IV. ENVIRONMENTAL IMPACT ANALYSIS
A. EARTH

1.0 INTRODUCTION

This section addresses the potential impacts of the Proposed Project on earth resources, including grading, erosion/sedimentation, dewatering, subsidence, seismic hazards, tsunami/seiches, liquefaction, slope stability, and other geologic conditions. The analysis describes the regulatory setting, the existing above-ground features of the Proposed Project site, including man-made structures and natural and man-made landforms, and the local and regional context for below-ground surface (geological and geotechnical) characteristics. The impacts are addressed in terms of whether implementation of the Proposed Project would result in significant risks to people or structures on-site or would cause a geologic impact to other properties by causing or accelerating instability from erosion or result in sediment runoff or deposition which could not be contained on-site. Issues related to earth, but discussed in detail in other sections include groundwater, which is more fully described in Section IV.C.(2), Water Quality, soil gases (including methane, BTEX, and hydrogen sulfide) and soil/groundwater contamination from past activities at, and adjacent to, the Proposed Project site, which are more fully described in Section IV.I, Safety/Risk of Upset. The analysis addresses the impacts that would occur for the Project as proposed, for the Project's Equivalency Program, and for the Project's secondary impacts that would occur from the implementation of the Project's off-site mitigation measures.

2.0 ENVIRONMENTAL SETTING

2.1 Regulatory Framework

2.1.1 State Level

The Alquist-Priolo Geologic Hazards Zone Act was enacted by the State of California in 1972 to address the hazard and damage caused by surface fault rupture during an earthquake. The Act has been amended ten times and renamed the Alquist-Priolo Earthquake Fault Zoning Act, effective January 1, 1994. The Act requires the State Geologist to establish "earthquake fault zones" along known active faults in the state. Cities and counties that include earthquake fault zones are required to regulate development projects within these zones.

The Seismic Hazard Mapping Act of 1990 was enacted, in part, to address seismic hazards not included in the Alquist-Priolo Act, including strong ground shaking, landslides, and liquefaction. Under this Act, the State Geologist is assigned the responsibility of identifying and mapping seismic hazards zones.

The State Seismic Safety Commission was established by the Seismic Safety Commission Act in 1975 with the intent of providing oversight, review, and recommendations to the Governor and State Legislature regarding seismic issues. The Commission has recently completed a review of the 1994 Northridge earthquake and has provided recommendations for changes in current laws.

2.1.2 County Level

In October 1998, the Los Angeles County Board of Supervisors voted to direct the Office of Emergency Management of the Chief Administrative Office, in conjunction with all affected County Departments and other public and private agencies, to research, develop, and issue a Tsunami Emergency Response Plan, which applies to all coastal areas within the County, including both incorporated cities (i.e., City of Los Angeles, where the Proposed Project is located) and unincorporated areas. While this plan is being developed by the County Office of Emergency Management, the County has issued an interim emergency response plan for tsunami operations within the Los Angeles County Operational Area. This interim plan addresses the risks and emergency response activities associated with a tsunami event, the main conclusions of which are summarized below.

Depending on the magnitude of the tsunami, coastal areas of the County could be inundated, most notably along Santa Monica Bay. Areas potentially affected include Long Beach, Palos Verdes, Redondo Beach, Hermosa Beach, Manhattan Beach, Marina del Rey, Venice, and Santa Monica. Continued development in areas exposed to coastal inundation has increased the risk of property damage and loss of life from future tsunamis. While historical geologic evidence suggests a threat of tsunami is greater in Alaska, Hawaii, and the northern coastal areas of California, the same evidence indicates a potential for events impacting Southern California.

Although not probable, the County interim tsunami plan assumes a worst-case scenario to ensure the maximum level of preparation for such an event. This plan stresses multi-agency, multi-disciplinary coordination to effectively respond to a tsunami event and outlines activities and responsibilities for all involved parties or agencies at several stages during the emergency response scenario. The sequence of operational activities during a tsunami response would include the Alert Phase, Warning Phase, Evacuation Phase, and Damage Assessment Phase, and would involve emergency public information throughout all phases. The County Sheriff's Department is responsible for implementation of the plan activities, including evacuation and coordination of related services and agencies, while the County Office of Emergency

Management is responsible for updating and maintaining the plan itself. The plan calls for specific responsibilities for particular agencies during a tsunami event, including the County Fire Department, Department of Public Works, Internal Services Department, Department of Health Services, Department of Public Social Services, the American Red Cross, various cities' agencies, and the Los Angeles County Operational Area Organizational Matrix.

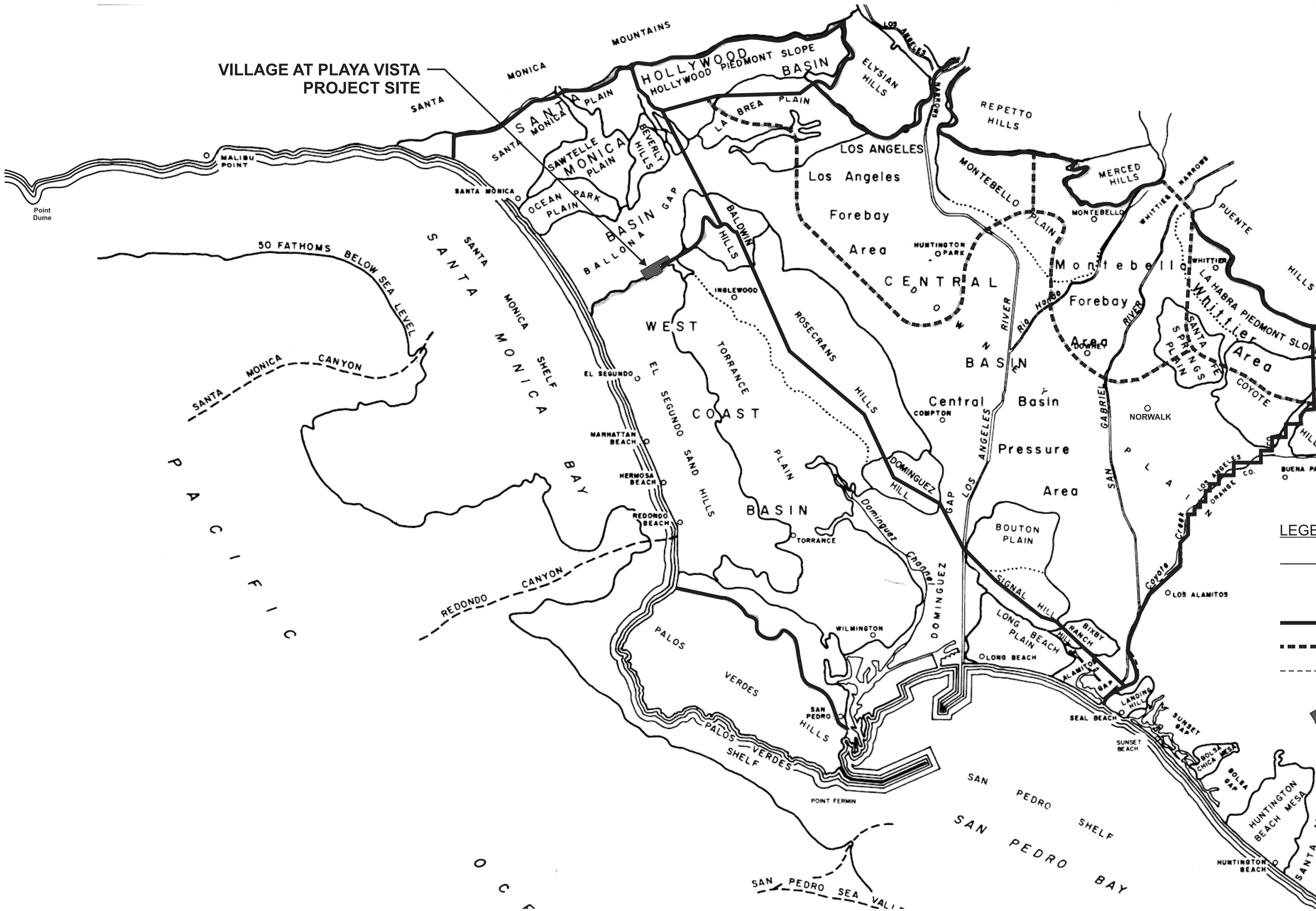
2.1.2 Local Level

The City's primary seismic regulatory document is the Safety Element of the City of Los Angeles General Plan (1996). The objective of the Safety Element is to better protect occupants and equipment during various types and degrees of seismic events. In the Safety Element, specific guidelines are included for the evaluation of liquefaction, tsunamis, seiches, non-structural elements, fault rupture zones, and engineering investigation reports. The City's Emergency Operations Organization (EOO) helps to administer certain policies and provisions of the Safety Element. The EOO is a City department comprised of all City agencies, pursuant to City Administrative Code, Division 8, Chapter 3. The Administrative Code, EOO Master Plan and associated EOO plans establish the chain of command, protocols and programs for integrating all of the City's emergency operations into one unified operation. Each City agency in turn has operational protocols, as well as plans and programs, to implement EOO protocols and programs. A particular emergency or mitigation triggers a particular set of protocols which are addressed by implementing plans and programs. The City's emergency operations program encompasses all of these protocols, plans and programs. Therefore, its programs are not contained in one comprehensive document. The Safety Element goals, objectives and policies are broadly stated to reflect the comprehensive scope of the EOO. As pertains to tsunamis and other flood hazards, the Safety Element refers to the City's Flood Hazard Specific Plan, which addresses areas adjacent to hazards, agency involvement and coordination, and procedures to be implemented during an emergency.

Other City regulatory documents that affect earth resources include the City Building Code and City Grading Standards. These documents include specific requirements for seismic design, slope stability, grading, foundation design, geologic investigations and reports, soil and rock testing, and groundwater. The City Department of Building and Safety is responsible for implementing the provisions of the Building Code and Grading Standards.

2.2 Existing Conditions

Regionally, the Proposed Project site is located in the Los Angeles Coastal Plain, and locally, within the Ballona Gap, an ancient floodplain. The Los Angeles Coastal Plain and other regional geological features are shown in Figure 12 on page 208. In the subsections below, the regional context and local conditions are described separately under each topical heading.



LEGEND

- BOUNDARY BETWEEN PHYSIOGRAPHIC FEATURES (DOTTED WHERE APPROXIMATE OR POORLY DEFINED)
- BOUNDARY OF GROUNDWATER BASIN
- BOUNDARY OF FOREBAY AND WHITTIER AREA
- AXIS OF SUBMARINE CANYON
- PROPOSED VILLAGE AT PLAYA VISTA

Scale: NTS

SOURCE: CALIFORNIA DEPARTMENT OF WATER RESOURCES, GROUNDWATER GEOLOGY OF THE COASTAL PLAIN OF LOS ANGELES COUNTY, PHYSIOGRAPIC FEATURES AND GROUNDWATER BASINS.

CDM

Figure 12
Regional Geologic Features

2.2.1 Geology

2.2.1.1 Regional Conditions

The Proposed Project site is located in the Los Angeles Coastal Plain within the Peninsular Ranges Geomorphic Province of California.[13] The Peninsular Ranges Province is characterized by northwest trending ranges and valleys that extend south from the Los Angeles Basin into Baja California. The Peninsular Ranges extend approximately 80 miles offshore to the west and are truncated on the north by the Transverse Ranges, an east-west trending series of mountains that include the Santa Monica and San Gabriel Mountains.

The regional geology of the Los Angeles Coastal Plain reflects both structural and stratigraphic complexities resulting from a long depositional history interrupted by large-scale earth movements. Both the Peninsular Ranges and Transverse Ranges Provinces were affected simultaneously by large-scale deformation (earth processes resulting in folding and faulting of rock units).[14]

In general, the geology in the vicinity of the Proposed Project site consists of Jurassic Age (190 million years old) basement schist (metamorphic rock type) which is unconformably overlain (i.e., a break in continuity of rock strata usually resulting from erosional processes) by Tertiary (65 million years old) marine and river sediments consisting of shales, siltstones, claystones, sands, and gravels approximately 6,500 feet thick. Tertiary sediments are overlain by the Lower Pleistocene (two million years old) San Pedro Formation that is comprised primarily of marine and fluvial (river) deposits of silt, sand, and gravel approximately 300 feet thick. The upper portion of the San Pedro Formation is referred to as Palos Verdes Sands (see Section IV.P.(1), Paleontological Resources, for a detailed discussion). Holocene Alluvium (also referred to as Recent Age Alluvium - deposited within approximately the last 11,000 years) and sand dune deposits of lagoonal and fluvial origin represent surface deposits approximately 100 feet thick.[15] A typical cross-section for the Proposed Project site is shown in Figure 13 on page 210.

[13] *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, page 2.2.*

[14] *California Department of Water Resources, "Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County," Appendix A, Ground Water Geology, Bulletin 104, 1961, page 8.*

[15] *California Department of Water Resources, "Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County," Appendix A, Ground Water Geology, Bulletin 104, 1961, pages 123-125.*

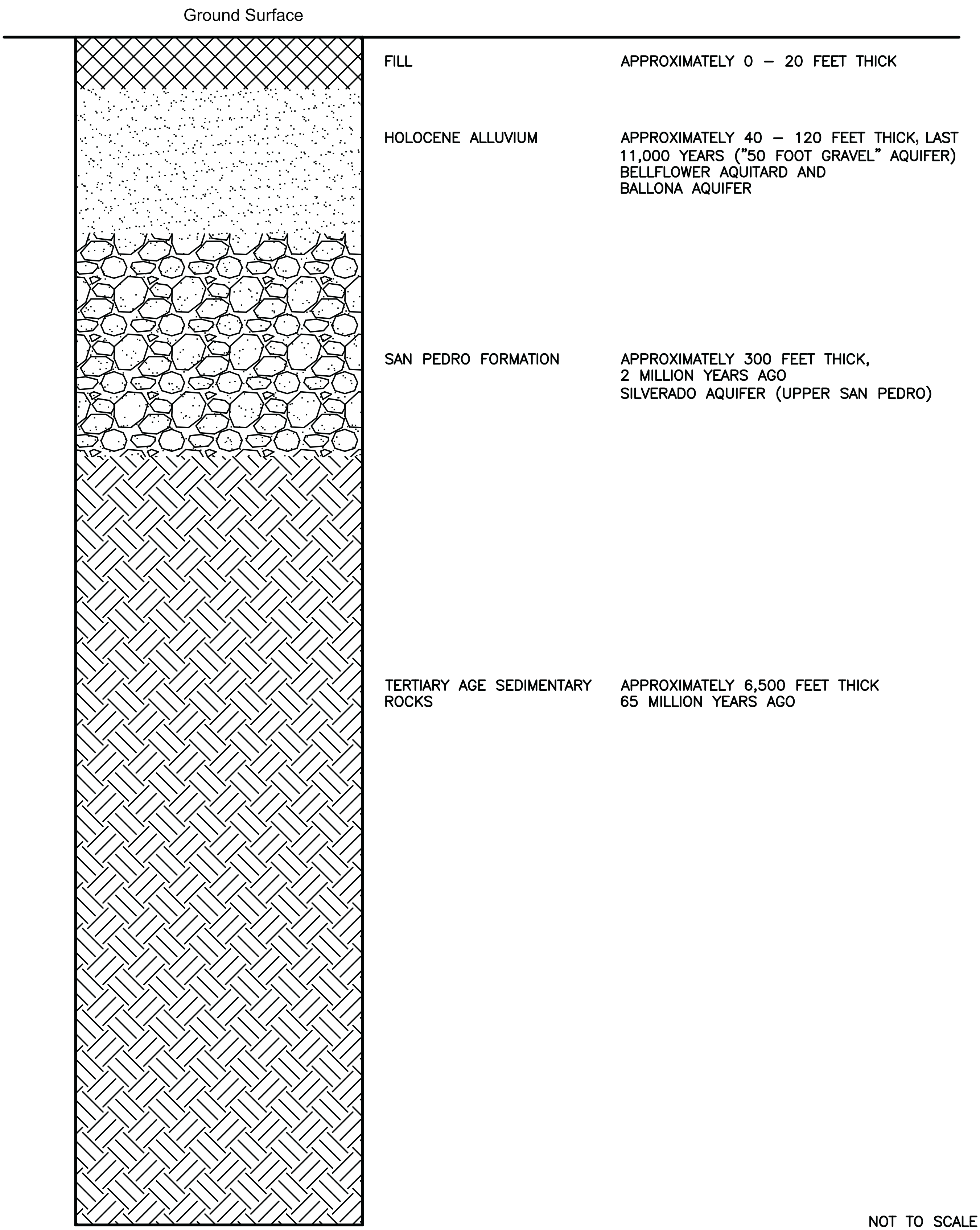


Figure 13
Typical Cross-Section of Local Geology at the Proposed Project Site

2.2.1.2 Proposed Project Site

Overall, the Proposed Project site is primarily flat and low-lying, with elevations ranging from approximately 7 to 24 feet above mean sea level (AMSL). This low-lying area is located in the southern portion of the Ballona Gap, an ancient floodplain, consisting of unconsolidated sedimentary deposits (alluvium) of Recent Age. The Ballona Gap is located between Baldwin Hills to the south and Beverly Hills to the north and extends to the ocean. It was initially formed by headward erosion from the ocean.[16]

The Ballona Escarpment, a portion of which is located along the southern border of the Proposed Project site, is an erosional feature that formed as the ancestral Los Angeles River was naturally diverted from its course and flowed through the Ballona Gap. In 1884, when the concrete-lined Los Angeles River Channel was constructed by the U.S. Army Corps of Engineers (USACE), the river was diverted away from the Ballona Gap into San Pedro Bay.[17] The Ballona Channel runs east-west across the Ballona Gap, approximately 0.33 mile north of the Proposed Project site. The surface of the Proposed Project site is covered primarily by Recent Age alluvium and fill.

Artificial fill material (i.e., material placed by man) overlies Holocene Alluvium (i.e., native sediments) across much of the Proposed Project site.

The Proposed Project site is currently used for a number of permitted activities associated with the construction of the adjacent Playa Vista First Phase Project. Since 1987, the City of Los Angeles Department of Building and Safety has issued over ten grading permits and almost thirty compaction modifications to allow the Applicant to maintain several stockpiles within the Proposed Project site. By the early 1990s, a stockpile of more than 2,000,000 cubic yards of dirt covered the northern half of the Proposed Project site. Currently, one of the stockpiling permits allows up to 500,000 cubic yards of excavated soils to be stored within the southern portion of the Proposed Project site south of Runway Road, generally west of Building 45. In addition, the City of Los Angeles Department of Public Works has approved the excavation and maintenance of temporary detention basins near the 500,000 cubic yard stockpile as part of the adjacent Playa Vista First Phase Project's Stormwater Pollution Prevention Plan (SWPPP) and Erosion Control Plan. The detention basins provide temporary storm drainage and control sediments for First Phase areas currently under construction west of the Proposed Project site that will ultimately drain into the Riparian Corridor, as well as portions of the adjacent Playa Vista First Phase

[16] *California Department of Water Resources, "Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County," Appendix A, Ground Water Geology, Bulletin 104, 1961, page 35.*

[17] *Converse Consultants, "Comprehensive Geotechnical Report, Playa Vista Parcel, Marina del Rey Area," May 29, 1981, page 8.*

Project site, located east of the Proposed Project site, which will ultimately drain to the Central Storm Drain or the Riparian Corridor. It is expected that temporary drainage facilities will remain on the Proposed Project site pursuant to the SWPPP as may be modified from time to time.

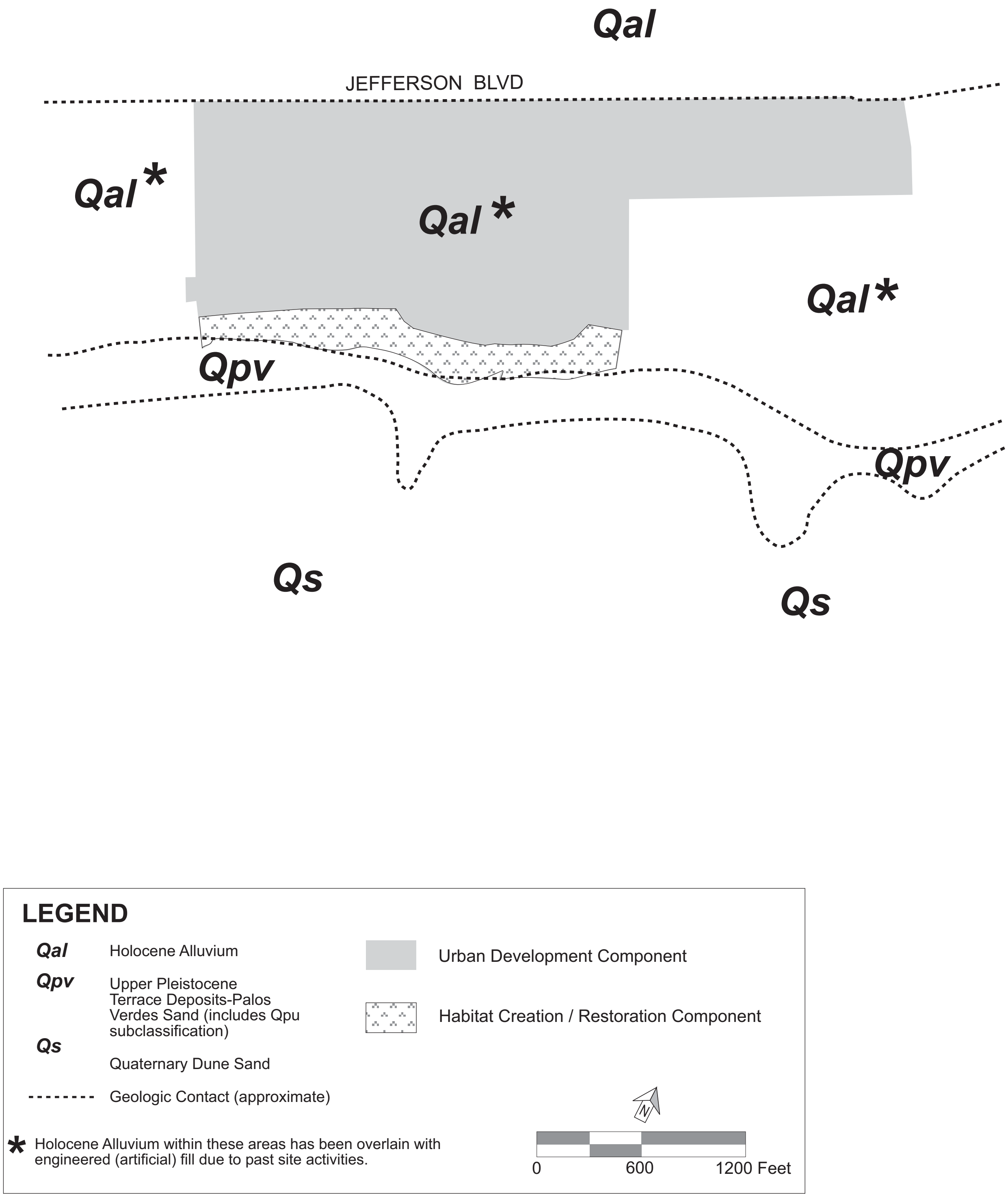
Other activities at the Proposed Project site associated with the construction of the adjacent Playa Vista First Phase Project include rock crushing and stockpiling, and equipment staging and parking.

The construction of the adjacent Playa Vista First Phase Project includes a roadway (Runway Road) connecting the east and west ends of the Playa Vista First Phase Project site, bisecting the Proposed Project site. The finished grade of this roadway would occur at an elevation approximately 15 to 20 feet above the existing topography (i.e., the road would occur as an elevated strip through the Proposed Project site until such time as the Proposed Project development occurs and areas adjacent to the elevated strip are filled to match the roadway).

The following describes the fill and alluvial deposits that are anticipated to be encountered during grading and construction activities, beginning with the most recent fill deposits. A description of the underlying San Pedro Formation below 100 feet, for approximately 300 feet, has also been included although it is not anticipated that such deposits will be encountered during construction. Figure 14 on page 213 shows the local geology for the Proposed Project site and vicinity.

2.2.1.2.1 Fill

Dating to the 1940s, fill material has been imported from a variety of sources covering many portions of the Proposed Project site. Fill thickness within the Proposed Project site ranges from approximately 2 to 11 feet. In the area adjacent to the foot of the Ballona Escarpment (i.e., Westchester Bluffs), fill averages a thickness of approximately 20 feet. The fill material consists of clay, silt, silty sand, and clayey sand. In some areas of the Proposed Project site, the upper portion of the fill material was imported (prior to 1990) from the vicinity of the La Brea tar pits and, as such, has the potential to contain naturally occurring hydrocarbons. These hydrocarbons do not constitute an organic waste such as fuels, or other refined hydrocarbons, that can



PCR

Figure 14
Local Geology

Source: Law/Crandall, Inc., 1996 (As Modified by PCR and CDM), July 2003 sometimes occur as contaminants within fill material.[18] During the most recent investigation, tar sands were not observed in any of the soil samples collected at the Proposed Project site.[19]

2.2.1.2.2 Alluvium

Alluvium is disintegrated rock deposited, permanently or in transit, by streams. It includes all variations and mixtures of gravel, sand, silt and clay. Holocene Alluvium underlying the Proposed Project site ranges from 40 to 120 feet thick.[20] The upper portion consists of soft silty clay and clay with layers of silt and sand. This material is compressible and exhibits low shear strength. This clay is probably representative of the Bellflower Aquitard.[21] *Aquitards* generally consist of fine-grained, relatively impermeable materials (rock or sediment) that do not readily transmit water. Therefore, they inhibit the horizontal and vertical movement of groundwater.

The middle portion of alluvium consists of clay and silt. This material is moderately compressible and exhibits slightly higher shear strength than the upper section of alluvium. This middle section is representative of transition deposits between the Bellflower Aquitard and the underlying Ballona Aquifer.[22, 23] An *aquifer* is defined as a geologic formation (rock or sediment) that is saturated and capable of yielding economically valuable quantities of water to wells and springs.

The bottom section of alluvium is characterized by sand and gravel. This material typically has low compressibility and high shear strength. This water-bearing section of Holocene Alluvium is referred to as the Ballona Aquifer in the vicinity of the Proposed Project

[18] *LeRoy Crandall and Associates, "Ground Water Monitoring Well Installation and Water Quality Study, Playa Vista Project," Maguire Thomas Partners, August 21, 1990, page 3.*

[19] *CDM, "Soil and Groundwater Investigation Report, Phase 2 Portion of the Area D Project Area," Playa Vista Site, May 15, 2002.*

[20] *LeRoy Crandall and Associates, "Ground Water Monitoring Well Installation and Water Quality Study, Playa Vista Project," Maguire Thomas Partners, August 21, 1990, page 3.*

[21] *McLaren Environmental Engineering, "Site Investigation and Evaluation of Remedial Measures Report, Howard Hughes Properties Plant Site, Los Angeles," May 8, 1987, page II-5.*

[22] *City of Los Angeles, "Draft Environmental Impact Report, Del Rey Addition 1-81," SCH No. 84091907, June 1985, page 2.4-3.*

[23] *McLaren Environmental Engineering, "Site Investigation and Evaluation of Remedial Measures Report, Howard Hughes Properties Plant Site, Los Angeles," May 8, 1987, page II-5.*

site.[24, 25] A stratigraphic column of the alluvium underlying the Proposed Project site is presented in Figure 15 on page 216.

2.2.1.2.3 San Pedro Formation

The San Pedro Formation, which is the Lower (older) Pleistocene material that underlies the fill and alluvium, is approximately 300 feet thick in the Ballona Gap area and consists of poorly consolidated sand and gravel along with beds of silty sand and silt. The formation may also include fragments of slate, schist, and volcanic pebbles.[26, 27] The uppermost layer of the San Pedro Formation is water-bearing and is known as the Silverado Aquifer. Under the Proposed Project site, the Silverado Aquifer ranges from approximately 100 to 300 feet in thickness and is one of the larger groundwater aquifers of the Los Angeles Basin. Beneath the site, this aquifer is believed to be hydraulically connected to the Ballona Aquifer, as there is no evidence of any continuous fine-grained, low permeability material separating the two aquifers within the site boundaries.[28] See Section IV.C(1), Hydrology, for a detailed discussion of groundwater hydrology at the site.

Approximately 6,500 feet of Tertiary Age sedimentary rocks underlie the San Pedro Formation. Natural gas is currently stored by Southern California Gas Company (SCGC) within a portion of this rock formation, which constitutes the Del Rey Hills portion of the former Playa del Rey Oil Field, at depths in excess of 6,200 feet (more than one mile) below the surface in an area approximately 1.25 miles to the west and northwest of the Proposed Project site.[29] No portion of the SCGC storage reservoir exists beneath the Proposed Project site. For a discussion of SCGC operations in the former oil field, refer to Section IV.I, Safety/Risk of Upset, in this EIR.

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[24] *City of Los Angeles, "Draft Environmental Impact Report, Del Rey Addition 1-81," SCH No. 84091907, June 1985, page 2.4-3.*

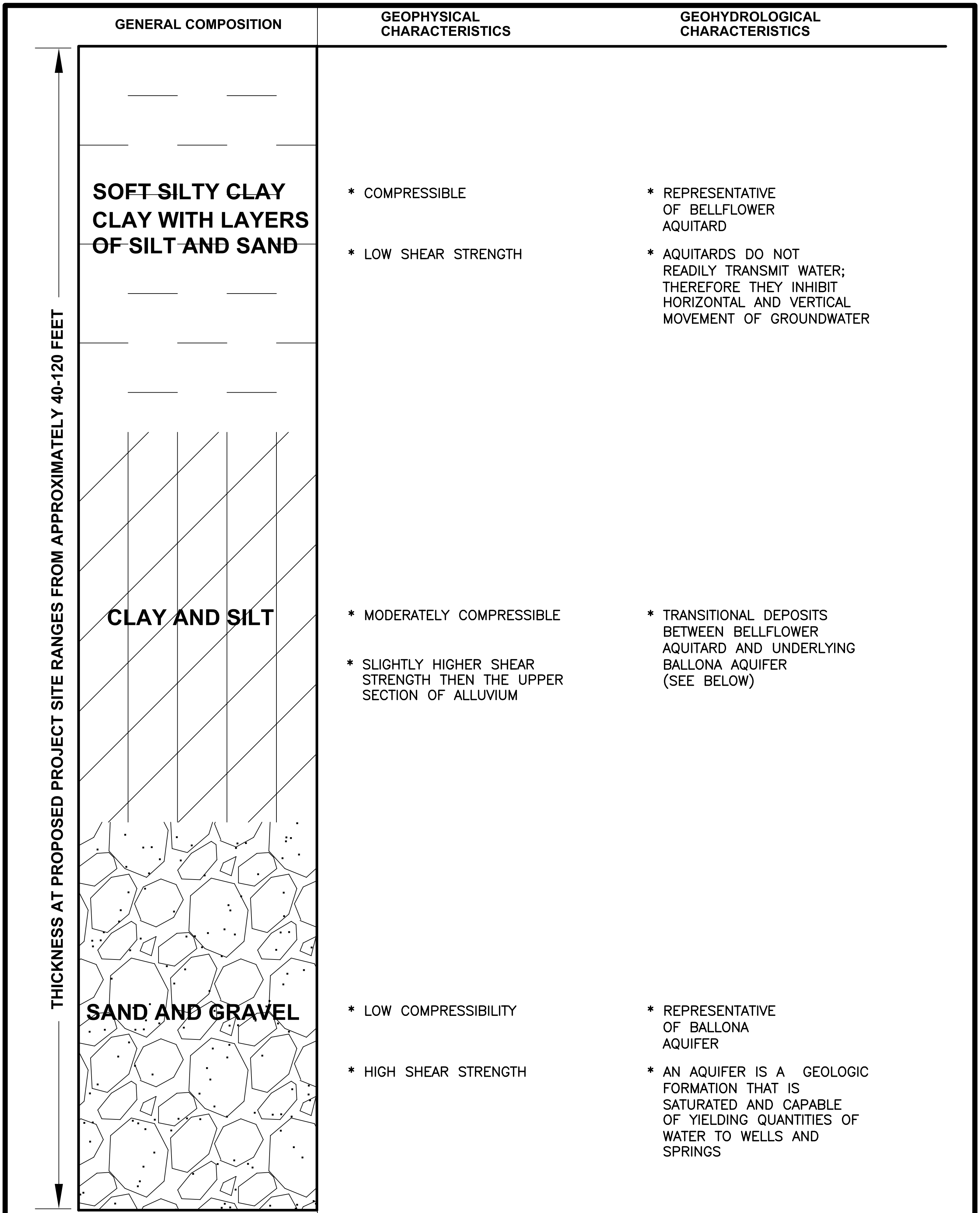
[25] *McLaren Environmental Engineering, "Site Investigation and Evaluation of Remedial Measures Report, Howard Hughes Properties Plant Site, Los Angeles," May 8, 1987, page II-5.*

[26] *California Department of Water Resources, "Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County," Appendix A, Ground Water Geology, Bulletin 104, 1961, pages 65, 125.*

[27] *City of Los Angeles, "Draft Environmental Impact Report, Del Rey Addition 1-81," SCH No. 84091907, June 1985, page 2.4-3.*

[28] *McLaren Environmental Engineering, "Site Investigation and Evaluation of Remedial Measures Report, Howard Hughes Properties Plant Site, Los Angeles," May 8, 1987, page II-6.*

[29] *LeRoy Crandall and Associates, "Effect of Natural Gas Storage Reservoir on Proposed Playa Vista Marina Construction, Lincoln Blvd. and Ballona Creek Channel, Marina del Rey," March 31, 1989, page 2.*



NOT TO SCALE

Figure 15

General Stratigraphic Column of Alluvium Typical of the Proposed Project Site

CDM

2.2.1.3 Hydrogeology

Numerous studies to determine current water quality, depth-to-water, and gradient conditions below the vicinity of the Proposed Project site have been conducted, including at the Proposed Project site. The findings of such studies are discussed in greater detail in Section IV.C.(2), Water Quality, Subsection 2.0, Environmental Setting. Land surface elevation at the Proposed Project site varies from about 7 feet AMSL at the western end to approximately 24 feet AMSL at the eastern end. Groundwater elevations beneath the Proposed Project site vary in depth depending on the groundwater unit (aquifer/aquitard) of interest. Three aquifer/aquitard systems (hydrostratigraphic units) are located beneath the Proposed Project site, including the Silverado Aquifer, the Ballona Aquifer, and the Bellflower Aquitard [30] (from greatest to least depth). The uppermost hydrostratigraphic unit beneath the site is the Bellflower Aquitard, which is a sequence of low permeability continental, marine and wind-blown deposits consisting primarily of clay and silty clay. The Bellflower Aquitard occurs beneath the site at depths from near the ground surface to approximately 35 feet below ground surface (bgs). Below the Bellflower Aquitard is the Ballona Aquifer, which is encountered in the Ballona Gap north of the Westchester Bluffs and merges into the Gage/Gardena Aquifer to the southeast. The Ballona Aquifer is often times called the "50-foot Gravel" aquifer because it is generally encountered 50 feet below native grade, and primarily consists of stream deposited coarse sand, rounded to sub-rounded gravel, and cobbles (up to 5 inches in diameter) of granitic and metamorphic origin. The Ballona Aquifer ranges in thickness from less than 10 feet near the coast to 40 feet near Beverly Hills. In some portions of the Proposed Project site the Bellflower Aquitard and the Ballona Aquifer function as a single aquifer system.[31] Further below, the Silverado Aquifer was deposited during the Pleistocene Epoch (San Pedro Formation). The Silverado Aquifer is composed primarily of marine and non-marine sand and gravel. Though the Silverado Aquifer can be up to 500 feet thick in parts of the Los Angeles Basin, locally, the aquifer is estimated to be approximately 200 feet below mean sea level and ranges approximately 100 to 300 feet in thickness.[32,33] For the purposes of this discussion, water level measurements taken by Camp Dresser & McKee Inc. in August 2002 are representative of the site's affected environment and existing conditions, recognizing that actual groundwater levels may vary from year-to-year and season-to-season depending on many factors as described below. Groundwater elevations in and

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[30] *Although the Gage-Gardena Aquifer is thought to occur in depths similar to the Ballona Aquifer, it is not known to occur beneath the Proposed Project site.*

[31] *Camp Dresser & McKee, Inc., "Third Quarter 2002 Groundwater Monitoring and Progress Report," October 15, 2002.*

[32] *Camp Dresser & McKee, Inc., "Third Quarter 2002 Groundwater Monitoring and Progress Report," October 15, 2002.*

[33] *McLaren Environmental Engineering, "Site Investigation and Evaluation of Remedial Measures Report, Howard Hughes Properties Plant Site, Los Angeles," May 8, 1987.*

around the Proposed Project site generally range from approximately 3.0 feet to approximately 5.8 feet AMSL (see Appendix D-3 of this EIR).

2.2.2 Seismic Faults and Other Geological Hazards

2.2.2.1 Regional Faults

Like most of California, the area surrounding the Proposed Project site is characterized by major faults and fault zones that are generally parallel to the San Andreas Fault zone. Most faults in the area are characteristically northwest-trending right-lateral strike-slip faults. A *strike-slip fault* is one in which the movement is horizontal, as shown schematically in Figure 16 on page 219. Strike slip faults are designated as right-lateral or left-lateral depending on how the ground opposite an observer appears to have moved, when the observer is standing looking at the fault. This fault would display movement toward the northwest, with apparent surface movement occurring at the east (or right side) of the fault. These faults are the result of major deformational episodes that have occurred throughout the development of the California mountain ranges. Recent seismic activity in the Los Angeles Basin has raised the issue of hidden faults, including blind-thrust faults, existing in the region. *Blind-thrust faults* are nearly flat geologic structures that do not extend to the Earth's surface. Blind-thrust faults are important sources of regional seismic hazards as more fully described in Subsection 2.2.2.2 below.[34]

Faults are categorized by the California Geological Survey (CGS) as active, potentially active, or inactive, according to most recent seismic activity. *Active faults* are faults on which movement has occurred within historic or recorded time, or have been included in the State of California Fault Rupture Studies Zones in accordance with the Alquist-Priolo Act of 1972. *Potentially active faults* are faults along which no known historical ground surface ruptures or earthquakes have occurred. Classification is instead based on indications of offset or barriers to groundwater flow in rock strata and sharpness of topographic features along the fault. Potentially active faults are further divided into high or low-potential subgroups. For high-potential faults, the characteristics noted above are observed in shallower Holocene (Recent Age) deposits (i.e., movement within the last 11,000 years). For low-potential faults, the characteristics are observed in deeper Pleistocene Age deposits only (i.e., movement within 11,000 to 2 million years). *Inactive faults* are those without recognized Holocene or Pleistocene Age offset or activity (i.e., no movement within two million years).[35]

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[34] *Law/Crandall, Inc., "Geotechnical Issues, Earthquake Hazards, Playa Vista Project," March 7, 1995, page 3.*

[35] *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, (Appendix D-11 of this EIR.).*

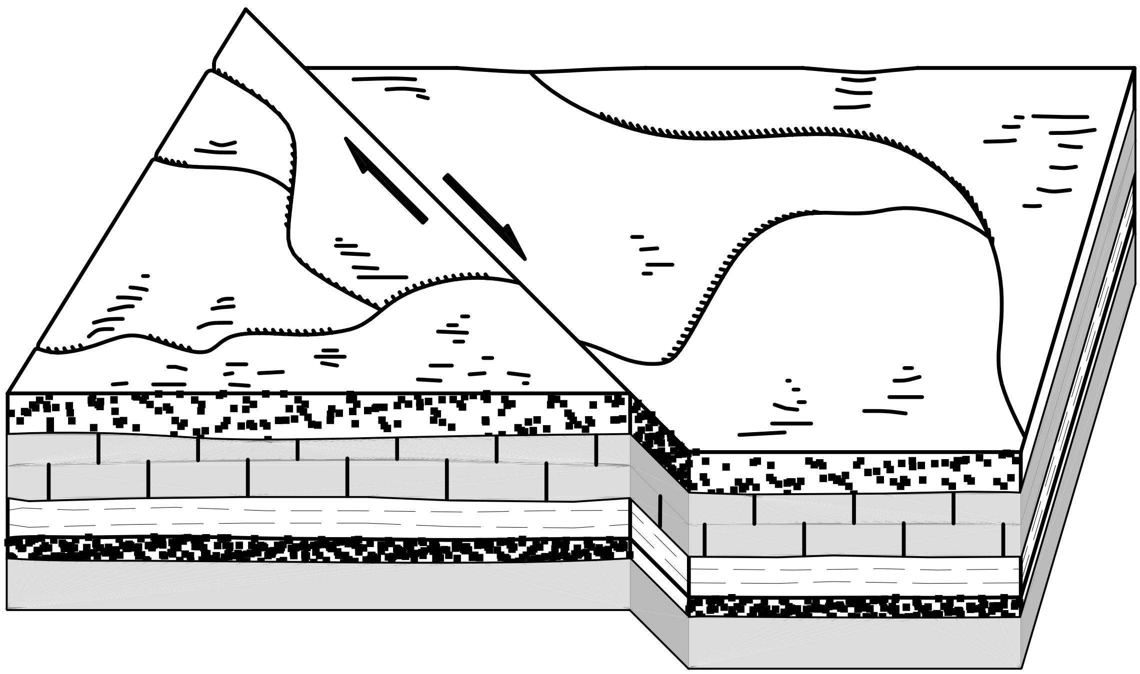

Figure 16

Schematic Drawing of a Right-Lateral Strike Slip Fault

CDM

Faults located within a 70-mile radius of the Proposed Project site that are considered to be active due to evidence of fault movement and displacement of Holocene sediments within historic time, or that have been zoned by the State Geologist per the Alquist-Priolo Act, are considered to be relevant to the Proposed Project and are presented in Table 6 on page 221.

Potentially active faults within a 40-mile radius of the site are listed in Table 7 on page 222. These faults are considered potentially active due to the fact that no known historical ground surface ruptures or earthquakes have occurred on them. The faults listed on these tables are limited by the information available regarding each of the faults (i.e., there may be limited or anecdotal information on past seismic events occurring within the Southern California region; however, there is insufficient scientific data to attribute such activity to specific faults and/or to identify the location of the causal fault).

The fault zones in closest proximity to the Proposed Project site are the Compton-Los Alamitos (could pass beneath the site, but at considerable depth), the Newport-Inglewood (approximately two miles from the site), the Santa Monica (approximately 4.8 miles from the site), and the Palos Verdes (approximately 5 miles from the site). As indicated in Table 6 on page 221, the maximum credible magnitudes[36] for earthquakes along the Compton-Los Alamitos, the Newport-Inglewood, the Santa Monica, and the Palos Verdes Fault Zones are 6.8, 6.9, 6.6, and 7.1, respectively. It should be noted that magnitude is a measure of the strength of an earthquake or strain energy released by it, as determined by seismographic observations. This is a logarithmic value originally defined by Charles Richter (1935). An increase of one unit of magnitude (for example, from 4.6 to 5.6) represents a 10-fold increase in wave amplitude on a seismogram or approximately a 30-fold increase in energy released. There is no beginning or end to this scale; however, rock mechanics seems to preclude earthquakes smaller than about –1.0 or larger than about 9.5. A magnitude –1.0 event releases about 900 times less energy than a magnitude 1.0 earthquake.

[36] *Maximum credible magnitudes are determined by the CGS, and are defined as the largest earthquake magnitudes that appear to be reasonably capable of occurring under the conditions of the presently known tectonic (or geologic) framework. The maximum earthquake is expressed in terms of magnitude which is estimated by 1) using correlations between fault parameters (fault length, fault displacement, and fault area) and earthquake magnitudes, or 2) the largest historical event to have occurred along a particular fault. The correlations applied are derived from historical observations of worldwide earthquakes.*

Table 6

ACTIVE FAULTS [a]

Fault	Date of Latest Major Activity	Maximum Credible Earthquake (Richter Scale)	Distance/Direction from Site
Anacapa-Dum		7.3	17 miles W
Big Pine	1852	6.7	65 miles NNW
Compton-Los Alamitos Thrust	Unknown [b]	6.8	Unknown [b]
Cucamonga	Within last 11,000 years [c]	7.0	44 miles ENE
Elsinore Zone	1910	6.8	45 miles E
Elysian Park Fold & Thrust Belt	1987	6.7	6.8 miles NE
Garlock	(Intermittent creep)	7.1	62 miles NNW
Hollywood		6.4	7.8 miles N
Malibu Coast	1973	6.7	8 miles NW
Newport Inglewood	1933	6.9	2 miles ENE
Northridge [d]	1994	—	unknown
Oakridge Zone	Within last 11,000 years [c]	6.9	35 miles NNW
Palos Verdes	Within last 11,000 years [c]	7.1	5 miles SSW
Raymond	Approximately 200 years	6.5	16 miles NE
San Andreas (southern segment)		7.4	43 miles NNE
San Andreas Zone (Mojave Segment)	1857	8.2	41 miles NE
San Cayetano (Eastern Segment)	Within last 11,000 years [c]	6.8	36 miles NW
San Fernando		6.7	22 miles N
San Gabriel	Within last 11,000 years [c]	7.0	25 miles NNE
San Jacinto Zone	1968 (intermittent creep)	6.7	63 miles ENE
Santa Monica	Within last 11,000 years [c]	6.6	4.8 miles NNW
Santa Monica Mountains Thrust	Within last 11,000 years [c]	7.2	8.9 miles NNW
Sierra Madre-San Fernando Zone	1971	7.0	23 miles NE
Simi-Santa Rosa	Within last 11,000 years [c]	6.7	28 miles NW
Verdugo	Within last 11,000 years [c]	6.7	17 miles NNE
Whittier	1987	6.8	23 miles E

[a] *An active fault is one in which movement has occurred within historic or recorded time or that has been included in the State of California Fault Rupture Studies Zone in accordance with the Alquist-Priolo Act of 1972.*

[b] *Recent academic studies indicate that the Compton-Los Alamitos blind thrust fault could pass beneath the Proposed Project site at considerable depth. (Considerable depth means that there is no fault rupture at the surface; yet the Compton-Los Alamitos fault is still considered active because it meets the requirements as set forth in the Alquist-Priolo Act of 1972.)*

[c] *Zoned by the State Geologist pursuant to the Alquist-Priolo Act of 1972.*

[d] *The exact location of the fault responsible for the Northridge earthquake has not been identified and the fault has not been named. It is believed that the blind-thrust fault associated with the Northridge Earthquake is part of the Oak Ridge Fault System. The Oak Ridge Fault System roughly encompasses the Simi-Santa Rosa-Northridge Fault Zone.*

Source: Law/Crandall, May 8, 1998, and CDM, 2003.

Table 7

POTENTIALLY ACTIVE FAULTS [a]

Fault Name	Maximum Credible Earthquake (Richter Scale)	Distance From Site (Miles)	Direction From Site
Charnock [b]	6.5	< 1 [b]	NE and SE
Chino – Central Avenue	7.0	39	E
Clamshell - Sawpit	6.5	29	E
Coyote Pass	6.7	14	ENE
Duarte	6.7	28	ENE
Holser	6.5	35	NNW
Indian Hill	6.6	34	ENE
Los Alamitos	6.2	20	SE
MacArthur Park	5.7	10.5	NE
Northridge Hills	6.6	19.6	N
Norwalk	6.7	23	ESE
Overland	6.0	3	NE
San Jose	6.7	32	ENE
Santa Cruz Island	6.8	56	W
Santa Susana	6.6	24	NNW

[a] *Potentially Active faults are ones along which no known historical ground surface ruptures or earthquakes have occurred; however, they do show some indications of geologically recent activity.*

[b] *The Charnock Fault has historically been thought to underlie the adjacent Playa Vista First Phase Project site, east of the Proposed Project site. There is, however, no surface trace of the fault at the adjacent Playa Vista First Phase Project or Proposed Project sites , and further investigations completed in 2000 found no evidence of the Charnock Fault beneath the adjacent Playa Vista First Phase Project or Proposed Project sites. See Subsection 2.2.2.2.4, for more information regarding the Charnock Fault.*

Source: Law/Crandall, 1998, and CDM, 2003.

Intensity is a measure of the effects of an earthquake at a particular place on humans, structures, and/or the land itself. The intensity at a point depends not only upon the strength of the earthquake (magnitude) but also upon the distance from the earthquake to the point and the local geology at that point.[37] The hazards associated with rupture along these fault zones include the potential for ground rupture, ground shaking, liquefaction, lurching, tsunamis, and seiches. The locations of recently active faults within the regional area of the Proposed Project site are shown on Figure 17 on page 223. This figure also shows the epicentral area, year, and magnitude of earthquakes with recorded magnitudes greater than 5.0 on the Richter scale. The Richter scale assigns numerical values for earthquake magnitude based on interpretation of

[37] *United States Geological Survey, National Earthquake Information Center, Magnitude and Intensity. http://neic.usgs.gov/neis/general/handouts/magnitude_intensity.html.April 4, 2001.*

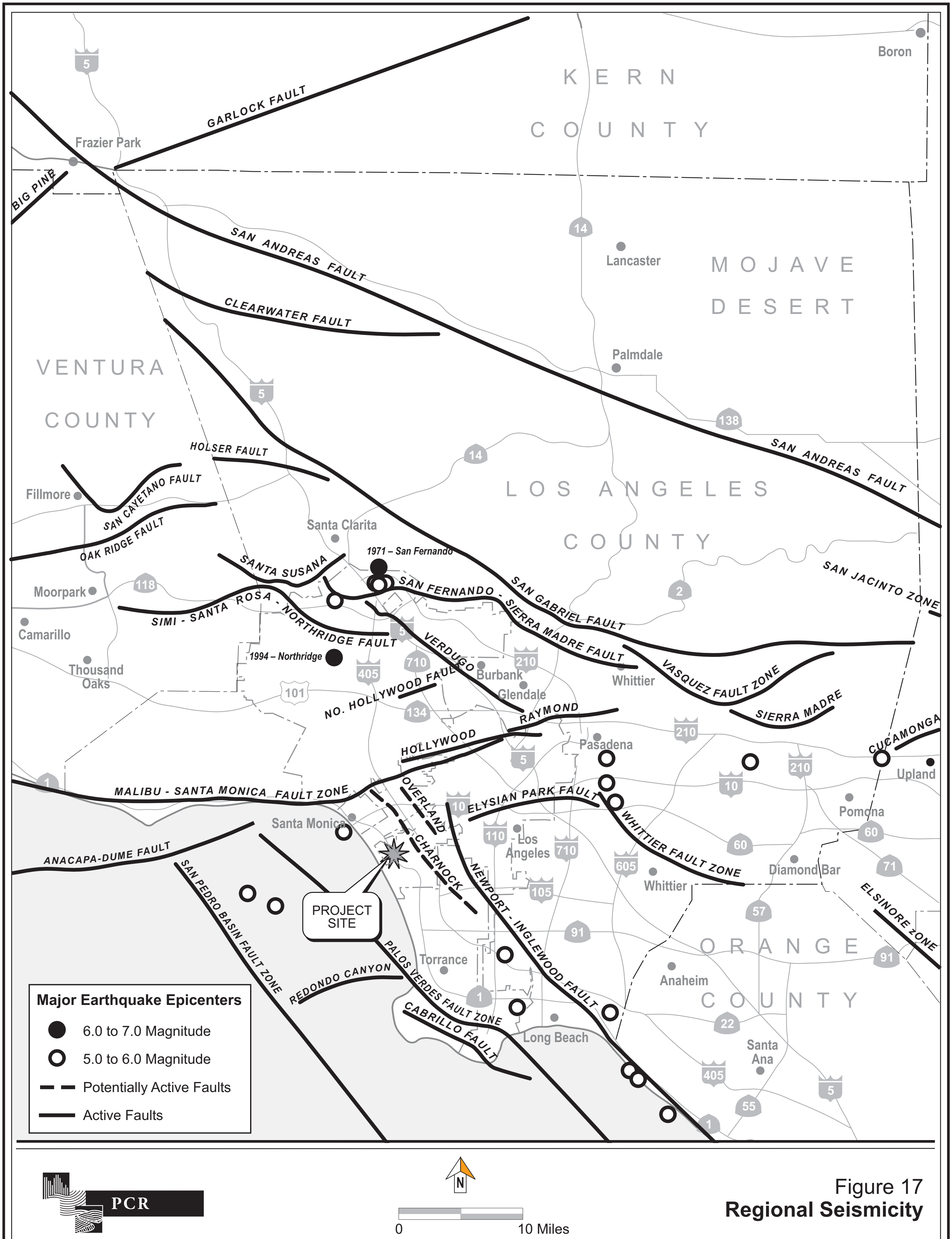

Figure 17
Regional Seismicity

Source: Data 1994 Fault Activity DMG Open-File Report by C. Jennings and PCR Services Corp., April 2003 seismic data collected during earthquakes. For earthquakes which occurred prior to the use of recording instruments, magnitudes were estimated based on damage and intensity reports.[38]

2.2.2.2 Local Faults

2.2.2.2.1 Active Faults

The Proposed Project site is not located within a City of Los Angeles Fault Rupture Studies Zone or within an Alquist-Priolo Special Studies Zone. The Compton-Los Alamitos is an inferred blind-thrust fault that could pass beneath the Proposed Project site at considerable depth (approximately 5 to 10 kilometers or approximately 3 to 6 miles below surface). The maximum credible earthquake produced from this blind-thrust fault is expected to be a magnitude 6.8. There is, however, considerable uncertainty as to the existence and location of the fault and its relationship to the site.[39, 40] This is because there is no direct data on recurrence intervals or characteristic displacements for individual blind thrust segments at this time. As discussed below, recent geotechnical investigations by Earth Consultants International (ECI) and Davis and Namson Consulting Geologists (Davis and Namson) concluded that there is no evidence of surface or shallow subsurface faulting at the Proposed Project site, and, therefore, the potential for surface rupture is considered extremely low (See Appendices D-4 and D-5 for the reports from Davis and Namson and ECI, respectively).

2.2.2.2.2 Potentially Active Faults

The closest potentially active fault to the Proposed Project site is the Charnock Fault (see Figure 14 on page 213). As described below however, in Subsection 2.2.2.2.4, Postulated Faults, recent geotechnical/seismic investigations, using the most advanced technology available, completed at and around the Proposed Project site, suggest that the Charnock Fault is not present beneath the Proposed Project site (see Appendices D-4 and D-5). Various geotechnical consultants performed these studies, in order to provide evidence as to the possible existence of subsurface faults occurring beneath the Proposed Project site, due to the assertion in dated previous studies (e.g., Poland, 1959, described below) that such faulting exists in that location.

The Charnock Fault was initially identified by Poland and others, 1959, on the basis of differing water levels in the early Pleistocene Age San Pedro Formation sediments on opposite

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38 *Association of Engineering Geologists, "Geology Seismicity, and Environmental Impact," Special Publication, 1973.*

39 *Law/Crandall, Inc., "Geotechnical Issues, Earthquake Hazards, Playa Vista Project," March 7, 1995, page 3.*

40 *McArdle, Steve, Law/Crandall, Inc., Written Communication, March 14, 1996.*

sides of the fault, suggesting a groundwater barrier.[41] Since that time, both geotechnical and petroleum companies have attempted to verify the existence and exact location of the Charnock Fault. The Charnock Fault trends northwest-southeast, subparallel to the trend of the Newport-Inglewood Fault Zone and Overland Fault Zone. For the most part, Holocene deposits conceal the fault trace. The total vertical extent of the fault is unknown. Movement along the fault has placed sands and gravels from the Silverado Aquifer adjacent to silty clays and clayey silts of the Upper San Pedro Aquiclude. It is estimated that the base of the early Pleistocene Age San Pedro Formation has been displaced approximately 140 feet, with the dropped block on the east side of the fault.

The Charnock Fault is recognized as a groundwater barrier by the Los Angeles County Flood Control District. The most recent data presented by the Los Angeles County Flood Control District, for water levels obtained in the fall of 1985, indicate a water level difference of about 10 feet adjacent to the inferred fault trace. The barrier effect reportedly increases along the trace of the fault up to the vicinity of the Ballona Escarpment and then decreases as it continues beyond the Ballona Gap. The fault is thought to act as a partial barrier to east-west flow within the Silverado Aquifer. In a groundwater investigation conducted on both sides of the fault in May of 1987, groundwater levels from the down-faulted portion (i.e., the side of a fault where the earth has moved downward) of the Silverado Aquifer were found to be 6.5 to 7.0 feet lower than the other nearby wells, indicating that the down-faulted section may be isolated by the Charnock Fault on the west and by overlying silty clay layers.

A 1991 report by the American Association of Petroleum Geologists, stated that during the 1960s, extensive reflection seismic surveys and exploratory drilling were performed along the proposed alignment of the Charnock Fault for petroleum exploration, and no significant displacements were found that might correlate to the existence of the Charnock Fault.[42] In other words, the groundwater barrier, if present, may be due to channeling (a subsurface erosional feature where eroded rock formed a barrier during deposition) in the Upper Pleistocene sediments rather than the Charnock Fault.

A fault hazard evaluation conducted by Law/Crandall Inc. in 1995 indicated that the contact between the Ballona Aquifer and overlying alluvium does not exhibit any offset, nor were any groundwater anomalies observed. The fault hazard evaluation concluded that the Holocene Alluvium/San Pedro Formation contact is also likely unaffected by faulting. The results of this study are in agreement with other reports, which have concluded that the subject

[41] *Poland, J.F., Garrett, A.A., and Sinnot, Allen, "Geology, Hydrology and Chemical Character of Ground Waters in the Torrance-Santa Monica Area California," U.S. Geological Survey Water-Supply Paper 1461, p. 76-78, 1959.*

[42] *Wright, Thomas L., and Kevin T. Dibble, American Association of Petroleum Geologists, "Structural Geology and Tectonic Evolution of the Los Angeles Basin, California, in Active Margin Basins," Memoir 52, p. 90, 1991.*

offset/groundwater barrier is confined to Pleistocene deposits and does not offset Holocene deposits. This study verified, therefore, that movement along the fault, if present, has not occurred during the past 11,000 years and that its classification as potentially active, as opposed to active, is correct. Because offset is confined to Pleistocene Age deposits, it may be further classified as a low potential fault. Additionally, the potential for surface rupture along the subject offset is considered very low.

On September 16, 2000, a magnitude 3.3 earthquake occurred, with the epicenter believed to be in the vicinity of Marina del Rey, approximately 2 miles northwest of the Proposed Project site. A technical assessment of the subject event was completed by Davis and Namson Consulting Geologists (see Appendix D-1 for copy of assessment letter). The assessment found that the September 16, 2000, earthquake was a small seismic event occurring deep below the surface. Dozens to hundreds of earthquakes in this magnitude range occur throughout southern California each year. Except for aftershocks of major earthquakes, few of these smaller seismic events can be associated with a known fault. The September 16, 2000, earthquake was well recorded and data generated by Caltech provided reliable information regarding the "focal mechanism" of the earthquake. A focal mechanism is a common type of seismological analysis that shows the geometry of the fault plane and the movement direction during an earthquake. The focal mechanism for the September 16, 2000, event shows a 45-degree dipping thrust fault with an east-west striking fault plane. The focal mechanism analysis does not determine whether the fault surface dips toward the north or toward the south. Projection of the faults upward along the 45 degree-dipping planes indicate that the south-dipping fault could project to the surface on the south flank of the Santa Monica Mountains, and the north-dipping fault plane could project to the near surface at Hermosa Beach. In either case, because of the fault dip, the projected fault planes could only intersect the shallow subsurface miles from the Proposed Project site. It should be noted that the earthquake occurred deep in the crystalline basement (Catalina Schist) under the Los Angeles Basin and most likely along a minor fault that does not propagate to shallow levels.

There are several reasons why the September 16, 2000, earthquake could not have occurred along the postulated Charnock fault. First, the focal mechanism shows that the earthquake occurred along an east-west striking fault, whereas the Charnock is a north-south striking fault. Second, the earthquake was a thrust type earthquake, whereas the Charnock, if it exists, is most likely a strike-slip fault based on its strike similarity to nearby strike-slip faults such as the Newport-Inglewood fault. Third, the earthquake focus occurred 7.6 miles below the Proposed Project site and projection of the possible fault plane solutions upward places the surface projections of the faults 7-8 miles to the south or north of the Proposed Project site. In summary, the seismic event of September 16, 2000, was a small earthquake that occurred deep underground, as is common in the Los Angeles area, and is not related to the postulated Charnock Fault.

2.2.2.2.3 Inactive Faults

The Division of Oil and Gas, and Geothermal Resources has also mapped six smaller faults within the Playa del Rey Oil Field which appear to be Upper Miocene Age (approximately 15 million years ago) or older. Four of the faults occur northwest of the Proposed Project site, near the Venice portion of the Playa del Rey Oil Field, and two of the faults occur west of the Proposed Project site, near the Del Rey Hills portion of the Field. Due to their age and extensive overlying sediments, these faults are considered to be inactive and are, consequently, not located within any Alquist-Priolo Special Studies Zone.

2.2.2.2.4 Postulated Faults

In April 2000, Exploration Technology Inc. (ETI)[43] used geochemical data (such as soil gas survey data) to propose that the area immediately east of Lincoln Boulevard (approximately 0.5 miles west of the Proposed Project site) is underlain by a fault. ETI speculated that the fault, which it refers to as the "Lincoln Boulevard Fault", trends north-northwesterly, dips to the west with a normal sense of slip (the west side of the structure has moved down relative to the east side of the structure), and allows methane gas that originates at depths of 500 to 3,400 feet to reach the surface. In postulating the existence of the Lincoln Boulevard Fault, ETI referred to a 1935 report by Metzner[44] that described the Playa del Rey Oil Field and the hills to the south of the oil field, southeast of the Proposed Project site. Metzner identified four separate areas or provinces in these hills based on topographic features, and argued that the two westernmost provinces, closest to the coastline, appear to be controlled by faulting. Metzner also identified several faults in the subsurface in the Playa del Rey Oil Field, to the southwest of the Proposed Project site. However, as discussed below, according to Davis and Namson Consulting Geologists, Metzner did not project faults in the topographic province close to the postulated Lincoln Boulevard Fault.[45] In response to the ETI study, a study was conducted by ECI[46] to evaluate whether or not a fault does underlie the area where ETI postulated the Lincoln Boulevard Fault occurred. To address this issue, ECI undertook a multiphase geological study that included the review of relevant, historical, oil, groundwater and geotechnical studies of the

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43 *Exploration Technologies Inc. (ETI), Subsurface Geochemical Assessment of Methane Gas Occurrences, Playa Vista Development, First Phase Project, Los Angeles, California. Prepared for the City of Los Angeles, Department of Building and Safety, Project No. 99-2219, April 17, 2000.*

44 *Metzner, L.H., 1935, The Del Rey Hills Area of the Playa Del Rey Oil Field: California Division of Oil and Gas Summary Operations, v. 21, no. 2, p. 5-26.*

45 *Davis and Namson Consulting Geologists, An Evaluation of the Subsurface Structure of the Playa Vista Project Site and Adjacent Area, November 2000.*

46 *Earth Consultants International Inc. (ECI), 2000, Geologic Study to Evaluate the Potential for Active Faulting Near the Intersection of Lincoln and Jefferson Boulevards, at the Playa Vista Site, in the City of Los Angeles, CA.*

area, including Metzner's (1935) report. From this review, ECI concluded that, "none of the published maps, cross-sections and geologic reports that cover this portion of the Los Angeles Basin show any faults or reasons to suspect a fault underlying the area southwest of Lincoln and Jefferson Boulevards, in the area of the proposed Lincoln Boulevard Fault."[47] ECI also conducted a Cone Penetrometer Testing (CPT) study that included confirmatory borings, to evaluate whether shallow subsurface geologic layers are continuous across the area where the Lincoln Boulevard fault had been inferred. These CPTs and borings were used to find the contact between relatively fine-grained alluvium and lagoonal deposits of Holocene age (less than about 10,000 years old), and coarse-grained alluvial deposits that are Pleistocene in age (more than 10,000 years old). An extensive database of CPTs and borings previously drilled in the study area by other investigators was also used to complement the data obtained from ECI's subsurface study. The purpose of the study was to model the surface of this Pleistocene-Holocene boundary, to determine whether or not it is offset by faulting.

ECI prepared several cross-sections (images) of the near-surface sediments down to the gravelly layer that forms the Pleistocene-Holocene boundary and found that although the boundary is locally irregular, the irregularities are not linear, and therefore do not suggest the presence of a fault. ECI also looked at fine-grained sediments (estimated to be about 6,000 years old) above this boundary and found that in the areas where the gravelly layer is irregular, the layers above are laterally continuous and smooth, and therefore not faulted. Lastly, ECI examined geologic reports that had mapped the Westchester Bluffs south of the site. The Bluffs are composed of sediments estimated to be at least 120,000 years old, and therefore significantly older than the Ballona Gap sediments. If the area were underlain by faults that have moved in the last 10,000 years, the sediments in the bluffs would be faulted. The geologic maps reviewed did not show any faults. From all of these data ECI concluded that there is no fault in the area that has ruptured the ground surface in at least the past 10,000 to 100,000 years, and that there is no need to mitigate for potential surface fault rupture.[48]

In May 2000, Davis and Namson Consulting Geologists[49] also undertook a study of the subsurface of the Proposed Project site and adjacent areas to determine the possibility of a Lincoln Boulevard fault as proposed in the ETI report, and to evaluate the possibility of other faults at the site. Davis and Namson's multiphase approach began with a review of existing

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[47] *Earth Consultants International Inc. (ECI), 2000, Geologic Study to Evaluate the Potential for Active Faulting Near the Intersection of Lincoln and Jefferson Boulevards, at the Playa Vista Site, in the City of Los Angeles, CA.*

[48] *Earth Consultants International Inc. (ECI), 2000, Geologic Study to Evaluate the Potential for Active Faulting Near the Intersection of Lincoln and Jefferson Boulevards, at the Playa Vista Site, in the City of Los Angeles, CA, (page 23).*

[49] *Davis and Namson Consulting Geologists, An Evaluation of the Subsurface Structure of the Playa Vista Project Site and Adjacent Area, November 2000.*

geologic literature, in which they found no mention of a Lincoln Boulevard fault prior to the ETI report. Davis and Namson concluded that geologic evidence cited by ETI (Metzner, 1935) does not support the presence of the proposed fault. Davis and Namson also compiled an extensive oil and gas well database, from which they constructed several maps and cross-sections. These maps and cross-sections support the conclusion that no faulting has occurred in the western portion of the adjacent Playa Vista First Phase Project site during the last 2.5 to 3.0 million years.

During May and June 2000, Davis and Namson searched for and reviewed existing seismic data near the Proposed Project site. An east-west trending seismic line acquired by another party[50] was located that should intersect the proposed Lincoln Boulevard Fault. The proposed Lincoln Boulevard fault is not shown on the line, indicating that either the fault is non-existent or it does not extend out to the line. Above the 5,000-foot depth, the line shows a number of layers that are continuous across their entire length, which indicates that no faulting has occurred since these layers were deposited (i.e., during the last 3.0 million years).

During July 2000, an extensive seismic reflection study was initiated under the direction of Davis and Namson and Subsurface Exploration Company (SECO)[51] to more accurately survey the subsurface structure between oil and gas wells, in order to further evaluate the existence of the proposed Lincoln Boulevard Fault. Additionally, the evaluation by Davis and Namson included the bluff areas east of the Proposed Project site where the Charnock Fault had previously been assumed to exist. A 2-dimensional (2D) high-resolution seismic line (an acoustic cross-section of the subsurface layers along a line), located along Jefferson Boulevard, shows no fault breaks in subsurface layers and therefore shows no evidence of the proposed Lincoln Boulevard or Charnock Faults at the Proposed Project site. A 3-dimensional (3D) seismic line (a 3-dimensional acoustic image of subsurface layers, similar to a 2D cross-section, spread over the entire area to a greater depth) over the entire Proposed Project site and some additional surrounding areas shows that nearly the entire site and the surrounding area is underlain by continuous layers which have not been faulted in the last 2.0 million years.[52] In the western end of the Ballona Wetlands, abundant well data indicate that no faulting has occurred in the last 2.5 to 3.0 million years. The continuous Pico Formation layers (2.0 million years old) over most of the site show that the proposed Lincoln Boulevard and Charnock faults are not

[50] *Playa Vista purchased a licensed seismic reflection line from Chevron, known as Line LAB-85-4, which is located about 9,000 to 12,000 feet south of the Playa Vista site, and is oriented in an east-west direction. The Chevron seismic line is licensed data, and thus, the "wiggle trace" presentation could not be reproduced for the Davis and Namson Consulting Geologists report. A discussion of the Chevron seismic line can be found in Section 3.0, Onshore Geophysical Survey, in the Davis and Namson report: Davis and Namson Consulting Geologists, An Evaluation of the Subsurface Structure of the Playa Vista Project Site and Adjacent Area, November 2000.*

[51] *Davis and Namson Consulting Geologists, An Evaluation of the Subsurface Structure of the Playa Vista Project Site and Adjacent Area, November 2000.*

[52] *Reflectors (layers) were not imaged on the western end of the Ballona Wetlands.*

present at that or younger stratigraphic levels. The 3D seismic survey revealed no evidence of either the proposed Lincoln Boulevard or Charnock Faults being present at deeper levels below the middle Pico Formation. Where these proposed faults would cross the 3D survey there are continuous layers to about a 4,500-foot depth. Oil and gas well data show these continuous reflectors are from the middle and upper Repetto Formation (2.5 to 4.0 million years old) and the overlying Pico Formation. Thus, the seismic reflection study concludes there is no evidence for the proposed Lincoln Boulevard or Charnock Faults in layers deposited during the last 4 million years.

In summary, there is no historical geologic data to support the presence of the proposed Lincoln Boulevard Fault. In fact, all evidence from historical records and recent advanced studies, as stated above, points against the presence of the Lincoln Boulevard Fault. Though the Charnock Fault has been previously mapped as a groundwater barrier, new state-of-the-art, detailed geologic studies show no evidence of its existence at the Proposed Project site. Further, oil and gas well data and 2D and 3D surveys show no evidence of the existence of either fault at the Proposed Project site. In response to the Davis and Namson studies, ETI reviewed the most recent data and agreed that a postulated Lincoln Boulevard Fault that would provide a methane gas pathway to the Proposed Project site is unsubstantiated, and the City of Los Angeles Department of Building and Safety accepted these conclusions (see Appendix J-6).[53] These conclusions were reaffirmed by the results of the investigation completed by the City of Los Angeles Office of the Chief Legislative Analysis, including supporting correspondence from the State Geologist (Appendix J-6).

2.2.2.3 Slope Stability

The only portion of the Proposed Project site having slope stability considerations is the Habitat Creation/Restoration Component area, along the southern edge where the Ballona Escarpment abuts the Proposed Project site (i.e., the southern edge of the Urban Development Component).

The Ballona Escarpment (the Escarpment) is situated due south and immediately adjacent to the Proposed Project site as shown in Figure 18 on page 231. The portion of the Escarpment that parallels the southern border of the Proposed Project site is locally referred to as the Westchester Bluffs and is occupied by Loyola-Marymount University and private residences. The Westchester Bluffs and the off-site Riparian Corridor (being constructed as part of the adjacent Playa Vista First Phase Project) are the only distinct and prominent geologic features at,

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[53] *City of Los Angeles, Department of Building and Safety, Grading Section. Personal Communication. Letter to Playa Capital Company from Mr. David Hsu, Chief of Grading Section, regarding the existence of the Lincoln Boulevard fault. December 19, 2000. (Attached as Appendix G to the "City Investigation of Potential Issues of Concern for Community Facility District No. 4 Playa Vista Development Project" by the City of Los Angeles Office of the Chief Legislative Analyst, May 2001.)*

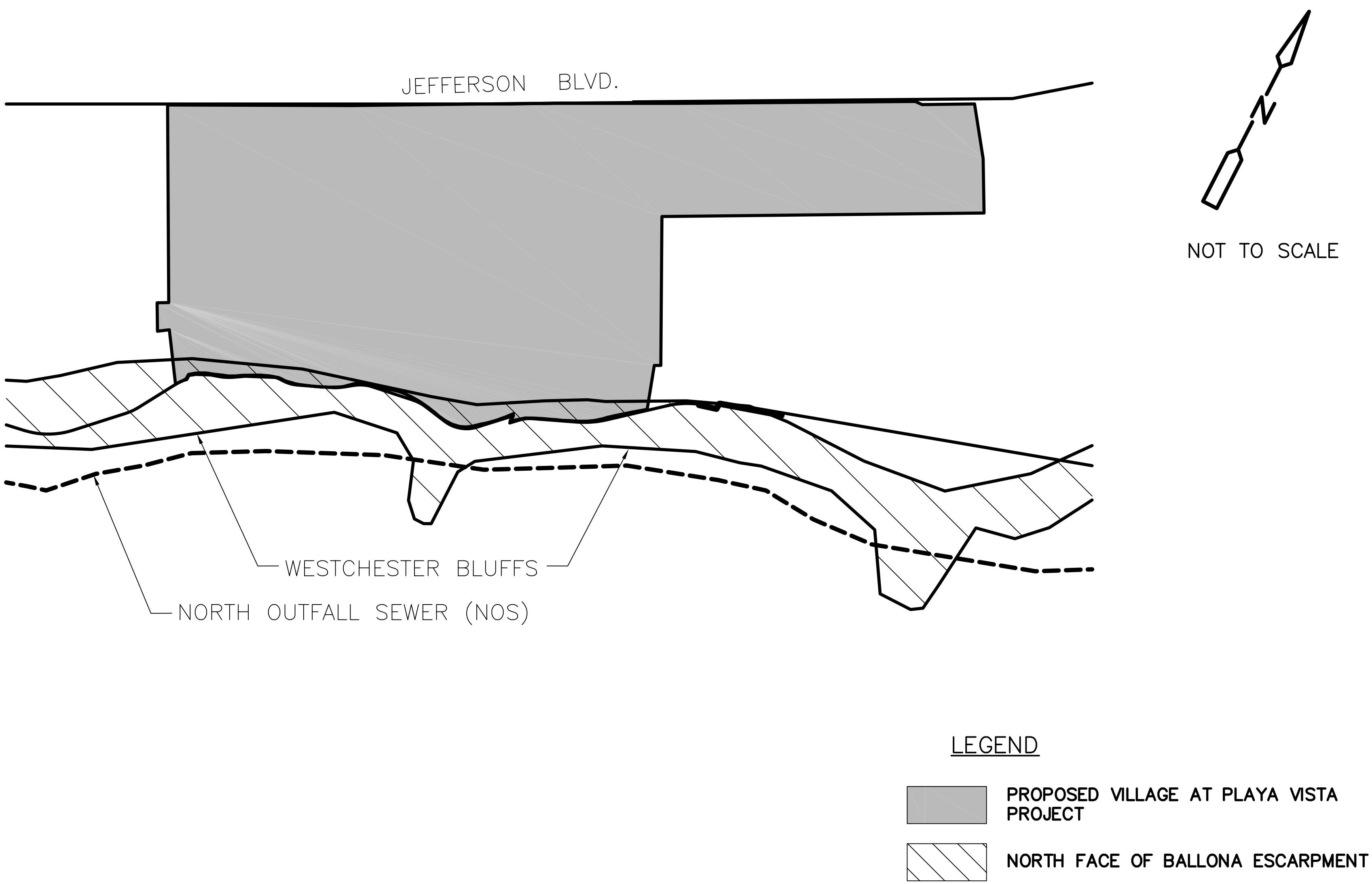

Figure 18

Ballona Escarpment Location

CDM

or near, the Proposed Project site. The entire Escarpment is located within a City of Los Angeles Hillside Grading Area, as designated in the City's Building Code.

The Escarpment rises approximately 120 to 140 feet above the ancient flood plain (i.e., 120 to 140 feet AMSL) with the slope in the site vicinity varying from 1.5:1 to 2:1 (horizontal to vertical).[54] It is capped by the Upper (younger) Pleistocene Older Dune Sand which consists of fine to medium sand with minor sandy silt, clay, and gravel lenses.[55] The three zones of the Older Dune Sand include: (1) a deeply weathered surface; (2) an intermediate section of clean sands, basal beach sands, and gravels; and (3) an Older Dune Sand in the Lakewood Formation, which is also an Upper Pleistocene deposit. The upper section of the Lakewood Formation contains typical stream-type alluvium with finer flood plain sediments. The lower section consists of coarser sands and gravels, with basal deposits of sand and gravel and discontinuous lenses of sandy silt and clay. This lower sand and gravel section iswater-bearing and most likely represents the Gage-Gardena Aquifer. The San Pedro Formation underlies the Lakewood Formation, accounting for all Pleistocene deposits within the Escarpment. The San Pedro Formation, as previously discussed, consists of sand, gravel, silty sand, and silt, and most likely includes the Silverado Aquifer, at depths exceeding 100 feet below sea level.[56] A stratigraphic column of the Escarpment is presented in Figure 19 on page 233.

The existing City of Los Angeles' North Outfall Sewer (NOS) is located within the Escarpment some 35 to 45 feet above the base of the bluff. The 10.5-feet diameter (maximum height), semi-elliptical sewer was constructed in 1925. Up to 20 feet of fill was encountered in soil borings located adjacent to the NOS. Additional fill deposits also were noted to overlie the lower portions of the slope (see additional discussion below).

Two nearby developments that have the potential to affect the Escarpment are located on the Westchester Bluffs south of the Proposed Project site. One of the developments is located east of Loyola-Marymount University (Tract 43415) and consists of a 49-unit, single-family residence tract. The other development lies further east, near the eastern tip of the Proposed Project, and consists of 85 single-family homes. Construction has resulted in lowering and flattening of the top of the Escarpment in that vicinity. The portions of the slopes adjacent to

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[54] *Law/Crandall, Inc., "Addendum to Report of Geotechnical Studies, Bluff Stability," September 22, 1995, page 1.*

[55] *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, pages 3.1-3.2.*

[56] *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, pages 56-79.*

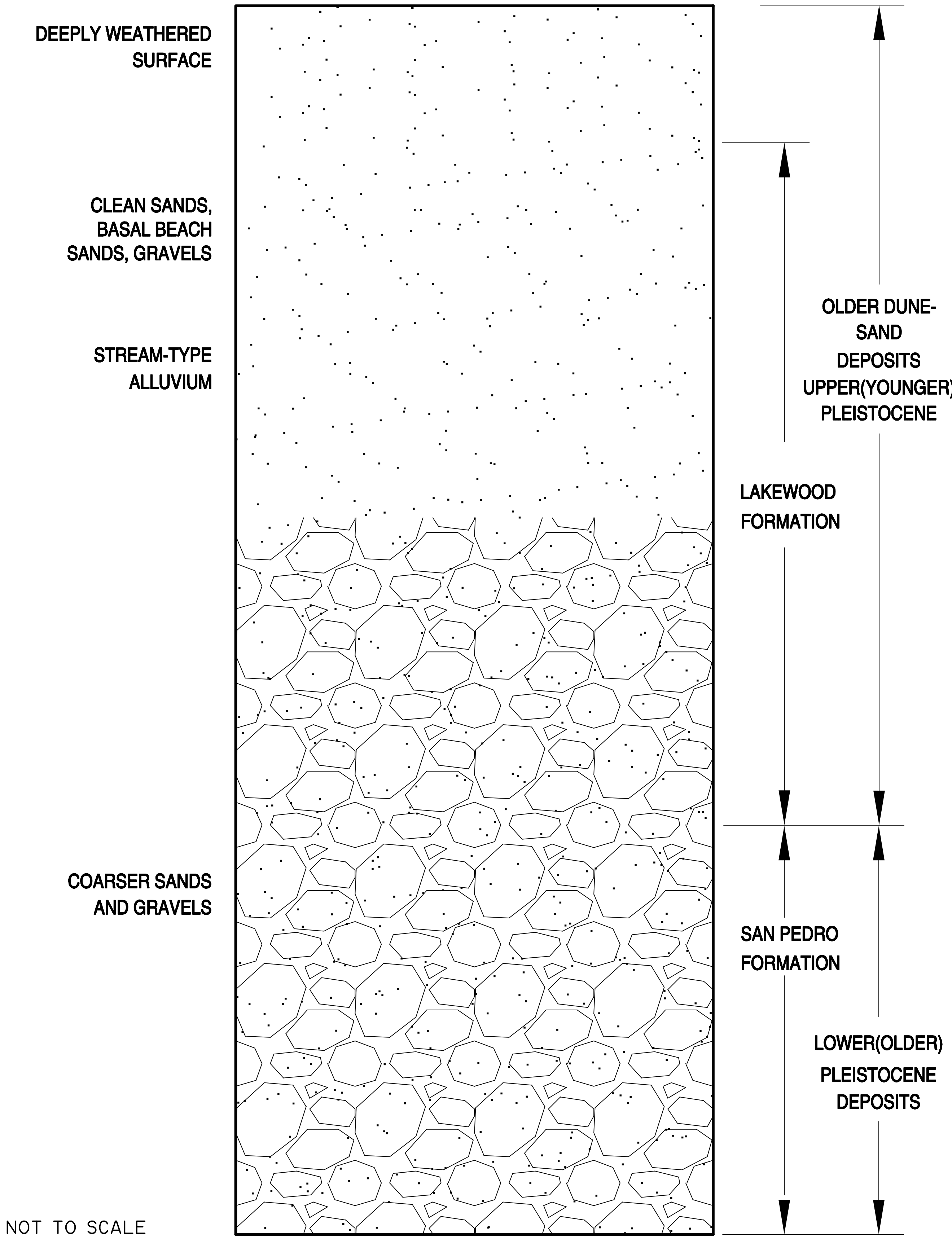

Figure 19

Stratigraphic Column of the Ballona Escarpment

CDM

these developments appear to be performing well, with some erosion problems principally due to incomplete vegetation cover in some areas.[57]

A bluff stability investigation was undertaken by Law/Crandall and Associates in 1991, and a supplemental investigation was completed by Group Delta Consultants (GDC) in 2001 (described below on page 235). The purpose of the 1991 investigation was to determine whether the Westchester Bluffs presents any hazards to the Proposed Project site (primarily those portions of the Proposed Project site within the Habitat Creation/Restoration area, immediately adjacent to the Escarpment) and to identify indicators for the potential effects of grading adjacent to the Escarpment on bluff stability.[58] The Law/Crandall investigation included geological mapping of the surface of the Escarpment and noted areas of water seepage, erosion, slumps, and other indications of potential instability. A total of seven exploratory borings were drilled and various laboratory analyses performed on selected soil samples. The findings of the 1991 study are summarized below.

Geologic investigations indicate that the Escarpment is considered grossly stable throughout the entire slope (i.e., not potentially subject to deep-seated sliding to the top of the bluff).[59] Geologic mapping of the Escarpment did not reveal the presence of any deep-seated rotational or translational landslide failures. The layering within the sedimentary materials was observed to dip in a favorable direction into the slope. It appears that the Escarpment reached an essentially stable slope configuration prior to the construction of the NOS. Cabora Road was cut into the slightly cemented sands, creating oversteepened portions of the slopes, which subsequently retreated by mass wasting (i.e., down-slope movement of rock debris by gravity). The cut slopes above the road are likely to continue slumping until a stable configuration is reached, though many of the old road cuts appear to have already stabilized.

The soils in the Escarpment are susceptible to erosion. Deeply incised erosion gullies were found in areas where surface water runoff had been allowed to flow over the edge of the Escarpment. Surface waters percolating through the dune sand occasionally resurface as springs in the Escarpment face and may contribute to slope erosion. The potential hazard for development at the toe of the Escarpment is related to the accumulation of soil debris at the toe

57 *Law/Crandall, Inc., "Addendum to Report of Geotechnical Studies, Bluff Stability," September 22, 1995, page 2.*

58 *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, pages 3.1-3.15.*

59 *LeRoy Crandall and Associates, "Report of Bluff Stability Investigation Tentative Tract Nos. 44857, 43415, and 43416 South of Jefferson Boulevard Between Lincoln Boulevard and Centinela Avenue Los Angeles, California for Howard Hughes Properties and Howard Hughes Realty," October 16, 1987.*

of the slope. The sewer construction and maintenance road (Cabora Road) is approximately 30 feet wide and serves as an effective catch for soil debris from the upper slope.[60]

As indicated above, an additional geotechnical investigation regarding slope stability on the Ballona Escarpment, as it relates to potential impacts to the NOS, including areas adjacent to the Proposed Project site, was completed by GDC in December 2001, the conclusions of which were accepted, with conditions, by the City of Los Angeles, Department of Public Works, Bureau of Engineering, Geotechnical Engineering Division, on February 19, 2002. Copies of the GDC analysis and the Bureau of Engineering memo approving the analysis are included in Appendix D-2. Recognizing that the overall Escarpment, from top of bluff to base of slope, is considered to be grossly stable, the GDC analysis focused on the stability of slopes descending from Cabora Road. As generally described above, Cabora Road occurs over the NOS that was constructed approximately 70 years ago. Soils excavated from the sewer trench were side-cast onto the existing natural slope below, creating an oversteepened and erodible condition. The combination of slope height, steepness, and shape on portions of the slope below Cabora Road have created conditions with the potential for localized slope failure. Slope stability calculations completed by GDC found that slopes greater than 38 feet from toe to crest (at Cabora Road) have a factor of safety (i.e., potential for slope failure) that does not meet geotechnical engineering safety standards. Also, slopes steeper than 1.5:1- H:V (i.e., for every 1.5 feet of horizontal distance the slope rises or drops more than 1 foot in vertical distance) generally have a factor of safety that is less than the acceptable standard. Slopes that are less than 38 feet high with grades (steepness) equal to, or flatter than, 1.5:1 (H:V) are generally stable and have an acceptable factor of safety.

The majority of the slope below Cabora Road, including those areas within the Proposed Project site, is less than 38 feet high and flatter than 1.5:1 (H:V) and thereby meets the acceptable factor of safety. For those limited portions of the slope below Cabora Road that were identified as having the potential for slope stability problems, GDC provided specific recommendations for the repair (stabilization) of such areas. Figure 20 on page 236 shows the portions of the slope below Cabora Road within the Proposed Project site that were identified as having the potential for slope stability problems. Depending on the specific characteristics of each area, different types of repair were recommended by GDC. The two types of repair that apply to slope areas within the Habitat Creation/Restoration Component of the Proposed Project site are as follows.

- *Type 1: Full Slope Height Fill* – The affected portions of the slope would be cut back in benches, a minimum of one equipment width into dense native soil with a 2-foot

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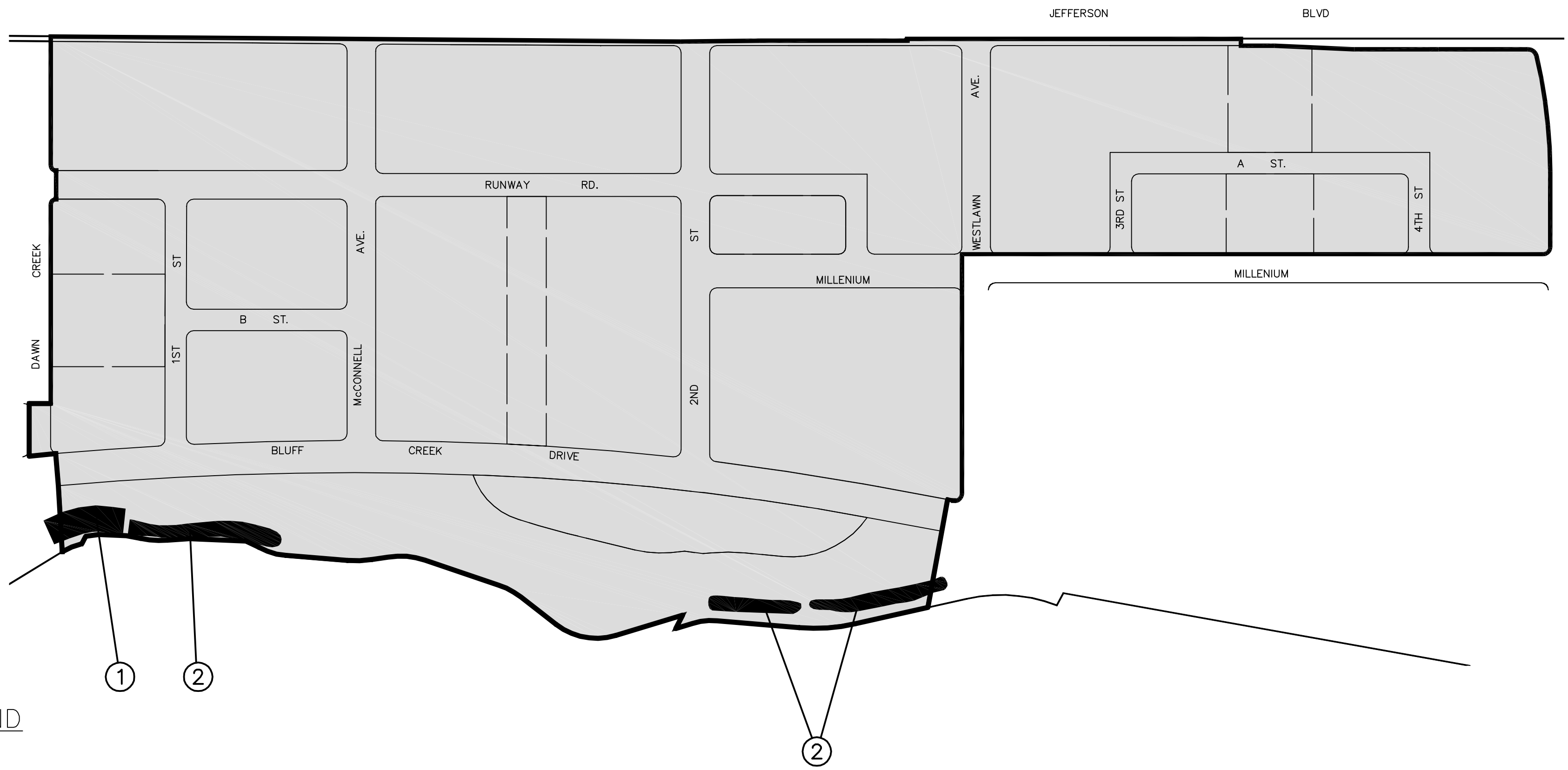
[60] *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, pages 3.13-3.14.*



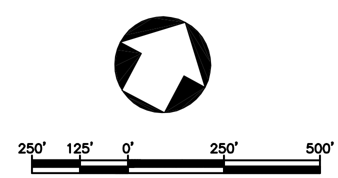
LEGEND

PROJECT BOUNDARY

AREAS OF POTENTIAL SLOPE STABILITY PROBLEMS.

① SLOPE REMEDIATION = REPAIR/FILL ENTIRE SLOPE.

② SLOPE REMEDIATION = REPAIR/FILL A PORTION OF SLOPE.



NOTE: BASE MAP AS SHOWN HEREON WAS PREPARED BY PSOMAS. SLOPE STABILITY INFORMATION SHOWN HEREON WAS DERIVED FROM GROUP DELTA CONSULTANTS SLOPE STABILITY INVESTIGATION OF 2001–2002.

Figure 20

Areas of Potential Slope Stability Problems at the Proposed Project Site

CDM

deep key at the toe. The removed material would be replaced with material having a minimum cohesion of 200 pounds per square foot (psf) and effective angle of internal friction of 30°, with a slope grade of 1.5:1 (H:V).

- *Type 2: Partial Slope Height Fill* – A portion of the slope height would be cut back into dense native soil and filled with material having a minimum cohesion of 200 psf and effective angle of internal friction of 30°, in 2-foot lifts of 8-inches or less in thickness. The slope grade would match the surrounding grade of 1.5:1 (H:V) or flatter.

The slope stability analysis and repair recommendations would account for and address the geotechnical characteristics of the area below Cabora Road; however, should erosion or other slope problems occur due to leaks from the NOS or from failure to maintain Cabora Road, slope stability problems could develop.

2.2.2.4 Subsidence

Subsidence is the lowering of land surface as a result of the extraction of oil, groundwater, or other materials. The site is not located in an area of known significant ground subsidence. Development of the Playa del Rey Oil Field, located about one mile to the west of the Project site, began in the 1920s with production peaking in 1935. Only minor subsidence was noted in the oil field between the primary production years of 1925 to 1938, with no subsidence noted between 1949 and 1955.[61] Oil extraction is no longer occurring, and the former oil reservoir is pressurized for natural gas storage. Accordingly, the potential for subsidence occurring beneath the site is considered remote. Subsidence related to the extraction of groundwater is considered remote, as groundwater withdrawals have markedly decreased since the 1930s. This reduced pumping was instituted in response to seawater intrusion that had degraded groundwater supplies in the area.[62] Groundwater extraction currently occurring as part of remediation activities within the Proposed Project site and the adjacent Playa Vista First Phase Project site, is not substantial (particularly relative to historical, i.e., pre-1940s, groundwater extraction) and is not anticipated to result in ground subsidence on- or off-site.

In a recent review of survey records (maintained by the City of Los Angeles, Department of Public Works) for the Playa del Rey area, GDC confirmed that subsidence over the last 45 years has been minimal. The records demonstrated that the subsidence in the area between the period from 1955 to 1970 ranged between 0.2 feet and 0.32 feet, which is consistent with the

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[61] *City of Los Angeles, Office of the Chief Legislative Analyst, City Investigation of Potential Issues of Concern for Community Facility District No. 4 Play Vista Development Project, May 2001, Section 3.*

[62] *LeRoy Crandall and Associates, January 3, 1991, op. cit., page 2.10.*

California Division of Oil and Gas Sixtieth Annual Report (1974) indicating a movement of about 0.3 feet during this time period. In 2000, Psomas, a registered survey firm, resurveyed benchmarks that the City of Los Angeles has maintained. This study determined that the subsidence at six benchmark points near the Proposed Project site during the 15-year period from 1985 to 2000 ranges between 0.72 inches and 1.4 inches with an average of 1.02 inches, while the subsidence at eight other benchmarks further east down Jefferson Boulevard during the same period ranges between 0.2 inches and 1.2 inches, with an average of 0.72 inches. The corresponding average subsidence since 1974, a 26-year period, has been 1.6 inches.[63, 64]

To further investigate the issue of regional subsidence, the City of Los Angeles Public Works Department, Bureau of Engineering, Survey Division conducted a survey of areas in, and near, the Proposed Project site. The investigation was conducted as part of a study completed by the City of Los Angeles Office of the Chief Legislative Analyst (CLA) in May 2001. The subsidence evaluation included, but was not limited to, the general area of the Playa del Rey Oil Field. The field investigation included over 50 survey points and review of previous data for those points to determine precise changes in surface elevations between 1985 and 2000. The investigation found elevation changes over this 15-year period to range from –2.66 inches (subsidence) to +0.81 inches (uplift). The conclusion of the investigation was that there is no significant or clearly defined trend of increased subsidence with the Playa del Rey Oil Field or any other specific area; settlement that was observed is localized and may be associated with curb, sidewalk, and gutter settlement along major streets.[65]

Furthermore, GDC assessed the potential for subsidence in response to concerns regarding the operation of dewatering systems for two-level subterranean parking garages and for the methane safety systems to be installed below on-site structures (see Section IV.I, Safety/Risk of Upset, in this EIR, for a description of the methane safety systems). Based on the analysis, GDC concluded that the combined effect of operations of the dewatering systems and the excavation of garages would result in a net heave (ground level rise) of approximately 0.5 inch (see Appendix D-6).

Peat deposits have been known to cause subsidence due to oxidation. Both peat and soft to very soft plastic clays can subside when a surcharge or load is applied or if they are allowed to dry. The potential compression of the peat or plastic clays under load was considered in the

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[63] *Group Delta Consultants, Inc., July 12, 2000, Letter to Playa Capital LLC with the subject of "Subsidence Evaluation Review."*

[64] *Group Delta Consultants, Inc., September 6, 2000, Letter to Playa Capital LLC with the subject of "Response to City of Los Angeles Review Comments, Subsidence Evaluation Review."*

[65] *City of Los Angeles Office of the Chief Legislative Analyst, City Investigation of Potential Issues of Concern for Community Facility District No. 4 Playa Vista Development Project, May 2001.*

various geotechnical investigations, with the conclusion that the Proposed Project site is suitable for development.[66,]

2.2.2.5 Liquefaction Potential

Liquefaction is a process by which saturated clay-free deposits or sediments lose strength and behave as a viscous liquid rather than a solid. When seismic waves or seismic shear waves pass through a loose granular layer of soil, they distort the granular structure, causing the loosely packed groups of grains to collapse. If the grains do not drain during the collapse, the pore-water pressure will increase. If the pore-water pressure approaches the weight of the overlying soil, the granular layer temporarily behaves as a viscous liquid and liquefaction results. Subsidence due to liquefaction can occur if the pressurized water then finds an escape route (usually up to the surface) allowing the soil grains to collapse (taking up less space than before).

The potential for liquefaction depends on several factors, including soil type, particle size and gradation, water level, relative density, confining pressure, intensity of shaking, and duration of shaking. Intensity of shaking and duration of shaking are functions of the maximum anticipated ground accelerations at the site. Potential for subsidence due to liquefaction depends as well upon the overall size of the deposits, especially their thickness, their containment by other non-liquefiable materials, and the potential for the water to escape. Large, loose, poorly contained deposits can show extreme subsidence; whereas, smaller, more compacted, more contained deposits generally show significantly less subsidence. Liquefaction and subsidence potential has generally been found to be greatest where the groundwater level is shallow and loose fine sands occur within a depth of 50 feet or less.

The City of Los Angeles General Plan Safety Element indicates that the Proposed Project site is in an area subject to potential liquefaction. In addition, the State Geologist has zoned parts of Los Angeles County based on their potential for seismically induced liquefaction and landslides. The Proposed Project site is within an official Liquefaction Zone of the Venice 7.5-Minute Quadrangle Seismic Hazard Zones Map. Although this map was originally issued on March 25, 1999, by the State Geologist in compliance with the Seismic Hazards Mapping Act of 1990, an electronic version is maintained and updated on the California Geological Survey website.[67] For both the County and State classifications, site-specific seismic hazard evaluations are required to validate the level of hazard in order to develop appropriate mitigation recommendations. In addition, the City of Los Angeles Department of Building and Safety has

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[66] *LeRoy Crandall and Associates "Geotechnical Studies, Proposed Playa Vista Project Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, page 2.11.*

[67] *California Department of Conservation, California Geological Survey. Seismic Hazard Mapping Program (SHMP) Data Access Page. http://gmw.consrv.ca.gov/shmp/MapProcessor.asp. Accessed February 19, 2003.*

standards to determine the level of mitigation required for specific types of construction projects, based on the results on site-specific liquefaction investigations, which must be carried out by a qualified geotechnical engineer. Such standards establish allowable and unacceptable on-site ground settlements for development projects, depending on the type of occupancy and uses proposed. These standards set forth the rationale for the level of mitigation required to receive approval of grading plans from the Department of Building and Safety. [68]

Throughout the Proposed Project site, localized areas of fine-grained sandy lenses (layers) are found within the upper 30 to 60 feet and could be subject to liquefaction. Under existing soil conditions, a severe earthquake within the Proposed Project vicinity could cause liquefaction of the looser sand and silty sand deposits in the upper 30 to 60 feet. However, the scattered nature (many soil borings exhibit little or no evidence of lenses) and small relative size (up to 5 feet thick in borings) of the lenses would limit the extent of liquefaction.[69] In the event of a severe earthquake on the San Andreas Fault Zone or a moderate earthquake on other nearby capable faults, settlements due to liquefaction in the range of 1 to 2 inches are expected within the Proposed Project site. Such settlement would be localized (i.e., limited to the fine-grained sandy lenses located in shallow groundwater, and not the vast majority of the Proposed Project site), and any effects related to liquefaction can be mitigated by proper engineering design and construction.[70]

2.2.2.6 Lurching

Another geologic (seismic) hazard that was previously investigated within the bluff portion of the Proposed Project is lurching. Lurching is the horizontal movement of soil, located on relatively steep embankments. The movement can cause material to yield in the unsupported direction, forming a series of cracks separating the ground into rough blocks. The Westchester Bluffs (Ballona Escarpment) have been designated as a City of Los Angeles Slope Stability Area. These Bluffs were essentially in their present condition during the 1933 Long Beach and 1857 Fort Tejon earthquakes. If lurching had occurred during these events, the relic blocks would be visible. However, none were found.[71] The natural slope angle of the Bluffs south of

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[68] *Southern California Grading Review Professionals, "Allowable Ground Settlements in Review of Grading Projects," December 2002.*

[69] *LeRoy Crandall and Associates "Geotechnical Studies, Proposed Playa Vista Project Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, page 2.10.*

[70] *LeRoy Crandall and Associates "Geotechnical Studies, Proposed Playa Vista Project Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, page 2.13.*

[71] *LeRoy Crandall and Associates, January 3, 1991, op. cit., page 2.12.*

the Proposed Project site reduces the potential for lurching, according to LeRoy Crandall and Associates.[72]

2.2.2.7 Tsunami and Seiche

The Proposed Project site is located in a very low-lying coastal area and could be subject to inundation by earthquake-generated sea waves known as tsunamis. A tsunami is a long-period wave (usually 15 to 60 minutes) caused by a large-scale movement of the sea floor, from a volcanic eruption, submarine earthquake, or landslide; although usually barely noticeable at sea, its velocity may be as high as 400 knots (approximately 460 miles per hour), so that it travels great distances and in shallow water may reach heights of around 15 meters (approximately 50 feet). The maximum expected run-up from a tsunami wave in the Proposed Project vicinity is 7.9 feet AMSL in a 100-year interval, which is approximately 0.9 feet higher to 16.1 feet lower than the existing elevations within the Proposed Project site.

Locally generated tsunamis have the potential for run-up of an additional two feet,[73] resulting in a maximum run-up of 9.9 feet AMSL. There have been no historical tsunamis generated from local offshore earthquakes from which the potential hazard to the Proposed Project could be more accurately estimated. Although the southwestern portion of the Proposed Project site is 0.9 feet below the predicted maximum run-up of a tsunami and 2.9 feet below the estimated maximum run-off for locally generated tsunamis, it is unlikely that floodwaters would substantially affect the site. This is because Lincoln Boulevard (which will be raised to 11 feet AMSL prior to construction of the Proposed Project), as well as the adjacent Playa Vista First Phase Project structures to the west of the Proposed Project site, would serve as a barrier to inundation that would prevent substantial flooding in low-lying areas on-site. Furthermore, the proximity of the Proposed Project site to major drainage and flood control infrastructure (i.e., Ballona Creek Channel, Centinela Ditch/Riparian Corridor, and various local storm drains) would allow any on-site flooding resulting from a tsunami to drain to the ocean relatively quickly, thereby avoiding long-term flooding on-site.

The City of Los Angeles Flood Hazard Specific Plan (as discussed in the City's Safety Element) sets forth design criteria for development in coastal zones, including increased base building elevations. The City of Los Angeles Department of Building and Safety's Flood Hazard Management Specific Plan Guidelines (Flood Hazard Guidelines) address development requirements for construction within flood risk zones, as delineated in the Los Angeles Flood Hazard Map (LAFHM). The Flood Hazard Guidelines discuss construction limitations in Coastal

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[72] *LeRoy Crandall and Associates, January 3, 1991, op. cit., page 2.12.*

[73] *Latiolat, Tim, Principal Engineer Geologist, LeRoy Crandall and Associates, Telephone Communication, June 19, 1991.*

High-hazard Areas (Zones V and VI-30 on the LAFHM), or areas subject to inundation from tsunamis or other wave action. According to the LAFHM, no portion of the Proposed Project site is within a flood hazard area, as designated by the Federal Emergency Management Agency (FEMA).

USACE is responsible for constructing and maintaining the breakwaters which are designed to mitigate damaging wave action, particularly in harbor areas. The City of Los Angeles Harbor Department (now referred to as "The Port of Los Angeles") works cooperatively with the USACE relative to maintenance and protection of the breakwater facilities. Along with the fire and police departments, it participates in the federal tsunami alert program to warn potentially affected properties and harbor tenants of tsunami threats and to advise them concerning protective response actions. In addition, as discussed above in Subsection 2.1, Regulatory Framework, the County of Los Angeles Office of Emergency Management is in the process of developing a tsunami operations response plan for affected coastal areas within the County (inclusive of incorporated cities and unincorporated County areas), an interim draft of which is currently in place pending completion of the final plan.

Seiches are oscillations in a body of water caused by earthquake shaking. The result of seiching of the existing marina (i.e., Marina del Rey), or various channels (i.e., Ballona Channel and channels within the existing Ballona Wetlands, approximately 1.1 miles west of the Proposed Project site) on or near the Proposed Project site could cause the water level to rise or lower a few inches to a few feet, possibly resulting in limited flooding.

2.2.3 Existing Surface and Subsurface Installations and Uses

Surface and subsurface features have influenced the earth characteristics at the Proposed Project site. These features are discussed in the following subsections. Figure 21 on page 243 illustrates these features.

Easements for a storm drain and the NOS are located along the southern edge of the Proposed Project site. Several structures located within the Proposed Project site were once part of the former Hughes Aircraft Corporation and the former McDonnell Douglas Helicopter Company plant site; two of these structures (Buildings 22 and 45), as well as various other small buildings (sheds and minor storage structures that are located within the former Salvage Yard area), and construction trailers occur within the Proposed Project site. Several utility lines currently traverse the Proposed Project site, including several SCGC lines, LADWP water lines, and telephone lines along Jefferson Boulevard.[74] In addition, there are on-site utilities serving

[74] *Psomas and Associates, "Utility Master Plan, Playa Vista Project" (map), April 5, 1996.*

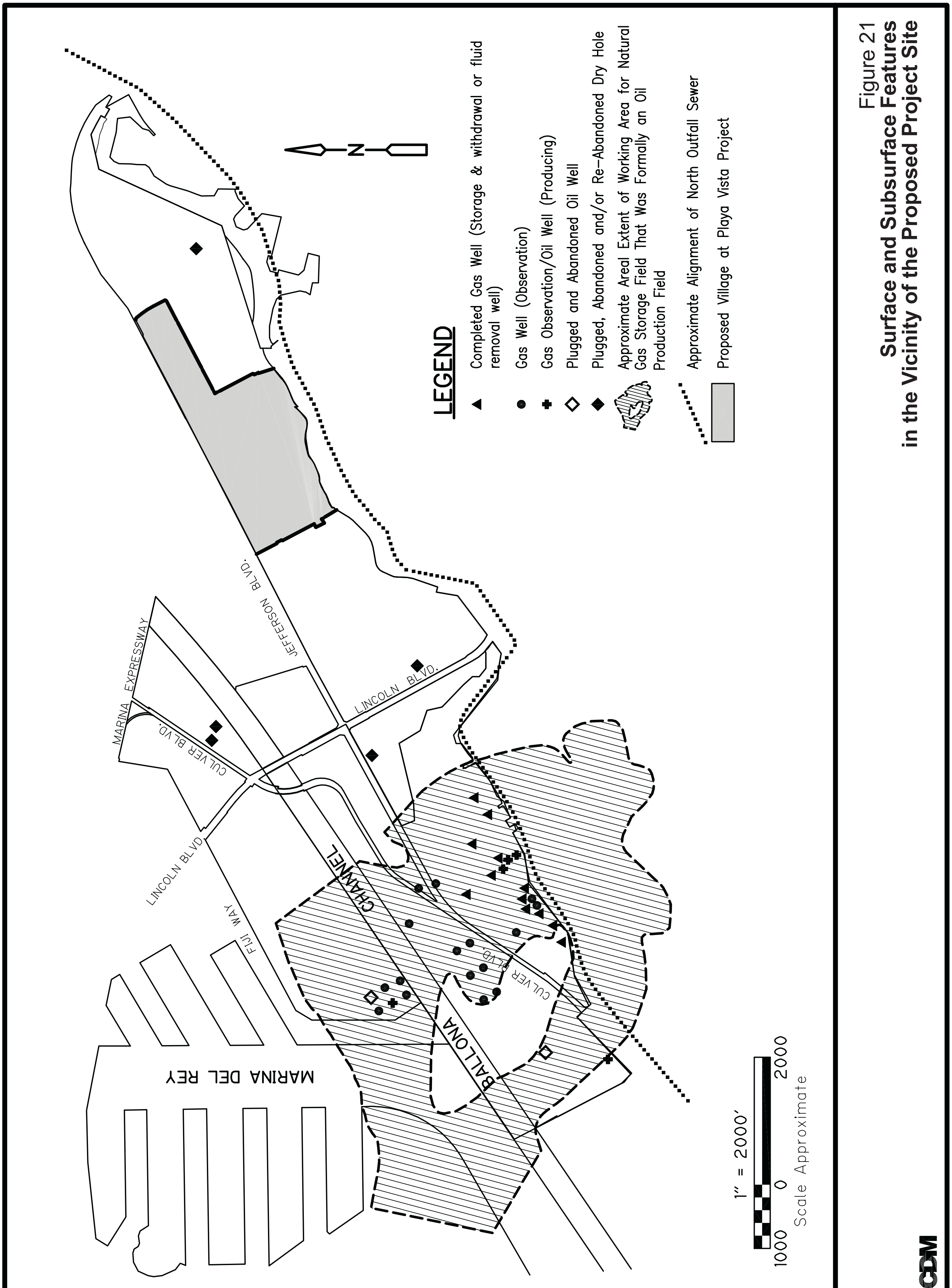


Figure 21
Surface and Subsurface Features in the Vicinity of the Proposed Project Site
LEGEND
Completed Gas Well (Storage & withdrawal or fluid removal well)
Gas Well (Observation)
Gas Observation/Oil Well (Producing)
Plugged and Abandoned Oil Well
Plugged, Abandoned and/or Re-Abandoned Dry Hole
Approximate Areal Extent of Working Area for Natural Gas Storage Field That Was Formally an Oil Production Field
Approximate Alignment of North Outfall Sewer
Proposed Village at Playa Vista Project
N
MARINA DEL REY
BALLONA CHANNEL
LINCOLN BLVD.
CULVER BLVD.
MARINA EXPRESSWAY
JEFFERSON BLVD.
FIJI WAY
1" = 2000'
1000 0 2000
Scale Approximate
CDM

the former Plant Site's internal connections. The utilities are reportedly shallow, buried less than five feet below existing grade.

A detailed discussion on energy, water and wastewater infrastructure can be found in Sections IV.M; Energy Consumption; IV.N(1), Water Consumption; and IV.N(2), Wastewater in this EIR.

Historical operations and events on, and adjacent to, the Proposed Project site resulted in potential contamination of soils and groundwater. For a detailed discussion of historical operations adjacent to, and at, the Proposed Project site, and soil and groundwater investigation and remediation, see Section IV.I, Safety/Risk of Upset.

For a description of SCGC's underground natural gas reservoir and various oil and gas wells in the vicinity of the Proposed Project, see Section IV.I, Safety/Risk of Upset.

3.0 IMPACT ANALYSIS

3.1 Methodology

The following evaluation of potential impacts is based upon published geological reports as well as the results of site-specific geotechnical investigations and studies completed for the Proposed Project site. These reports were prepared by geotechnical consulting firms, primarily Law/Crandall Inc. (formerly LeRoy Crandall and Associates), ETI, ECI, and GDC. Geotechnical/geologic reports prepared for, or as otherwise related to, the Proposed Project site, and related correspondence, are included with this document as Appendices D-1 through D-12 and Appendix J-6.

3.2 Significance Thresholds

The Los Angeles CEQA Thresholds Guide addresses impact to earth resources under Section C, Geology. There are four areas of study relative to geology: (1) geologic hazards; (2) sedimentation and erosion; (3) landform alteration; and (4) mineral resources. The first three areas of study are addressed in this section, while the fourth, mineral resources, is addressed in Section IV.H, Mineral Resources, of this EIR.

The Draft Los Angeles CEQA Thresholds Guide (page C.1-4) states that a project would normally have a significant geologic hazard impact if it would:

- Cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury.

The Draft Los Angeles CEQA Thresholds Guide (page C.2-3) states that a project would normally have a significant sedimentation and erosion impact if it would:

- Constitute a geologic hazard to other properties by causing or accelerating instability from erosion; or

- Accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site.

Additionally, the Draft Los Angeles CEQA Thresholds Guide (page C.3-2) states that a project would normally have a significant landform alteration impact if:

- One or more distinct and prominent geologic or topographic features would be destroyed, permanently covered or materially and adversely modified. Such features may include, but are not limited to, hilltops, ridges, hill slopes, canyons, ravines, rock outcrops, water bodies, streambeds, and wetlands.

3.3 Project Design Features

Implementation of the Proposed Project would involve grading in order to achieve desired soil conditions and pad elevations within proposed development areas. Engineered fill (i.e., earthen material that meet soils engineering criteria relative to use for development purposes and that is applied in a specific manner) would be used at the Proposed Project site to raise existing elevations of proposed development areas to desired levels (i.e., subterranean parking would be located above groundwater). The placement of fill would also serve to improve, or compensate for, the engineering properties of existing soils on-site. For example, the placement of engineered fill including an additional increment known as “surcharge” (see description below) would result in the consolidation and settlement of compressible natural clays that occur throughout much of the Proposed Project site, consequently providing a more stable base suitable for building foundations.

The grading approach proposed for the Proposed Project would include, where feasible and appropriate, the transfer of excavated materials between development subareas within the Proposed Project site to reduce the import and export needs of the Proposed Project. Additionally, the proposed use of on-site materials for surcharging and backfilling would help reduce the import and export requirements of the Proposed Project. Surcharging involves the placement of extra fill on a proposed development area to use the extra weight of the fill for consolidating and compacting the underlying soils and then, when the desired amount of compaction has occurred, removing the excess materials. Based on the amount of consolidation that occurs, the amount of material removed at the end of the surcharge process would be less than that originally placed.

Backfilling involves mostly the placement and compaction of graded materials around the base of new structures as they are completed. These and other types of measures are proposed to help reduce the overall grading import and export needs of the Proposed Project. Also as part of the grading program, erosion and sedimentation control measures (e.g., Stormwater Pollution Prevention Plan [SWPPP] and Erosion Control Plan) would be implemented during site grading to reduce erosion impacts.

With regard to seismic considerations, all construction proposed in conjunction with the Proposed Project would conform to the requirements of the City Building and Safety Department codes, and the most recent Uniform Building Code, including the provisions related to seismic safety.

Similarly, temporary dewatering activities required during construction would be conducted in accordance with the requirements of the Regional Water Quality Control Board (RWQCB) and would also be subject to the review and approval of the City Building and Safety Department, as appropriate.

3.4 Project Impacts

3.4.1 Urban Development Component

3.4.1.1 Grading

Although the Urban Development Component is relatively flat, grading would be required to accommodate the development proposed. Such grading would include excavation of earthen materials ("cut") and placement of earthen materials ("fill"). Table 8 on page 247 indicates the general nature (i.e., cut and fill) and amount (i.e., cubic yards) of grading associated with the Urban Development Component. It should be noted that the cut and fill quantities indicated in Table 8 on page 247, are general estimates based on approximate existing site elevations and preliminary development plans with assumed building area elevations. In general, development areas would require the addition of fill materials to provide suitable building pad elevations and characteristics (i.e., surcharge of soils to minimize potential subsidence). Portions of the subject fill would subsequently be removed following completion of surcharging and would also be removed in conjunction with building excavation (i.e., development of

Table 8

SUMMARY OF CUT/FILL VOLUMES FOR THE PROPOSED PROJECT (in Million Cubic Yards)

	Initial Fill	Surcharge Fill	Total Fill	Total Cut	Net Cut/Fill (Export) Import
Urban Development	0.45	0.25	0.70	(0.20)	0.50
Habitat Creation/Restoration	0	0	0	(0.08)	(0.08)
Total	**0.45**	**0.25**	**0.70**	**(0.28)**	**0.42**

Net import of 0.42 mcy would likely occur incrementally throughout the construction period for the Proposed Project.

mcy =million cubic yards

[a] *This column assumes that cut and fill would be balanced on-site to the maximum extent possible. Where the total amount of cut exceeds the total amount of fill, the excess materials would be "export" as shown in parentheses. Where the total amount of cut is less than the amount of fill, the additional material required would be "import."*

Source: Camp Dresser & McKee, Inc., 2003.

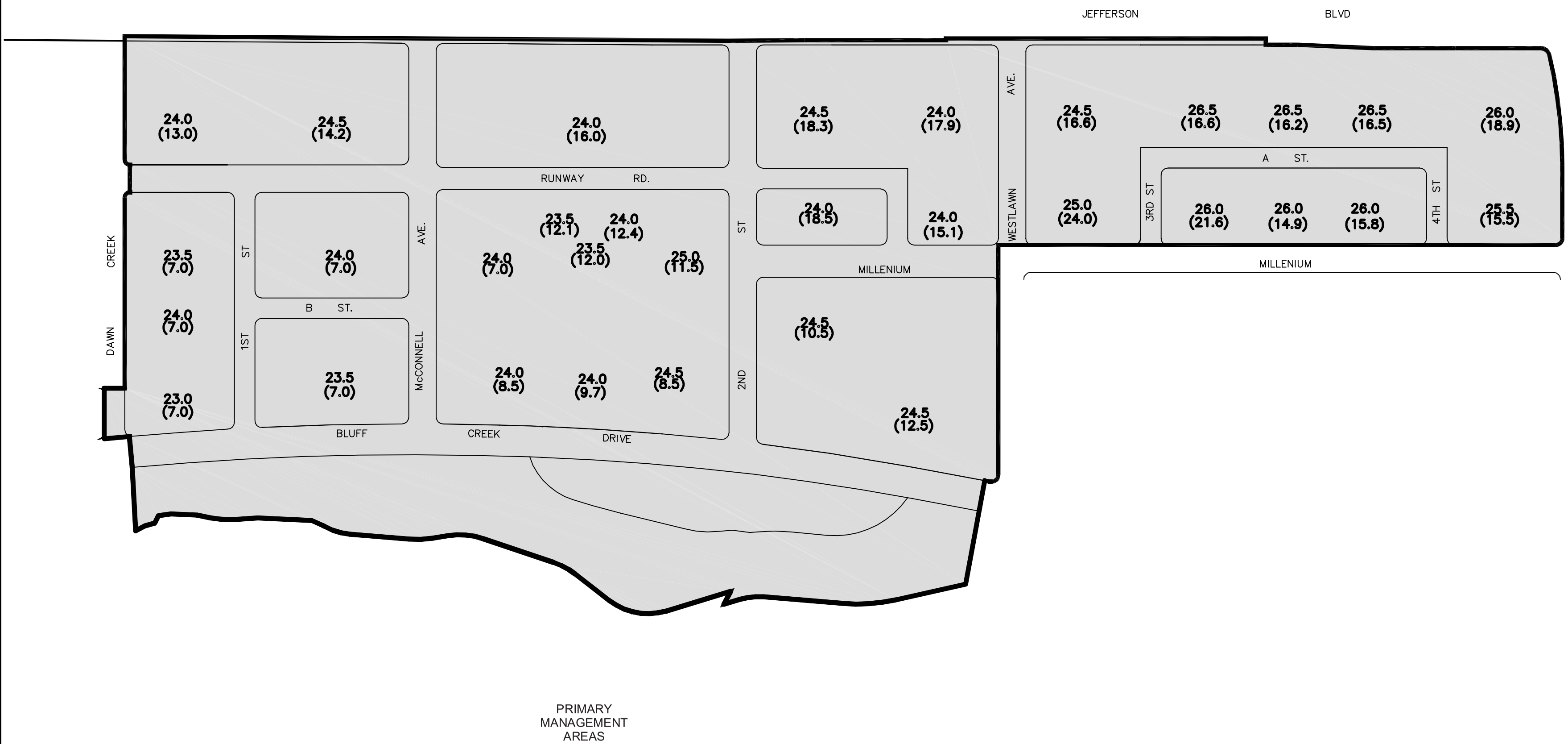
subterranean parking). It should be noted that surcharging is not necessary in all areas, but is an option to aid proper compaction of building pads where appropriate.

Figure 22 on page 248, provides comparisons of existing and proposed surface elevations at various locations within the Urban Development Component.

Excavation and Fill

Excavation (i.e., cut) and fill would be required for the Urban Development Component of the Proposed Project.

Subterranean (underground) parking for the Proposed Project is anticipated to be predominantly single-level, though in some instances, dual-level parking would be constructed in conjunction with higher density uses. Excavation for subterranean parking would extend down to a maximum of 23 feet below finished pad elevation (as opposed to native grade elevation) for dual-level parking.



LEGEND

18.0 – PROPOSED ELEVATION (IN FEET AMSL)

(12.0) – EXISTING ELEVATION (IN FEET AMSL)

NOTE: BASE MAP AS SHOWN HEREON WAS PREPARED BY PSOMAS. ALL OTHER INFORMATION SHOWN HEREON WAS SUPPLIED BY PLAYA CAPITAL COMPANY.

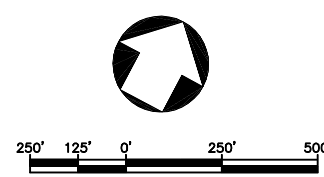


Figure 22
Existing and Proposed Ground Elevation

CDM

Existing elevations of the Urban Development Component range from a low of 7 feet AMSL to approximately 24 feet AMSL. Proposed building pad elevations would range from 23 feet AMSL to 26.5 feet AMSL. Placement of fill within the Urban Development Component would raise the existing elevations to the desired level. As noted above, the grading approach for the Proposed Project would include, where feasible and appropriate, the transfer of excavated materials between development subareas within the Proposed Project site to reduce the import and export needs of the Proposed Project. As indicated in Table 8, the total amounts of cut and fill associated with the Urban Development Component are approximately 0.20 mcy and 0.70 mcy, respectively. As such, there would be a net deficit of 0.50 mcy of material for the Urban Development Component. A portion (0.08 mcy) of this import need would be provided through grading of the Riparian Corridor (see discussion below) while the remainder would come from off-site areas, which would have to be imported. When import of materials is necessary to meet fill requirements, it is likely that such fill material would originate from within the general Los Angeles metropolitan area. The specific nature and locations of such off-site fill sources would depend largely on the timing and amount of material needed. As the need to import fill occurs, it is anticipated that nearby development projects having excess excavation materials would be evaluated first as potential sources of fill. It is anticipated that such import would occur incrementally over the duration of the Urban Development Component's construction period. Given the types of fill activities that have been successfully completed for similar local development projects, which met the requirements of local grading codes and ordinances, it is anticipated that fill operations for the Proposed Project can be conducted in accordance with applicable codes and ordinances with grading plans to be approved by the City Building and Safety Department. As such, excavation activities would not adversely affect any on-site geologic or topographic features, as no such features exist within the Urban Development Component. Therefore, it is anticipated that a less than significant impact would occur because the proposed grading and excavation activities would not: (1) cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury; and (2) one or more distinct and prominent geologic or topographic features would not be destroyed, permanently covered or materially and adversely modified.

Additionally, major underground utilities (one SCGC line, one LADWP water line, one LADWP power cable, two SCE power cables, and two GTE telephone lines) are located below, or near, several major streets adjacent to the Urban Development Component (i.e., Jefferson Boulevard). These utilities are reportedly shallow, buried less than five feet below the existing grade. In accordance with state requirements and standard construction practices, any grading, excavation, or compaction occurring in proximity to such utilities would be coordinated with the responsible utility company to avoid direct or indirect impacts. Compacted fill would be placed over such existing lines. Settlement of the utilities is expected to be minimal (varying from zero to 1 inch). The engineering, design, and placement of such fill would take into account the potential for settlement and provide the necessary precautions to avoid any damage or weakening of the lines. With adherence to state and local requirements regarding construction activities near utilities, and with coordination/consultation with affected utility agencies, construction within the Urban Development Component would result in a less than significant impact as it would not: (1) cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury; and (2) one or more distinct and prominent geologic or topographic features would not be destroyed, permanently covered or materially and adversely modified. Indirect adverse impacts from grading and excavation activities are addressed in other related sections such as Sections IV.B, Air Quality; IV.P, Cultural Resources; IV.K, Transportation; and IV.D, Biotic Resources, in this EIR.

Grading and excavation within areas having contaminated soils poses the potential to expose workers to health risks. Previously identified contaminated soils in the adjacent Playa Vista First Phase Project site area are currently being remediated. Additional investigations have been conducted within the Proposed Project site in accordance with the requirements of the RWQCB pursuant to Cleanup and Abatement Order No. 98-125. Section IV.I, Safety/Risk of Upset, provides a description of investigations completed at the Proposed Project site related to soils or groundwater contamination and the potential impacts associated with Proposed Project buildout including the potential to expose workers to health risks.

Erosion and Sedimentation

The surface soils of the Proposed Project site are predominately quaternary sands (alluvium), which are subject to erosion. Grading, excavation, and other earth-moving activities in all subareas could potentially result in substantial erosion and sedimentation. As part of the Proposed Project, the Playa Vista Stormwater Pollution Prevention Plan (SWPPP), which was developed for the adjacent Playa Vista First Phase Project, would be modified and updated to address Proposed Project construction. The SWPPP defines temporary BMPs to be implemented in accordance with the General Construction Permit.[75] BMPs deployed during construction include the following categories:

- Drainage Control
- Tracking Controls (from vehicles)

[75] *Requirements for compliance with the state's General Construction Permit, including the need to prepare, maintain, and implement a SWPPP, are described in Water Quality Order 99-08-DWQ and associated fact sheets from the State Water Resources Control Board.*

- Waste Management Practices
- Sediment Controls
- Soil Stabilization (erosion control)
- Management of Pesticides and Fertilizers
- Material Delivery and Storage Controls
- Paving Operations Controls
- Training
- Ponded Water Management
- Vehicle and Equipment Cleaning, Fueling, and Maintenance Controls
- Spill Preventions and Control Procedures
- Contaminated Soil Management
- Measures to Comply with Waste Disposal, Sanitary Sewer, and Septic Regulations
- Concrete and Construction Materials Management
- Wind Erosion Control

The Urban Development Component construction activities would be subject to the requirements of the existing Playa Vista SWPPP, as amended for the Proposed Project, which would adequately address potential water quality impacts associated with general construction activities, as well as for grading. More specifically, the selection and implementation of appropriate BMPs as described in the SWPPP for Playa Vista, and as also reflected in the General Construction Permit for Los Angeles, would specifically address potential construction-related erosion and sedimentation impacts. Erosion/sediment control BMPs can include, as appropriate, measures for: the minimization of disturbed areas; stabilization of disturbed areas through the use of tarps, plastic, vegetation, mulching, geotextiles, etc.; protection of slopes and channels through the use of covering, vegetation, etc.; controlling site perimeter through the use of sandbagging and other diversion techniques; and controlling internal erosion through the use of barriers to slow sediment-laden runoff and/or basins to allow sediment to settle out. Implementation of these and other such measures would enable Proposed Project-related grading, excavation and other earthmoving activities to result in a less than significant impact by not constituting a geologic hazard to other properties by causing or accelerating instability from erosion; or accelerating natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site. Operation of proposed uses within the Urban Development Component would incorporate stormwater control devices to minimize or avoid erosion and sedimentation on- and off-site. All areas that are not proposed for development of structures would be appropriately landscaped, or otherwise stabilized, in order to reduce the potential for the transport of soil material from the Proposed Project site. Further, stormwater facilities would be designed and constructed to reduce runoff velocities and/or volumes, thereby minimizing the potential for stormwater flows to result in substantial erosion or sedimentation. As such, the Urban Development Component would result in less than significant erosion and sedimentation impacts, since operation of proposed uses would not constitute a geologic hazard to other properties by causing or accelerating instability from erosion, and would not accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site. For additional discussion of construction and operational water quality impacts of the Urban Development Component, as relates to erosion and sedimentation, please refer to Section IV.C.(2), Water Quality, in this EIR.

3.4.1.2 Dewatering

Because of the shallow water level conditions that exist throughout the Urban Development Component, dewatering is likely to be required in certain areas requiring subsurface excavation, although this is dependent upon the actual construction techniques employed. Excavation for development of subterranean parking within development areas may also encounter groundwater, particularly for dual-level parking structures which would extend approximately 23 feet below finished pad elevations.

Any dewatering that becomes necessary for development construction on-site would be done in accordance with a dewatering permit obtained from the RWQCB. Prior to initiating any construction dewatering activities that are not included within the scope of the permit provisions, the Applicant/Contractor must update the plans and provisions related to the permit and must notify the RWQCB of any such plan/provisions modifications. The requirements of the dewatering permit include monitoring and reporting of the quantity and quality of dewatering discharge.

Dewatering activities within the Urban Development Component would be coordinated with the existing off-site groundwater remediation program at the former Plant Site, particularly with respect to the potential for construction dewatering to draw from a contaminated groundwater plume.

Construction dewatering in the vicinity of the Proposed Project site has been successfully completed in accordance with RWQCB requirements for a number of years (as part of the adjacent Playa Vista First Phase Project). Accordingly, it is anticipated that construction dewatering for the Urban Development Component can, and will, comply with the applicable regulatory requirements. Permanent, dewatering that may occur as part of the Urban Development Component, such as relates to ongoing groundwater remediation activities and dewatering of subterranean parking structures and for methane safety systems, is not anticipated to be substantial relative to construction dewatering. Furthermore, as discussed above in

Subsection 2.2.2.4, Subsidence, GDC concluded that operation of dewatering systems for subterranean parking and the methane safety systems would not result in any net subsidence at the Proposed Project site. As such, dewatering activities during construction and operation of Urban Development uses are anticipated to result in a less than significant impact since they would not: (1) cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury; (2) constitute a geologic hazard to other properties by causing or accelerating instability from erosion; and (3) accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site. For more information on potential impacts resulting from dewatering, please see Section IV.C.(2), Water Quality, and Section IV.I, Safety/Risk of Upset, in this EIR.

3.4.1.3 Subsidence

Although limited subsidence has occurred historically on, or near, property adjacent to the Proposed Project site (i.e., pre-1940, as discussed above in Subsection 2.2.2.4, Subsidence), the subsidence was due directly to the historical withdrawal of subsurface natural (petroleum and groundwater) resources. No significant subsidence has occurred within the last 50 years, and no additional subsidence is anticipated, as no additional subsurface natural resource withdrawal is planned, aside from normal operation of the adjacent natural gas storage reservoir and on-site groundwater remediation. In a recent review of leveling records in the Playa del Rey area, GDC confirmed that subsidence over the last 45 years has been minimal (see description below).[76] In response to comments from the City of Los Angeles Department of Building and Safety regarding their subsidence evaluation report issued during July of 2000, GDC reevaluated subsidence benchmarks (points of reference from which elevation changes may be gauged) and issued a supplementary report in late August of 2000.[77] This report analyzed subsidence on the Proposed Project site and adjacent properties by referencing a benchmark outside the area of potential subsidence, to more accurately estimate the amount of subsidence or heaving (rise) on and around the Proposed Project site. Based on the survey data referenced to the new benchmark, it was concluded that the Proposed Project vicinity has had minor settlement (about 1 inch) during the past 15 years, and 1.67 inches during the past 26 years. This settlement is

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[76] *Group Delta Consultants, Inc., July 12, 2000, Letter to Playa Capital LLC with the subject of "Subsidence Evaluation Review."*

[77] *Group Delta Consultants, Inc., Response to City of Los Angeles Review Comments, Subsidence Evaluation Review, Playa Vista Development, California, August 29, 2000,* and *Earth Consultants International Inc. (ECI), 2000, Geologic Study to Evaluate the Potential for Active Faulting Near the Intersection of Lincoln and Jefferson Boulevards, at the Playa Vista Site, in the City of Los Angeles, CA.*

general settlement over a distance of several miles and has no adverse effect on individual structures. The additional investigation of potential subsidence completed by the City's Bureau of Engineering also found no trend or evidence of notable subsidence in the Proposed Project area. The City's investigation concluded that only localized settlement such as may be associated with curb, sidewalk and gutter settlement along major streets has occurred in the vicinity of the Proposed Project site. Additionally, the GDC analysis concluded that operation of dewatering systems for subterranean parking and the methane safety systems would not result in any net subsidence at the Proposed Project site. Because subsidence is minimal in and around the Proposed Project site, and no significant subsidence is anticipated in the area, development of the Proposed Project uses would not cause or accelerate geological hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury. As such, subsidence impacts to or from the Proposed Project would be less than significant.[78]

3.4.1.3 Seismic Hazards

Development of the proposed uses would increase the resident and daytime populations of the Urban Development Component. Such populations would be exposed to the potential for seismic events and associated hazards. Given that all of southern California is subject to seismic events and associated hazards, the potential risk to the resident and daytime populations is not considered to be unique to, or excessive for, the Urban Development Component (please see Subsection 2.2.2.2.4 – Postulated Faults, above). As discussed under Project Design Features, all structures would be designed, located and built in accordance with City Building and Safety Department requirements and the most recent Uniform Building Code. Further, the Proposed Project would not cause or accelerate seismic or geological hazards which would result in substantial damage to structures or infrastructure, and thus seismic and geologic hazards impacts would be less than significant. The following provides the specific information and analysis supporting this conclusion.

Groundshaking and Rupture

The Proposed Project site is not located within the City's Fault Rupture Study Zone. There were no fault or fault-associated features observed on or adjacent to the site during field investigations conducted by LeRoy Crandall and Associates, and recent geotechnical investigations by ECI and Davis and Namson Consulting Geologists found no evidence of

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[78] *Group Delta Consultants, Inc., Response to City of Los Angeles Review Comments, Subsidence Evaluation Review, Playa Vista Development, California, August 29, 2000.*

surface or shallow subsurface faulting at the site.[79, 80] The potential for surface rupture within the Proposed Project site is considered extremely low.

Movement on any of the active and potentially active faults previously described in Subsection 2.0, Environmental Setting, could, however, cause ground shaking at the site. In accordance with the City Building and Safety Department's review requirements and/or the UBC, structures would be designed to withstand the effects of an earthquake occurring in the vicinity of the Proposed Project site. Therefore, the risk to Project structures from ground shaking and rupture would be minimized. The groundshaking and fault rupture hazard associated with the Urban Development Component is a less than significant impact, as the Proposed Project would not cause or accelerate groundshaking and fault rupture hazards.

Tsunami and Seiche

As mentioned in Subsection 2.2.2.7 above, the Proposed Project site is located in a very low-lying coastal area and could be subject to inundation by earthquake-generated sea waves known as tsunamis. The maximum expected run up from a tsunami wave in the Proposed Project site is 7.9 feet AMSL in a 100-year interval, which is approximately 0.9 feet higher to 16.1 feet lower than the existing elevations throughout much of the Proposed Project site. Locally generated tsunamis have the potential for run-up of an additional 2 feet resulting in a maximum runup of 9.9 feet AMSL.[81] There have been no historic tsunamis generated from local offshore earthquakes from which the potential hazard to the Proposed Project could be more accurately estimated.

Minimum finished pad and street elevations of the Proposed Project site are generally between 23 and 27 feet AMSL; hence, tsunamis would not significantly affect development within the Proposed Project site. Further, the Proposed Project would comply with any applicable strategic plans developed by the State Office of Emergency Services and the Los Angeles County Office of Emergency Management, as well as the construction limitations contained in the City of Los Angeles Flood Hazard Management Specific Plan Guidelines (as referenced in the City General Plan Safety Element). Tsunami impacts would be less than

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[79] *City of Los Angeles, Draft Program Environmental Impact Report, Master Plan Project for Playa Vista, EIR No. 90-0200-SUB(C)(CUZ)(CUB), September 1992.*

[80] *Davis and Namson Consulting Geologists, An Evaluation of the Subsurface Structure of the Playa Vista Project Site and Adjacent Area, November 2000.*

[81] *Latioloat, Tim, Principal Engineer Geologist, LeRoy Crandall and Associates, Telephone Communication, June 19, 1991.*

significant, as the Proposed Project would not cause or accelerate tsunami hazards, which would not result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury.

Seiches are oscillations in a body of water caused by earthquake shaking. The possibility of seiches occurring in Ballona Channel is considered remote because the height of a seiche is a function of the size of the water body, and the Channel is relatively narrow. The seiche hazard associated with the Proposed Project is minimal due to the distance of the Proposed Project site from the Channel. Thus, seiche impacts would be less than significant as the Proposed Project would not cause or accelerate seiche hazards.

Liquefaction Potential

Throughout the Proposed Project site, localized areas of fine-grained, sandy lenses are found within the upper 30 to 60 feet that are moderately subject to liquefaction. In the event a severe earthquake occurred within the Proposed Project site vicinity, liquefaction of the looser sand and silty sand deposits in the upper 30 to 60 feet could occur. However, the scattered nature (many soil borings exhibit little or no evidence of lenses) and relatively small size (up to 5 feet thick in borings) of the lenses would limit the extent of liquefaction. In the event of a severe earthquake on the San Andreas Fault Zone or a moderate earthquake on the nearby capable faults, settlements due to liquefaction in the range of 1 to 2 inches are expected.[82]

Current seismic codes require dynamic analysis to be performed prior to building design to determine appropriate structural components. Structural components for current projects can include L- and slurry-walls, various types of piles, and increased steel within concrete foundations. New techniques are also available to minimize the possibility of liquefaction within the soil itself, such as stone columns, vibration, and dynamic compaction. On a site-by-site basis and in accordance with all City and other applicable Codes, as described above in Subsection 2.2.2.5, Liquefaction Potential, further soil analyses would be completed in conjunction with building development site engineering to define the appropriate safety standards and measures that will be incorporated into project plans prior to receiving approved grading plans.

In order to avoid possible settlement resulting in structural damage, structures would be designed to resist these effects and/or the underlying soils would be properly prepared. In the application of City structural engineering standards, liquefaction must be considered during

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[82] *Leroy Crandall and Associates, "Geotechnical Studies – Proposed Playa Vista Project – Area D, Tentative Tract Map No. 49104," January 3, 1991.*

structural design. Therefore, through compliance with the provisions required by City building and safety codes and by the Uniform Building Code (UBC) a significant impact related to liquefaction is not expected, as the Proposed Project would not cause or accelerate liquefaction hazards which would result in substantial damage to structures or infrastructures, or expose people to substantial risk of injury.

Lurching

With respect to the Urban Development Component's impacts related to lurching, no evidence of potential lurching hazards was found during previous geotechnical investigations, as discussed above in Subsection 2.2.2.6, Lurching. Additionally, the Bluffs are sufficiently remote from the Urban Development Component, and bluff restoration activities (associated with the Habitat Creation/Restoration Component, discussed below) would only occur at the surface such that lurching, if it were ever to occur, would not result in substantial damage to structures or infrastructures, or expose people to substantial risk of injury; therefore, no significant impact is anticipated.

Slope Stability

The southern portion of the Proposed Project site is subject to potential hazards from slope stability associated with the Ballona Escarpment (Westchester Bluffs). However, the areas to be developed with structures as part of the Urban Development Component are not on or near the Escarpment. As such, slope stability impacts pertain almost exclusively to the Habitat Creation/Restoration Component, discussed below.

3.4.2 Habitat Creation/Restoration Component

The following discussion addresses earth impacts as relates to the Habitat Creation/ Restoration Component of the Proposed Project. The only earth impacts that relate to the Habitat Creation/Restoration Component pertain to grading and slope stability; as such, only these topics are addressed below.

3.4.2.1 Grading

Excavation and Fill

Implementation of the Habitat Creation/Restoration Component would require grading activities within the southern portion of the Proposed Project site. Bluff restoration activities would include replacement of non-native vegetation with native species and implementation of erosion control methods (i.e., erosion mat or equivalent), thereby improving the ecological function of the bluff habitat, and no notable grading would be involved. With regard to the Riparian Corridor, the anticipated cut volume associated with excavation of the stream channel, as summarized in Table 8 on page 247, is approximately 80,000 cubic yards (0.08 mcy). Such excavation is minor relative to overall Proposed Project-related grading volumes, and given the Proposed Project's projected deficit of fill materials, this cut volume would be used to supply fill areas within the Urban Development Component. Existing utility easements are located within and adjacent to the Proposed Project site, including an easement for an existing storm drain (Centinela Ditch) and sanitary sewer (NOS) along the southern edge of the Habitat Creation/Restoration area. Compacted fill would be placed over such existing lines. Settlement of the utilities is expected to be minimal, varying from 0 to 1 inch (i.e., utilities buried below compacted fill are expected to settle within trenches as a result of application of such fill materials). However, the engineering, design, and placement of such fill would take into account the potential for settlement and provide the necessary precautions to avoid any damage or weakening of the lines. Also, grading activities would not materially and adversely affect any on-site or nearby off-site geologic or topographic features, such as the Westchester Bluffs or the existing Riparian Corridor. In fact, the excavation of the on-site Riparian Corridor would replace the existing drainage (i.e., the Centinela Ditch), and would improve the health and function of the overall riparian system (i.e., the entire Riparian Corridor, including the new section created under the Habitat Creation/Restoration Component, as well as the existing off-site portion constructed as part of the adjacent Playa Vista First Phase Project). Additionally, the proposed bluff restoration would benefit the health and visual characteristics of the bluffs. Therefore, it is anticipated that grading activities would not cause or accelerate a geologic hazard which would result in substantial damage to structures or infrastructure or expose people to substantial risk of injury. Further, grading activities would not destroy, permanently cover, or materially and adversely modify any distinct and prominent geologic or topographic features. Thus, grading impacts relative to geologic hazards and landform alteration would be less than significant.

Erosion and Sedimentation

As discussed above, the Habitat Creation/Restoration Component would include the creation of a segment of the Riparian Corridor and revegetation of, and application of erosion control measures to, the Westchester Bluffs. Consequently, both the construction of the Riparian Corridor and the stabilization/revegetation of the Bluff surface would serve to reduce erosion and sedimentation on- and off-site. Thus, sedimentation and erosion impacts associated with the Habitat Creation/Restoration Component would be less than significant, as such improvements would not constitute a geologic hazard to other properties by causing or accelerating instability from erosion, and would not accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site.

3.4.2.2 Seismic Hazards

Lurching

As discussed above in Subsection 2.2.2.6, Lurching, no evidence of potential lurching hazards was found during previous geotechnical investigations. Additionally, bluff restoration activities associated with the Habitat Creation/Restoration Component would only occur at the surface, and would serve to stabilize the surface of the bluff slope, providing a beneficial impact. Any lurching, if it were ever to occur, would not result in substantial damage to structures or infrastructures, or expose people to substantial risk of injury; therefore, no significant impact is anticipated.

3.4.2.3 Slope Stability

Direct field examination by LeRoy Crandall and Associates revealed that some mass wasting (downward movement of a significant quantity of earth) has occurred in the form of incised erosion gullies at various locations along the Bluffs on- and off-site. The sediments composing the Escarpment to the south of the Proposed Project site are predominantly cohesionless sands, which are highly erodible and subject to gullying if drainage is not properly controlled. However, the soil types present in the Escarpment are not generally susceptible to mud flows.[83]

With development of the Proposed Project's Habitat Creation/Restoration Component, the center segment of the Riparian Corridor (i.e., the segment located between the east and west portions of the adjacent Playa Vista First Phase Project Riparian Corridor improvements) would be completed. As part of that improvement, the Centinela Ditch would be filled, and water flows would be diverted southerly to the newly constructed Riparian Corridor segment near the toe of the Westchester Bluffs. Improvements included in connection with development of this portion of the Riparian Corridor, including energy dissipation structures, trash racks, and revegetation, would reduce the loss of soil from waterborne erosion of the Bluffs during storm events. Such erosion controls minimize the potential for long-term erosional damage to the Bluff face, and

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[83] *LeRoy Crandall and Associates, "Geotechnical Studies, Area D, T.T. 49104," for Maguire Thomas Partners, January 3, 1991, pages 2.12 and 3.9.*

thus reduces the future potential for instability and eventual slope failure. Therefore, a beneficial impact would occur.

There would be no excavation at the base of the Escarpment, except for improvement of the center segment of the Riparian Corridor. The alignment of the Riparian Corridor channel would be such that the toe of the Escarpment would not be disturbed. Channel depths in the center segment would range from 9.2 feet AMSL at the segment's eastern end (adjacent bank elevation of approximately 15 feet AMSL) to 5.2 AMSL at the segment's west end (adjacent bank elevation of approximately 14 feet AMSL). The bottom of the channel, the side slopes, and the area along the toe of the Westchester Bluffs would be revegetated as soon as possible, while avoiding the rainy season or other seasonal restrictions.

The proposed channel of the Riparian Corridor would be set back at least 25 feet from the toe of the Escarpment, or further to the extent necessary to protect the bluffs. No structures are planned for the south side of the Corridor. Also, the Riparian Corridor itself, along with the adjacent linear park and Bluff Creek Drive, would provide additional distance between the bluffs and buildings constructed as part of the Urban Development Component.

Although the Ballona Escarpment is considered to be, overall, grossly stable (i.e., from top of slope to base of slope), some areas on the Escarpment below Cabora Road may be locally unstable. As discussed above, the Riparian Corridor improvements under the Habitat Creation/Restoration Component include removing vegetation on slope areas below Cabora Road, installing an erosion mat (or equivalent), and revegetating the slopes with native plant material. Notwithstanding the erosion correction and control measures that will be implemented, the combination of slope height, steepness, and shape on portions of the slope below Cabora Road have created conditions with the potential for localized slope failure. Consequently, although the bluff would be revegetated and erosion control measures applied, the slope has the potential to fail and adversely impact the Riparian Corridor, and indirectly, the NOS. Therefore, slope stability impacts relative to geologic hazards associated with the Habitat Creation/Restoration Component would be potentially significant, because the Proposed Project could cause or accelerate a geologic hazard which would result in substantial damage to structures or infrastructure or expose people to substantial risk of injury.

Bluff restoration activities and development of the Riparian Corridor would modify the existing landform (geologic and topographic features) of the southern portion of the Proposed Project site. However, such modifications would be beneficial to the existing landform; the Bluffs would be revegetated and erosion-control measures would be applied, but the landform would not be substantially altered in terms of slope or topography, and the Riparian Habitat would be created to improve hydrologic and ecological function (of the entire Riparian Corridor, on- and off-site). As such, implementation of the Habitat Creation/Restoration Component would not destroy, permanently cover, or materially and adversely modify any distinct and prominent geologic or topographic features. No significant adverse slope stability impacts related to landform alteration are anticipated to occur and no mitigation is required.

3.4.3 Summary of Impacts

Grading

Excavation and Fill

Fill and excavation activities during the grading phase of construction would result in a less than significant impact because the proposed grading activities would not cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury, and one or more distinct and prominent geologic or topographic features would not be destroyed, permanently covered or materially and adversely modified.

Erosion and Sedimentation

Grading activities have the potential to result in erosion and sedimentation; however, implementation of BMPs and other erosion and sedimentation control measures would enable Proposed Project-related grading, excavation and other earth-moving activities to avoid a significant impact. As such, construction of Proposed Project components (i.e., the Urban Development and Habitat Creation/Restoration Components) would result in a less than significant impact by not constituting a geologic hazard to other properties by causing or accelerating instability from erosion; or accelerating natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site. Operation of Proposed Project components would not constitute a geologic hazard to other properties by causing or accelerating instability from erosion, and would not accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site. Therefore, operations-related impacts would be less than significant.

Dewatering

Dewatering would be required for the construction and operation of the Urban Development Component. However, dewatering activities during construction and operation of Urban Development uses are anticipated to result in a less than significant impact since they would not: cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury; constitute a geologic hazard to other properties by causing or accelerating instability from erosion; or accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site.

Subsidence

Because subsidence is minimal in and around the Proposed Project site, and no significant subsidence is anticipated in the area (i.e., from dewatering activities during construction and operation of proposed uses), development of the Proposed Project components would not cause or accelerate geological hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury. As such, subsidence impacts to or from the Proposed Project would be less than significant.

Seismic Hazards

Groundshaking and Rupture

Although the Proposed Project site is located within a region subject to seismic events, development of the Proposed Project is not expected to expose people or structures associated with the Urban Development Component to a higher level of risk from groundshaking or surface rupture than would otherwise occur in other parts of the region. As such, the groundshaking and fault rupture hazard associated with the Urban Development Component is a less than significant impact, as the Proposed Project would not cause or accelerate groundshaking and fault rupture hazards.

Tsunami and Seiche

The Proposed Project site is not expected to be affected by seiching, and the site is not located in a flood hazard zone on the applicable flood hazard map (such as would be subject to tsunami-related flooding). Consequently, impacts would be less than significant, as the Proposed

Project would not cause or accelerate tsunami or seiche hazards, which would not result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury.

Liquefaction Potential

Although the Proposed Project site is located in a potentially liquefiable area, on-site geotechnical investigations have concluded that the potential for adverse effects from liquefaction is minimal, given the thickness and distribution of liquefiable soils on-site. As such, given compliance with the provisions required by City building and safety codes and by the Uniform Building Code (UBC), a significant impact related to liquefaction is not expected, as the Proposed Project would not cause or accelerate liquefaction hazards which would result in substantial damage to structures or infrastructures, or expose people to substantial risk of injury.

Lurching

The Bluffs are sufficiently remote from the Urban Development Component, and bluff restoration under the Habitat Creation/Restoration Component would only be at the surface such that lurching, if it ever did occur, would not result in substantial damage to structures or infrastructures, or expose people to substantial risk of injury; therefore, no significant impact is anticipated.

Slope Stability

The Urban Development Component would not have the potential to affect slope stability, or be affected by slope failure. However, the Habitat Creation/Restoration Component could have the potential to affect, or be affected by, unstable slopes. Therefore, the Habitat Creation/Restoration Component would result in a potentially significant impact, since the Proposed Project could cause or accelerate a geologic hazard which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury, and slope failure could destroy, permanently cover, or materially and adversely modify a distinct and prominent geologic or topographic feature (i.e., the Riparian Corridor).

3.4.4 Equivalency Program Impacts

The preceding earth resources analysis addressed impacts associated with construction and operation of the Proposed Project relative to the following issues: (1) grading (excavation/ fill and erosion/sedimentation); (2) dewatering; (3) subsidence; (4) seismic hazards (groundshaking and rupture, tsunami and seiche, liquefaction, slope, and lurching); and (5) slope stability. The proposed Equivalency Program allows for specific limited exchanges in the types of land uses occurring within the Project's Urban Development Component. No changes are proposed under the Equivalency Program to the Project's Habitat Creation/Restoration Component.

The exchange of office uses for retail and/or assisted living units would be accomplished within the same building parameters, and would occur at relatively limited locations within the Project site. Furthermore, under the Equivalency Program, there would be no substantial variation in the Project's street configurations, building pad elevations, or the depth of excavation. Potential changes in land use under the Equivalency Program would therefore have no substantial effect on the proposed earth moving activities and their associated impacts because only the use is changing. Specifically, the grading, dewatering and slope stabilization required for Project development would be the same under the Equivalency Program, as well as the on-site exposure to seismic hazards. Very minor variations regarding foundation types or in the preparation of landscaping areas could occur, however such variation would be within the range of construction procedures anticipated to occur with the Proposed Project. In addition, development under the Equivalency Program would not cause or exacerbate any impacts that would occur under the Proposed Project.

All Project Design Features (as discussed in Subsection 3.3 above) and/or recommended mitigation measures (discussed in Subsection 4.0, Mitigation Measures, below) to minimize earth resources impacts under the Proposed Project would be implemented, as appropriate, under the Equivalency Program. Implementation of the Equivalency Program would therefore not cause or accelerate geologic hazards which would result in substantial damage to structures, or infrastructure; expose people to substantial risk of injury; constitute a geologic hazard to other properties by causing or accelerating instability from erosion; accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site; or destroy, permanently cover or materially and adversely modify one or more distinct and prominent geologic or topographic features. Consequently, with implementation of applicable mitigation measures (discussed below), earth resources impacts attributable to the Equivalency Program, as is the case with the Proposed Project, would be less than significant.

3.4.5 Impacts of Off-Site Improvements

Proposed Project development could result in secondary impacts arising from implementation of the Project's mitigation measures, as well as the direct impacts described above. Mitigation measures within Section IV.K.(1), Traffic and Circulation, require physical improvements in transportation facilities at numerous locations including roadway widening at seven locations, as described in Subsection 5.8 of that Section. In addition, as discussed in Section IV.N.(1), Water Consumption, the Proposed Project would require the construction of a water regulator station in the vicinity of Jefferson Boulevard and Mesmer Avenue. These off-site improvements are all located in developed urban areas. All of the off-site improvements, with the exception of the water regulator station, would occur within, or adjacent to, existing roadways. The water regulator station includes a small amount of above-ground piping equipment, a common element of the urban environment. Implementation of the Project's mitigation measures does not involve the construction of any buildings.

Due to the fact that the off-site roadway improvements occur along existing transportation corridors, the impacted areas have been previously graded. The road widenings would not be substantial enough as to induce unstable earth conditions or change geologic substructures. Intersection improvements would generally involve very limited, if any, grading or excavation (e.g., for overhead signal footings). Since the Centinela Avenue corridor has been graded and constructed on properly engineered fill materials, and the road improvements (i.e., widening) would apply appropriate design and engineering standards to construction, the potential for soil instability associated with the corridor and intersection improvements is considered very low. There is a potential for wind or waterborne soil erosion, and its resulting sedimentation, to occur during construction. However, all grading will be accomplished in accordance with an Erosion Control Plan to be prepared for each improvement, which would be approved by the City, County or State agency having jurisdiction. Mitigation Measures are proposed in the water resources analysis (Section IV.C.(2), Water Quality) to control such effects.

As discussed above, the proposed intersection and roadway improvements would occur on existing public streets, which have been previously graded, and would entail very limited (if any) excavation for the placement of substructures and/or roadbed materials. Due to the limited excavation required to construct the proposed improvements (where applicable), the potential for dewatering, and associated subsidence, is considered negligible.

The proposed off-site improvements are located in the seismically active region of Southern California. Several active and potentially active faults have been mapped in the general vicinity of the off-site improvements; hence, there are potential impacts associated with seismic hazards. However, given the nature of the proposed improvements (i.e., signalization and widening of existing intersections and roadway corridors), residents and employees in the vicinity would not be exposed to any greater seismic risk than is currently experienced, and the improvements would not add residents or employees to the area that would be exposed to such risk. Some of the proposed improvements are located within an area that is potentially susceptible to tsunamis. However, given the nature of the proposed intersection and roadway improvements, tsunamis are not expected to substantially affect the improvements or expose nearby residents to increased risk. As mentioned above, the improvements would occur on previously graded street rights-of-way and adjacent areas, which were designed and built to meet proper engineering standards. As such, with the incorporation of properly engineered fill materials, the potential for liquefaction impacts is considered remote.

With regard to lurching and other slope stability impacts, all of the proposed roadway widenings would occur on flat terrain. They would involve minor/surficial excavation in previously paved areas and would not increase the potential for ground or slope failure. As such, there would be no potential for lurching or landslides to occur.

In summary, the proposed off-site mitigation improvements would not cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury; constitute a geologic hazard to other properties by causing or accelerating instability from erosion; accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site; and would not destroy, permanently cover, or materially and adversely modify one or more distinct and prominent geologic or topographic features (including, but not limited to, hilltops, ridges, hill slopes, canyons, ravines, rock outcrops, water bodies, streambeds, and wetlands). As such impacts to earth resources from implementation of the proposed off-site improvements would be less than significant.

4.0 MITIGATION MEASURES

Mitigation Measures for the Proposed Project and the Equivalency Program

Slope Stability

- Prior to completion of the Riparian Corridor, the slope stability remedial measures shall be implemented as appropriate for the areas of potential instability below Cabora Road in accordance with the Group Delta Consultants (GDC) bluff stabilization final assessment report dated December 3, 2001 and approved by the City of Los Angeles Department of Public Works on February 19, 2002. Identification of areas having the potential for slope stability problems is shown in the GDC report and completion of the appropriate mitigation (slope stability remedial) measures shall be subject to approval of the Department of Public Works.

Completion of the slope repair shall be monitored by a qualified engineer subject to approval of the City of Los Angeles Department of Public Works.

In accordance with the recommendations of the GDC report, the following slope repair methods would be employed as appropriate to minimize the potential for slope failures in areas of potential instability. The applicable locations of each repair type is shown within the GDC report, and that same information is also shown on Figure 20 on page 236 of this EIR.

Type 1: Full Slope Height Fill – The affected portions of the slope would be cut back in benches, a minimum of one equipment width into dense native soil with a 2-foot deep key at the toe. The removed material would be replaced with material having a minimum cohesion of 200 pounds per square foot (psf) and effective angle of internal friction of 30°, with a slope grade of 1.5:1 (H:V).

Type 2: Partial Slope Height Fill – A portion of the slope height would be cut back into dense native soil and filled with material having a minimum cohesion of 200 psf and effective angle of internal friction of 30°, in 2-foot lifts of 8-inches or less in thickness. The slope grade would match the surrounding grade of 1.5:1 (H:V) or flatter.

- A soil erosion resistant matting shall be used in the Proposed Project site for the portion of the slope below Cabora Road to reduce the accumulation of soil debris.

- Permanent erosion control features (i.e., rip-rap, concrete steps, stones) shall be installed at all stormwater discharge points within the southern portion of the Proposed Project site in a manner satisfactory to the City of Los Angeles' Department of Building and Safety and/or Department of Public Works, as appropriate.

Other

- All dewatering shall be conducted in accordance with the requirements of dewatering permits obtained from the Regional Water Quality Control Board. Prior to initiating any construction dewatering activities that are not included within the scope of permit provisions, the Applicant/Contractor must update the plans and provisions related to the permit and must notify the Regional Water Quality Control Board of any such plan/provision modifications.

- Prior to the issuance of grading permits for initial site preparation, a pest control firm shall be retained to conduct and implement a rodent control program to prevent the migration of rodents or pest to neighboring properties. The rodent control program shall comply with all applicable local, state, and federal regulations. Evidence shall be provided to the advisory agency prior to the issuance of any permit that this provision has been satisfied.

5.0 UNAVOIDABLE ADVERSE IMPACTS

Implementation of the Proposed Project would not result in any significant impacts due to the implementation of mitigation measures and Project Design Features, as discussed previously. Specifically, the Urban Development Component would not cause or accelerate geologic hazards which would result in substantial damage to structures, or infrastructure, or expose people to substantial risk of injury. Although the Habitat Creation/Restoration Component has the potential for significant impacts relative to slope stability, with implementation of slope repair mitigation measures, the Habitat Creation/Restoration Component would not cause or accelerate geologic hazards which would result in substantial damage to structures, or infrastructure, or expose people to substantial risk of injury. Therefore, slope stability impacts as pertains to geologic hazards for the Proposed Project, Equivalency Program, and off-site improvements would be less than significant. With adherence to the provisions of the Playa Vista SWPPP and applicable BMPs, construction and operation of the Urban Development and Habitat Creation/Restoration Components, including the Project's Equivalency Program and off-site improvements, would not constitute a geologic hazard to other properties by causing or accelerating instability from erosion or accelerate the natural processes of wind and water erosion sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site. Erosion and sedimentation impacts would be less than significant. Additionally, the Project's Urban Development Component, Equivalency Program, and off-site improvements would not destroy, permanently cover, or materially and adversely modify any distinct and prominent geologic or topographic features. The Project's Habitat Creation/ Restoration Component, however, has the potential to affect, or be affected by, slope stability impacts, including slope failure. Such impacts could have the potential to destroy, permanently cover, or materially and adversely modify a distinct and prominent geologic or topographic feature (e.g., the Bluffs or off-site Riparian Corridor). Implementation of applicable mitigation measures relative to slope stability would minimize the potential for slope failure, and would thus reduce slope stability impacts associated with the Habitat Creation/Restoration Component to a level less than significant. In summary, with implementation of applicable mitigation measures, no unavoidable adverse impacts with respect to earth resources are anticipated to occur.

6.0 CUMULATIVE IMPACTS

For the most part, aside from the Project's off-site improvements, the earth resources impacts of the Proposed Project and the Project's Equivalency Program would be unique to the Proposed Project site, not leading to cumulative effects in conjunction with related projects. The only other development of note in close proximity to the Proposed Project would be the previously approved Playa Vista First Phase Project, which is adjacent to the east and west of the Proposed Project site. Because the Proposed Project site and the adjacent Playa Vista First Phase Project site are adjacent, the two projects' combined earth impacts may be evaluated relative to cumulative effects. The adjacent Playa Vista First Phase Project, currently under construction, is not anticipated to result in significant earth resources impacts, and BMPs and Project Design Features are being employed to minimize the potential for impacts from geologic hazards, erosion and sedimentation, and landform alteration. Such BMPs and design features would also be applied during implementation of the Proposed Project and the Project's Equivalency Program. As such, the Proposed Project and the adjacent Playa Vista First Phase Project, considered cumulatively, would not cause or accelerate geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury; constitute a geologic hazard to other properties by causing or accelerating instability from erosion; accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site; or destroy, permanently cover, or materially and adversely modify one or more distinct and prominent geologic or topographic features. Therefore, cumulative earth resources impacts of the Proposed Project, including the Equivalency Program, and the adjacent Playa Vista First Phase Project would be less than significant.

The Project's off-site improvements would occur at various locations within the Proposed Project vicinity. The off-site improvements would result in limited, temporary impacts to earth resources at the affected location(s) in which construction of the improvements is occurring. It is assumed that these improvements would be phased or constructed at a sufficient distance from one another such that the potential for cumulative earth resources effects would be avoided. Given the relatively limited ground disturbance and the overall nature of the off-site improvements, the cumulative impacts to earth resources from implementation of the Project's off-site improvements would be considered less than significant.