Santa Monica Bay. Santa Monica Bay at Redondo Beach was a major seaport during the latter half of the 19th century. The following discussion presents three historic time periods: the Maritime Exploration Period between 1542 and 1775, the Spanish/Mexican period of 1769 to 1846, and the American Period and development of the coastline between 1846 and the present.

Maritime Exploration Period (1542-1775)

Juan Rodriguez Cabrillo, a Portuguese pilot and navigator, commanded the expedition to explore the California Coast north of Cedros Island in Baja California. Imbued with the hope of discovering fabulous riches, locating the fabled northwest passage, the “Strait of Annan,” and determining if Asia could be reached by following the Pacific Coast north, he departed Navidad near Acapulco in June of 1542 in the *San Salvador* and the *Victoria* (Bancroft 1886). Cabrillo was the first European expedition to explore along the California coast. Cabrillo died during the voyage, and his remains are believed to be buried on one of the Channel Islands, possibly San Miguel Island (Mortiarty and Keistman 1963; Heizer 1973).

Other explorers followed the Cabrillo expedition, including Pedro de Unameno, who opened the Acapulco-Manila trade route between the Philippines and Mexico in 1565, allowing Spain to realize Columbus' dream of a new trade route with the Indies. The Manila galleon trade lasted until 1815 (Schurz 1939). Another expedition led by Sebastian Vizcaino in 1602 produced fairly accurate charts of the coast and harbors of Southern and Central California north to about 42° north latitude.

The Manila galleons sailed annually from Manila to Acapulco carrying silks, porcelain and spices. The sailing masters steered the galleons as near to 30° north latitude as possible, often having to travel further north to find favorable winds. After the long trip across the Pacific, the ships turned south upon seeing the first indications of land and thus avoided the uncharted hazards of the California coast (USDOI/MMS 1987). If all went well, the first land seen by the sailors would be the tip of the Baja peninsula. The ship then sailed to Acapulco. One such galleon, the *San Augustin*, wrecked in a storm and became the first shipwreck in California.

Many galleons never made it to safe harbor in Acapulco (e.g., *Capitana* [unknown location, circa 1600]; *Nuestro de Senora Aguda* [Catalina Island, circa 1641]; *Francisco Xavier* [Columbia River, Oregon, circa 1707]). Galleons also had fallen prey to pirates such as Sir Francis Drake, Thomas Cavendish (*Santa Ana* [off

the tip of Baja, 1587], and George Compton [*San Sebastian*, aground on Catalina Island, 1754]; Schurz 1939, Bancroft, 1885, Meighan and Heizer 1952 in USDOI/MMS 1987).

Spain finally colonized California in response to incidents like these piratical threats to her claims over the territory. Soldiers established a series of forts known as Presidios along the coast that were soon followed by the Missions, and Spain required all ships sailing along the California coast, including the Manila galleons, to stop at Monterey.

Schurz (1939) states that over 30 Manila galleons were lost over the 250 years of trade. A few were wrecked on the westward passage and others shortly after leaving Manila. At least a dozen remain unaccounted for, and at least a few are suspected to have been lost in the Californias.

George Vancouver, an Englishman, explored much of the Pacific including California.

Spanish (1769 to 1818) and Mexican Colonial Period (1818-1846)

The years of the Spanish-Mexican hegemony in California saw increasing numbers of vessels arriving on the California coast to engage in the sea-otter fur trade, smuggling, and the legal trade of China goods in exchange for California's abundant hides and tallow from the vast herds of cattle kept at various private ranchos (Ogden 1923). It is, of course, the founding of the Spanish Mission system in Upper California that begins the continuous record of local history.

The sea otter trade, existing roughly from 1784 to 1848 (declining markedly after 1830), and the hide and tallow trade of the 1830s and 1840s, were the major international commerce of California until the Gold Rush of 1849. While certain Spanish and later Mexican citizens were authorized to conduct business on behalf of the government, this commerce consisted largely of smuggling by Yankee ships from East Coast ports. Spanish and later Mexican, authorities either made trading except through specified ports either illegal or exceedingly high tariffs in order to protect their economic interests.

To the inhabitants of colonial locations like California, participating in smuggling ventures was the only way to acquire certain common conveniences and luxury goods. Smugglers in the otter trade would buy as many skins as possible in California and then sail to China and trade them for goods that brought high prices in New England or Europe. Otter furs were initially supplied by Native Americans working for the missions. Later, Aleut Islanders from Alaska working for the Russians competed for this lucrative trade.

The hide and tallow trade, also commonly known as hide droughing, consisted of buying cattle hides from the vast ranchos in California and returning with them to New England's expanding industrial base for the production of leather goods for domestic use and export. Most hide and tallow trade took place in Southern California, Richard Henry Dana, Jr., a major trader of hides for example, took few trips north of Point Conception during his stay on the coast from 1834 to 1836. It was his chronicle of the hide droughing industry that resulted in the famous book: *Two Years Before the Mast* (Dana 1964). Droughing was also illegal before California's seizure by the United States in 1846, but it was not the focus of such intense restrictive effort as was otter fur trade. The Mexican-American war of 1846 and the Gold Rush of 1849 permanently changed the character of California shipping (USDOI/MMS 1987). Clipper ships and side-wheel steamers soon eclipsed the outdated sailing brigs, and what had in Hispanic times been a sparsely-populated coast with an economic base of ranching supplemented by some fur trading was transformed into a thriving, densely-populated, American state with a diverse economy.

American Period (After 1846)

With the discovery of gold in California in 1848, and the arrival of thousands of vessels into San Francisco as part of the Gold Rush, the primacy of San Francisco as the principal port on the West Coast was confirmed. The Pacific Coast, otherwise isolated from the rest of the world until the completion of the transcontinental

railroad in 1869, depended on ships bringing raw and manufactured goods, immigrants, and capital (Delgado 1989). California waters were soon alive with clipper ships and side-wheel steamers. Lumber, bricks, food, machinery and labor were provided by vessels because San Francisco and the rest of California had only scarce agricultural and industrial output. Soon, however, reciprocal trade burgeoned with the establishment of lumber mills, farms, factories, and ranches. One of the initial maritime trades to develop in the aftermath of the Gold Rush was the active commerce resulting from the influx of goods from the eastern seaboard and Europe to San Francisco, which was subsequently, shipped them to various smaller ports on the coast. Lumber, hay, dairy products, produce, and meat were shipped up and down the coast.

With the U.S. annexation of California in 1846 and the California Gold Rush in 1849, the resident population saw an invasion of immigrants. While most came first to the larger cities of northern California, by the 1850s, the population of San Luis County, Santa Barbara, and Los Angeles was also increasing. The Spanish land grant *ranchos* were broken up and sold to incoming settlers, and communities around the county grew to accommodate the new commerce of farm and dairy produce.

Coastal trade in California continued to grow with the expansion of mining, agriculture, fishing, and manufacturing. California's burgeoning economy coupled with the natural physical barrier to terrestrial commerce resulted in coastal growth at an unparalleled rate (Caughley 1970 in USDOI/MMS 1987). Rapid industrial growth and the advent of rapid technological development in the shipping industry in the latter half of the 19th century resulted in larger and larger wood, iron, and steel ships. Southbound sidewheel ships carried gold shipments from the gold fields. Spanish ships bringing grain from Chile were common during the last half of the 19th century. In the last quarter of the 19th century, lumber schooners were bringing lumber and railroad ties from the north while huge British iron barks were bringing rails and heavy machinery (Caughley 1970). With the development of agriculture in California, barks could carry grain out instead of sailing "in ballast" (without any cargo). Steamships and schooners were being built on this coast, and steel-hulled ships were being built on the East Coast and elsewhere. The increasing need for coal brought British ships from Newcastle, which was later used, along with San Francisco ferryboats, as fishing barges up and down the coast. Others were converted into cargo barges for use in the coastal trade. A large percentage of these ships sank along the California coast and constitute a significant element of the total cultural resources found in the study area. During the last quarter of the 19th century, the Japanese dominated the California fishing industry with vessels of traditional Japanese design. During the first quarter of the 20th century, the Japanese fishing communities were gradually supplanted by the Portuguese and Italian communities and finally displaced altogether when World War II brought about their relocation (USDOI/BLM 1979).

Coastal growth resulted in ships of all kinds from all over the world bringing in a variety of goods and, in turn, distributing California products to ports worldwide (USDOI/MMS 1987). The latter half of the 19th century saw rapid industrial growth and the advent of rapid technological development within the shipping industry. Larger and larger wood, iron, and steel ships appeared. By the end of the 19th century, sails were being replaced by steam as the primary mode of transportation, and the Pacific coast of the United States became prominent in shipbuilding. The vast forests of fine tree varieties from Alaska to California provided the raw materials for some of the largest and strongest wooden vessels ever built (USDOI/MMS 1987).

By World War I, the diesel engine and oil-burning steam turbine replaced sail for all bulk cargoes. As steam replaced sail, the internal combustion engine became popular among small boat enthusiasts. California became the American gateway to the Pacific world, and virtually every type of ship, large and small, was seen in California waters. Through the years separating the two World Wars, two additional shipping phenomena were added to southern California: the “Hollywood Navy” and the U.S. Navy’s Pacific Fleet.

Santa Monica Bay

Santa Monica Bay was a major seaport during the latter half of the 19th century. The construction of a breakwater at San Pedro in about 1912, as well as other political and economic developments, led to what is now the Los Angeles/Long Beach Harbor complex, and Santa Monica Bay was eclipsed as the major local

seaport. Artificial harbors were created in Santa Monica Bay following World War II expressly for pleasure craft at Marina del Rey and King Harbor.

Santa Monica beach has been a recreational beach since the Civil War. Tourists were welcomed there by Francisco Marquez and Ysidro Reyes, who were granted title to Rancho Boca de Santa Monica by the Mexican governor. In 1839, their property extended north to Topanga Canyon and south to what is now Montana Avenue, and from the ocean to a line paralleling 26th street in Santa Monica (Stanton 1990). A small pier known locally as the Shoo Fly Landing was several hundred yards south of the present pier, near what is now the foot of Pico Boulevard. This pier was used for loading shipments of asphaltum brought overland by wagon from Henry Hancock's Rancho La Brea tar pits. The tar was bound for San Francisco for use in roofing and shipbuilding.

Two early visitors who helped shape the history of Santa Monica were Colonel Robert S. Baker and his business partner General E.F. Beale, who arrived in the area in 1872 and 1873, respectively. Together they developed a scheme for a port near the Shoo Fly Landing. Baker and Beale acquired a franchise for a 14 mile (22.5 km) narrow-gauge railroad designed to link their port with Los Angeles. Although they failed to convince Los Angeles merchants and officials to back their venture, they did obtain backing from New York interests and christened their railroad the Los Angeles and Truxton Railroad. As the result of a merger with Senator John P. Jones' Los Angeles and Independence Railroad, Baker and Jones established the town site of Santa Monica. By 1875, road gangs of Chinese laborers where cutting through the soft palisades at the end of a Santa Monica arroyo to create rail access to a 1,740 ft (530 m) long wharf. The Los Angeles and Independence Railroad Wharf north of the present site of the Santa Monica Pier was built in 1875. Pilings of this pier are still visible from the Pacific Coast Highway.

Growth of Santa Monica and the need to dispose of city sewage resulted in the building of the first municipal pier. Prior to 1907, the city had dumped sewage via a pipeline beneath Ocean Park's Pier, but its capacity became overloaded. It became necessary for health reasons to build a longer pier or wharf to carry the outfall pipe far enough so that the tides would carry the untreated sewage out to sea. Construction of the 1,600 ft (488 m) reinforced concrete pier began in May 1908 and was dedicated in September of the following year. The Santa Monica Municipal Pier was built at the foot of Colorado Avenue between the stub of the old railroad wharf and the North Beach Pier. The 720 by 267 ft (219 by 81 m) wide Looff Amusement Park Pier was built adjacent to the Municipal Pier in 1916-1918. By 1919 the Municipal Pier was condemned by engineers as unsafe due to deterioration of the concrete pilings. The City of Santa Monica Public Works began replacing the concrete with wood pilings in 1920.

The Santa Monica breakwater was built in 1930. The structure required 220,000 tons (199.6 metric tons) of rock transported from a quarry on Catalina Island to build the 2,000 ft (610 m) breakwater. A 200 ft (61 m) long pier extension at the end of the pier was built by the Santa Monica Harbor Company in 1930 but is no longer present. An enlarged T was built at the end of the Municipal Pier and a lower deck was constructed in 1934. A Harbor office was constructed on the upper deck in 1937. On March 1, 1983, 15,000 square ft (1,394 square meters) of pier deck and buildings west of Moby's Dock and 37,500 ft (11,430 m) of the pier's parking lot were swept into the sea. Remains washed ashore south of the pier. The pier was completely reconstructed by April 1990. The destroyed breakwater, however, remains barely visible at low tide.

El Segundo and Dockweiler State Beach

Prior to El Segundo's incorporation in 1917, it was part of Rancho Sausal Redondo ("Ranch of the Round Clump of Willows"). The rancho extended from Playa del Rey in the west to Inglewood in the east and to Redondo Beach in the south. The land consisted of wheat and barley fields on which cattle and sheep grazed. El Segundo, Spanish for "the second one," received its name when five men representing the Standard Oil Company selected the site for Chevron's second oil refinery. Standard Oil bought 840 acres (3.4 square kilometers [km^2]) of this land on June 11, 1911, and the refinery opened November 27, 1911. Less than 6 years later on January 18, 1917, the City of El Segundo was incorporated. In the 1920s, Mine's Field, a

landing strip for barnstormers, was chosen as the site for the new Los Angeles Municipal Airport. Today, LAX forms the northern boundary of El Segundo.

By the 1880s, Los Angeles experienced a land boom. Moye Wicks looked at the Ballona wetlands and visualized a world class harbor. He organized the Ballona Harbor and Improvement Company in 1886 and began to dredge "Port Ballona." The Santa Fe Railroad had been looking for a major port near Los Angeles and agreed to extend their tracks to the proposed port. In 1887, the first passenger train arrived at Port Ballona. When Wicks' cash was exhausted 3 years later, crews were still battling currents that swept silt back into the channel as fast as they could dig it out. The project ended when a storm took out the Ballona Wharf in 1889.

In 1902, Moses Sherman and Eli P. Clark, builders of the Los Angeles Pacific Electric Trolley line, purchased 1,000 acres (4 km^2) of land around the lagoon, forming The Beach Land Company, and started work on their resort "King's Playground." Landscape architect Alfred Solano planned to take advantage of Wicks' 1885 channel to build a small harbor and create a Venetian style resort on the marshy land, including Venetian bridges and towers, a bathing pavilion, and a hotel on the cliffs overlooking the lagoon. They called it Playa del Rey, or "King's Beach." Construction of Venice by Abbot Kinney to the north soon followed.

Sherman and Clark hauled hundreds of visitors on their trolley across the marsh to their resort. The centerpiece was a three-story pavilion on the banks of the lagoon (at the western edge of "Duck Pond") featuring restaurants, bowling alleys, and dance floors. A fishing pier was extended 1,200 ft (366 m) into the ocean, and a boat-racing course was laid out, complete with shore-side grandstand. Parts of the fishing pier collapsed in 1911 and then again in 1917. The Marina del Rey Yacht harbor was built in 1960.

4.1.3.4 Historic Sea Routes and Shipwreck Distribution

Coastal and overseas routes in use in Southern California today are time-honored routes first established by the Spanish. While traversing coastal waters without stops, ships pass just seaward of the offshore islands. Local traffic passes between the islands and the mainland. Overseas ships bound directly from or to a specific port will usually take a route south of the northern Channel Islands. Motorized ship traffic traverses within these shipping lanes. Sailing vessels, however, must constantly tack and jib in order to make headway up the coast because of the prevailing northwesterly wind pattern. Sailing ships running down the coast usually will not tack or jib because they are running before the wind. Established routes are compiled from descriptions in the historic record and idealized depictions taken from route charts published by various shipping lines (USDOI/MMS 1987). Branching of shipping lanes to reach local ports varies with the point of origin, destination, and direction and force of the wind, which changes with the seasons. Ships often take shortcuts to reduce running time outside of the shipping lanes. Thus, while historic shipping lanes can be plotted, they were not always followed, and vessel losses may have occurred within the lanes or shoreward. The density of losses increases with the occurrence of natural hazards such as rocky shoals, headlands, and reefs, as well as in the vicinity of ports of call.

The coastal shipping lane serving local ports runs between the mainland and the offshore islands. This system is now separated into northbound and southbound lanes to reduce traffic accidents. These lanes occupy the historic coastal shipping lane. Ports of call continue to be accessed from the coastal shipping lane. This configuration has changed little since the first Spanish explorations and the Philippine Manila galleon trade.

While numerous vessels have been reported lost in the study region, many of these vessels may be eliminated by accurate and semi-accurate coordinates, which place them outside the immediate study area, or by description of their loss, which indicates a stranding or grounding of vessels in locations adjacent to the shoreline, sandbars, rocks or reef areas. The remaining vessels include those for which accurate loss location coordinates are unknown and those for which accurate or semi-accurate loss location coordinates are within the study area. Given the number of vessels lost en route along the California coast that lack specific

coordinates of loss, one or more of these potentially significant shipwrecks may occur within or near the deepwater portion of the proposed Project, both within and outside of the 3 NM (5.6 km) limit of the submerged tidelands of the City of Los Angeles. The nine Manila galleons reported lost offshore California could be located anywhere in the Pacific; however, there remains a potential for their occurrence within the deepwater portions of the proposed route located between the 3 NM (5.6 km) and 12 NM (22.2 km) limits.

4.1.3.5 Ethnography

This section summarizes the prehistoric and historic context of the onshore Project area. The discussion has been limited to that Native American group described as occupying the area at the time of European contact and the historically documented activities following that contact. A more detailed description of time frames and theories surrounding the formation, establishment, organization, and cultural or physical affinities of earlier populations can be found in Heizer (1971), Moratto (1984), and Wallace (1971 and 1978).

Based on their association with the Spanish missionary establishment of *San Gabriel Arcangel*, the Native American people historically described as occupying the territory surrounding the Project area came to be known as the *Gabrielino.* These people, along with their neighbors to the north and south speaking similar languages, the *Fernandeno* and the *Juaneno* respectively, are collectively members of a larger affiliation known as the *Shoshoneans*.

The *Shoshoneans* form a broad band of peoples, speaking variants of *Uto-Aztekan* languages that extend from the mountains of Idaho and Montana south into Panama (Kroeber 1953). Moving west from the Great Basin area into the Mojave Desert, and subsequently through the San Gabriel and San Bernardino Mountain passes onto the coastal plains, *Uto-Aztecan* peoples are believed to have been well established in southern California, a minimum of 1,200 to 1,500 years ago, and may have arrived as early as 3,000 years ago (Bean and Smith 1978; Kroeber 1953; Moratto 1984). Resident coastal and inland populations were apparently displaced to the west and south with the *Uto-Aztecans* forming a "wedge" between the linguistically similar, *Hokan* speaking, *Chumashan* and *Yuman* peoples.

Uto-Aztecan speakers are represented by a number of languages grouped into three primary branches: *Takic*, *Tubatulabal*, and *Numic* (Shipley 1978). The *Gabrielino* are a *Takic* speaking people described by Kroeber (1953) as the "wealthiest and most thoughtful of all the *Shoshoneans* of the State." At the time of European contact, these people 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. These areas offered numerous resources to the aboriginal inhabitants and allowed for the development of complex social, political, and religious ties between communities (Bean and Smith 1978).

The predominant food resources for the *Gabrielino* living in the inland valleys and foothills included acorns, sage, yucca, and deer. For the coastal inhabitants, shellfish and marine species common to the sandy beaches and offshore kelp beds were added. Settlement patterns for the *Gabrielino* have been depicted as consisting primarily of permanently inhabited village sites that were organized on the basis of clan groupings, augmented by outlying satellite camps that were occupied on a temporary, perhaps seasonal, basis. These temporary camps were employed by small (perhaps family) groups and were located in areas of increased, localized resource availability (Bean and Smith 1978).

Social and political orientation was organized around a system of non-localized, often fragmentary, patrilineal lineages. Political control of primary villages rested with the leader of the dominant lineage, whose authority was legitimized by possession of a sacred bundle linking physical and spiritual embodiments of power. The leader's most important duty was to administer to the needs of the community and to preserve the sacred bundle. It was not uncommon for several villages to be under the control of a single leader (Bean and Smith 1978).

Adding cohesion to this organization was the establishment of trade ties between interior, coastal, and island groups. With mainland primary village sites estimated to number between 50 and 100, each sustaining a range of populations described by Spanish explorers as from 50 to 200 people (Bean and Smith 1978), social and political affiliations was of great importance. Trade goods radiated from the core *Gabrielino* area in all directions with artifacts of steatite from Catalina Island, and shell beads from the coast, passing into the interior. These goods eventually reached the *Chumash* on the north and west, the *Serrano* in the mountain passes, and have reportedly been encountered as far inland as central Arizona (Bean and Smith 1978). In return the *Gabrielino* acquired exotic materials such as obsidian, pelts, and supplemental foodstuffs.

European contact for the *Gabrielino* began in 1542 with the voyage of Juan Rodriguez Cabrillo but had little cultural effect until 1771, when the Mission San Gabriel was established as noted above. With the establishment of the mission system, the *Gabrielino* were slowly drawn into the economic sphere of the Spanish colonists. By the year 1800, the majority of the native population had been assimilated into the missions, died of introduced diseases, or fled to other areas. The introduction of the Spanish mission system into southern California brought about dramatic changes in the aboriginal way of life. Between the time of the establishment of the first missions (1769) and that of Mexican independence and the secularization of mission lands (1834), ancient ways of life steadily disappeared. Villages were abandoned, hunting and gathering activities were disrupted as newly introduced agricultural practices altered the landscape, and large portions of the native population were decimated by European diseases. As a result of the parceling out of church lands, the economic system of the missions and early *Rancherias* began to founder and the stage was set for a new order.

In the years following the secularization of mission lands, settlements marked by adobe structures, raised by the labor of neophyte hands directed by Spanish padres, evolved from missions to cities. Vast cattle ranches, latterly controlled by California dons, were replaced by grain fields, row crops, and orchards, and subdivisions were created to attract town dwellers.

4.1.4 Literature Reviews and Surveys

In support of the evaluation of potential impacts to cultural resources, Woodside has undertaken both literature and focused offshore and onshore surveys.

4.1.4.1 Offshore Component

Records Search

Archaeological resources in the offshore Project area are associated with either Native American or Euro-American occupation of the area.

Information on offshore prehistoric archaeological sites and shipwrecks was compiled from several sources, including the California State Lands Commission (CSLC) and the Minerals Management Service (MMS), in the form of a computerized database of nautical cultural resources (USDOI/BLM 1980; USDOI/MMS 1987). Additional shipwreck locations were identified based on historical information for the Project area obtained from the National Ocean Survey nautical charts and the National Oceanic and Atmospheric Administration (NOAA) Automated Wreck and Obstruction Survey Database.

Results of the Record Search

Native American sites documented in the offshore Project area include inundated habitation sites and isolated bottom-founded artifacts deposited in the marine environment by erosion or by accidental or purposeful deposition. No evidence of Native American watercraft in the marine environment has been documented in the offshore Project area, and it is considered unlikely that such fragile craft would be preserved. Underwater

prehistoric sites are located in the nearshore environments east of Point Dume and northeast of Point Vicente. Prehistoric sites in the offshore Project area are listed in **Table 4-1.**

The earliest shipwrecks documented are mainly of European or American origin, although one Chinese junk has been reported lost in the offshore Project area. The majority of reported shipwrecks are situated within the 3 NM (5.6 km) limit of the submerged tidelands of the City of Los Angeles and are found clustered near historic harbors, piers, landings, and points of land (Point Dume and Point San Vicente), although shipwrecks in deeper waters offshore are also present. Shipwrecks in the offshore Project area documented by CSLC and MMS are listed in **Table 4-2.** Additional shipwrecks not evaluated previously by the MMS are also present and are listed in **Table 4-3**. Several of these vessels are documented as significant or moderately significant. One vessel evaluated as insignificant is reported near the SPMs.

A total of 88 shipwrecks are charted within a 5 mile radius of the proposed pipeline route, HDD, PLEM, and alternative pipeline route. Of these only 11 of the shipwrecks are charted near the planned pipeline route. Ten of these shipwrecks are located in water depths of less than 165 ft (50 m). The only charted deep-water shipwreck near the planned route is the *Andrew D*. This vessel is reportedly located at a water depth of about 2,600 ft (790 m) at 33° 45.00'N - 118° 50.00'W (Verdian 2001 in Fugro 2006a) and is near the anchoring area for the SPM.[3] The *Andrew D* is documented as a 116 ton (105 metric tons) vessel that burned and sank in 1953 (CSLC 2006). It has been previously evaluated by USDOI/BLM (1979) and USDOI/MMS (1987) as insignificant. It should be noted that very few of the shipwrecks in the study region have been accurately located or mapped. In addition to shipwrecks, there are two downed aircraft locations listed as jetliners and one unknown aircraft location reported within the Project area offshore LAX.

Note: A vessel below 40 tons (36 metric tons) and 40 ft (12 m) in length is generally classified as a boat. However, submarines and fishing vessels are always known as boats whatever their size. A boat may also be classified as a vessel small enough to be transported on a ship.

Offshore Survey

The objective of the marine remote sensing archaeological survey is to identify and inventory cultural resources that may be present in the Project area though an examination of existing literature, review and analysis of and site-specific marine geophysical remote sensing survey data, and to develop mitigation procedures to minimize impacts to significant cultural resources if present. Available information detailing existing environmental, geological, and cultural resource conditions has been integrated into the interpretation and analysis of site conditions and cultural resource evaluation present herein.

A series of three integrated marine geotechnical field surveys of the proposed HDD site, pipeline route, and port site were conducted within the offshore survey area discussed in detail above and shown in the Fugro West, Inc. survey reports (Fugro 2006b, 2006c, 2006d). The survey and navigation systems, survey methods employed, and vessels used for the surveys are presented in three field survey reports (Fugro 2006b, 2006c, 2006d). The surveys consist of the (1) shallow-water survey (Continental Shelf Charting Operations [April through June 2006]; (2) two deepwater surveys (Autonomous Underwater Vehicle [AUV] Operations [April through June 2006]; and (3) SYS100D Operations (May through June 2006)].

[3] Additional information for the *Andrew D*, including the vessels length and breadth, has been requested from the San Francisco Maritime Museum.

Survey Methods

The vertical datum for the Project is Mean Lower Low Water (MLLW). Depths were corrected for tide variations based on tidal data obtained from the NOAA tide gauges at Santa Monica Pier (Station ID: 9410840).

Shallow-Water Survey Area (Continental Shelf Seabed Mapping Survey)

The *R/V Zephyr* commenced seabed mapping operations after mobilization in Ventura on April 8, 2006 (Fugro 2006b). A total of 1,105.2 line-kilometers were run during the site investigation, 635.9 line-kilometers for the Seabed Mapping, and 469.3 line-kilometers for the magnetometer survey. The data were collected to correlate with existing data and further characterize the subsurface structure and stratigraphy along the proposed pipeline alignment and HDD exit area. A map depicting the seabed mapping survey area and magnetometer survey area is contained in **Appendix I**. Marine survey operational procedures, geophysical instrumentation employed, and navigation systems may be found in the survey reports (Fugro 2006b, 2006c, 2006d).

Survey operations consisted of traversing a pre-plotted grid of survey lines while towing the various system sensors. The sidescan sonar (SSS) was deployed by a tow cable from the center of the vessel's stern, and the Multibeam transducer was mounted on a ridge over-the-side pole along the vessel's starboard side. All vessel offsets were recorded prior to survey operations. Vessel speed was 3 knots (5.5 km per hour).

The seafloor mapping survey lines were numbered with the 100-numbered lines beginning in the shallowest water and continuing out along the Southern Pipeline route to the shelf with the 300-lines picking up the area on the Northern Pipeline route, and the 200- and 400-lines finishing up near the shelf. All tie lines were 900-series lines. For the very inshore areas, lines were spaced at 50 m and increased with water depths to as much as 150 m apart.

The *R/V Zephyr* was mobilized for the magnetometer survey at Marina del Rey on May 3, 2006. Survey operations commenced on May 4, 2006, following calibrations for the system. Navigation positioning and software were the same as the SSS and multibeam portion of survey operations.

Survey operations consisted of traversing a pre-plotted grid of survey lines while towing the marine magnetometer sensors. The magnetometer sensor was deployed by a tow cable from the vessel's stern. The Marine Magnetic's SeaSpy marine magnetometer measures the ambient magnetic field using a specialized branch of nuclear magnetic resonance technology applied specifically to hydrogen nuclei producing very high sensitivity and accuracy. The sensor is reported to have an absolute accuracy of 0.2 Nanotesler (nT) and a counter sensitivity of 0.001 nT.[4] Total magnetic field values, tow sensor altitude, and depth were logged together with time-tagged navigation information at a rate of 1 Hz. The magnetometer sensor was kept at an altitude of 16 to 33 ft (5 to 10 m) above the seabed to assure maximum resolution.

The magnetometer survey grid was created to document and locate ferrous objects on the seafloor such as existing pipeline, cables, and other debris. The layout was dictated by the limitations of the magnetometer and existence of known seabed features. The pipeline-parallel lines were numbered in series with the 100-numbered lines beginning in the shallowest water and continuing out along the Southern Pipeline route to the shelf, the 300-lines picking up on the Northern pipeline route, and the 200- and 400-series lines finishing up near the shelf. Survey line spacing was 490 ft (150 m). All tie lines were 900-series lines.

The archaeologist reviewed and analyzed the survey lines in digital and mosaic format in Explorer and ArchView 3.2 for sonar contacts and magnetometer anomalies indicative of a potential cultural resource.

[4] One nT (nanotesler) is equivalent to 1 gamma.

Resolution of the data was evaluated as adequate for cultural resources interpretation and capable of resolving features as small as .65 feet (0.2 m) in horizontal and/or vertical extent.

Deep Water Survey (AUV Operations)

Following mobilization of the 165 ft (50 m) survey vessel *American Patriot*, the second of three offshore surveys commenced from Pier C in Long Beach, California, on April 20, 2006 (Fugro 2006c). The AUV operations were conducted during April through June 2006. Nine hundred survey line-kilometers of data were collected to correlate with existing data and further characterize the subsurface structure and stratigraphy along the proposed pipeline alignment (Fugro 2006c). A map depicting the AUV Survey area is contained in Appendix I.

Marine survey operational procedures, instrumentation, and other documentation may be found in the survey report (Fugro 2006c).

The survey included Bluefin AUV for simultaneous acquisition of swath (multi-beam) bathymetry, SSS, and subbottom profiler data. Survey operations were performed 24 hours a day along pipeline routes between approximately 200 and 2,900 ft (60 to 880 m) water depth. The AUV survey line layout was adjusted to fit the survey corridor based on system and operational requirements. The survey area extending seaward from about 200 to 230 ft (60 to 70 m) water depth with primary lines at 300 ft (90 m) spacing parallel to the proposed route and tie lines approximately 3,900 ft (1,200 m) apart. The survey corridor was about 6,500 ft (2 km) wide in water depths greater than 1,000 ft (300 m) and about 3,200 ft (1 km) wide to the north and south of the envelope of the possible pipeline route above 1,000 ft (300 m) water depth for possible shore approaches to LAX North and South HDD exits (Fugro 2006c).

The archaeologist reviewed the survey lines in digital mosaic format in ArchView 3.2 for anomalies indicative of a potential cultural resource. The resolution of seafloor features (SSS contacts) in the mosaic data in digital format of the AUV lines is not considered optimal for resolving an older fragmented or otherwise degraded shipwreck. The data reviewed along with the original SSS and subbottom paper records, however, was evaluated as adequate for cultural resources identification. Both systems were able to resolve features as small as 3 to 5 ft (1 to 1.5 m) in length and height above seafloor of 3 ft (1 m) or more.

Deep Water Survey (SYS100D Survey)

Following mobilization of the survey vessel American Patriot, the third of three offshore surveys commenced from Pier C in Long Beach, California, on May 20, 2006 (Fugro 2006d). The SYS100D survey was conducted between May 20 and June 11, 2006. Acquisition of 840 survey-line miles (1,353 survey line-kilometers) of data were collected to correlate with existing data to further characterize the subsurface structure and stratigraphy in the vicinity of the DWP, along the proposed pipeline alignment, and a series of lines (cross lines). Vessel speed was 3 knots (5.5 km per hour).

Swath width was 1,640 ft (500 m). A map depicting the SYS100D survey area is contained in **Appendix I**. Marine survey operational procedures, instrumentation, and other documentation may be found in the survey report (Fugro 2006d).

Survey resources for the survey consisted of SYS100D deep tow fish for simultaneous acquisition of swath bathymetry, SSS, and subbottom profiler data. Marine survey operational procedures, instrumentation, and other documentation may be found in the survey report (Fugro 2006c). The survey operated 24 hours per day. The SYS100D integrated shallow-water swath bathymetry and SSS capability provides an acoustic seafloor image in fix swath widths and simultaneously maps highly accurate bathymetry in a swath that is about three times as wide as the water depth beneath the transducer array (Fugro 2006d). The SYS100D also provides “Chirp” subbottom profiler data (3 kilohertz [kHz] to 7 kHz frequency sweep) that shows subsurface geological structure.

The SYS100D survey was conducted along the pipeline routes between approximately 2,100 ft (640 m) and 3,000 ft (915 m) water depth, which is depicted in a map contained in **Appendix I**. The survey corridor was set to about 6,500 ft (2 km) wide in water depth greater than 1,000 ft (300 m); and insure from about 1,000 ft (300 m) water depth, the survey corridor was extended about 3,200 ft (1 km) to the north and south of the envelope of the possible pipeline route shore approaches to LAX North and South HDD exits.

The towfish survey lines layout was adjusted to fit the survey corridor based on system and operational requirements. A complete, time-correlated record of all navigation and survey data was kept throughout the survey using automatic data logging equipment and digital backups (Fugro 2006d). Primary lines were at 300 ft (90 m) spacing parallel to the route downslope and across the basin. Tie lines were approximately 3,900 ft (1200 m) apart. At the DWP area, the survey covered a rectangle of 4.3 by 6.2 miles (7 by 10 km). Northeast-Southwest lines were 300 ft (90 m) apart; the westernmost lines are extensions of pipeline route survey lines. Survey lines are perpendicular to the basin axis. Tie lines were approximately 3,900 ft (1,200 m) apart.

The archaeologist reviewed the survey lines in digital mosaic format in ArcView 3.2 for sonar contacts indicative of potential cultural resources that might be impacted during construction or operation of the proposed Project. The mosaic data in digital format was not considered optimal for cultural resources identification as seafloor images lost considerable resolution as it was increased in size for viewing in ArcView 3.2. Given this factor, the archaeologist also reviewed original SSS/subbottom profiler paper records for the deep water survey areas. Although the SSS data lost resolution in deeper water and in areas of high reflectivity, it was evaluated as adequate for cultural resources interpretation.

Survey Results

The sonar signatures suggest that the seafloor in the shallow-water survey area primarily consists of fine-grained sediments (areas of low sonar reflectivity), and geotechnical data shows that those sediments consist of silt/fine sand and grading to clay from water depth of about 50 to 55 ft (15 to 17 m). Areas of higher reflectivity in the central portion of the surveyed area correspond to coarser-grained sediments, including medium to coarse sand and gravel. The ancestral Los Angeles River probably deposited those sediments during periods of lower sea level. The gravel clasts have a maximum diameter of about 4 inches (10 cm).

They are primarily metamorphic, suggesting that they originated from the San Gabriel Mountains (Fugro 2006e). These coarser sediments are visible in areas along the shelf break.

Subbottom profiler records allow mapping of the Pleistocene-Holocene boundary, submerged relic environments, and filled channels on the continental shelf that may be used for purposes of reconstructing submerged subaerial topography in relation to possible prehistoric human occupation. Archaeological subsurface mapping, however, was not pursued in this analysis because the comprehensive geological study did not identify submerged (drowned) subaerial topography suggestive of the presence of preserved environments. It is predicted that such locations may survive in the association with filled channels and submarine canyons that traverse the continental shelf along this portion of the coast.

During prehistoric time and during periods of glacially lowered sea levels, the Los Angeles River flowed through Ballona Creek area into Santa Monica Bay. Major floods would occasionally shift the main channel from Ballona Creek to the modern channel that flows into San Pedro Bay. Drainage into the Ballona Creek channel would also include flows directly from the Santa Monica Mountains, supplying gravel and larger rocks that may have reached the coast during peak flood stages. Upon reaching the coast, sediments would have been deposited in the nearshore zone, where subsequent longshore transport likely moved much of the sediment along the coast toward the south, similar to today. There is evidence of a coast-parallel river or nearshore marine channels. The high energy nearshore marine processes of sediment erosion, transport, and deposition often creates complex coast-parallel channels, banks, and berms. Seismic data suggests the presence of a buried north-south trending river channel on the middle shelf as well as possibly the nearshore channel zone.

The HDD and shallow-water survey area, however, is characterized as a high-energy coastal environment. Active tidal currents, longshore currents, and storm-induced, wave-driven currents all contribute to sediment transport , scour, erosion, and deposition and make survival of preserved environments unlikely.

The survey identified medium to coarse sand and gravel deposit exposed in the central portion of the survey area. The chirp data suggest that the deposit is widespread across the shelf area. The upper surface of the deposit was mapped as Horizon 1. Near the HDD area sediments above the gravel deposits are about 4 ft (1.2 m) thick. The sediments thicken to the east and pinch out about 1600 ft (490 m) west of shore. The sediments are exposed about 1500 ft (460 m) southwest of the HDD area. West of the gravel exposure, the sediments thicken to a maximum of about 27 ft (8 m) at the southwestern limit of the survey area. Horizon 1 was not identified near the southern proposed HDD exit. SSS data suggests that fine-grained sediments are on the seafloor within that area but are probably too thin to be resolved on the chirp data. The chirp data show discontinuous reflectors in the area closest to shore that probably do not correlate with Horizon 1. Within the exposed gravel area, there are isolated areas of fine-grained sediment about 1 ft (30 cm) thick.

Linear features in the southern portion of the shallow-water survey area are identified as the abandoned pipelines associated with the Hyperion wastewater treatment plant.

Selecting seafloor features that may have potential cultural origin requires interpretation of acoustic images (SSS and subbottom profiler). Using this remote sensing data, seafloor features appear as indirect representations not generally conclusive as to their origin. Selection of seafloor features as potential archaeological resources is, therefore, based on a range of acoustic image characteristics that may indicate possible cultural origin. Magnetic anomalies were also examined for proximity to any of the selected features.

A total of 218 SSS contacts (seafloor features) and 21 magnetometer anomalies were documented in the Fugro 2006 surveys (Fugro 2006e, 2006f, 2006g). Of the 218 SSS features, the archaeologist selected 73 features as representing features of possible cultural origin on the seafloor based on the following criteria.

- geometry (size, shape, angularity);
- aspect ratio (watercraft lengths are generally 3 to 6 times their beam width);
- density (high reflectivity);
- extent or complexity;
- perpendicular elements or apparent association with nearby targets;
- association with a coincident magnetometer anomaly (shallow-water survey only); and/or
- definitive shadows indicating protrusion into the water column.

These features are tabulated in **Table 4-4** and plotted on a map (included in **Appendix I**). Each of the features identified as representing possible shipwrecks or small boats are presented in **Figures 4-2 to 4-15**. Categories of tabulated information included the feature number, description and interpretation, location of the feature in State Plane and Universal Transverse Mercator (UTM) as well as in latitude and longitude, approximate size in meters and feet, water depth, and distance to the proposed Project elements and potential cultural resource significance.

Most of the data events (contacts) examined gave only subtle indication of their origins. Associations of magnetic anomalies or minor magnetic variations, which might lead to identification of anchors or cannons, were not evident except in the case of sonar contact No. 1. As the result of this analysis, features were classified as possible shipwrecks, possible small boats lacking cultural significance, and unidentified (i.e., possible debris [jetsam] from vessels transiting to and from Marina del Rey Harbor or natural features [areas of coarser grained sediment]).

All the features identified as possible shipwrecks are located in Federal waters except for No. 16. The SSS contacts and magnetometer anomalies are presented in **Tables 4-4 and 4-5**. Many of the features are small, less than 33 feet (10 m) in size, with little or no projection into the water column (above seafloor height). Seven of the features (Nos. 57, 61, 62, 63, 64, 65, 66, and 73) are interpreted as shipwrecks; 4 features (Nos. 16, 31, 40, and 52) are identified as possible degraded shipwrecks, ballast piles, or possibly an incidence of dumping rock or other debris; and 4 features (Nos. 3, 7, 18, and 19) are interpreted as possible small boats (less than 40 ft in length {10 m}). The remaining SSS contacts are interpreted as most likely representing non-ferromagnetic debris or areas of coarse-grained sediment (bottom change) or other natural bottom feature. Four features in the deep water (2900 ft [2880 m] water depth) are interpreted as unknown bottom founded features of greater reflectivity (density). One feature in the deep water (2900 ft [880 m] water depth) has been interpreted by Fugro (2006f) as a methane hydrate or mud volcano). Of the 21 magnetometer anomalies, one is associated with a possible shipwreck (No. 57), 7 are interpreted as representing an abandoned 20 inch (½ m) pipeline, and 1 a fishing reef. Five are associated with SSS contacts, and the remaining 9 are unidentified.

Twelve of the features, unless otherwise identified through further research, are evaluated as potentially significant. The three SSS contacts interpreted as small boats less than 10 tons (9 metric tons) are not evaluated as culturally significant. All shipwrecks over 10 tons (9 metric tons) are evaluated as potentially significant unless other information is available by which its actual significance as a cultural resource may be evaluated. It remains unknown at this time if the reported shipwreck *Andrew D* is represented in the survey area by one of the SSS contacts.

A total of 21 magnetometer anomalies are located within the pipeline route. These anomalies are presented in **Table 4-5**. Seven have been identified as consistent with an abandoned 20 inch (0.5 m) steel pipe, five have been identified as coincident with SSS contacts (seafloor features), and nine remain unidentified and may be associated with a buried ferromagnetic object or geological feature. One of the five anomalies (Anomaly No. 17) appears to be associated with a large SSS contact (No. 57). This anomaly is consistent both in horizontal and vertical extent and in magnitude (3723.4 nT dipole) with a shipwreck. One of the anomalies (Anomaly No. 13) has been reported by Fugro as associated with a nondescript sonar contact (Fish Reef), one appears to be associated with a possible anchor chain or other ferromagnetic debris (Contact No. 1/Anomaly No. 14), one (Anomaly Nos. 15) is associated with a linear sonar contact, and one (Anomaly No. 18) is associated with an area of scatter sonar contacts (Contact No 59). These contacts are interpreted as possible ferromagnetic (man-made) debris.

Two of the SSS contacts were interpreted by Fugro as shipwrecks (Nos. 62 and 64). One SSS contact (No. 40) was identified by Fugro on a survey line that was not part of the data set reviewed by the archaeologist. However, neither the ArcView or Explorer data formats had sufficient resolution for the archaeologist to verify these or other deep water SSS contacts from the mosaic (geotiff formats). The mosaic itself also served to obscure data that may have been present at the locations shown in Fugro West Inc.'s in-house SonarWiz.MAP – Contact Report Fugro (n.d.) but which were obscured by overlapping lines. This data format is evaluated as inappropriate for cultural resources interpretation. The archaeologist's subsequent review of original SSS/subbottom profiler paper records deep water lines resolved these issues.

4.1.4.2 Onshore Component

Records Search

Woodside has conducted an archaeological files and records search at the South Central Coastal Information Center (SCCIC), at California State University, Fullerton, for the proposed Project. The archival review included the compilation of recorded archaeological sites and cultural resource investigations, a review of historic properties on the federal, state, and local levels, and a review of historic maps within the study area. The study area is defined as the 1 mile (1.6 km) wide records search corridor.

The purpose of the search was to determine the presence of all previously recorded onshore prehistoric and historic resources located within a 0.5 mile (0.8 km) area on both sides of the proposed Project route (1 mile [1.6 km] wide). The search also determined whether any historic properties are listed within the 1 mile wide study area on the following:

- National Register of Historic Places (NRHP)
- California State Historic Resources Inventory (HRI)
- California State Historical Landmarks (CHL)
- California Points of Historical Interest (PHI)
- California Register of Historical Resources (CRHR)

Documents regarding previous cultural resource investigations, including records searches, surveys, test and data recovery excavations, site and building evaluations, and other pertinent information, were also compiled. Research of the Sanborn Fire Insurance Maps, dating from the late 1800s to about 1945, to determine the presence of potential buried historical resources within the area of the proposed route, as well as early U.S. Geological Survey (USGS) 15-minute topographic maps, were conducted.

Results of the Records Search

A total of 11 cultural resources have been previously recorded within the 1 mile (1.6 km) wide study area for the proposed route: four prehistoric and seven historic. These resources are listed in **Table 4-6** according to cultural resource number, cultural resource type, distance to pipeline, and the NRHP eligibility status.

A total of 50 cultural resource investigations have been conducted within the 1 mile (1.6 km) wide corridor within the records search study area. Due to the nature of the linear alignment of the current proposed Project, as well as its location within the densely built Los Angeles Basin environment, only the two surveys that were completed for LAX included a fairly large portion of land. **Table 4-7** lists the cultural resource investigations conducted within the study area for the proposed route. The cultural resource investigations are arranged alphabetically by author/company according to the appropriate USGS 7.5-minute map quadrangle, and include the type of investigation, relation to the proposed alignment, and whether any cultural resources were recorded during the study.

The review of the Sanborn Fire Insurance Maps, dating from the late 1800s to about 1945, depending on the development pattern of the city, found no adobes located along the proposed route or any definitive evidence to suggest the presence of other potentially buried historical resources. This research was conducted by reviewing individual map sheets that contained the proposed route as well as surrounding streets for each year the maps were made until 1945.

Field Survey Methods

The initial field investigation for the proposed pipeline corridor was conducted in April 2006 and included a drive-by surveillance of the alignment as well as on-foot surveys of all open areas. Additional portions of the route that were either previously inaccessible or later added, were surveyed in June 2006 and July 2007. Since the pipeline will be installed buried beneath existing pavement, the survey corridor is herein defined as including a 50-ft (15-m) wide buffer on both sides of the existing paved roadway, or as allowed by open space, as a means to determine if potential subsurface cultural resources exist buried beneath the paved streets. The width of the survey corridor is intended to include the width of any easements of the pipeline trench, as well as the footprints of any associated facilities and/or associated structures. However, the examination of the survey corridor does not include an evaluation of potential historic properties within the built environment adjoining the paved roads, since these structures will not be affected.

The 1-inch to 200-ft (25-millimeter to 61-m) scale aerial photography maps were used to follow the routes and to identify areas of open space for the purpose of on-foot examination. Approximately 90 to 95 percent of the proposed route is located within built environments that include residential, commercial, and light industrial properties, and concrete or asphalt paved parking lots and sidewalks. As a result, these areas were not systematically surveyed on-foot due to the lack of ground surface visibility. Private residential properties were also not systematically surveyed on foot due to lack of permission. All areas with exposed ground surfaces, such as parks, vacant lots, unpaved open spaces, and landscaped areas that had some degree of ground visibility, were examined for the presence of cultural resources by two archaeologists walking in either systematically spaced transects in approximately 6 to 9 ft (2 to 3 m) intervals or opportunistically, as ground visibility or access allowed. No newly recorded cultural resources were encountered during the field examination of the proposed route.

As part of the field examination, previously recorded cultural resources identified during the records search as within or adjacent to the survey corridor, were re-inspected on foot. Their locations were located by a Garmin GPS system, and plotted on the ENSR aerial photography and topographic maps, and notes and digital photographs were taken to document their current status.

Survey of Proposed Route

The survey of the proposed pipeline corridor is described below according to street segments, generally from west to east, along with the results regarding cultural resources that could potentially exist buried within the APE, once it is defined. Those areas that were inaccessible during the survey are also presented.

The western extent of the proposed route, which includes the LAX north shore crossing, was surveyed between Vista del Mar and Pershing Drive. In addition, six proposed subsurface geological exploration locations (5 CPT, and 1 boring), all situated within paved areas, were examined between Vista del Mar and Pershing Drive. This area was a former residential neighborhood, built in the 1930s and demolished in the 1960s for the expansion of LAX, and is currently fenced. There are no previously recorded cultural resources located within or adjacent to this portion of the route, and no resources were found during the survey. Two additional geological exploration areas were examined near the Jet Pets facility, located at the northeast corner of Pershing Drive and Westchester Parkway.

The former residential area along the pipeline route between Vista del Mar and Pershing Drive is now vacant, and commercial properties exist along the route to Aviation Boulevard. Westchester Parkway becomes Arbor Vitae Street at its intersection with Airport Boulevard. There are two previously recorded cultural resources situated along Westchester Parkway, prehistoric site CA-LAN-1118, which is potentially located within the APE, once it is defined, and historic building 19-150445, which is located 200 ft (60 m) north of the intersection of Sepulveda Boulevard and Westchester Parkway, and was recommended as ineligible for the NRHP.

The survey corridor along Westchester Parkway is bounded on both sides by inaccessible LAX property to approximately 600 ft (180 m) west of Sepulveda Boulevard, at which point commercial property begins. Both sides of Westchester Parkway outside of the fenced LAX enclosures were surveyed. The width between the fence and curb varied between approximately 10 and 30 feet (3 to 10 m) and included both cut slopes and areas nearly level with Westchester Parkway. Ground surface visibility was between 10-75 percent, due to vegetation. No newly encountered resources were observed during the survey, and the area where previously recorded site, CA-LAN-1118, was recorded to exist, was examined.

The boundaries of prehistoric site CA-LAN-1118 have been variously depicted on topographic maps since it was originally recorded by Stickel and Appier in 1981; therefore, its precise limits are unknown. Based on the original description and map depiction, the site extended from the western terminus of La Tijera Boulevard west 328 ft (100 m) and northwest for 820 ft (250 m). Raschke et al. (1995) conducted a survey for the LAX master plan and updated the site record in 1995. They stated the following regarding CA-LAN-1118:

> Examination of this site area reveals that it has been extensively damaged since being recorded by Stickel and Appier in 1981. In fact, Westchester Parkway opened for traffic only last year, was constructed directly through the heart of the site. In addition, virtually all of the site surface has been damaged by recent grading.
>
> Pockets of shell and limited debitage can be seen throughout the site area. South of Westchester Parkway the recent grading damage is extreme and it is apparent that little of the deposit remains undisturbed. However, to the north of Westchester Parkway the grading damage is apparently less extensive. Shell is generally visible at the surface throughout the northern area. It is believed that a substantial subsurface deposit may remain in the northern area, since nearly every rodent burrow spoil pile was observed to contain shell.
>
> Stickel recommended a test excavation, but there is no evidence that such was ever accomplished. During the current LAX master plan study, it was recommended that the site be subjected to immediate test excavation and managed in accordance with the results (Raschke et al. 1995).

However, in the Raschke et al. (1995) report, there are two maps of the site in Appendix E that show different configurations of the boundaries. As shown on Figure 1 of Appendix E (Raschke et al. 1995), the site boundaries extend south of the current alignment of Westchester Parkway, whereas on the Archaeological Site Location Map for CA-LAN1118, the site is just north of Westchester Parkway and extends further to the east. Since the site was never subjected to a test excavation, the depth of the deposit is unknown, and therefore, it is not known if any remains of a potential intact deposit may still exist below the current alignment of Westchester Parkway. At the intersection with Falmouth Avenue, Westchester Parkway has been cut 2-3 feet (60-90 cm) below the surrounding landform, then descends to a 20-25 feet (6.1-7.6-m) road cut to the west.

The area of the potential extension of site CA-LAN-1118, south of Westchester Parkway, within LAX property, was examined during an escorted visitation of this area. At the time, some minor grading was being conducted for a staging area, and visibility was 100 percent. No evidence of the site was found within the LAX property. The open areas to the north of Westchester Parkway, east and west of Falmouth Avenue, were inaccessible due to fencing. No cultural remains were observed in those areas outside of the fenced enclosures where the landform has been modified for street construction. It remains unknown if any remnants of the site may still exist buried beneath Westchester Parkway in the area of Falmouth Avenue.

The proposed route along Arbor Vitae Street is a built environment that predominantly consists of single family residential properties, with some commercial properties, and available ground surface visibility was extremely poor. A proposed receiving and custody transfer station (RCTS) is to be located south of Arbor Vitae Street at 5651 96th Street, just south of Bellanca Avenue. Bellanca Avenue is developed with commercial/industrial structures, paving, and some minor planter areas, which resulted in nearly non-existent ground surface visibility, and the area of the proposed RCTS at 5651 96th Street, is currently paved. No cultural resources have been previously recorded in this area.

There is a vacant lot on the south side of Arbor Vitae Street approximately 1½ blocks east of Airport Boulevard. This property, which is fenced and inaccessible, appears to have been previously developed. An internet search of aerial photographs on Google Earth shows what appears to be a multi-family residence on the property. Planters located at the southeast and southwest corners of Arbor Vitae Street and Cedar Avenue, Arbor Vitae Street between Rosewood Avenue and Eucalyptus Avenue, the southwest corner of Arbor Vitae Street and Walnut Street, and the northwest corner of Arbor Vitae Street and La Brea Avenue were all inspected for cultural remains. A few small fragments of unidentifiable clam shell remains were found in the planter located at the northwest corner of Arbor Vitae Street and La Brea Avenue. Soil in the aforementioned planter consisted of a light yellowish brown fine–to-medium-grained silty sand, as opposed to a potential dark colored cultural midden deposit. Soil in the other planters appeared to be fill material that contain imported gravels and small pieces of asphalt and concrete, as well as subsurface sprinkler systems.

No cultural resources have been previously recorded within or adjacent to the pipeline survey corridor, and none was found during the survey.

The proposed route turns north on Prairie Avenue, which consists of residential properties along the west side of the street, and the Hollywood Park Racetrack and Casino and Great Western Forum on the east side of the street. Parking lots for both of these facilities are covered with asphalt, and there was no ground visibility. No cultural resources have been previously recorded within or adjacent to the pipeline survey corridor, and none was found during the cursory walk-over along the residential west side of the street.

The proposed route turns east on Manchester Boulevard, which predominantly consists of commercial properties with some residential structures. The Inglewood Park Cemetery is located along the north side of Manchester Boulevard, from Prairie Avenue to West Boulevard. The south side of the cemetery was surveyed on foot to 50 ft (15 m) from Manchester Boulevard. The entire length has been disturbed, both by excavation for graves and construction of roads and buildings. No evidence of any prehistoric or historic cultural remains was observed. A vacant lot located at the southwest corner of Manchester Boulevard and 5th Avenue was surveyed on foot, and an unidentifiable fragment of clam shell was found; however, the soil appeared to consist of imported fill material. No cultural resources have been previously recorded within or adjacent to the pipeline survey corridor along Manchester Boulevard. With the exception of the aforementioned areas that were surveyed on foot, ground surface visibility along this segment was predominantly non-existent due to structures and/or paving.

At the intersection with S. Central Avenue, the proposed route becomes Firestone Boulevard, which primarily consists of commercial properties with associated paved areas and only some residential parcels. The front lawn of South Gate High School, between State Street and California Avenue, was surveyed on foot, and no cultural materials were observed. Ground surface visibility along this segment was extremely poor, less than 2 percent. No cultural resources have been previously recorded within or adjacent to the pipeline survey corridor.

A proposed lateral extends from Manchester Boulevard south for approximately 1 mile (1.6 km) along S. Central Avenue to E. Century Boulevard, and primarily consists of commercial properties. Will Rogers Memorial Park, located at the southeast corner of S. Central Avenue and E. Century Boulevard, was surveyed on foot, and no cultural materials were observed. Ground surface visibility along this segment was extremely poor, less than 2 percent. No cultural resources have been previously recorded within or adjacent to the pipeline survey corridor and none was observed along this built environment.

At California Avenue, the proposed route turns north to Santa Ana Street then turns east on Santa Ana Street ending at its intersection with Otis Avenue. This segment of the pipeline survey corridor consists of residential properties. Both sides of the street were walked, and the easement between the sidewalk and the street was inspected for cultural materials, as well as some yards that could be inspected from the sidewalk. This extent of the proposed route crosses the one cultural resource that has been previously recorded along this segment: the historic Union Pacific Railroad (UPRR; 10-186110), which crosses California Avenue just north of Ardmore Avenue. This historic resource, recorded by Ashkar in 1999, has been recommended as eligible for the NRHP.

Survey Results

There are two cultural resources that were previously identified within the records search area for the proposed route as potentially located within or immediately adjacent to the APE (once it is defined). Prehistoric site CA-LAN-1118 may be located within the APE; however, it was not re-located during the field survey; however, due to the potential of buried deposits, it should be archaeologically monitored during construction. The other cultural resource consists of the historic UPRR (10-186110), which crosses the proposed route at California Avenue, just north of Ardmore Avenue, and the proposed route ends just west of another recorded historic segment of the railroad, of which both are currently still in use. Ashkar (1999)

considered the resource as eligible for inclusion on the NRHP under Criteria A and B. The portions of the Union Pacific rail lines that were recorded by Ashkar (1999) were originally other historic railroad lines that were later acquired by Union Pacific. The original lines included the Southern Pacific, the Pacific Electric, the Los Angeles and San Pedro railroad, and the Los Angeles and Salt Lake Railroad. The Southern Pacific line through the Los Angeles area was constructed in the 1870s, and originally extended south from Los Angeles through Watts and Compton to Wilmington, and east from Los Angeles through Alhambra, San Gabriel, Puente, Pomona, and on though Colton before continuing toward Yuma, Arizona. The major portion of the tracks and associated spurs, sidings, rail yards, and stations were constructed between 1869 and 1905.

The site records for those cultural resources located within or adjacent to the proposed route are attached as **Appendix E.**

4.1.5 Native American Coordination

The Native American Heritage Commission (NAHC) has been contacted regarding whether any listed Sacred Lands exist within or adjacent to the study area and the APE (**Appendix F**). Based on the check of the Sacred Lands File by Rob Wood, Environmental Specialist III of the NAHC, the following Native American cultural resources have been identified:

Los Angeles County:	Sa'anga, Venice Quadrangle (CA-LAN-63, 64, 65, 203, 204, 206A, and 211).
Orange County:	Adams-Estancia, Newport Beach Quadrangle (CA-ORA-76).
	Fairview Village, Newport Beach Quadrangle (CA-ORA-58).
	Newland House, Newport Beach Quadrangle (CA-ORA-183).
	ORA-64 – Eastbluff, Newport Beach Quadrangle (CA-ORA-64).

With the exception of CA-ORA-183, which is located atop a bluff approximately 0.4 mile (0.6 km) to the west of the proposed pipeline, all of the other sites are more than 0.5 mile (0.8 km) from the pipeline; therefore, there will be no effect on these sacred sites.

Individual letters will be sent to Gabrielino Native American groups and individuals that are on the NAHC list (**Appendix G**).

4.2 Regulatory Setting

This study was undertaken to assist in consideration of the effects, if any, of the proposed Project on cultural resources listed on, or eligible for, the NRHP. The work was performed in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and pursuant to its implementing regulations, 36 CFR 800. All aspects of these investigations were completed in accordance with the following:

- Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (Federal Register 48, No 190, 1983)
- Abandoned Shipwreck Act of 1987 (43 USC 2101-2106)
- Abandoned Shipwreck Guidelines, National Park Service
- National Register Bulletins Nos. 14, 16, and 20.
- American Indian Religious Freedom Act (AIRFA) of 1978
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- Executive Order 13007 – Indian Sacred Sites

- National Register Bulletins Nos. 15 (historic properties), 36 (historic archaeological sites and districts), and 38 (traditional cultural properties)
- Archaeological and Historic Preservation Act of 1974
- Archaeological Resources Protection Act of 1979, as amended
- 36 CFR 60-66 and 800, as appropriate

4.2.1 National Register Significance Criteria (36 CFR 60.4)

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, association and:

- that are associated with events that have made a significant contribution to the broad patterns of our history; or
- that are associated with the lives of persons significant in our past; or
- that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- that have yielded, or may be likely to yield, information important in prehistory or history.

4.2.2 Traditional Cultural Properties

Bulletin 38 "*Guidelines for Evaluating and Documenting Traditional Cultural Properties*" (n.d.) states that a traditional cultural property may exist if it represents:

- a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;
- a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
- an urban neighborhood that is the traditional home of a particular cultural group and that reflects its beliefs and practices;
- a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; or
- a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity.

As further defined in Bulletin 38 (n.d.):

> A traditional cultural property, then, can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in the community's history, and (b) are important in maintaining the continuing cultural identity of the community.

Integrity

Site integrity depends upon the survival of historic or prehistoric materials that exist today as they were crafted or combined into a district, site, building, structure or object in the past, or as they were deposited in a site. As stated in Bulletin 15 "*How to Apply National Register Criteria for Evaluation*" (n.d.):

> Integrity is based on significance: why, where, and when a property is important. Only after significance is fully established can you proceed to the issue of integrity...Ultimately, the question of integrity is answered by whether or not the property retains the identity for which it is significant.

Bulletin 15 outlines seven aspects of integrity, as follows:

- Location
- Design
- Setting
- Materials
- Workmanship
- Feeling
- Association

4.2.3 California Register of Historical Resources

Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the CRHR (Pub. Res. Code SS5024.1, Title 14 CCR, Section 4852) consisting of the following criteria:

- It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States; or
- It is associated with the lives of persons important to local, California, or National History; or
- It embodies the distinctive characteristics of a type, period, region, or method or construction, or represents the work of a master, or possesses high artistic values; or
- It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

4.2.4 Onshore Area of Potential Effects

In accordance with 36 CFR 800, the APE is defined as the *geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist*. The APE will consist of all ROW required for the pipeline as well as the footprint of the PLEMs and the onshore facilities. The onshore APE will be the width and any easements/ROW of the pipeline trench, as well as the footprints of any associated facilities and/or structures.

4.2.5 CEQA

The California Environmental Quality Act (CEQA) Guidelines (Section 15064.5) define “historical resources” as follows:

Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in the light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource has integrity and meets the criteria for listing on the CRHR as follows:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- Is associated with the lives of persons important in our past;
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Has yielded, or may be likely to yield, information important in prehistory or history.

4.3 Impact Analysis and Conservation Measures

This section describes the potential impacts of the OceanWay Secure Energy Project to cultural resources. This section also identifies Conservation Measures (CM) that will be implemented by Woodside to reduce or eliminate potential impacts. Impacts to cultural resources would occur primarily due to disturbance to known or previously unknown culturally important sites. These sites may be prehistoric or historic. The potential impacts of construction are discussed first, followed by the potential impacts of operations.

4.3.1.1 Offshore Areas of Potential Effect

Offshore construction has the potential to affect both prehistoric sites that have been covered by the rise in sea level or historic ship wrecks.

Impact

CULT-1[5]: Marine Archaeological Sites and Artifacts.

Offshore construction may result in an adverse effect on archaeologically significant resources in offshore Project areas.

The Project could adversely affect cultural resource standards or archaeologically significant resources in offshore Project areas (Class III). However, Woodside has conducted offshore surveys to identify potential shipwrecks and other areas of potential cultural artifacts. Based on the results of those surveys, Woodside will make small revisions to the pipeline alignment to avoid impacts on those resources.

Conservation Measures

CM-CULT-1: Marine Archaeological Surveys. To the maximum extent practicable, Woodside will avoid shipwrecks or other underwater cultural resources identified as culturally significant in order to minimize potential impacts. Where avoidance is not possible, further research will be conducted to relocate and identify the resource, evaluate its cultural resource significance, and perform studies sufficient to mitigate impacts to insignificant (Class III).

[5] Note that Impacts have been identified in this section using a "CULT" (i.e., "cultural resources") designation, while the associated conservation measures have been identified using a "CM-CULT" (i.e., "conservation measure" to address the "cultural resources" impact) designation.

Four possible shipwrecks (Nos. 16, 62, 64, and 66) are located within 220 m, 200 m, 240 m and 320 m, respectively, of the proposed pipeline route (**Table 4-8**). These distances may need to be refined. The standard avoidance zone for cultural resources is 300 m (1,000 ft). Pipelaying barges will use dynamic positioning rather than anchoring at locations along the route to avoid impacts on potential cultural resources. There remains a possibility, however, that pipe installation may diverge from the intended path during construction for a variety of reasons. The requirement for additional investigations of the identified potential cultural features at risk will be determined based on their distance from the final centerline. Additional investigation (ground truthing) is recommended to confirm the location and gather additional information with which to identify submerged features determined to be subject to potential impact from the Project and evaluate their potential significance. With the implementation of this measure, impacts will be reduced to less than significant levels.

No archaeologically relevant surficial seafloor or subbottom features occur at the HDD or southern alternative HDD sites. Excavation of sand for pipeline insertion at these locations, therefore, should have no adverse effect on cultural resources.

CM-CULT-2: Phase III Data Recovery Program. If the resource cannot be avoided, Macfarlane Archaeological Consultants, in consultation with the Office of Historic Preservation (OHP), will perform a relocation and identification survey (Phase II investigation) to determine if the find is a historic property under Section 106 of the NHPA and/or significant under the State CEQA Guidelines. In lieu of diver surveys or excavation in deeper water, identification of the vessel or type of vessel will be by remotely operated vehicle (ROV) survey. Should the find be determined to be significant a Phase III Data Recovery will be performed. These investigations may be performed well before construction of the offshore pipeline or other components. This will avoid unnecessary construction delays and OHP review time. The Data Recovery program will consist of recordation of the vessel using a standard Department of Parks and Recreations archaeological site and historic building record forms, identification of the vessel, its built data, loss of life, and complete photographic and engineering documentation of the vessel based on a budget that is acceptable to Woodside and/or the environmental consultant.

4.3.1.2 Onshore Construction

Ground-disturbing activities, including trench excavation, pre-construction ditching, grading, and HDD, all have the potential to directly impact cultural resources. Areas sensitive to surface disturbance include parking and equipment staging areas, access easements, footprints of associated facilities and/or structures, and the pipeline ROW.

Impact

CULT-2: Impacts to Previously Recorded and Newly Recorded Cultural Resources

Onshore construction may directly impact previously recorded and newly recorded cultural resources.

Conservation Measures

CM-CULT-2a: Programmatic Agreement. A mitigation plan involving all cultural resources identified during the records search, field survey, pre-construction testing, archaeological monitoring, trenching, or other construction will involve the establishment of a Programmatic Agreement (PA) between the OHP, Woodside, and the archaeological consultant, prior to any project construction. A PA will aid in expediting the 106 process. The OHP usually prefers a proactive approach to the identification of potential historic properties because it maximizes the chances for the protection of cultural resources, saves review time for the agency itself, and potentially saves both time and money for the developer. A proactive mitigation plan is presented below that is composed of two parts: a Pre-construction Pothole Testing Plan and an Unanticipated Finds Plan.

CM-CULT-2b: Pre-construction Pothole Testing Plan. Prior to any trenching or other construction activity, when the Project APE is finalized (this will include a marked pipeline trench centerline and footprints for all facilities and/or structures), an Environmentally Sensitive Area (ESA) will be established around each of the cultural resources identified during the records search and/or field survey. For each resource within or immediately adjacent to the APE, the ESA will extend approximately 100 ft (30 m) beyond the recorded boundaries that intersect or parallel the APE.

Prior to excavation of the pipeline trench and/or other construction activities, a series of potholes will be dug with a rubber-tired backhoe with a plated bucket. A team of at least two archaeologists, one to monitor and the other to screen spoils piles within the ESA of each cultural resource will be engaged to determine if buried finds exist. In cases where the ESAs overlap, the pothole testing program will be continuous, with the distance between the potholes being determined on a case by case basis. Some of the potholes will be excavated to a depth where cultural resources are first encountered, at which point the pothole will be terminated. A select number of the potholes will be excavated until culturally sterile soil is reached, in order to determine whether the cultural deposit is intact or in a disturbed context, and to what depth the cultural deposit reaches into the proposed trench line or other construction area.

If no cultural resources are found, the potholes will be excavated to a depth of not less than 2 ft (60 centimeters [cm]) below the proposed depth of the pipeline or other construction impact. The same will be true for all associated facilities and structures. Areas determined to be archaeologically sensitive during the Pre-construction Pothole Testing Plan, will be monitored during open trenching by a qualified archaeologist to a depth of Horizon C culturally sterile soil or to a depth of 15 ft (4.6 m), whichever is deeper.

In the case of HDD, all guide/placement holes will be monitored by a qualified archaeologist to the depth of Horizon C culturally sterile soil or to a depth of 15 ft, whichever is deeper, and includes the dunes at the eastern end point of the HDD within the fenced LAX property south of Westchester Parkway.

If the find is determined to be intact, discussions between the OHP, the archaeological consultant, the construction company, the environmental consultant, and Woodside will focus on whether the resource can be avoided. If the find is determined to be of Native American origin, a Native American chosen from the NAHC list would also be included as a consultant in the discussion. Avoidance options include the mechanical boring underneath the cultural resource or re-routing the pipeline trench around it.

CM-CULT-2c: Phase III Data Recovery Program. If the resource cannot be avoided, the archaeological consultant, in consultation with the OHP, will consider the find to be a historic property under Section 106 of the NHPA and/or significant under the State CEQA Guidelines, so that a Phase II investigation can be omitted and the process shortened to proceed directly to a Phase III Data Recovery program. This will avoid unnecessary construction delays and OHP review time. The Data Recovery program will consist of a sample of hand-excavated control units in the area of the find based on a budget that is acceptable to Woodside and/or the environmental consultant.

If the find is a Native American resource, the consulting Native American will monitor the archaeological field excavation.

CM-CULT-2d: Archaeological Monitoring Following the Phase III Data Recovery Program. After the field excavation is completed, the area of the find will be monitored by a qualified archaeologist (and a Native American when the resource is Native American in origin) authorized to halt mechanical excavation in unsampled locations when potential finds are encountered. These finds will be assessed, recorded, and removed as quickly as possible, except in cases where human remains are encountered.

If the find includes human remains, the coroner will be immediately contacted pursuant to Health and Safety Code 7050.5. If the remains are determined to be of Native American origin, a burial agreement must be made between the Most Likely Descendant (MLD) Native American, chosen on a rotating basis from the

NAHC list, and Woodside concerning any possible study as well as disposition of the remains. The MLD Native American may or may not be the same as the Native American consultant.

CM-CULT-2e: Archaeological Monitoring within Disturbed Contexts. If the find is determined to be in a disturbed context, the area will be mapped, recorded, photographed, and monitored by a qualified archaeologist who will spot screen the spoils piles for any chronologically sensitive artifacts such as beads and projectile points as well as for any undetected intact deposit.

Although an ESA can provide an extra measure of protection for a cultural resource, the entire APE will be monitored by at least one qualified archaeologist, depending on how many separate earth-disturbing activities are occurring at one time since there are too many unknowns concerning past development and disturbance.

If cultural resources are encountered during the monitoring, the Unanticipated Finds Plan (presented below) will be implemented. All cultural resources collected during archaeological monitoring and/or excavation will be catalogued, analyzed, and included in a final report that will detail cultural resource findings and follow Archaeological Resource Management Reports (ARMR) guidelines. All the collections will be curated in State-recognized facilities.

Impact

CULT-3: Impacts to Previously Unknown Cultural Resources

Onshore construction may directly impact previously unknown cultural resources.

Conservation Measure

CM-CULT-3: Unanticipated Finds Plan. An unanticipated find is any artifact, feature, or cultural deposit discovered during archaeological monitoring, trenching, or other activity after the records search and pre-construction pothole testing program has been completed. When an unanticipated cultural resource is encountered during trenching or other construction activity, the observing archaeologist will have the authority to stop all work at that location. The potential find will be assessed as quickly as possible to determine whether it is intact or in a disturbed context.

Construction activity will be allowed, if possible, at other locations where monitoring is required, provided there is one qualified archaeologist to monitor each individual piece of excavating machinery.

If the find is found in a disturbed context, it will be removed as quickly as possible.

If the find is determined to be intact, discussions between the OHP, the archaeological consultant, the construction company, the environmental consultant, and Woodside will focus on whether the resource can be avoided.

If the find is determined to be Native American in character, a Native American chosen from the NAHC list will also be included as a consultant in the discussion.

If the resource cannot be avoided, a Data Recovery program must be completed prior to further construction activity in the area. The Data Recovery program will consist of a sample of hand excavated control units in the area of the find based on a budget that is acceptable to Woodside and/or the environmental consultant. If the find is a Native American resource, the consulting Native American will observe the archaeological field excavation.

After the field excavation is completed, trenching or other construction activities will be allowed to resume in the affected area, with a qualified archaeological monitor (and a Native American monitor when the resource is

Native American in origin) authorized to halt construction activities in unsampled locations within the area of the cultural resource when potential finds are encountered. These finds will be assessed, recorded, and removed as quickly as possible, except in cases where human remains are encountered.

If the find includes human remains, the coroner will be immediately contacted pursuant to Health and Safety Code 7050.5. If the remains are determined to be of Native American origin, a burial agreement must be made between the MLD Native American, chosen on a rotating basis from the NAHC list, and Woodside concerning any possible study as well as disposition of the remains. The MLD Native American may or may not be the same as the Native American consultant.

All cultural resources collected during archaeological monitoring and/or excavation will be catalogued, analyzed, and included in a final report that will detail cultural resource findings and follow ARMR guidelines. All the collections will be curated in State-recognized facilities.

4.3.1.3 Offshore or Onshore Operations

The Project, when operational, will result in no disturbance to the ground surface. Potentially significant offshore resources are situated in deep water where incidental anchoring that could result in impacts to submerged resources is unlikely to occur. Based on this consideration, Woodside does not anticipate that cultural resources will be affected by either offshore or onshore operations.

4.4 Alternatives

Consistent with good engineering and business practices, and to facilitate the environmental review under NEPA and CEQA, Woodside considered a variety of alternatives when developing the OceanWay Project. This section discusses the impacts to cultural resources caused by the nine alternatives to the proposed Project. Project alternatives include: No Action alternative (no Project); AES Alternative DWP and associated onshore pipeline routes; LAX south shore crossing; onshore pipeline route alternatives; Submerged Combustion Vaporization (SCV) as an alternative vaporization technology; burying segments of the pipelines on the ocean floor; an alternate site for the RCTS; an alternate method for installing the pipeline across the dunes; and refilling the pit excavated for the seaward end of the HDD. Each of these alternatives is summarized below. **Topic Report 13/Alternatives** presents a more comprehensive discussion of each of these alternatives.

4.4.1 No Action alternative

The No Action Alternative means that the OceanWay Project would not go forward and that none of its associated facilities would be installed. Accordingly, none of the environmental impacts identified for the construction and operation of the proposed Project would occur. In the event that energy needs of the region must be satisfied by other LNG or natural gas pipeline projects, the impacts of such projects are likely to be comparable in nature and magnitude to the impacts associated with the OceanWay Project.

4.4.2 AES Alternative DWP and Associated Onshore Pipeline Route

The proposed AES Alternative DWP would be located approximately 20 miles (32 km) offshore of Orange County, with the offshore pipeline making landfall in Orange County at Huntington Beach, near the south end of Newland Street. The onshore pipeline would run approximately 24 miles (39 km) to the north and east across city streets of Orange County, making a connection with the SCG transmission system near the city of Orange.

4.4.2.1 Records Search

The same records search methods as described for the proposed route in **Section 4.1.4/Literature Reviews and Surveys**, were used for the AES alternative DWP and associated onshore pipeline routes.

Results of the Offshore Records Search

A total of 53 shipwrecks and 1 airplane have been recorded within a 5 mile radius of the AES alternative DWP route (**Table 4-11**). Three of the vessels have been refloated and/or removed. Accurate locations are available for only 5 of the vessels and the airplane. Twelve of the vessels have been evaluated as moderately significant and five of the vessels have been evaluated as insignificant. The majority of the shipwrecks reported are located nearshore between Huntington Beach and Dana Point. One shipwreck is located just north of the pipeline at Huntington Beach. No other shipwrecks appear to be located in close proximity to the AES alternative DWP route.

Results of the Onshore Records Search

A total of 49 cultural resources have been previously recorded within the 1 mile (1.6 km) wide records search study area for the AES alternative DWP and associated onshore pipeline routes; 10 prehistoric and 39 historic, of which 35 are individual structures. These resources are listed in **Table 4-12** according to cultural resource number, cultural resource type, distance to pipeline, and NRHP eligibility status.

A total of 54 cultural resource investigations have been conducted within the 1 mile (1.6 km) wide corridor within the records search study area. Many of these investigations were building evaluations for proposed street expansions and/or neighborhood re-development projects. **Table 4-13** lists the cultural resource investigations conducted within the study area for the proposed route. The cultural resource investigations are arranged alphabetically by author/company according to the appropriate USGS 7.5-minute map quadrangle, and the table listing includes the type of investigation, relation to the pipeline alignment, and whether any cultural resources were recorded during the study.

The review of the Sanborn Fire Insurance Maps, dating from the late 1800s to about 1945, depending on the development pattern of the city, found no adobes located along the AES route or any definitive evidence to suggest the presence of other potentially buried historical resources. This research was conducted by reviewing individual map sheets that contained the proposed route, for each year the maps were made until 1945.

Results of the Offshore Records Search

A total of 51 shipwrecks and 1 airplane have been recorded within a 5 mile radius of the AES alternative DWP route. Three of the vessels have been refloated and/or removed. Twelve of the vessels have been evaluated as moderately significant and 7 of the vessels have been evaluated as insignificant. The majority of the shipwrecks reported are located nearshore between Huntington Beach and Dana Point. One unknown shipwreck is located just north of the pipeline at Huntington Beach. No other shipwrecks appear to be located in close proximity to the AES alternative DWP route but accurate locations are available for only 5 of the vessels and the airplane.

4.4.2.2 Field Survey Methods

The same survey methods as described for the proposed route in **Section 4.1.4/Literature Reviews and Surveys**, were used for the AES alternative route.

Survey of the AES

With the exception of some inaccessible properties (approximately 5 percent of the route), which are identified below, only approximately 5 percent of this route was systematically surveyed on foot, whereas the remainder (approximately 90 percent) was a drive-by surveillance due to the extensively built environment. The survey of the AES alternative route is described below according to street segments, along with the results regarding cultural resources that may exist buried within the APE, once it is defined. Those areas that were inaccessible during the initial survey are also presented.

The southern portion of this route basically extends north along Newland Street, from Pacific Coast Highway to Bolsa Avenue. A pedestrian survey was conducted along the east side of Newland Avenue, outside the wall of the AES facility, from Pacific Coast Highway to where the pipeline route crosses to the west side of the road. An open trench about 3 ft (1 m) from the wall, approximately 1 ft (30 cm) wide by 1.5 ft (40 cm) deep by 600 ft (182 m) long was examined. A lens of dark grayish brown midden soil with fairly sparse shellfish remains was observed from the ground surface to approximately 8 inches (20 cm) in depth above a sterile layer of sand along the entire extent of the trench. Due to the presence of previously standing water, the lower extent of the walls and base of the trench were covered by silt, and it could not be determined if a deeper, potentially intact deposit of midden soil existed below the sterile sand layer. Ground surface visibility on either side of the trench was excellent (98 percent), and soil consisted of grayish brown silty sand with sparse shellfish, small chunks of asphalt and gravel observed. One quartzite flake was also found about 10 ft (3 m) northeast of the trench. The potential for a buried prehistoric deposit exists in this area.

A fence-enclosed vacant lot located on the west side of Newland Avenue, across from the AES facility, was inaccessible. The lot is somewhat lower than the street and is covered by dense gravel, potentially for drainage. A very sparse scatter of small shellfish fragments was observed along the fence-line. This parcel will require an on-foot examination when access becomes available.

A vacant lot located on the west side of Newland Avenue, just north of the Huntington Beach Channel and east of Hamilton Avenue, was surveyed on foot for a distance of 50 ft (15 m) from Newland Avenue. Approximately 15 fragments of shell that included oyster (*Ostrea* sp.), chione (*Chione* sp.), mussel (*Mytilus* sp.), scallop (*Aequipectin* sp.), and razor clam (*Solen rosaceus*) was observed in a 30 by 30 ft (10 by 10 m) area in the southwest corner of the lot in an area that had some ground surface visibility, whereas the remainder of the lot had less than 15 percent visibility due to dense vegetation. The soil in the area of the shell consisted of light brown silty sand.

North of the lot discussed above is another inaccessible vacant lot with a street address of 21471 Newland Avenue. Visibility within the lot appears to be extremely poor, again due to the dense gravel cover. Signage on the fence indicates that the property may be owned by either Golden West Refinery or Southern California Edison. This lot will require on-foot examination when access is available.

Privacy walls adjacent to residential neighborhoods exist along Newland Street from Hamilton Avenue on the east, and Lomond Drive on the west, north to Carnegie Avenue; therefore, there was no ground visibility.

An approximately 6 ft (2 m) wide planter at the northwest corner of Newland Street and Modale Drive extends north for approximately 600 ft (183 m). It was examined on foot, and approximately 10 fragments of shellfish remains, chione and scallop were observed within light grayish brown silty sand.

A vacant lot located at the northwest corner of Newland Avenue and Warner Avenue, which appears to have been a former gas station, was field inspected. Modern trash is scattered throughout the lot, and no prehistoric or historic cultural remains were observed within this disturbed parcel.

The remains of prehistoric site CA-ORA-492 is recorded as located partially in Palos Verdes Park and the adjacent Southern California Edison easement, at the northeast corner of Newland Avenue and Carnegie Way. Much of CA-ORA-492 had been destroyed by the construction of Newland Street prior to its original

recording by Dixon in 1974. Dixon (1974) described the remaining eastern portion of the site as a shell midden, approximately 262 by 98 ft (80 by 30 m), with a potential depth of 16 inches (40 cm) that primarily consisted of scallop and chione, with no surface artifacts observed. The site record was updated by Wesson et al. in 2002, and additional portions of the site appear to have been destroyed by the construction of houses on Boone Circle and Palos Verdes Park, with the only potential intact portion within a Southern California Edison Company easement. This area was systematically examined on foot during the current survey, and no cultural resources were observed; however, ground visibility was extremely poor (less than 2 percent) due to low lying grasses, with only a few small, bare areas around some trees.

A cursory examination was made from the sidewalk of the open areas of the fence-enclosed school grounds across from Palos Verdes Park. These areas appeared to be covered by fill material.

At the intersection of Newland Street and Bolsa Avenue, the route extends to the east and changes to W 1st Street at Starboard Street, then continues to Burlington Northern and Santa Fe Railroad. There are very few open spaces along this portion of the route to examine on foot.

The northwest corner of Bolsa and Magnolia, where ORA-816 was recorded, is currently completely covered by paving and structures.

A vacant lot located on the northwest corner of the intersection of W. 1st Street and Pacific Avenue is currently inaccessible.

A vacant lot (previously a gas station) located on the southeast corner of the intersection of W. 1st Street and Bristol Street is currently inaccessible.

A vacant lot located on the southeast corner of W. 1st Street and Bristol Street was surveyed on foot. Visibility is approximately 50 percent due to imported gravel. Modern trash is strewn throughout the property, and no cultural resources were observed.

Two adjacent empty lots on the south side of W. 1st Street between Booth Street and Shelton Street are inaccessible.

At the northeast corner of W. 1st and Garfield streets, the vacant lot is inaccessible due to fencing.

The route turns north along the Atchison Topeka and Santa Fe Railroad to Lincoln Avenue. At Fairhaven Avenue, it turns to the east, then north along Cambridge Street, and west along Palm to its terminus at Atchison Topeka and Santa Fe Railroad.

A vacant lot on the northeast corner of 17th Street and Lincoln was surveyed on foot. No prehistoric or historic cultural materials were observed.

A vacant lot located on the northeast corner of Fairhaven and Grand was surveyed on foot. Modern trash is strewn throughout the property, and no cultural resources were observed.

The lots located at the northeast and southeast corner of Fairhaven Avenue and Cambridge Street have been developed since the aerial photographs were taken.

Vacant lots on the west and east sides of Cambridge Street at Rosewood Avenue were surveyed on foot. Approximately 50 percent of the west lot was covered with imported fill material that completely obscured the ground, and no cultural resources were observed on the remaining 50 percent of the lot. A vacant lot on the east side is covered with mulch, with 0 percent ground visibility.

A lot on the south side of Palm, just east of Cypress Street, is currently under construction.

Survey Results

Nine prehistoric sites have been previously recorded in the records search study area between Pacific Coast Highway and north Bolsa Avenue. Eight of the sites are not located within or adjacent to the pipeline survey corridor, seven of which (CA-ORA-183, -282, -283, -356, -302, -145, and-296) are located atop the bluff above Newland Street and one of which (CA-ORA-358) was reported to have been destroyed by a housing tract. No cultural remains were found in the area of the one site, CA-ORA-492, recorded as situated adjacent to the pipeline survey corridor.

The potential remains of an unrecorded prehistoric site may be adjacent to the AES facility; however, based on the current evidence, it could not be determined if this site remains intact and will require subsurface testing. Further, several properties to the north of the AES facility where some shellfish was observed will need to be accessed if the AES Project alternative were selected.

A single prehistoric site, CA-ORA-816, was previously recorded along Bolsa Avenue; however, it was recorded by an employee of Conrac Corporation at an unstated date as a shell midden that had been impacted by the construction of industrial structures, and no other information was provided. This area is currently covered by paving and structures, with no ground visibility.

A number of structures have been recorded and evaluated along Bristol Street and W. 1st Street; however, since the pipeline will be built within existing streets, the built environment will not be affected by the proposed Project route.

A historic site, 30-00-1598, located at the corner of W. 1st Street and the Burlington Northern and Santa Fe Railroad, adjacent to the pipeline corridor, has been subjected to data recovery excavations and subsequently developed into a storage facility.

No other cultural resources have been previously recorded within or adjacent to the remainder of the corridor route, and none was encountered during the field investigation.

The site records for those cultural resources located within or adjacent to the AES route are attached as **Appendix H**.

4.4.2.3 Impacts and Conservation Measures

Woodside will avoid impacts to cultural resources by completing the Conservation Measures outlined in **Section 4.4**. No site-specific Conservation Measures have been identified for this alternative.

4.4.3 LAX South Shore crossing

The LAX south shore crossing would involve a more southerly route for the offshore pipelines, and offshore and onshore HDD entry points approximately a mile (1.6 km) and 1.2 miles (1.9 km) respectively, south of the proposed routing.

There is one site, CA-LAN-2386H, that is within roughly 350 ft (100 m) of the proposed pipeline route. The site is an historic World War II observation bunker whose status for eligibility as an historic site is unknown. Should this alternative be selected, Woodside will implement the Conservation Measures called out in **Section 4.4** to protect this resource.

The same records search methods as described for the proposed route in **Section 4.1.4/Literature Reviews and Surveys**, were used for the alternative route. The LAX South HDD Exit and alternate pipeline route was included in the shallow-water and deep-water survey areas. The alternate pipeline route merges with the proposed route in about 950 to 1,000 ft water depth. No previously recorded cultural resources (shipwrecks or

other cultural features) were identified in the literature review, and no new archaeological sites or artifacts were identified within the SSS or magnetometer data within 100 to 300 m of the HDD LAX South Alternate Route.

4.4.4 Onshore Pipeline Route Alternatives

From the onshore end of the HDD pipeline segment there are multiple alternative routes to the identified tie-in point with SCG's Line 765 near the intersection of Otis and Santa Ana in South Gate.

Alternative 1 would join the southern LAX shore crossing to the proposed onshore pipeline route via Pershing Drive.

Alternative 2 would run from the Southern HDD exit point south on Pershing to Imperial Highway. It would follow Imperial Highway east to Prairie Avenue then go north to join the primary route at Manchester Avenue. It would also include a lateral to the RCTS site.

Alternative 3 would run from the proposed pipeline route on Prairie Avenue south to Century Boulevard. It would follow Century Boulevard east to Vermont Avenue, turn north to connect to the proposed Project pipeline at Manchester.

Alternative 4 would run from the corner of Vermont Avenue and Manchester Boulevard north on Vermont Avenue to Florence Avenue. It would travel east on Florence Avenue to Pacific Boulevard, then east down Grand Avenue to tie-in the SCG Line 765.

In examining SCG's natural gas transmission pipeline network, Woodside identified several locations that could be used to deliver gas in addition to line 765. One such pipeline is Line 2003, which runs roughly parallel but south of the proposed route. Woodside has identified a short lateral connection that could come off Alt 3 and join at 104th Street.

4.4.4.1 Records Search

The same records search methods as described for the proposed route in **Section 4.1.4/Literature Reviews and Surveys**, were used for the alternative routes.

Results of the Records Search

A total of 18 cultural resources have been previously recorded within the 1 mile (1.6 km) wide records search study area for the onshore pipeline route alternatives; 4 prehistoric and 14 historic, of which 7 are individual structures. These resources are listed in **Table 4-9** according to cultural resource number, cultural resource type, distance to pipeline, and NRHP eligibility status.

A total of 36 cultural resource investigations have been conducted within the 1 mile (1.6 km) wide corridor within the records search study area. Many of these investigations were building evaluations for proposed street expansions and/or neighborhood re-development projects. **Table 4-10** lists the cultural resource investigations conducted within the study area for the route alternatives. The cultural resource investigations are arranged alphabetically by author/company according to the appropriate USGS 7.5-minute map quadrangle, and the table listing includes the type of investigation, relation to the pipeline alignment, and whether any cultural resources were recorded during the study.

The review of the Sanborn Fire Insurance Maps, dating from the late 1800s to about 1945, depending on the development pattern of the city, found no adobes located along any of the alternative routes or the lateral, or any definitive evidence to suggest the presence of other potentially buried historical resources. This research was conducted by reviewing individual map sheets that contained the proposed route as well as surrounding streets for each year the maps were made until 1945.

4.5.3.2 Field Survey Methods

The same survey methods as described for the proposed route in **Section 4.1.4/Literature Reviews and Surveys**, were used for the alternative routes.

Survey of Alternative Route 1

This route follows Pershing Drive, from its intersection with the LAX south shore crossing, north to the intersection of the LAX north shore crossing and the proposed route. Both sides of Pershing Drive outside of the fenced enclosures for LAX to the east and the El Segundo Blue Butterfly Habitat Restoration Area to the west, were surveyed. Along the eastern side, adjacent to LAX, the area between the fence and the curb varied between 10 and 20 feet (3-6 m) wide and included both cut slopes and areas level with Pershing Drive. Along the western side, the width between the fence and curb was approximately 10 feet (3 m) wide and also included level areas and cut slopes. Ground surface visibility was 100 percent in the area walked outside of the fence, and between 20-50 percent within the adjacent fenced enclosures. No cultural resources have been previously recorded and no newly encountered resources were observed during the survey.

Previously recorded historic site, CA-LAN-2386H, has been depicted on maps as located within 350 ft (107 m) south of the LAX south shore crossing, and isolated prehistoric artifact 19-100116 is approximately 700 ft (213 m) east of the route near its northern terminus. CA-LAN-2386H was examined during an escorted visit within the El Segundo Blue Butterfly Habitat Restoration Area, located just east of Vista del Mar. This site consists of a concrete slab for the former bunker and a fronting concrete apron that is located approximately 10 ft (3-m) south of Kilgore Street, and at least 0.6 mile (100-m) south of the LAX south shore crossing APE.

Survey of Alternative Route 2

This route extends south from the southern terminus of Alternative Route 1 along Perishing Drive, then turns east onto Imperial Highway to Prairie Avenue. The extent along both sides of Pershing Drive is inaccessible due to fencing along LAX. A single cultural resource has been previously recorded along Imperial Highway. Prehistoric site CA-LAN-691 was recorded by Leonard in 1974 as approximately 3,500 ft (1067 m) east of Pershing Drive and 300 to 350 ft (91 to 107 m) north of Imperial Highway, within LAX property. The site was revisited by Raschke et al. in 1995, and the site record was updated by Bissell (1995b), who stated the following:

> The site area was carefully examined during the LAX master plan study project. CA-LAN-691 has been buried under many feet of unconsolidated fill. There is no evidence that the test excavation recommended by Leonard [in 1974] was accomplished. It is not known what disturbance was caused on the site surface prior to the placement of the fill. The current study recommends that the fill be carefully removed by heavy equipment to just above the midden, followed by test excavation and evaluation.

This site was not re-examined during the current investigation due to its location within LAX property. Further, it is not presently known if a test excavation of the site has been completed.

Both the median and north shoulder of Imperial Highway were surveyed on foot from Pershing Drive to Main Street, and no cultural resources were observed. From Main Street east to the intersection with the 105 Freeway, the median consists of a cut slope covered by dense grasses and was not surveyed. From the intersection with Sepulveda Boulevard/Highway 105, east to the 405 Freeway, approximately 95 percent of the area along Imperial Highway is a built environment, covered by large commercial structures and associated paved lots. An extension from Alternative Route 2 extends from Imperial Highway north along Aviation Boulevard, west on Century Boulevard, then proceeds north on Bellanca Avenue to the proposed RCTS site at 5651 96th Street, or to the alternative RCTS site by continuing west on 96th Street, north on Airport Boulevard, then east on W. 93rd Street, to a location between Belford Avenue and Airport Boulevard, south of W. 93rd Street.

The majority of the route to the proposed and alternative RCTS sites is within a built environment. There is a man-made catch basin at the northeast corner of Imperial Highway and Aviation Boulevard that extends north to 111th Street. The basin area was inaccessible due to fencing, and most of the area appears to contain piles of imported fill soil. There is a restaurant and parking lot at the northeast corner of Aviation Boulevard and 111th Street, with open space north to 106th Street. This open space is airport property and is fenced and inaccessible. The east side of Aviation Boulevard from 106th Street to Century Boulevard consists of commercial/industrial properties. The west side of Aviation Boulevard from Imperial Highway to Century Boulevard is airport property. Century Boulevard from Aviation Boulevard to Bellanca Avenue is commercial property. Bellanca Avenue from Century Boulevard to 96th Street is commercial property. 96th Street from Bellanca Avenue to Airport Boulevard is commercial and multi-family residential property. There is a vacant lot at the corner of 96th Street and Airport Boulevard, which is fenced and inaccessible. Based on an internet search of aerial photographs on Google Earth, the lot appears to have been previously developed by multi-family residences.

The area between the 405 Freeway and Prairie Avenue consists of mixed residential and commercial properties. There are several vacant properties with no access along Imperial Highway. These included the northeast corner of Imperial Highway and Aviation Boulevard; areas north and south of Imperial Highway within the 405 and 105 freeway ROW; the south side of Imperial Highway between Inglewood and Gale avenues; the freeway ROW on-ramp to the 105 north of Freeman and Menlo Avenues; and the northwest and northeast corners of Imperial Highway and Prairie Avenue.

Alternative Route 2 turns north on Prairie Avenue to meet Alternative Route 3 at Century Boulevard and to meet the proposed route at Arbor Vitae. This route consists of mixed commercial and residential built environments. There are several areas that were not accessed due to fenced enclosures. These include the northeast corner of Prairie Avenue and 111th Street, which is covered by piles of dirt, and the east and west sides of Prairie Street between 102nd and 101st streets. No cultural resources have been previously recorded along Alternative Route 2 and none was found during the survey; however, approximately 95 percent is covered by structures and/or pavement.

Survey of Alternative Route 3

This route extends east along Century Boulevard from its intersection with Prairie Avenue, then turns north along S. Vermont Avenue to where it intersects with the proposed route at Manchester Avenue. This area consists of a built environment that is approximately 95 percent covered by commercial properties and some residential parcels.

The Hollywood Park Racetrack and Casino and Great Western Forum, located on the north side of Century Boulevard, from Prairie Avenue to S. 11th Avenue, are nearly completely covered by asphalt paving, with only a few border planters that afforded ground visibility. A vacant parcel on the south side of Century Boulevard, just east of Prairie Avenue, is inaccessible due to fencing. Several additional parcels along the south side of Century Boulevard that were vacant on the aerial photographs have subsequently been developed. A vacant parcel owned by the Los Angeles Department of Water and Power and Jesse Owens Park, located at the northwest corner of Century Boulevard and Western Avenue, was surveyed on foot to a distance of 50 ft (15 m) from the route, and no prehistoric or historic cultural materials were observed. No cultural resources have been previously recorded within or adjacent to the pipeline survey corridor and none was found during the survey.

Survey of Alternative Route 4

This route extends north along S. Vermont Avenue from Manchester Avenue, continues east on Florence Avenue, turns south on Pacific Boulevard, east on Grand Avenue, south on California Avenue, east on Santa Ana Street, to its terminus at Otis Avenue. Approximately 90 to 95 percent of this route is covered by built environments that primarily consist of commercial and light industrial properties along S. Vermont and

Florence avenues and Pacific Boulevard, then residential along Grand Avenue. There are two previously recorded cultural resources along this route, a buried historic refuse deposit, 19-002906, located at the corner of Florence and Central avenues, and 19-186110, the UPRR that crosses the route at Florence Avenue and the Alameda Corridor. No unrecorded cultural resources were encountered during spot checks of the few open areas along this route.

There are several vacant parcels located on the east side of S. Vermont Avenue, between W. Manchester Boulevard and 83rd Street, which are inaccessible due to fencing. A vacant lot located at the northeast corner of Pacific Boulevard and Grand Avenue was not surveyed due to fencing.

A north-south power line easement that crosses Grand Avenue just west of California Avenue, with approximately 20 ft (7 m) of access on both the north and south sides of the street, was surveyed, and no cultural resources were observed.

Survey Results

There is one previously recorded resource along Alternative Route 1. The site, CA-LAN-2386H, an historic WW II observation bunker, was examined during an escorted visit within the El Segundo Blue Butterfly Habitat Restoration Area, located just east of Vista del Mar. It consists of a concrete slab for the former bunker and a fronting concrete apron that is located approximately 10 ft (3-m) south of Kilgore Street, and at least 0.6 mile (100-m) south of the LAX south shore crossing APE.

A single prehistoric site, CA-LAN-691, has been previously recorded along Alternative Route 2. It was first recorded by Nelson in 1974 as a shell midden, located approximately 300 to 350 ft (91 to 107 m) north of Imperial Highway, within LAX property. The site has not been currently re-examined due to lack of access.

There are two previously recorded cultural resources along Alternative Route 4. One is 19-002906, a subsurface historic refuse deposit located within 100 ft (30 m) north of the northwest corner of Florence and Central avenues that was recorded by Jordan in 2001. It was encountered subsurface during the archaeological monitoring of a utility trench located in the western (southbound) lane of Central Avenue at an unspecified distance just north of Florence Avenue. Historical materials included a cluster of glass fragments, ceramic shards, decomposing metal, and animal (primarily bovid) bones that were dated to approximately 1909 to 1936. The 71 inches (180 cm) long deposit was found approximately 18 to 47 inches (45 to 120 cm) below the road surface. Approximately 6 inches (15 cm) of the deposit was removed from the west wall, which was found to continue under the road to the west. Upon recovery of the sample, further excavation into the west wall was halted in order to maintain the structural integrity of the road above. This resource was not formally evaluated, and its potential to extend subsurface into the APE, once it is defined, is not known.

The second resource, 19-186110, consists of the UPRR that crosses the route at Florence Avenue and the Alameda Corridor. This historic linear cultural resource was recorded by Ashkar (1999) and is considered eligible for inclusion on the NRHP under Criteria A and B. It was previously discussed above since it crosses the proposed route at California Avenue, just north of Ardmore Avenue (refer to Survey Results for the proposed route).

The site records for those cultural resources located within or adjacent to the alternative routes are attached as **Appendix H**.

4.4.5 Alternative Vaporization Technologies

Submerged Combustion Vaporization (SCV) is a commonly used technology for regasification of LNG and heating of natural gas for LNG projects. Implementation of this technology will have no effect on cultural resources. Woodside is proposing no Conservation Measures.

4.4.6 Burying of Pipeline on the Ocean Floor

One or more sections of the offshore pipeline would be buried where conflicts with the fishing industry might occur as a result of the pipeline installation or operation. Woodside will perform geotechnical investigations that will identify potential cultural resources on the seabed and will relocate the pipeline away from those resources. Based on this effort to avoid impacts to cultural resources, it is unlikely that burying the pipeline on the ocean floor will result in impacts to cultural resources. As such, Woodside is proposing no specific Conservation Measures to further protect cultural resources should the pipeline need to be buried.

4.4.7 Alternative RCTS Location

The alternative RCTS site would be constructed and operated between Belford Avenue and Airport south of 93rd Street, approximately two blocks west of the proposed site. Implementation of this technology will have no effect on cultural resources. Woodside is proposing no Conservation Measures.

4.4.8 Open Trenching Alternative for Shore Crossing Dunes Crossing

The dual 24 inch (600 mm) pipelines would be installed across the coastal dunes between the shore crossing HDD work area and just east of Pershing Drive using open trenching. The impacts of this alternative will be similar to those identified for the proposed Project. No site-specific Conservation Measures have been identified for this alternative.

4.49 Active Backfilling Alternative for Shore Crossing HDD Material

The dredge material that will be removed from the shore crossing HDD receiving pit would be actively returned into the excavation. Implementation of this technology will have no effect on cultural resources. No site-specific Conservation Measures have been identified for this alternative.

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Tables

Table 4-1 Offshore prehistoric sites within the Project APE

Prior Designation	CA-UMS-No.	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds	Depth (meters)	Finds	References
ML 29	2900	34	1		118	47		-6.1	Individual finds	Hudson, 1976:12
Pierson 2	6700	34	1		118	47			Individual finds	BLM 1978:VIII.B-594
Pierson 3	6800	33	48		118	25			Mortar	BLM 1978:VIII.B-595
ERA 7	7000	33	47		118	25			Individual finds	BLM 1978:VIII.B-596
ERA 8	7100	33	47		118	25			Individual finds	BLM 1978:VIII.B-595
Muchie 2	7300	34	2		118	45			Individual finds	BLM 1978:VIII.B-596

Table 4-2 Shipwrecks within the Project area listed by MMS and CSLC

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names] (Blue indicates CSLC Coordinates Differ)	Built	Lost	Day/Month	Rig/Service	Tons	Degrees	Minute	Seconds	Degrees	Minutes	Seconds	Water Depth (ft)	Geographic Association	Situation	Location
227302	586		2	E	Ameco	1917	1930	530			33N	32	0	117W	52	30	75	Santa Monica	Stranded	Santa Monica, 1/2 mi off Topanga Cyn.
207287	19		3	C	America	1910	1957	711	Ol.S.	55	33N	25		118W	25			Santa Monica	Foundered	Approx. 1 mi N of Pt. Vicente
	21		3		American Boy		1930	626	Ol.S.	130	34N	1		118W	42			Point Dume		
	421	R/R	3	E	American Fisher		1937	524	Tnk		33N	42		118W	25			Santa Monica		2 mi off Pt. Vicente
236705	25		3	C/A	Andrew D	1937	1953	1113	Ol.S.	116	33N	45	0	118W	50	0		Point Dume		Approx. 5 mi S Point Dume
	577		2	C	Annie Gee	1874	1897	1201	Schooner (147net)	154 [147N]	33N	50		118W	23	30		Redondo Beach	Stranded	Redondo Beach Harbor
	30		3	E	Aristozehis		1954				34N	0		118W	30			Santa Monica		Off Santa Monica
220221	31		3	E	Arkansas	1920	1941	1015	Ol.S.	41	34N	0		118W	48			Point Dume	Foundered	Off Pt. Dume Fishing Grounds, 25 mi. from LA
	32		2	E	Astorian		1937				34N	0		118W	48			Point Dume		
	35	2	2	A	Avalon	1891	1960	718	St.S.	1985	33N	47	40.2	118W	25	0	70	Santa Monica		
214060	36		2	D	Bacchus	1916	1926	408	Brg	311	33N	57		118W	29			Santa Monica	Stranded, 1 life lost	Off Venice, Santa Monica Bay
	59		1 (2 Pierson)	D	C.D. Murray [D.C. Murray (MMS 604)]		1888	1889, 709 (Pierson)	Barque		33N	50		118W	23	30		San Pedro	Ashore	Redondo Beach, en route Pt Discovery to SP
	598		2	E	Cascade	1904	1905											Point Dume		Pt. Dume
	61	R/R	2	E	Cascade		1923				34N	0		118W	48			Point Dume		Pt. Dume
	74		3	D	Cleopatra		1941				33N	44		118W	24			Santa Monica		Pt. Vicente
	75		3	D	Columbia Contract 41	1916	1941	607	Brg	473	33N	50		118W	30			Redondo Beach	Foundered	5 mi off Redondo Beach
170535	82		3	E	Crowley 64	1913	1949	1101	Brg	267	33N	50		118W	28			Santa Monica	Foundered	In Santa Monica Bay
	89		3	D	Defender		1940				34N	0		118W	48			Point Dume		
	97	3	3	A	Dominator	194-	1961		Ol.S.	10000	33N	46	30	118W	26	0	10	Santa Monica		

Table 4-2 Shipwrecks within the Project area listed by MMS and CSLC (Cont'd)

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names] (Blue indicates CSLC Coordinates Differ)	Built	Lost	Day/Month	Rig/Service	Tons	Degrees	Minute	Seconds	Degrees	Minutes	Seconds	Water Depth	Geographic Association	Situation	Location
	723		2	E	Enterprice		1927	201	Ga.Schooner									Point Dume		Pt. Dume
120632	121		1/3	E	Falcon	1886	1945	323	Ol.S.	106	33N	55	18	118W	25	55		El Segundo	Stranded off Pier	Standard Oil Pier, El Segundo
	5361		0	E	Fish Haven (not a shipwreck)						34N	1	19.8	118W	39	30		Artificial Reef		
	5362		0	E	Fish Reef (not a shipwreck)						33N	57		118W	29			Artificial Reef		
	124		2	D	Fullerton	1902	1927	507	Brkn/Conv.Fish Barge	1554	33N	50		118W	23	30		Redondo Beach	Ashore, Abandoned	
	126		4	E	Garcia						33N	44		118W	25			Santa Monica		Off Pt. Vicente
	617		2	E	Gardiner City		1904	501	Barque		33N	50		118W	23	30		Redondo Beach	Ashore	At Redondo Beach
131		2	D	Georgina	1901	1935		4-masted bark	998	33	50N		118	23W	30		Redondo Beach			
	133		2	D	Georgina [Georgiana/MMS 623]	1901	1935		Brkn (4Mstd)/ Conv. Fsh Brg	998	33N	50		118W	23			Redondo Beach	Stranded	(Georgiana?)
86624	132		3	D	Georgina [MMS 622]	1902	1966	222	Barque/Brg Conv (?)	96	33N	49		118W	25			Redondo Beach	Foundered	About 2 mi SW of King Harbor, Redondo Beach
	143	2	2	A	Gratia	1881	MMS 1932, SLC 1933	420	1582	Two-Masted Steel Barkentine260x38	1582N	33	48		118	24	40	MMS 33 46, 118 30, MMS 15 ft		
226027	146		2	D	Horizon	1926	1932	831	Ol.S.	69	34N	0		118W	48			Point Dume	Burned	
217878	147		2	E	Humanity	1919	1939	912	Ol.S.	45	34N	0		118W	48			Point Dume	Wrecked, Collision w/ Ft. Nunsuco	Pt. Dume, W side of Santa Monica Bay
100721	154	R/R	2	E	Irene [MMS 153]	1900	1937	128	Brg. (186.4x39.7x14.3)	772 [687N]	33N	50		118W	23	30		Redondo Beach	Sunk	Off Redondo Beach, total loss
	573		1		Junk						33N	47		118W	25		18	Santa Monica		
	628	7	1	E	J.D. Rice		1867	12	Brig		33N	53		118W	24	40		Unknown	Ashore	19 miles N of Wilmington
14347	169		2	E	Katie Flickinger	1876	1905	1120	(7/21) Brkn (MMS, 472 Tons)	425	33N	50		118W	23	30	10	Redondo Beach	Stranded	Redondo Beach/Santa

Table 4-2 Shipwrecks within the Project area listed by MMS and CSLC (Cont'd)

																			Monica Bay
161184	173		3	E	Kohala	1901	1940		Brkn (194.8x39.9x15.8)	891 [776N]								Santa Monica		Point Vicente
	175		3	E	L Padre (El Padre?)		1956				34N	0		118W	48			Point Dume		
141722	182		2	C	Lahaina	1901	1933	1005	Brk./Brg. Conv. (217x42x17)	1067 [994N]	33N	44		118W	24			Santa Monica	Stranded	Point Vicente
229792	185		2/3	E	Leader	1930	1947	913	Prse Snr	35	33N	44		118W	25			Santa Monica	Beached and burned, stranded	At San Vincente Point, near San Pedro
167327	191		2	E	Los Angles Tuna Canning Co. #1	1915	1921	218	Brg./Fsh. Unrigged MV (listed lost 50 tons)	130	33N	59		118W	29			Santa Monica	Foundered	Ocean Park
241103	197		3	D	Lucretia K.	1941	1958	906	Ol.S.	54	23N	10		119W	48			Point Dume	Foundered	Approx. 9 mi bearing 251 deg. true from Pt. Dume
	198		2	D	Mabel Grey	1882	1904	311	Wood Schnr./Ship (list 205 tons)	205 [195N]	33N	50		118W	23	30		Redondo Beach	Hell's Half Acre	
	207	E	2	C	Minnie A. Caine	1900	1939	924	Schnr	880	34N	2	0	118W	23	30		Hermosa Beach		
	215		2	E	National City		1907				33N	50		118W	23	30		Hermosa Beach	Off Hermosa Beach	
237894	231		3	E	Novus	1938	1940	1025	Ga.S.	34	33N	50		118W	23	30		Hermosa Beach (Redondo Beach)	Off Hermosa Beach Bkwtr	
228626	240		2	D	Oriental	1929	1930	131	Ol.S.	66	34N	0		118W	48			Point Dume		
	720	E	3	E	Palowan	1944	1977		Ship	14250 [441N]	33N	49	25	118W	24	53	120	Redondo Beach	Sunk as artificial Reef	Off Redondo Beach
	248				Pan Pacific						33N	50		118W	55			Point Dume		
254926	248		3	E	Pan Pacific	1948	1950	306	Ol.S.	226	33N	46	45	119W	10	20	[10-20]	Point Dume	Foundered	25-miles offshore of Point Dume; at Pt. Mugu Firing Range
234222	582	P	2	A	Paprika IV [Errol Flynn's Yacht]	1935			Ga.S./Yct.	18 [14N]	34N	2		118W	41		30	Santa Monica		Errol Flynns Yacht
	254	R/R	2	E	Phyllis		1918	4			33N	44		118W	25			Santa Monica		Pt. Vicente
	657		1	E	Pilgrim		1852				33N	55		118W	50			Point Dume	Burned at sea	Off Pt. Dume
215272	262		2	E	Putnik	1917	1926	407	Ga.S.	35	33N	55		118W	57			El Segundo	Stranded	
221977	269		3	C	Retriever	1922	1951	429	Brg. (110)	99	33N	49	25	118W	24	53		Redondo	1 mi. S of	

Table 4-2 Shipwrecks within the Project area listed by MMS and CSLC (Cont'd)

																		Beach	Monstad Pier	
169403	275		3	D	S & C No. 9	1925	1940	924	Brg.	161	33N	42		118W	25			Santa Monica	Foundered	Pt. San Vicente
	279	None	2	C/A	Sacramento	1877	1968		Ferry	87	33N	49	12	118W	25	22	360	Redondo Beach	2 mi. SW King Harbor Light, Redondo Beach	
116698	321		2	D	Saint Croix	1895	1909	1129	St.S.	1993							100	Point Dume	Burned, no lives lost	5 mi SE of Pt. Dume (previously listed Pt. Loma)
216175	707		2	E	Salt	1918	1938	903	Ol.S./Tug	34 [23N]								Point Dume	Stranded, aground	Point Dume, California MV 1939:513
250736	297		3	C	Sea King	1946	1956	1128	Ol.S.	132 [71N]	33N	51	24	118W	32	42		Santa Monica	Foundered	In Santa Monica Bay
	299		2	E	Sea Products Co. No. 1	1912	1917	416	Brg.	57	33N	58		118W	48			Point Dume		Off Pt. Dume
	300		2	E	Sea Products Co. No. 2	1915	1917	217	Brg.	75	33N	59		118W	30			Santa Monica		Off Venice
	301		2	E	Sea Products Co. No. 4	1916	1917	217	Brg.	111	33N	57		118W	28			Redondo Beach	Off Playa del Rey	
	299		2	E	Sea Products Co. No. 9	1912	1917	416	Brg.	57								Point Dume		Off Pt. Dume
	303	P	4	B	Sea Witch					25	33N	50	25	118W	24	30	70	Santa Monica		Accurate
	670		4	E	Silver Strand	1927	1948	907										Santa Monica	Lost	Point Vicente
	671		3	E	Spare Time		1952	728	Fishing Boat		33N	50		118W	38			Santa Monica	Exploded 40 48	14 mi SW of Santa Monica
247715	319		3	D	St. Anne of the Sunset	1944	1955	1017	Ol.S.	130	33N	46	39	118W	40	9		Anacapa Isl. (Point Dume?)	Foundered	30 miles E of E end of Anacapa Island
	324	P	3	A	Star of Hollywood, {Star of Scotland Texas, HMS Mistletoe]	1918	1942	123	St.S. (5/-) Ex-British Q-Boat	1473	33N	59	43	118W	31	11	75	Santa Monica	Sprung seams	2 miles off SM Pier
227690	334		2	E	Tennessee	1918	1942	224	Ga.S.	13	33N	58		118W	32			El Segundo	Foundered	5 mi off El Segundo (MMS 1987, off Santa Monica)
145916	338		2	C	Thomas P. Emigh	1901/ 1902	1932	420	Brkn/Conv.Fishing Barge/Fsh.	1040	33N	49	50	118W	23	55		Redondo Beach	Ashore, Foundered/ Sank deeper water	At Old Redondo Pier (BLM lists 6/26)
	563		3	D	Unknown				Jetliner		33N	48		118W	30			Redondo	Off Redondo	Off Redondo

Table 4-2 Shipwrecks within the Project area listed by MMS and CSLC (Cont'd)

																	Beach	Beach	Beach
	564		3	D	Unknown				Jetliner		33N	48		118W	31		Redondo Beach		
	343		4	C	Unknown				Trawler		33N	44		118W	24		Santa Monica		Pt. Vicente
	349		4	A	Unknown						33N	44	5	118W	24	55	Santa Monica		
	355	P	2/4	A	Unknown				Ol.S.		33N	44	58	118W	24	56	20	Santa Monica		
	423		3	D	Unknown				Aircraft		34N	2		118W	39		33			
	471		4	A	Unknown						33N	51	0	118W	30	0				
	472		2	C	Unknown						34N	0	36	118W	31	45	80			
	324		3	E	Unknown [Star of Scotland/ MMS 681]						33N	59	43	118W	31	11	75	Santa Monica		
	389		3	E	Western Fisher		1948				34N	0		118W	48			Point Dume		Off Pt. Dume
81380	396		2	E	Wm Bowden	1892	1926	212	4-Mstd Schooner/ Brg. Conv.	778	33N	50		118W	23	30		Redondo Beach	Stranded	Redondo Beach, Santa Monica Bay

Table 4-3 Shipwrecks within the Project area but not previously evaluated by MMS

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names]	Construction	Built	Lost	Day/Month	Rig/Service	Tons	Net Tons	Length	Breadth	Depth	Degrees	Minute	Seconds	Degrees	Minutes	Seconds	Water Depth	Geographic Association	Situation	Location
511683			4		Auriga		1967	1971	417	Ga.ct.	10												El Segundo	Foundered	3 miles of El Segundo
234177			4		Calhata		1917	1959	1231	Ol.S.	12												El Segundo	Foundered	At El Segundo
231558			4		Gratia		1916	1937	1212	Ga.S.	10												El Segundo	Foundered	
256724			4		USC	Wood	Unknown	1955	812	Ga.S.	13												El Segundo	Burned	1 mi offshore from Standard Oil Co. Wharf
263466			4		Lucky Ann		1951	1959	1128	Ol.S.	14												Gardena	Burned	At Gardena
249361			4		Co-Bi-Do		1945	1954	1003	Ol.S.	31												Hermosa Beach	Grounded and broke up in surf	At foot of 15th Street, Hermosa Beach
269511			4		Lori D		1942	1975	1029	Ol.S.	14												Marina del Rey	Burned	1/2 mile S of Marina del Rey
508640			4		Veteran		1967	1975	1210	Ol.S.	53												Marina del Rey	Foundered	11 miles bearing 29 deg. Marina del Rey, Ca
262428			4		Cherry Picker		1942	1977	401	Brg.	129					33	53	12	118	43	42		Point Dume	Foundered	
260366			4		Ikey May		1943	1975	1015	Ol.S.	12												Point Dume	Foundered	At Pt. Dume
228171			4		Traveler No. 2		1917	1938	828	Ol.S.	14												Point Dume	Burned	Point Dume
248548			4		US Republic		1945	1956	1210	Ol.S.	38												Point Dume	Foundered	Approx. 2-1/2 mi ESE of Pt. Dume
254833			4		Avenger		1944	1961	318	Ol.S.	12												Redondo Beach	Stranded	Approx. 500 yd NE of Bkwtr
214005			4		Barbarena		1915	1958	1114	Ol.S.	14												Redondo Beach	Collided w/ Redondo Beach bkwtr	With Redondo Beach bkwtr and broke up off Redondo Bch
223827			4		Daisy M.		1917	1939	413	Ga.S.	13												Redondo Beach	Foundered	Off Redondo Beach
250039			4		Kilindi		1943	1967	923	Ol.S.	27												Redondo Beach	Burned	At 7 mi W of Playa del Rey
230077			4		Maiden		1917	1954	217	Ga.S.	13												Redondo Beach	Foundered	On bkwtr in Redondo Beach
237585			4		New Deal		1923	1943	1012	Ga.S.	14												Redondo Beach	Foundered	
227467			4		New Monterey		1816	1935	430	Ga.S.	13												Redondo Beach	Stranded	Off Redondo Beach
239982			4		Nightingale		1923	1943	1012	Ga.S.	14												Redondo Beach	Foundered	
169590			4		Rosi		1926	1944	215	Ga.S.	15												Redondo Beach	Stranded	

Table 4-3 Shipwrecks within the Project area but not previously evaluated by MMS (Cont'd)

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names]	Construction	Built	Lost	Day/Month	Rig/Service	Tons	Net Tons	Length	Breadth	Depth	Degrees	Minute	Seconds	Degrees	Minutes	Seconds	Water Depth	Geographic Association	Situation	Location
224207			4		Sea Hawk		1924	1937	1225	Ol.S.	14												Redondo Beach	Foundered	Off Redondo, California
280396			4		Tyee		1953	1977	210	Ga.S.	12												Redondo Beach	Foundered	At Redondo Beach
215950			4		Victory		1918	1923	617	Ga.S.	14												Redondo Beach	Stranded	
535411			4		Wild Goose		1971	1973	824	Ol.S.	24												Redondo Beach	Foundered	About 10 miles off California near Redondo Beach
283666			4		Barbara Allen		1958	1966	521	Ga.S.	9												Santa Monica	Collided	With an unknown vessel 275 deg, 2 mi off Pt. Vicente
265537			4		Bateson III		1953	1957	914	Ol.S.	10												Santa Monica	Foundered	Approx. 1 mi off Lunada Bay, 2 mi. WNW of Pt. Vicente Light
216604			4		Beaver		1915	1943	1018	Ga.S.	9												Santa Monica	Foundered	Off Santa Monica, California
46954			4		Blanch Lee		1944	1952	952	Ol.S.	18												Santa Monica	Stranded	At Pt. Vincente
207614			4		Charlotte		1910	1936	310	Ga.S.	9												Santa Monica	Foundered	Santa Monica Harbor
235805			4		Eagle		1920	1943	325	Ga.S.	19												Santa Monica	Stranded	
242671			4		El Redondo		1928	1952	1114	Ga.S.	20												Santa Monica	Foundered	1 mi. SE of Pt. Vincente
224162					Georgie		1924	1952	727	Ol.S.	38				33	52	12	117	28	30			Santa Monica		
225963			4		H-10 Water Taxi No. 12		1926	1942	1128	Ga.S.	12												Santa Monica	Stranded	Santa Monica, California
218304			4		Kisanto		1917	1926	510	Ga.S.	14												Santa Monica	Burned	
223683			4		Palisades		1918	1943	114	Ol.S.	14												Santa Monica	Stranded	
230780			4		Peerless		1916	1932	420	Ga.S.	10												Santa Monica	Foundered	
224534			4		Solano		Unk.	1949	118	Ga.S.	11												Santa Monica	Foundered	In Santa Monica Yacht Basin
228396			4		Sweet		1917	1929	1007	Ga.S.	13												Santa Monica	Stranded	Venice, California

Table 4-3 Shipwrecks within the Project area but not previously evaluated by MMS (Cont'd)

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names]	Construction	Built	Lost	Day/Month	Rig/Service	Tons	Net Tons	Length	Breadth	Depth	Degrees	Minute	Seconds	Degrees	Minutes	Seconds	Water Depth	Geographic Association	Situation	Location
279638			4		Turk II		1953	1964	517	Ol.S.	11					33	55	5	118	26	0		Santa Monica	Foundered	
212395			4		Ursula		1914	1924	403	Ga.S.	14												Santa Monica	Burned	Off coast of Santa Monica
271333			4		Victor Lee IV		1956	1965	1231	Ga.S.	15												Santa Monica	Burned	Approx. 272.1 Magnetic, 2 mi from Pt. Vicente
233144			4		Yellowtail		1917	1944	212	Ol.S.	12												Santa Monica	Stranded	
211564			4		Desire		1913	1951	309	Ol.S.	82												Venice	Burned	6 miles off coast, Venice

Table 4-4 Sidescan sonar contacts in shallow-water and (partial listing) deep-water survey areas

Seafloor Features	Fugro Old Numbers	Fugro West New Numbers	Magnetic Anomaly	Line No.	Northing	California State Plane Zone 5 NAD83 (Feet) Easting	Northing	WGS-84 UTM, Zone 11-S (meters) Easting	Latitude	NAD 1983 (1986) Longitude	Water Depth (Feet)	Description and Interpretation	(Meters)	(Feet)	Approximate Distance from Proposed Pipeline ROW	Potential Cultural Resource Significance
1	C0001	C181	14	103	1806705.23	6421847.11	3758132.02	365053.55	33 57 18.16	118 27 37.64	50-100	Linear feature with above seafloor height (i.e., protrusion into the water column). Possible anchor chain or other ferromagnetic debris. Possibly coincident with Mag Anomaly 14 29.7 nT Monopole with a duration of 14.4 ft.	9.83x0.48x0.72	32.25x1.57x2.36	3450 N	No
2	C0010	C152		103	1806484.92	6419463.63	3758180.02	364272.68	33 57 19.35	118 28 08.08	50-100	Small feature with above seafloor height. Not visible on adjacent lines. Possible non-ferromagnetic debris or isolated area of coarser grained sediment.	2.65x0.99x0.32	8.69x3.25	3650 N	No
3	C0011	C132	3	101 102 103 104	1806693.46	6415448.48	3758259.44 3758259.44 3758254.27 3758261.48	362997.02 362997.02 363000.05 363052.32	33 57 21.33	118 28 57.81	50-100	Complex dense feature with interior shadows indicating above seafloor height. Coincident with an 84.9 nT dipolar magnetic anomaly No. 3 (near abandoned 20 inch pipeline location). Possible shipwreck.	10.65x3.5x3.07	34.94x11.48x10.07	4150 N	No
4	C0013	C117		107 109	1806072.27	6409600.02	3758086.98 3758088.48	361248.32 361281.65	33 57 14.91	118 30 05.83	50-100	Linear feature in depression parallel to line. Possible non-ferromagnetic debris or area of coarser grained sediment.	12.43x3.76x0.95	40.78x12.34	3300 N	No
5	C0015	C151		107 108 109	1805777.08	6418743.75	3757972.46 3757971.78 3757969.77	364023.93 364016.54 364051.23	33 57 12.50	118 28 17.65	50-100	Small feature in depression. Appears to be same as Fugro's C151. Possible non-ferromagnetic debris or isolated area of coarser grained sediment.	2.07x0.95x0.46	3.12x6.79	3000 N	No
7	C0022	C134		110	1805688.55	6416167.43	3757951.45	363282.28	33 57 11.47	118 28 46.53	50-100	Unusual feature shaped like a small boat with interior shadow indicating protrusion into the water column. Not visible on adjacent line. Appears to be same feature as Fugro C0022 (Line S-110 N3757950.37 E363265.89).	7.5x2.66x0.57	24.61x8.69x1.87	3100 N	No
8	C0027	C118		111 113	1805528.63	6410383.82	3757917.92 3757918.90	361484.35 361521.31	33 57 09.54	118 29 56.54	50-100	Small 1/2-circle feature in depression. Feature perpendicular to line. Appears to be same as Fugro C0027(Line 111 361502.98 3757918.65).Possible non-ferromagnetic debris.	7.96x3.70x2.25	12.14x26.12	3850 N	No
9		Not on List		111 113 115A	1805283.73	6413229.94	3757834.67 3757835.65 3757823.71	362333.35 362369.56 363257.29	33 57 07.31	118 28 47.43	50-100	Two small square features with height above seafloor. possible non-ferromagnetic debris.	2x2x0.5		2350 N	No
10	C0032	C143		112	1805029.61	6416896.21	3757747.43	363486.03	33 57 04.94	118 28 38.48	50-100	Square feature with no apparent above seafloor height. Possible non-ferromagnetic debris.	2.61x2.36	7.74x8.56	2400 N	No
11	C0033	C137		112	1805113.49	6416288.83	3757774.78	363301.19	33 57 05.75	118 28 45.69	50-100	Square feature with no apparent above seafloor height. Possible non-ferromagnetic debris.	1.73x1.5	4.92x5.68	2550 N	No
12	C0034	C138		112	1805283.50	6416500.69	3757825.96	363366.25	33 57 07.44	118 28 43.19	50-100	Square feature with no apparent above seafloor height. Possible non-ferromagnetic debris.	1.53x1.15	3.77x5.02	2700 N	No
13	C0035	C144		113 113A 114	1804931.91	6417085.22	3757716.25 3757717.50 3757721.06	363565.28 363543.34 363567.87	33 57 0.40	118 28 35.37	50-100	Square feature with above seafloor height. Possible non-ferromagnetic debris.	2.21x2.12x1.8	6.96x7.25	2350 N	No
14	C0044	C146		116	1804635.37	6417424.61	3757625.51	363602.20	33 57 01.04	118 28 33.89	50-100	Small rectangular feature with slight above seafloor height. Non seen on adjacent line. Possible non-ferromagnetic debris. Possibly same as Fugro C0044 (Line 116 N3757625.74 E363645.89)	2.92x1.76x0.75	5.77x9.58	2000 N	No
15	C0051	C178		123	1803137.30	6420625.52	3757256.85	364199.58	33 56 49.35	118 28 10.41	50-100	Small rectangular feature with no apparent seafloor height. Possible non-ferromagnetic debris.	3.46x1.75	11.35X5.74	100 N	No
16	C0052	C141		123 124 125	1803290.09	6416167.55	3757226.48 3757223.24 3757224.77	363224.01 363230.02 363253.30	33 56 47.81	118 28 48.16	50-100	Complex feature in an approximate 29x20m area. A contiguous scatter of small objects, the largest of which is 10mx2, smallest is 1x1. May be jetsam (dumped material) or remains of a ship's ballast pile.	28.65x17.1x1.47	94.0x56.1x4.82	720 N	Yes

Table 4-4 Sidescan sonar contacts in shallow-water and (partial listing) deep-water survey areas (Cont'd)

Seafloor Features	Fugro Old Numbers	Fugro West New Numbers	Magnetic Anomaly	Line No.	Northing	California State Plane Zone 5 NAD83 (Feet) Easting	Northing	WGS-84 UTM, Zone 11-S (meters) Easting	Latitude	NAD 1983 (1986) Longitude	Water Depth (Feet)	Description and Interpretation	(Meters)	(Feet)	Approximate Distance from Proposed Pipeline ROW	Potential Cultural Resource Significance
17	C0054	C159		126	1802715.50	6416949.43	3757042.10	363495.44	33 56 42.06	118 28 37.72	50-100	Linear feature with no apparent height above the seafloor. Located within 50 and 250 ft of Magnetometer Anomalies Nos. _ and _. Possible ferromagnetic debris.	4.21x0.51	13.81x1.67	100 N	No
18	C0061	C161		131 130 129	1802190.59	6416844.46	3756876.89 3756882.45 3756905.02	363465.98 363461.91 363561.07	33 56 36.86	118 28 38.93	50-100	Boat-shaped feature. Almost identical in form to No. 4. Sizes are consistent with a small sail or other boat or possible non-ferromagnetic debris.	5.48x2.05x1.09	21.69x7.45x3.58	350 S	No
19	C0062	C160		131 130 129	1802267.79	6417169.12	3756905.02	363561.07			50-100	Boat-shaped feature. Almost identical in form to No. 4. Sizes are consistent with a small sail or other boat or possible non-ferromagnetic debris.	6.61x2.27x0.88	17.98x6.73x2.89	300 S	
20	C0065	C162		133 134	1801644.67	6417257.44	3756715.47 3756717.85	363588.36 363600.17	33 56 31.50	118 28 33.92	50-100	linear feature with height above seafloor. possible non-ferromagnetic debris.	5.69x1.30x0.43	18.67x4.27	950 S	No
21	C0069	C122		135A 137	1801379.56	6411567.82	3756652.51 3756655.84	361837.93 361855.87	33 56 28.63	118 29 42.05	100-150	Oval feature. May be non-ferromagnetic debris or biological in origin.	10.94x7.16x1.2	35.89x23.49	1150 S	No
22	C0073	C185		141	1800418.97	6421298.05	3756329.49	364813.83	33 56 19.54	118 27 45.96	50-100	Rectangular feature with no apparent height above seafloor. possible non-ferromagnetic debris. Same as Fugro C0073.	2.92x1.41	9.58x4.59	3700 S	No
23	C0078	C189		146	1799290.63	6420565.65	3755987.81	364587.33	33 56 08.34	118 27 54.61	50-100	Square feature with above seafloor height. Possible non-ferromagnetic debris.	2.1x1.46x0.63	6.89x4.79x2.07	3650 S	No
24	C0081	C172		147 148A	1799289.47	6419245.88	3755995.79 3755990.95	364124.68 364170.93	33 56 08.39	118 28 12.62659	50-100	Linear feature with height above seafloor. possible non-ferromagnetic debris. Possibly same as Fugro C0081 (Line S-147 N3755991.34 E364185.16)	1.48x1.09x0.56	4.86x3.58x1.84	3450 S	No
25	C0084	C170		148A	1799026.08	6419254.86	3755911.05	364187.12	33 56 05.88	118 27 52.10	50-100	Dense feature with slight height above seafloor. possible non-ferromagnetic debris.	3.31x1.47x0.32	10.86x4.82x1.05	3700 S	No
26	C0083	C190		148A	1799272.06	6420773.82	3755981.54	364650.71	33 56 08.17	118 27 52.14	50-100	Linear feature with height above seafloor. Possible non-ferromagnetic debris.	2.87x1.39x0.64	9.42x4.56x2.1	3750 S	No
27	C0085	C165		149 151	1799031.34	6416922.89	3755917.24 3755917.67	363526.53 363490.50	33 56 05.56	118 28 35.88	50-100	Small objects associated with an apparent depression. possible non-ferromagnetic debris or area of coarser grained sediment.	8.18x8.12	26.64x26.84	3550 S	No
28	C0091	C167		151	1798532.65	6417941.78	3755764.55	363785.54	33 56 00.72	118 28 25.70	50-100	Linear feature. possible non-ferromagnetic debris.	2.82x0.31	9.25x1.02	4100 S	No
29a 29b 29c 29d 29e 29f	C0093 C0094 C0095 C0096 C0097 C0098	C194 C195 C196 C192 C191 C193		152 153	1798358.75 1798339.62 1798341.57 1798304.30 1798433.52 1798313.13	6421358.85 6421355.92 6421336.67 6421262.83 6421262.05 6421209.06	3755701.51 3755695.69 3755696.34 3755685.20 3755724.58	364826.30 364825.35 364819.49 364796.88 364797.02	33 59 59.16 33 55 58.97 33 55 58.99 33 55 58.62 33 55 59.90	118 27 45.14 118 27 45.18 118 27 45.40 118 27 46.28 118 27 46.29	<50	Several aligned and scattered small features with height above seafloor. Debris.	2x1x2 4.8x1x 0.7 4.49x1x0.63 0.79x0.95x.0.64 0.88x0.77x0.33 2.3x1.76x0.43 3	3.48x6.40 3.58x17.73 3.12x2.59 2.53x2.89 5.77x7.55 3.48x6.40	4650 S	No
30	C0099	C210		155	1797880.28	6426431.45	3755541.94	366365.42	33 56 01.92	118 26 45.24	<50	Rectangular object (cage-like). Appears real. Possible jetsam, debris.	3.66x2.28	7.48x12.01	6500 S	No
31		Not on List		156 157 158	1797742.15	6419153.57	3755520.10 3755520.85 3755524.43	364152.48 364150.98 364173.34	33 55 52.99	118 28 11.34	50-100	Dense contact unlike surrounding seafloor and sand ripples with interior features exhibiting some height above seafloor. Contact yet not identified in Fugro list. Unidentified feature. May represent a degraded shipwreck.	c 42.0x30.0x1-2	137.8x98.4x3.3	5000 S	Yes
32	C0100	C211		158	1797236.28	6427116.97	3755342.53	366577.64	33 55 48.31	118 26 36.75	<50	possible non-ferromagnetic debris. K-shaped feature. Fugro C0100.	6.4x2.6	21.03x8.53	7200 SSW	No

Table 4-4 Sidescan sonar contacts in shallow-water and (partial listing) deep-water survey areas (Cont'd)

Seafloor Features	Fugro Old Numbers	Fugro West New Numbers	Magnetic Anomaly	Line No.	Northing	California State Plane Zone 5 NAD83 (Feet) Easting	Northing	WGS-84 UTM, Zone 11-S (meters) Easting	Latitude	NAD 1983 (1986) Longitude	Water Depth (Feet)	Description and Interpretation	(Meters)	(Feet)	Approximate Distance from Proposed Pipeline ROW	Potential Cultural Resource Significance
33	C0103	C201		162	1796709.13	6421765.85	3755197.63	364945.47	33 55 42.86	118 27 40.22	50-100	Small feature with slight height above seafloor lying perpendicular to sand ripples visible on seafloor.	2.18x1.07x0.44	7.15x3.51x1.44	6500 S	No
34	C0106	C197		163	1796520.50	6420506.82	3755143.85	364561.28	33 55 40.94	118 27 55.15	50-100	Small square feature. Near 20-inch abandoned pipeline. Possible industry-related debris.	2.12x2.37	7.78x6.96	6450 S	No
35	C0107	C198		163	1796546.25	6420717.00	3755151.08	364625.38	33 55 41.20	118 27 52.66	50-100	Small square object. Near 20-inch abandoned pipeline. Possible industry-related debris.	1.68x1.02x0.39	5.51x3.35x1.28	5950 S	No
36	C0109	C125		165	1796528.55	6413513.77	3755166.86	362430.31	33 55 40.69	118 29 18.14	100-150	Rectangular objects in area of disturbed sediment adjacent to 20-inch abandoned pipeline. Possible industry-related debris.	3.42x1.49	4.89 x 11.25	7200 SSW	No
37	C0110	C212		171 172	1797312.27	6427213.21	3755365.40	366607.19	33 55 49.07	118 26 35.61	<50	Parallel dense linear features. possible non-ferromagnetic debris.	5.13x2.43	16.83x7.97	7500 SSW	No
38	C0111	C213		172 173 174	1797074.36	6427443.05	3755292.23 3755304.12 3755351.22	366676.53 366639.17 366571.28	33 55 47.10	118 26 34.33	<50	Linear feature. Appears to be same feature on 3 lines but coordinates are more indicative an alignment of similar features.	3.72x1.65	12.20x5.41	7500 SSW	No
39a 39b 39c		Not on list		172	1806386.41 1806349.85 1806280.92	6422763.39 6422800.65 6422798.87	3758143.62 3758132.37 3758111.37	365277.92 365289.17 365288.42	33 57 18.64 33 57 18.28 33 57 17.59	118 27 28.91 118 27 28.46 118 27 28.48	<50	Diffuse square features in linear alignment. possible non-ferromagnetic debris.	c. 1.0x1.0	3.3x3.3	2800 N	No
40	C0113	C214		177	1810355.62	6413866.11	3759379.34	362578.34	33 57 57.49	118 29 14.75	50-100	Complex feature with several overlapping linear components. Possible above seafloor height of one component. Possible shipwreck or (Jetsam) Debris. This feature requires review of Line 177 not present in the Data Set reviewed by the archaeologist.	23.30x18.98	76.44x62.27	8025 N	Yes
41	C0014	C108		180	1811207.83	6417614.18	3759628.00	363723	33 57 59.34	118 29 10.45	50-100	L-shaped or possibly rectangular feature with slight height above seafloor. possible non-ferromagnetic debris.	7.44x2.76x0.33	18.47x4.92	8025 N	No
42	C0117	C217		181	181167.95	6414321.72	3759625.54	362719.57	33 58 05.54	118 29 09.39	50-100	Small square object near area of seafloor change. possible non-ferromagnetic debris.	4.44x2.80	4.66x4.0	8525 N	No
43	C0116	C218		181	1811768.5	6414069.83.	3759708.00	362888	33 58 11.47	118 29 12.42	50-100	Dense feature with slight height above seafloor. possible non-ferromagnetic debris.	3.33x2.31x1.68	10.93x7.58x5.51	9175 N	No
44	C0119	C086	15	201 202	1812778.37	6388794.44	3760193.0 3760180.2	354948.0 355006.7	33 58 20.20	118 34 12.47	200	Linear sonar contact with no seafloor height. Possible coincident with Mag Anomaly 15 (N3760202 E354964), a 69.8 nT complex anomaly with a duration of 17.9 ft. Possible Ferromagnetic debris.	7.09x3.53	23.26x8.3	3800 SSW	Yes
45	C0123	C103		222	1799943.85	6403025.39	3756238.42	359244.22	33 56 13.95	118 31 22.81	150-200	Parallel linear features. No height above seafloor.	7.05x1.81	23.13x5.94	4100 SSW	No
46	c0125	C100		226	1799941.76	6402780.61	3756238.50	359169.62	33 56 13.92	118 31 25.72	150-200	Linear feature. possible non-ferromagnetic debris. No correlation on adjacent line.	15.91x3.78	52.2x12.4	4200 SSW	No
47		Not on List		227	1799497.28	6403541.43	3756100.82	359400.16	33 56 09.56	118 31 16.66	150-200	Dense Linear feature. No correlation with adjacent line.	7x1.5	22.97x4.92	4350 SSW	No
48	c0126	c124		227	1799497.28	6403541.43	3756003.18	362002.65	33 56 07.63	118 29 35.26	150-200	Square Feature. possible non-ferromagnetic debris.	3.44x2.59	11.29x8.5	4350 SSW	
49		Not on List		229 230	1798601.10	6397456.99	3755845.59	358543.40	33 56 00.86	118 31 49.88	>200	Linear scattered features. Possible seafloor change..	25x7x1	82.03x22.97x3.33	7850 SSW	No

Table 4-4 Sidescan sonar contacts in shallow-water and (partial listing) deep-water survey areas (Cont'd)

Seafloor Features	Fugro Old Numbers	Fugro West New Numbers	Magnetic Anomaly	Line No.	Northing	California State Plane Zone 5 NAD83 (Feet) Easting	Northing	WGS-84 UTM, Zone 11-S (meters) Easting	Latitude	NAD 1983 (1986) Longitude	Water Depth (Feet)	Description and Interpretation	(Meters)	(Feet)	Approximate Distance from Proposed Pipeline ROW	Potential Cultural Resource Significance
51		Not on List		306 307 101	1807714.47	6410901.69	3758583.22 3758584.33 3758584.33	361667.22 361665.96 361665.96	33 57 31.25	118 29 49.84	<100	Linear feature with height above seafloor.	9.47x5.73	31.07x18.8	5100 N	No
52		Not on List		309 310 311	1808518.60	6407744.83	3758837.55	360707.59	33 57 39.01	118 30 27.32	100-150	Complex feature with interior shadows indicating projection into the water column, possible dumping feature (jetsam) or degraded shipwreck. No other outcrop in area.	21x10x3	68.9x32.8x9.84	5400 N	Yes
53		Not on List		320 321	1808812.22	6399217.81	3758952.10	358109.98	33 57 41.48	118 32 08.56	150-200	Small feature with possible seafloor height	5x1x1	16.41x3.33x3.33	800 NE	No
54		Not on List		403	1819733.92	6382178.71	3762330.46	352949.61	33 59 28.57	118 35 31.61	150-200	Linear feature. possible non-ferromagnetic debris.	6x<0.5	19.69x1.64	3150 NNW	No
55	C0145	Not on list		403	1821879.37	6384919.35	3762976.21	353791.11	33 59 49.96	118 34 59.21	150-200	Square Feature. possible non-ferromagnetic debris.	6.53x6.11	21.43x20.0	4150 N	No
56		Not on List		404 405	1817741.38	6368862.11	3761729.76	352268.26	33 59 08.73	118 35 57.79	<250	Several scattered sonar contacts. Possible small debris or seafloor change.	c. 1x1	3.3x3.3	4650 N	No
57	C0149	Not on List	17	404 405 406	1819904.62	6373626.11	3762378.48 3762378.22 3762373.32	353401.92 353391.50 353385.85	33 59 30.35	118 35 14.42	150-200	Strong linear feature with height above seafloor. Roughly coincident with Mag Anomaly 17 (Line 405 N3762379 E353391) 120.8 nT dipole with a duration of 3723 ft. Ferromagnetic debris or shipwreck.	34.0x8.0x4.0 41.5x11.98	111.55x26.25x13	2950 N	Yes
58	C0148	Not on list		405	1815459.90	6378690.92	3761038.23	351874.17	33 58 46.09	118 36 12.72	350	Rectangular feature with no apparent height above seafloor. possible non-ferromagnetic debris. Possibly the same as Fugro C0148 (Line 405 N3761051.84 E351890.2)	14.5x4.5	47.58x14.77	1050 NW	No
59		Not on List	18	405 502	1818844.17	6382802.76	3762057.48	353137.17	33 59 19.81	118 35 24.13	150-200	One strong sonar contact and scattered small sonar contacts. None of the features have any visible height above seafloor. Within 100 m of A 32.9 nT dipolar magnetic anomaly. Ferromagnetic debris.	4x2	13x6.6	2050 NNW	No
60	C0154	C088		421	1816402.03	6390971.77	3761289.24	355619.42	33 58 56.11	118 33 46.96	150-200	Rectangular object. possible non-ferromagnetic debris.	15.25x6.5	18.41x29.86	300 N	No
61		Not on List		421	1816513.28	6391095.62	3761322.78	355657.49	33 58 57.22	118 33 45.50	150-200	Rectangular object. possible non-ferromagnetic debris.	15x3.5	49.22x11.5	450 N	No
62	SSS-015	C060		512 926	1780802.85	6340161.24	3750589.43	340030.90	34 53 00.61 33 53 00.73	118 43 47.14 118 43 47.24	1950-2000	Strong sonar contact with height above seafloor. Shipwreck in AUV Survey.	25.3x9.7x3.3 28.63x10.44x3.3	83x31.8x10.83	650 SSE	Yes
63	SSS-167	C059			1776540.13	6329997.31	3755969.34	336984.67	33 55 53.65	118 45 49.37	<2400	Shipwreck in AUV Survey.	21.0x6.0	68.9x19.68	2450 NNW	Yes
64	SSS-157	C067			1794686.70	6357446.09	3754770.00	345339.00	33 55 19.27	118 40 23.33	1200-1250	Shipwreck in AUV Survey.	9.0x20.0	29.53x65.62	800 SSE	Yes
65				115 116	1804604.7	6417894.37	3757615.01	363788.95	33 57 00.79	118 28 26.61	50-100	Irregular seafloor feature with small <1m or less more dense interior features with above seafloor height. Line 115 obscured by a large water column anomaly (fish). Area of coarser Sediment (gravel).	19x18	62.3x59.1	2000 N	No

Table 4-5 Magnetometer anomalies

Original Anom_ID	Revised Anom_ID	Line	Source_X	Source_Y	Duration Meters	Magnitude Gammas	Shape	Description	Quality
1	1	123	362875.2	3755120.6	437.9	98.1	Complex	Abandoned 20" steel pipe	Good
2	2	122_1	365763.2	3755123.2	437.4	73.6	Complex	Abandoned 20" steel pipe	Good
24	3	901	364613.1	3755128.5	66.7	84.5	Monopole	Abandoned 20" steel pipe	Fair
25	4	902_1	363410.4	3755120.8	79.3	25.7	Dipole	Abandoned 20" steel pipe	Fair
26	5	904	361012.3	3755111.8	60.3	45.8	Dipole	Abandoned 20" steel pipe	Fair
27	6	905	358847.9	3755123.1	71.3	42.7	Monopole	Abandoned 20" steel pipe	Fair
28	7	1903	362209.2	3755121.0	43.6	20.7	Dipole	Abandoned 20" steel pipe	Fair
3	8	122	360919.3	3755368.2	32.0	16.9	Monopole	Unidentified	Fair
4	9	117	358219.8	3756259.4	88.4	31.7	Monopole	Unidentified	Fair
5	10	114	363395.8	3756449.0	126.2	34.8	Monopole	Unidentified	Fair
6	11	111	364290.0	3756851.0	51.6	34.1	Dipole	Unidentified	Fair
18		506			80.7	14.9	Dipole		Fair
7	12	108_1	361228.4	3757458.2	60.9	35.4	Dipole	Unidentified	Fair
8	13	106_1	362686.0	3757688.0	38.3	31.6	Monopole	Small, nondescript sonar contact (Fishing Reef?)	Fair
23		516			41.0	65.5	Monopole		Fair
9	14	103	365167.9	3758007.0	29.7	14.4	Monopole	Unidentified	Fair
10	15	202	354964.0	3760202.0	69.8	17.9	Complex	Linear sonar contact	Fair
20		512			64.9	43.6	Monopole		Fair
11	16	204_2	355161.0	3759848.0	50.3	42.2	Monopole	Unidentified	Fair
19		511			189.0	51.8	Complex		Fair
21		513			98.1	30.1	Complex		Good
12	17	405	353391.0	3762379.0	120.8	3723.4	Dipole	Large sonar contact (34m x 8m x 4m)	Good
14		501			124.8	4459.9	Dipole		Good
13	18	405	353046.0	3762092.0	124.2	32.9	Dipole	Several scattered sonar contacts	Good

Table 4-5 Magnetometer anomalies (Cont'd)

Original Anom_ID	Revised Anom_ID	Line	Source X	Source Y	Duration Meters	Magnitude Gammas	Shape	Description	Quality
15		502			142.3	29.0	Dipole		Good
16	19	504	363504.0	3757042.0	79.8	44.2	Monopole	Unidentified - faint linear sonar contact	Fair
17	20	505	363574.0	3757059.4	102.0	36.5	Dipole	Unidentified	Fair
22	21	514	360911.1	3757778.5	104.3	38.5	Dipole	Unidentified	Fair

Line	Survey Line Number	Shape	Monopole=1 peak, Dipole=2 peaks, Complex=multiple peaks
Source X/Y	Probable location of anomaly source	Description	Potential anomaly source
Duration	Length of anomaly	Quality	Reliability of interpretation
Magnitude	Maximum magnetic intensity		

Table 4-6 Previously recorded onshore cultural resources located within the 1 mile (1.6 km) wide study area for the proposed route

Cultural Resource Number	Cultural Resource Type	Distance to Pipeline	NRHP Eligibility Status
CA-LAN-1716	Prehistoric lithic and shell scatter	0.2 mile (0.3 km)	Destroyed by housing development
CA-LAN-1118	Prehistoric shell midden with isolated lithic debitage	Crossed by proposed pipeline	Most of site probably destroyed by construction; unknown if any remnants of site still exist; eligibility unknown
CA-LAN-2385H	Historic refuse scatter	0.2 mile (0.3 km)	Unknown
19-100115	Prehistoric isolate	0.2 mile (0.3 km)	Not eligible
19-150445	Historic building – built in 1950	200 ft (61 m)	Recommended not eligible for the NRHP
19-150442	Historic building – built in 1948	0.2 mile (0.3 km)	Recommended eligible for the NRHP
LA 259	Historic Loyola Theater – built in 1948	0.4 mile (0.6 km)	Listed on Los Angeles City Historic-Cultural Monuments
CA-LAN-214	Prehistoric artifact scatter	0.3 mile (0.5 km)	Destroyed by housing development
CA-LAN-2847H	Historic brick foundation	0.4 mile (0.6 km)	Foundation re-buried after it was documented; eligibility unknown
CA-LAN-2838H	Historic brick foundation	0.5 mile (0.8 km)	Partially destroyed by previous construction; eligibility unknown
19-186110	Historic Union Pacific Railroad	Crossed by proposed pipeline along California Ave.	Recommended eligible for the NRHP.

Key: Ave. = Avenue; km = Kilometer; m = meter; NRHP = National Register of Historic Places.

Source: Compass Rose Archaeological, Inc. 2006.

Table 4-7 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide study area for the proposed route

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Proposed Alignment	Cultural Resources Recorded in 1.0 Mile Study Area	No Cultural Resources Recorded in 1.0 Mile Study Area
Brown & Murray 1983	L 1614	Venice	Test excavation	North of Manchester Boulevard (north of Proposed Route)		None
Bonner 2005	LA 7715	Venice	Survey for a telecommunications facility	South of Arbor Vitae (south of Proposed Route)		None
Bucknam 1974	LA 3583	Venice	Compilation of Site information	Unknown	Unknown	Unknown
City of Los Angeles 1977a	LA 3912	Venice	Survey for road widening	Crosses Proposed Route at Arbor Vitae		None
City of Los Angeles 1977b	LA 5556	Venice		North of LAX North		None
Duke 2000b	LA 5558	Venice	Survey for a telecommunications facility	Northwest of Century Boulevard (south of Proposed Route)		None
Duke 2000c	LA 5562	Venice	Survey for a telecommunications facility	North of Century Boulevard (south of Proposed Route)		None
Duke 2000a	LA 4862	Venice	Survey for a telecommunications facility	North of Manchester Boulevard (north of Proposed Route)	Historic Building LA-259	
Duke 2000d	LA 5755	Venice	Survey for a telecommunications facility	North of Manchester Boulevard (north of Proposed Route)		None
Duke 2002c	LA 5760	Venice	Survey for a telecommunications facility	South of Manchester Boulevard (north of Proposed Route)		None
Frank, Myra & Associates 1987	LA 3673	Venice	Survey for sewer line	Crosses Proposed Route		None
Hale 2002	LA 6248	Venice	Survey of fire station	South of Manchester Boulevard (north of Proposed Route)		None

Table 4-7 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide study area for the proposed route (Cont'd)

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Proposed Alignment	Cultural Resources Recorded in 1.0 Mile Study Area	No Cultural Resources Recorded in 1.0 Mile Study Area
Lapin 2000c	LA 5561	Venice	Survey for a telecommunications facility	South of Manchester Boulevard (north of Proposed Route)		None
Leonard n.d.	L 96	Venice	Survey of LAX	South of Proposed Route	Prehistoric	
McKenna 2002c	LA 6246	Venice	Records search for high school	South of Manchester Boulevard (north of Proposed Route)		None
Peak & Associates 1989	L 1975	Venice	Survey for a pipeline	North of Manchester Boulevard (north of Proposed Route)		None
Raschke et al. 1995	LA 4910	Venice	Survey of LAX	South of Proposed Route	Prehistoric & historic	
Romani 1977	LA 3511	Venice	Survey of wastewater plant	South of Manchester Boulevard (north of Proposed Route)		None
Scientific Resource Surveys, Inc. 1979	L 513	Venice	Survey of 7.11 acre parcel	South of Manchester Boulevard (north of Proposed Route)		None
Shepard et al. 2000	LA 4868	Venice	Records search for a proposed lease sale	South of Manchester Boulevard (north of Proposed Route)	Prehistoric	
Van Horn 1983	L 1613	Venice	Survey of 30+ acre parcel	North of Manchester Boulevard (north of Proposed Route)		None
Wallock 2001	LA 4867	Venice	Survey for a telecommunications facility	South of Manchester Boulevard (north of Proposed Route)		None
Wlodarski 1992c	L 2659	Venice	Survey of Sepulveda Tunnel	South of Proposed Route		None
Duke 1999a	LA 4560	Inglewood	Survey for a telecommunications facility	North of Arbor Vitae (north of Proposed Route)		None
Duke 1999c	LA 4748	Inglewood	Survey for a telecommunications facility	South of Arbor Vitae (south of Proposed Route)		None
Duke & Marvin 2002c	LA 7067	Inglewood	Survey for a telecommunications facility	North of Manchester Boulevard (north of Proposed Route)		None

Table 4-7 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide study area for the proposed route (Cont'd)

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Proposed Alignment	Cultural Resources Recorded in 1.0 Mile Study Area	No Cultural Resources Recorded in 1.0 Mile Study Area
Frank, Myra & Associates 1995	LA 4097	Inglewood	Survey for community redevelopment	North of Manchester Boulevard (North of the Proposed Route)	Historic structures	
Iverson 1999	LA 5103	Inglewood	Survey for interchange	Arbor Vitae Street and the 405 Freeway (north and south of Proposed Route)		None
McLean 1998b	LA 4021	Inglewood	Survey for a telecommunications facility	South of Manchester Boulevard (south of Proposed Route)		None
Scientific Resource Surveys, Inc. 1984	LA 4385	Inglewood	Survey along Arbor Vitae from the 405 Freeway to Prairie Avenue	North of Arbor Vitae (north of the Proposed Route)		None
Smith 2000	LA 5499	Inglewood	Caltrans re-paving of the 405 Freeway	North and south of Arbor Vitae (north and south of the Proposed Route)		None
Stickel 1993	L 2904	Inglewood	Records search for a water basin project	North of Manchester Boulevard (northwest of the Proposed Route)		None
Sylvia 2000	LA 5500	Inglewood	Caltrans improvement of the 110 Freeway	From Manchester Boulevard north to Slauson Avenue (crosses the Proposed Route)		None
Sylvia 2001	LA 5498	Inglewood	Caltrans survey for the widening of an off-ramp from the 405 Freeway	East and west of Manchester Boulevard (north of the Proposed Route)		None
Wlodarski 2001	LA 5196	Inglewood	Survey for a proposed sports center.	North of Florence Avenue (north of the Proposed Route)		None
Wlodarski 2002	LA 6019	Inglewood	Survey for the Casa Figueroa Project	Between Florence Avenue and Manchester Boulevard (north of the Proposed Route)		None
Ashkar & McGowan 1999	LA 4834	South Gate	Survey for a fiber optic cable	Northeast of intersection of Grand Avenue and California Avenue (northeast of Proposed Route)	Historic	
Bonner 2004	LA 7626	South Gate	Survey for a	Southeast of intersection of Otis		None

Table 4-7 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide study area for the proposed route (Cont'd)

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Proposed Alignment	Cultural Resources Recorded in 1.0 Mile Study Area	No Cultural Resources Recorded in 1.0 Mile Study Area
			telecommunications facility	Avenue and Santa Ana Street (southeast of Proposed Route)		
Duke 2002a	LA 5685	South Gate	Survey for a telecommunications facility	South of Firestone Boulevard (south of Proposed Route)		None
Maki 1994	L 3036	South Gate	Survey of 0.66 acre parcel	South of Firestone Boulevard (south of Proposed Route)		None
Mason 2001	LA 5956	South Gate	Survey for a telecommunications facility	North of Firestone Boulevard (north of Proposed Route)		None
McLean 1998a	LA 3980	South Gate	Survey for a telecommunications facility	South of Firestone Boulevard (south of Proposed Route)		None
Peak & Associates 1992	L 2950	South Gate	Survey for a pipeline	Crosses Proposed Route at Firestone Boulevard	Historic	
Scientific Applications International Corp 2000	LA 4836	South Gate	Survey for a fiber optic cable	Crosses Proposed Route at Firestone Boulevard		None
Stickel 1988	L 155	South Gate	Survey for a bikeway	South of Firestone Boulevard (south of Proposed Route)		None
Stickel 1994a	L 3408	South Gate	Records search for Rio Hondo project	North of intersection of Otis Avenue and Santa Ana Street (north of Proposed Route)		None
Stickel 1994b	L 3407	South Gate	Survey for Rio Hondo project	North of intersection of Otis Avenue and Santa Ana Street (north of Proposed Route)		None
SWCA Environmental Consultants	LA 8255	South Gate	Monitoring for a telecommunications project	South of intersection of Otis Avenue and Santa Ana Street (south of Proposed Route)		Unknown
Wlodarski 1992a	L 2577	South Gate	Records search for the Alameda Corridor	Crosses Proposed Route at Firestone Boulevard		None
Wlodarski 1992b	L 2644	South Gate	Survey for the Alameda Corridor	Crosses Proposed Route at Firestone Boulevard		None

Table 4-8 Project Impact analysis LAX north HDD pipeline ROW

Number	Potential Cultural Features	Dimensions (Length x Breadth x Depth)	Possible Tonnage*	Water Depth (Feet)	Distance to ROW (Meters)	Potential Significance**	Potential Impact unless Mitigated ***
Shallow-Water Survey Area							
No. 3	Possible small boat	10.65x3.5x3.07 m (34.94x11.46x10.1 ft)	43	50	1265	Yes	No
No. 16	Possible shipwreck or jetsam	28.65x17.1x1.47 m (94.0x56.1x4.82 ft)	270	50	220	Yes	Yes
No. 18	Possible small boat	5.48x2.05x1.09 m (21.69x7.45x3.56 ft)	6	50	110	No	No
No. 19	Possible small boat.	6.61x2.27x0.88 m (17.96x6.73x2.89 ft)	4	50	90 m	No	No
No. 31	Possible degraded shipwreck	42.0x30.0x1 m (137.8x98.4x3.3 ft)	476	475	1525	Yes	No
No. 40	Possible shipwreck or debris	23.30x18.98 m (76.44x62.27 ft)	51	50	750	Yes	No
No. 44	Possible small boat or other ferromagnetic debris	7.09x3.53 m (23.26x8.3 ft)	2	200	1150	No	No
No. 52	Possible shipwreck	21x10x3 (68.9x32.8x9.84)	237	100	1650	Yes	No
No. 57	Possible shipwreck	34.0x8.0x4.0 (111.55x26.25x13)	404	150	900	Yes	No
No. 61	Possible shipwreck	15x3.5 (49.2x11.5)	6	150	450	No	No
Deep Water Survey Area							
No. 62	Shipwreck	25.3x9.7x3.3 (83x31.8x10.63)	298	1950	200	Yes	Yes
No. 63	Shipwreck (Fugro)	21.0x6.0 (68.9x19.55)	14	2400	750	Yes	No

Table 4-8 Project Impact analysis LAX north HDD pipeline ROW (Cont'd)

Number	Potential Cultural Features	Dimensions (Length x Breadth x Depth)	Possible Tonnage*	Water Depth (Feet)	Distance to ROW (Meters)	Potential Significance**	Potential Impact unless Mitigated ***
No. 64	Shipwreck (Fugro)	20.0x9.0 (65.62x29.53)	21	1200	250	Yes	Yes
No. 65	Shipwreck	14.66x6.03x5.62 (48.1x19.78x18.4)	186	350	500	Yes	No
No. 66	Shipwreck	13.66x3.86x3.82 (44.8x12.7x12.5)	76	1700	400	Yes	No

Notes:

* Note: tons is calculated by length x extreme breadth x draft/94

**Note: Only vessels under 10 tons can be evaluated as insignificant without further research except in cases of loss of life.

***Note: Mitigation may be through avoidance or further investigation.

The avoidance zone for cultural resources in less than 400 ft water depth is 100 m

The avoidance zone for cultural resources in greater than 400 ft water depth is 300 m or more

Table 4-9 Previously recorded onshore cultural resources located within the 1 mile (1.6 km) wide study area for Alternative Route 1, Alternative Route 2, Alternative Route 3, Alternative Route 3 Lateral, and Alternative Route 4

Cultural Resource Number	Cultural Resource Type	Distance to Pipeline	NRHP Eligibility Status
Alternative Route 1 (LAX South northward to proposed Project Route)			
CA-LAN-202	Prehistoric site or Pleistocene shell deposit	0.5 mile (0.8 km)	Site destroyed by previous construction
19-100116	Prehistoric isolate	700 ft (213 m)	Not eligible
Alternative Route 2 (LAX South to proposed Project Route at Arbor Vitae/Prairie)			
CA-LAN-2345	Prehistoric lithic, ceramic, and groundstone scatter; fire-cracked rock	0.2 mile (0.3 km)	Unknown
CA-LAN-2386H	Historic WW II observation bunker	350 ft (107 m)	Unknown
CA-LAN-691	Prehistoric shell midden	300 to 350 ft (91 to 107 m)	Unknown
Alternative Route 3 (Departs proposed Project Route at Arbor Vitae rejoining at Vermont and Manchester)			
19-186740	Historic church – built in 1954	0.3 mile (0.5 km)	Recommended not eligible for the NRHP
Lateral 1 (Alternative 3 to tie into Line 2003 on 104th St)			
19-186739	Historic church – built in 1948	0.5 mile (0.8 km)	Recommended not eligible for the NRHP
Alternative Route 4 (Departs proposed Project Route at Vermont and Manchester to Line 765 tie in)			
19-100430	Historic wooden railroad and ballast	700 ft (213 m)	Unknown
19-002906	Historic refuse deposit	100 ft (30 m)	Unknown
19-186110	Historic Union Pacific Railroad	Crossed by proposed pipeline	Recommended eligible for the NRHP. The methodology for all crossings will be evaluated and selected during the FEED phase of the Project.
19-002839H	Historic refuse deposit	800 ft (244 m)	Buried under existing development
19-002840H	Historic brick foundation	0.5 mile (0.8 km)	Unknown
19-002845H	Historic refuse deposit	800 ft (244 m)	Unknown
19-002844H	Historic refuse deposit	800 ft (244 m)	Unknown
19-002843H	Historic refuse deposit	0.2 mile (0.3 km)	Unknown
19-002842H	Historic refuse deposit	0.3 mile (0.5 km)	Unknown
19-002854	Historic septic tank	0.5 mile (0.8 km)	Impacted by previous construction
19-186742	Historic building – built in the late 1920s	600 ft (183 m)	Recommended not eligible for the NRHP
Key: km = Kilometer; m = meter; NRHP = National Register of Historic Places.			

Table 4-10 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide onshore study area for Alternative Route 1, Alternative Route 2, Alternative Route 3, Alternative Route 3 Lateral, and Alternative 4

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Alignment	Cultural Resources Recorded in 1.0 Mile Study Area
Avina 2001	LA-5536	Venice	Monitor construction for fiber optics build	South of Imperial Highway (south of Alternative Route 2)	
Bunse & Mikesell 2000	LA 6240	Venice	Survey of built environment	East of Trask Avenue (east of Alternative Route 1)	
Duke 1999b	LA 4647	Venice	Survey for a telecommunications facility	South of Imperial Highway (south of Alternative Route 2)	
Duke 2002b	LA 5710	Venice	Survey for a telecommunications facility	South of Imperial Highway (south of Alternative Route 2)	
Lapin 2000a	LA 4860	Venice	Survey for a telecommunications facility	South of Imperial Highway (south of Alternative Route 2)	
Leonard n.d.	L 96	Venice	Survey of LAX	East of Alternative Route 1, north of Alternative Route 2	Prehistoric
McKenna 2002a	LA 5709	Venice	Survey for a telecommunications facility	South of Imperial Highway (south of Alternative Route 2)	
Raschke et al. 1995	LA 4910	Venice	Survey of LAX	West of Alternative Route 1, north of Alternative Route 2	Prehistoric & historic
Wesson et al. 2000	LA 6239	Venice	Survey of El Segundo Power Plant	East of Trask Avenue (east of Alternative Route 1)	
Wlodarski 1987	L 309	Venice	Survey of various parcels	South of Imperial Highway (south of Alternative Route 2)	
Wlodarski 1992c	L 2659	Venice	Survey of Sepulveda Tunnel	East of Alternative Route 1, north of Alternative Route 2	
Duke 2003	LA 6228	Inglewood	Survey for a telecommunications facility	Northwest of Florence Avenue (Northwest of Alternative Route 4)	
Duke & Marvin 2002a	LA 6015	Inglewood	Survey for a telecommunications facility	South of Century Boulevard (southeast of Alternative Route 4)	

Table 4-10 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide onshore study area for Alternative Route 1, Alternative Route 2, Alternative Route 3, Alternative Route 3 Lateral, and Alternative 4 (Cont'd)

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Alignment	Cultural Resources Recorded in 1.0 Mile Study Area
Duke & Marvin 2002b	LA 6045	Inglewood	Survey for a telecommunications facility	North of Century Boulevard (north of Alternative Route 4)	
Lapin 2000b	LA 5107	Inglewood	Survey for a telecommunications facility	North of Imperial Highway (North of Alternative Route 2)	
Maki 1995	L 3245	Inglewood	Survey of 0.24 acre parcel	North of Imperial Highway and west of Prairie Avenue (north and west of Alternative Route 2)	
Maki 2000	LA 5105	Inglewood	Survey of 1.34 acres parcel	South of Century Boulevard (south of Alternative Route 3)	
Marvin & Duke 2002	LA 7068	Inglewood	Survey for a telecommunications facility	South of Florence Avenue (south of Alternative Route 4)	
Michalsky 2000	LA 6032	Inglewood	Survey for a telecommunications facility	North of Imperial Highway (north and west of Alternative Route 2)	
Rosen 1975	L 78	Inglewood	Department of Transportation survey	South of and crosses Imperial Highway (south of and crosses Alternative Route 2)	
San Buenaventura Research Associates 1997	LA 3648	Inglewood	Survey of two small parcels	West of Vermont Avenue (west of Alternative Route 3)	
Sylvia 2000	LA 5500	Inglewood	Caltrans improvement of the 110 Freeway	North and south of Florence Avenue (crosses Alternative Route 4)	
Wlodarski 2002	LA 6019	Inglewood	Survey for the Casa Figueroa Project	South of Florence Avenue (south of Alternative Route 4)	
Ashkar & McGowan 1999	LA 4834	South Gate	Survey for a fiber optic cable	Northeast of intersection of Grand Avenue and California Avenue (northeast of Alternative Route 4)	Historic

Table 4-10 Cultural resource investigations conducted onshore within the 1 mile (1.6 km) wide onshore study area for Alternative Route 1, Alternative Route 2, Alternative Route 3, Alternative Route 3 Lateral, and Alternative 4 (Cont'd)

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Alignment	Cultural Resources Recorded in 1.0 Mile Study Area
Conejo Archaeological Consultants 1999	LA 4470	South Gate	Survey of 0.65 acre parcel	South of Florence Avenue (south of Alternative Route 4)	
Duke 2001c	LA 7046	South Gate	Survey for a telecommunications facility	North of Florence Avenue (north of Alternative Route 4)	
Duke 2001a	LA 4976	South Gate	Survey for a telecommunications facility	North of Florence Avenue (north of Alternative Route 4)	
Duke 2001b	LA 5950	South Gate	Survey for a telecommunications facility	North of Florence Avenue (north of Alternative Route 4)	
Duke 2002d	LA 6225	South Gate	Survey for a telecommunications facility	South of Grand Avenue (south of Alternative Route 4)	
Maki 1997	LA 3694	South Gate	Survey of 4.26 acres parcel	North of Florence Avenue (north of Alternative Route 4)	
Maki 2003	LA 7059	South Gate	Survey of 1.64 acres parcel	North of Florence Avenue (north of Alternative Route 4)	
Peak & Associates 1992	L 2950	South Gate	Survey for a pipeline	Crosses Alternative Route 4 at Florence Avenue	Historic
Scientific Applications International Corp 2000	LA 4836	South Gate	Survey for a fiber optic cable	Crosses Alternative Route 4 at Florence Avenue	
Wells 1996	LA 5577	South Gate	Survey for a park	South of Florence Avenue (south of Alternative Route 4)	
Wlodarski 1992a	L 2577	South Gate	Records search for the Alameda Corridor	Crosses Alternative Route 4 at Florence Avenue	
Wlodarski 1992b	L 2644	South Gate	Survey for the Alameda Corridor	Crosses Alternative Route 4 at Florence Avenue	

Table 4-11 Vessels report lost within 5 miles of AES Alternative Route

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names]	Built	Lost	Day/Month	Rig/Service	Tons	Length	Breadth	Depth	Situation	Location	NAD 27 Degrees Latitude	NAD 27 Minutes Latitude	NAD 27 Seconds Latitude	NAD 27 Degrees Longitude	NAD 27 Minutes Longitude	NAD 27 Seconds Longitude
503587			4		2002 X	1944	1973	907	Steel Brg.	45				Foundered	In Pacific about 9miles SW of Dana Point						
209142			4		Atlas	1911	1944	1018	Ga.S.	14				Explosion	Newport Beach						
	37		2	D	Bachelor Boy		1923		Ga.S.	45					Between Newport and Long Beach	33	38		118	3	
255959			4		Bluefin	1944	1953		Ol.S.	11				Stranded	1 mi NW of Huntington Beach, California						
230810	55		3	E	Brodie	1931	1965	411	Ol.S.	194				Burned	About 1/8mi N of Frog Rock, Catalina Isl.	33	28		118	0	
	71	R/R	2	E	City of Lille		1930	219							Newport Beach	33	36		117	54	
253211			4		Cookie	1943	1952	802	Ga.S.	10				Foundered	About 1.5 miles SW of Huntington Beach Pier						
212971			4		Crescent	1915	1952	828	Ol.S.	21				Foundered	Approximately 5 mi. due W of Huntington Beach						
225962			4		Crusier No. 2	1926	1951	428	Ga.S.	12				Foundered	At Huntington Beach						
550835			4		Curlew	1973	1979	1120	Ol.S.	6				Cause unknown	5 miles W of Newport Beach						
233868			4		Don Juan	1935	1975	417	Ol.S.	111				Foundered	Pacific	33	34		117	58	
	607		2	E	Einora		1872	401	Schr					Washed ashore	At Newport Beach						
273072	105		3	D	Elsie I	1943	1951	429	Brg.	79				Foundered	241 Deg. from end of Huntington Beach Pier, 3.5 mi offshore	33	37		118	4	
	116		2	D	Esther Buhne	1887	1927	213	Schn	287					Newport Beach	33	36		117	55	
	611		E	2	Evanger		1924								Near Newport Beach						
253809			4		Helena (Also 257809 listed)	1944	Unk.		Ol.S.	14				Foundered	At Newport Beach						
566849			4		HT II	1945	1978	906	Brg.	1479				Foundered	Off Dana Point						
226825			4		Ione	1927	1932	716	Ol.S.	11				Foundered	Off Newport Beach						
			4		John and Samuel	Unk.	1885	3	Sch. 2-mstd.					Wrecked	Newport						
247091			4		Jubilee	1944	1966	907	Ol.S.	20				Stranded	About 1250 yards 0921 magnitude off the E Jetty Light, Newport Beach						
214735			4		Jupiter	1915	1925	122	Ga.S.	13				Burned	Huntington Beach						
168310			4		K & K No. 2	1918	1934	1018	Brg.	73				Driven ashore	Huntington Beach						
234995	172		2	E	Kingfisher	1936	1938	709	Ol.S.	131				Stranded	Near Newport Harbor	33	35		117	55	
262117			4		Little Dixie II	1944	1956	601	Ol.S.	10				Foundered	In the channel off 26th Street Newport Beach						

Table 4-11 Vessels report lost within 5 miles of AES Alternative Route (Cont'd)

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names]	Built	Lost	Day/Month	Rig/Service	Tons	Length	Breadth	Depth	Situation	Location	NAD 27 Degrees Latitude	NAD 27 Minutes Latitude	NAD 27 Seconds Latitude	NAD 27 Degrees Longitude	NAD 27 Minutes Longitude	NAD 27 Seconds Longitude
140479	192		2/3	E	Lottie Carson	1881	1940		Schr./3Mstd/refit (list 272, 286 tons)	295 244Net	127.3	32.8	8.8		Los Angeles	33	40		118	5	
553381			3		Mary Sue	1973	1977	1009	Ol.S.	198					Pacific	33	25		117	55	
220666			4		Mikado	1920	1933	9	Ga.y	30				Burned	Laguna Beach						
324444			4		Miss Pam	1969	1974	525	Ol.S.	31				Stranded	At Newport Beach						
214352			4		Motorite	1916	1951	809	Ga.S.	26				Stranded	Off Newport Jetty, Newport Beach						
167310			4		N & K No. 2	1918	1934	1018		73				Burned	Drifted ashore at Huntington Beach						
235463	223		2	E	New Saturina	1936	1955	1114	Ol.S.	116				Foundered	2.5 miles W of Dana Point						
	233		2	D	NSK No.2	1918	1934	1018	Brg.	73					Huntington Beach	33	37		118	1	
	704		2	E	Oakwood		1933	1016	Wood/Ga.S./Rumrunner					Wrecked	At 3 Arch Cove, Laguna - USCG seized liquor						
260332			4		Ramona II	1941	1959	226	Ol.S.	12				About 100 yds N of Pier, Laguna Beach	Laguna Beach						
260332			4		Ramona II	1941	1959	226	Ol.S.	12				About 100 yds N of Pier, Laguna Beach	Laguna Beach						
	311		2	E	Silver Wave		1936	218							Off Newport Beach	33	35		117	54	
			4		Solano	1868	1871	909	Sch.					Went ashore, total loss	Off Newport Bar						
260857			4		Spindrift	1950	1964	1031	Ga.S.	19				Stranded	About 1/2 mile S of Crystal Cove, Newport Beach						
227792			4		Thetis	1928	1938	1101	Ga.y.	30				Burned	Newport Harbor						
209756	340		2	E	Tillicum	1912	1943	1019	Ga.S.	12					Mouth of Santa Ana River, Newport Beach	33	37		117	56	
274491			3		Tradewind	1957	1972	1005	Ol.S.	14				Stranded	9 miles from Newport Beach, California jetty						
212990			4		Twinn XX	1915	1927	815	Ga.S.	13				Burned	Newport Beach						
	571	P	3	D	Unknown				Large Aircraft						Los Angeles	33	35		118	5	
	501	R/R	3	A	Unknown				Brg.						Long Beach	33	39	42	118	3	31
	461		4	A	Unknown				Freighter							33	37	0	117	58	53
			4	A	Unknown				Unclassified Obstruction							33	12	3.7	117	54	4.82
	462		4	A	Unknown				Freighter							33	37	12	117	59	18

Table 4-11 Vessels report lost within 5 miles of AES Alternative Route (Cont'd)

Merchant Vessel Registry No.	BLM No.	Status	Significance	Accuracy of Location	Vessel Name [Former Names]	Built	Lost	Day/Month	Rig/Service	Tons	Length	Breadth	Depth	Situation	Location	NAD 27 Degrees Latitude	NAD 27 Minutes Latitude	NAD 27 Seconds Latitude	NAD 27 Degrees Longitude	NAD 27 Minutes Longitude	NAD 27 Seconds Longitude
			4	A	Unknown Wreckage				Engine block and wreck debris						LA/LB Harbor	33	39	29	118	3	38
	365	R/R	3	E	US Saratoga										Huntington Beach	33	39		118	1	
			4	A	Wreck				Submerged Wreck, Dangerous							33	37	30	117	59	54
229952	400		2	C	Yours Truly	1930	1934	325	Ga.Y.	51				Burned	Balboa, Newport Beach	33	36		117	54	

Table 4-12 Previously recorded cultural resources located within the 1 mile (1.6 km) wide study area for the AES Alternative DWP and associated onshore pipeline route

Site Number	Site Type	Distance to Pipeline	Eligibility Status
CA-ORA-358	Prehistoric campsite	0.5 mile (0.8 km)	Destroyed by housing development
CA-ORA-183	Prehistoric artifact scatter/Historic cemetery	0.4 mile (0.6 km)	Destroyed by housing development
CA-ORA-282	Prehistoric cemetery	0.2 mile (0.3 km)	Destroyed by housing development
CA-ORA-283	Prehistoric campsite	400 ft (122 m)	Destroyed by housing development
CA-ORA-356	Prehistoric shell midden	800 ft (244 m)	Destroyed by housing development
CA-ORA-302	Prehistoric shell midden	0.2 mile (0.3 km)	Destroyed by housing development
CA-ORA-145	Prehistoric shell midden	400 ft (122 m)	Site preserved as an open space within a housing development
CA-ORA-296	Prehistoric milling site	0.2 mile (0.3 km)	Destroyed by housing development
CA-ORA-492	Prehistoric shell midden	500 ft (152 m)	Destroyed by road construction
CA-ORA-816	Prehistoric shell midden	500 ft (152 m)	Impacted by industrial construction
30-161830	Historic Walker Residence – built in 1922	0.3 mile (0.5 km)	Recommended eligible for the NRHP
30-176647	Historic restaurant – built in 1954	500 ft (152 m)	Recommended not eligible for the NRHP
30-176648	Historic residence	500 ft (152 m)	Recommended not eligible for the NRHP
30-176649	Historic commercial building – built in 1955	200 ft (61 m)	Recommended not eligible for the NRHP
30-176650	Historic residence – built circa 1927	300 ft (91 m)	Recommended not eligible for the NRHP
30-176651	Historic residence – originally built in 1943; currently a Christian Fellowship Center	500 ft (152 m)	Recommended eligible for the NRHP
30-176652	Historic residence – built in 1913	500 ft (152 m)	Recommended not eligible for the NRHP
30-176653	Historic building – built circa 1924	550 ft (168 m)	Recommended not eligible for the NRHP
30-176657	Historic residence – built in 1921	600 ft (183 m)	Recommended not eligible for the NRHP
30-176658	Historic duplex – built in 1956	300 ft (91 m)	Recommended not eligible for the NRHP
30-176659	Historic residence – built circa 1913	500 ft (152 m)	Recommended not eligible for the NRHP

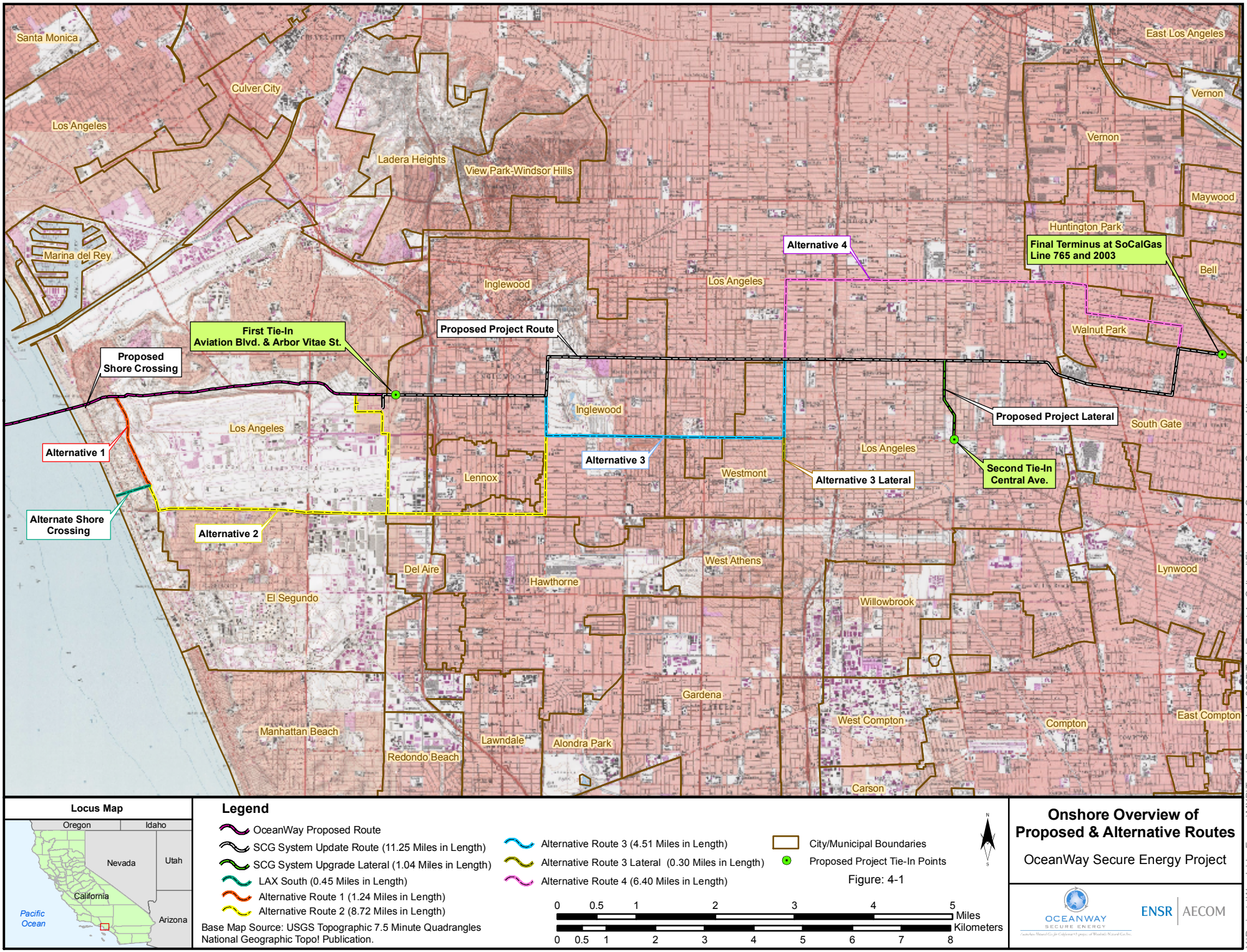
Table 4-12 Previously recorded cultural resources located within the 1 mile (1.6 km) wide study area for the AES Alternative DWP and associated onshore pipeline route (Cont'd)

Site Number	Site Type	Distance to Pipeline	Eligibility Status
30-176660	Historic residence – built circa 1954	500 ft (152 m)	Recommended not eligible for the NRHP
30-001598	Historic refuse deposit	Adjacent to the proposed pipeline	Destroyed by previous construction
CA-ORA-1030H	Historic cistern	0.2 mile (0.3 km)	Site may be destroyed
CA-ORA-1031H	Historic features	0.3 mile (0.5 km)	Excavated during previous construction
CA-ORA-1374H	Historic paved road	0.2 mile (0.3 km)	Converted into paved parking lot
CA-ORA-1375H	Historic residence – occupied in the late 1800s to mid-1900s	0.2 mile (0.3 km)	Archaeologically excavated
CA-ORA-1376H	Historic residence – occupied in late 1800s to mid-1900s	0.2 mile (0.3 km)	Archaeologically excavated
CA-ORA-1377H	Historic residence – occupied in late 1800s to mid-1900s	0.2 mile (0.3 km)	Archaeologically excavated
CA-ORA-1378H	Historic residence – occupied in late 1800s to mid-1900s	0.2 mile (0.3 km)	Archaeologically excavated
CA-ORA-1379H	Historic residence – occupied in late 1800s to mid-1900s	0.2 mile (0.3 km)	Archaeologically excavated
CA-ORA-1380H	Historic residence – occupied in late 1800s to mid-1900s	0.2 mile (0.3 km)	Archaeologically excavated
30-176575 to 30-176589	15 Historic residences – built between 1925 and 1948	0.2 to 0.3 mile (0.3 to 0.5 km)	Unevaluated
30-176756	Historic Craftsman house – built in 1907	0.3 mile (0.5 km)	Recommended eligible for the NRHP and CRHR
30-176535	Historic pump house	500 ft (152 m)	Recommended not eligible for the NRHP
Key: CRHR = California Register of Historical Resources; NRHP = National Register of Historic Places.			

Table 4-13 Cultural resource investigations conducted within the 1 mile (1.6 km) wide study area for the AES Alternative DWP and associated onshore pipeline route

Author/Date	File #	USGS Quadrangle	Type of Investigation	Relation to Alignment	Cultural Resources Recorded in 1.0 Mile Study Area
Ahlering 1973	OR 1	Newport Beach	Site inventory for Huntington Beach	Includes recorded sites within 0.5 mile along Newland Street	Prehistoric
Archaeological Associates 1978	O 202	Newport Beach	1 acre survey	East of Newland Street	
Billat 2000	OR 2769	Newport Beach	Survey for a telecommunications facility	North of W First Street	
Bissell 1985b	OR 1993	Newport Beach	Historic building evaluation along Bristol Street	South of W First Street	Historic
Bissell 1986	O 846	Newport Beach	Survey along Bristol Street	North of W First Street	
Bissell & Raschke 1985	O 789	Newport Beach	Survey along Bristol Street	South of W First Street	
Desautels & Roeder 1978	O 326	Newport Beach	Pipeline survey	Includes portions of Newland Street & other areas.	Prehistoric
Duke 1999d	OR 2000	Newport Beach	Records search for a telecommunications facility	South of W First Street	
Duke 1999e	OR 2001	Newport Beach	Records search for a telecommunications facility	South of W First Street	
Duke 2000e	OR 2229	Newport Beach	Survey for a telecommunications facility	East of Newland Street	
Duke 2001d	OR 2226	Newport Beach	Survey for a telecommunications facility	East of Newland Street	

Figures


Santa Monica
Culver City
Los Angeles
Ladera Heights
View Park-Windsor Hills
East Los Angeles
Vernon
Vernon
Maywood
Huntington Park
Bell
Marina del Rey
Inglewood
Los Angeles
Walnut Park
Alternative 4
Final Terminus at SoCalGas Line 765 and 2003
First Tie-In Aviation Blvd. & Arbor Vitae St.
Proposed Project Route
Proposed Shore Crossing
Inglewood
Proposed Project Lateral
South Gate
Los Angeles
Alternative 1
Alternative 3
Los Angeles
Lennox
Westmont
Alternative 3 Lateral
Second Tie-In Central Ave.
Alternate Shore Crossing
Alternative 2
West Athens
Lynwood
Del Aire
Hawthorne
El Segundo
Willowbrook
Gardena
Manhattan Beach
Lawndale
Alondra Park
West Compton
Compton
East Compton
Redondo Beach
Carson
Locus Map
Oregon
Idaho
Nevada
Utah
California
Arizona
Pacific Ocean
Legend
OceanWay Proposed Route
SCG System Update Route (11.25 Miles in Length)
SCG System Upgrade Lateral (1.04 Miles in Length)
LAX South (0.45 Miles in Length)
Alternative Route 1 (1.24 Miles in Length)
Alternative Route 2 (8.72 Miles in Length)
Alternative Route 3 (4.51 Miles in Length)
Alternative Route 3 Lateral (0.30 Miles in Length)
Alternative Route 4 (6.40 Miles in Length)
City/Municipal Boundaries
Proposed Project Tie-In Points
Figure: 4-1
0 0.5 1 2 3 4 5 Miles
0 0.5 1 2 3 4 5 6 7 8 Kilometers
Base Map Source: USGS Topographic 7.5 Minute Quadrangles National Geographic Topo! Publication.
Onshore Overview of Proposed & Alternative Routes
OceanWay Secure Energy Project
OCEANWAY SECURE ENERGY
ENSR | AECOM
Y:\Projects\Woodside_Energy\MXD\Topic_Reports_July_2007\Topic Report 4 - Cultural\Figure_4-1_Onshore_Overview_Alternative_Routes.mxd

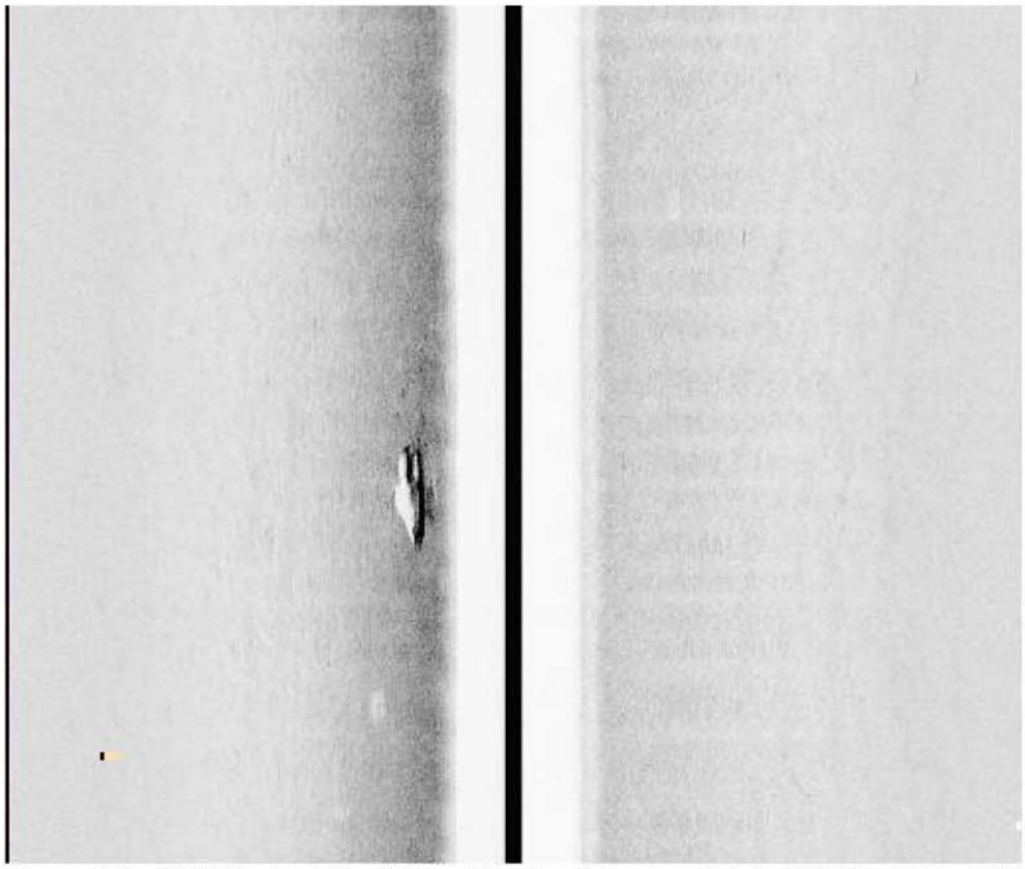


Figure 4-2. SSS Contact No. 3 Possible Small Boat or Debris (10.65 x 3.5 x 3.07-m)/ Magnetomer Anomaly No. 3 (84.9 nT dipolar)

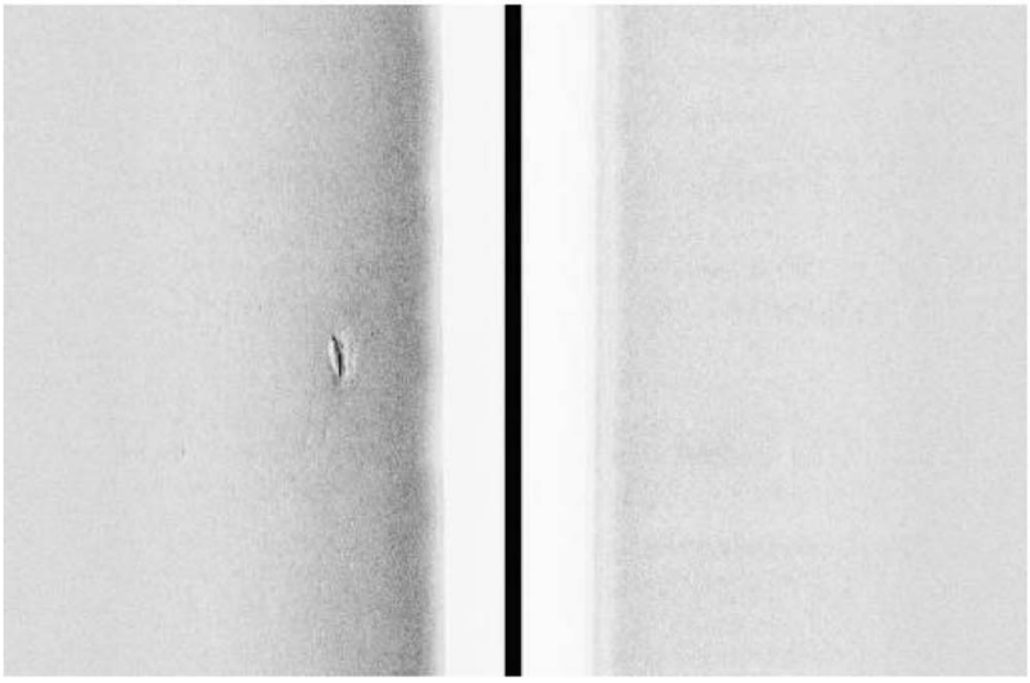


Figure 4-3. SSS Contact No. 7 Possible Small Boat or Debris (7.5x2.7x0.6-m).

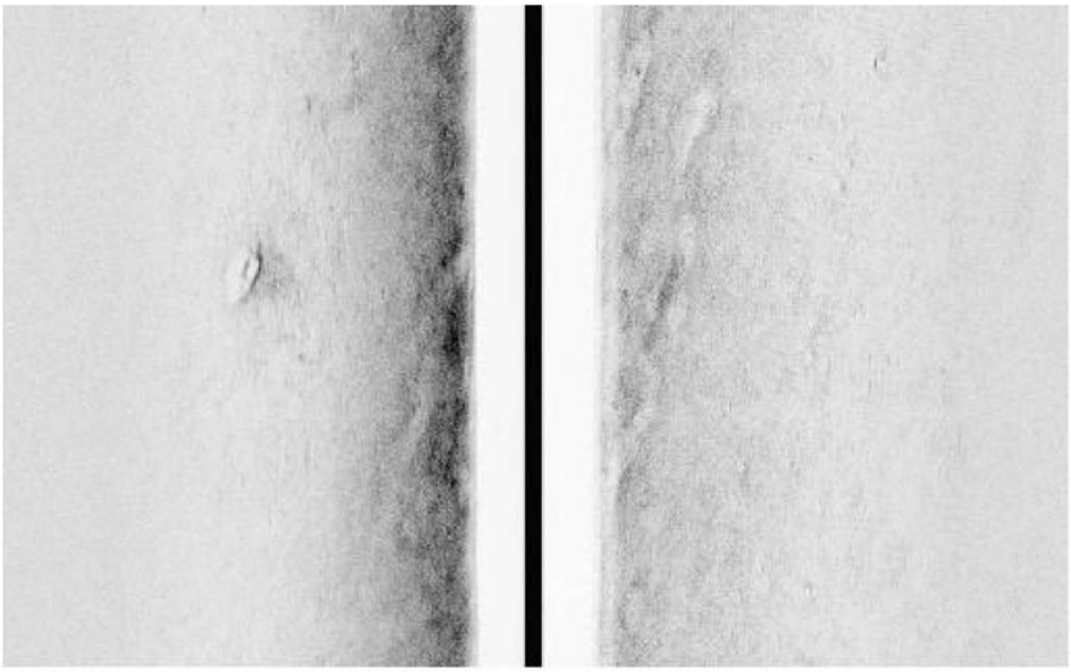


Figure 4-4. SSS Contact No. 7 Possible Small Boat or Debris (7.98x3.7x2.25-m.)

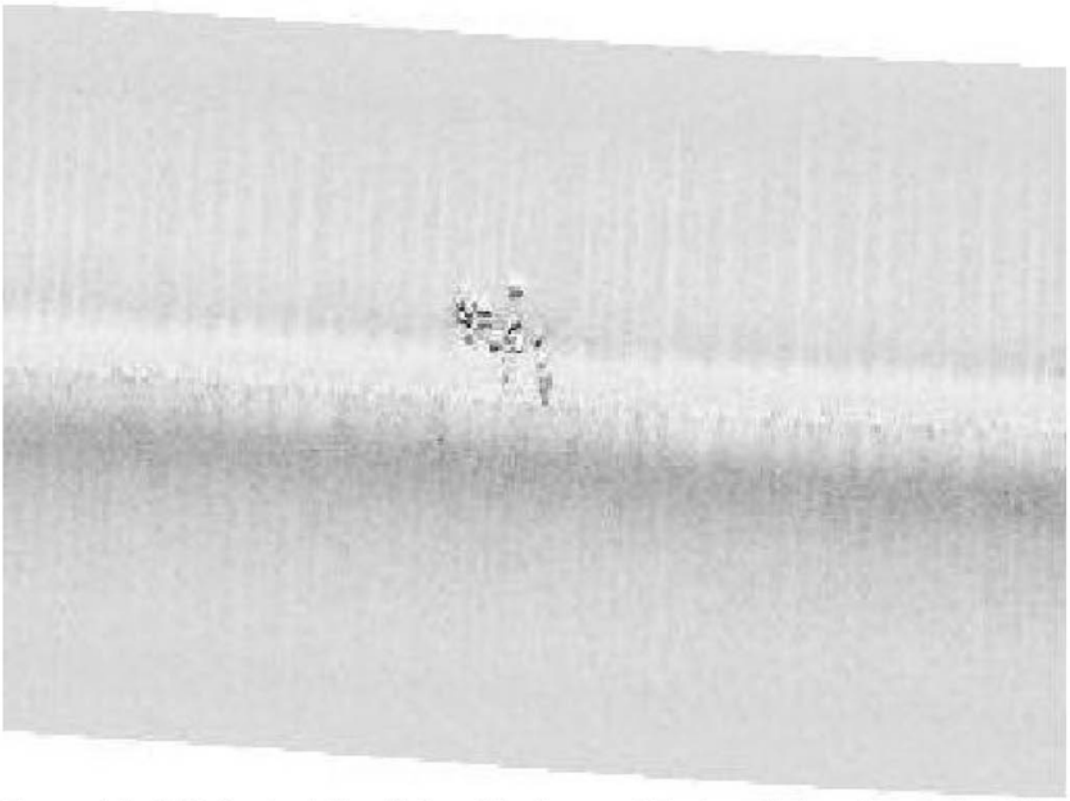


Figure 4-5. SSS Contact No. 16 Possible Dumped Feature (Jetsam) or Ballast Pile (28.85 x 17.1 x 1.47-m)

Figure 4-4 and 4-5

SSS CONTACT

OceanWay Secure Energy

OCEANWAY SECURE ENERGY ENSR | AECOM