4.5 GEOLOGY AND SOILS

INTRODUCTION

This section provides a discussion of the existing geologic and soils environment and an analysis of potential impacts from implementation of the proposed Colorado Lagoon Restoration project. This section also addresses the potential for damage to occur to the project site due to the local geology underlying the proposed project site, as well as slope stability, ground settlement, soil conditions, and regional seismic conditions. The following geology and soils information is based on information within *A Seismic Hazard Evaluation of the Long Beach 7.5-minute Quadrangle* prepared by the California Geological Survey (1998).

4.5.1 EXISTING ENVIRONMENTAL SETTING

Project Setting

The project location is within the United States Geological Survey (USGS) *Long Beach* 7.5-minute quadrangle. The site lies within the southwestern block of the Los Angeles Basin, which is comprised of a low alluvial floodplain. The floodplain is bound by a line of elongated low hills, folds, and faults, which delineate the northwest-trending Newport-Inglewood Structural Zone.

Prior to extensive dredging of the Colorado Lagoon (Lagoon) and Marine Stadium area in the 1920s, the site was a tidal mudflat that received alternating alluvial deposits of marine sands, organic silts and clays, and fluvial deposits. In the 1960s, the previously dredged area between what is now the north end of Marine Stadium and the south end of the Lagoon was filled and the existing underground box culvert constructed. This was done as part of the construction for the then-proposed Pacific Coast Freeway. This "filled" area is now Marina Vista Park.

Consistent with the project area's history, the soil underlying the project site is characterized by predominately younger alluvial deposits and artificial fill. Younger alluvial deposits consist of Holocene alluvial soft clay, silt, silty sand, and sand. The artificial fill soils within Marina Vista Park have a lot of variation with no consistent pattern of stratification among sites. Soils testing indicates that the fill consists of undifferentiated young and old soils, which generally include clay, sandy clays, and silty sand.

Structural Geology

The proposed project area is not located within an Alquist-Priolo Earthquake Fault Zone (CGS 1986). However, based on the current understanding of the geologic framework of the area, ground shaking resulting from an earthquake occurring along regional faults is the seismic hazard with the highest probability of affecting the project site. A fault is described as the area where two tectonic or continental plates meet. An "active" fault is defined by the State of California as having had surface displacement within the Holocene time (i.e., within the last 11,000 years). A "potentially active" fault

is defined as showing evidence of surface displacement during the Quaternary time (i.e., during the last 1.6 million years). These terms are, however, used by the State primarily for use in evaluating the potential for surface rupture along faults and are not intended to describe possible seismic activity associated with displacement along a fault. These definitions are not applicable to blind thrust faults that have only limited, if any, surface exposures. Figure 4.5.1 shows the faults within the region, and Figure 4.5.2 provides a closer look at the faults within the project area vicinity.

The project site is located within Seismic Zone 4 of the Uniform Building Code (UBC). UBC Seismic Zones are based on the probability of expected intensity of ground shaking due to an earthquake. Seismic Zone 4 corresponds to regions where expected peak acceleration (as a fraction of gravity, g) is greater than 0.3g. The probabilistic approach to forecasting future ground motion at the site determines the expected peak ground acceleration level that has a 10 percent probability of exceedance over 50 years.

The project site is located in the *Long Beach* 7.5-minute quadrangle, and the Seismic Hazard Zone Evaluation report for this area is Open-File Report 98-19.[1] The peak horizontal ground acceleration (PGA) is a commonly used parameter to represent the level of observed and/or estimated ground shaking at a particular site. The California Division of Mines and Geology's (CDMG) probabilistic seismic hazard analysis[2] estimates that a PGA of 0.49g is applicable to the project site conditions for a 10 percent probability of exceedance in 50 years (475-year return period). The "predominant earthquake" that contributes most to the ground-shaking hazard at 10 percent probability of exceedance in 50 years is a magnitude (Mw) 6.8 event on the nearby portion of the Newport-Inglewood Fault Zone, which is located 4 miles (mi) from the project site and shown in Figure 4.5.2.

The Newport-Inglewood Fault Zone dominates the geologic structure of the *Long Beach* quadrangle. There are three primary traversing faults within the larger Newport-Inglewood fault system, including the Cherry Hill fault, the Northeast Flank fault, and the Reservoir Hill fault. The northwest-trending and generally right lateral Newport-Inglewood Fault Zone is marked by a northwest-trending chain of elongated low hills and mesas that extend from Newport Bay to Beverly Hills. Within the project region, the Dominguez Hills and Signal Hill are uplifts along the Newport-Inglewood Fault Zone. Continuous seismic activity occurs along this fault zone, which is believed to pose the greatest seismic hazard to the Los Angeles area, including the project site. A major event along this zone would produce strong or intense ground motion at the project site. Likewise, the most significant previous earthquake with regard to the project location was the Mw 6.3 Long Beach earthquake on March 11, 1933. This earthquake occurred along the Newport-Inglewood Structural/Fault Zone at a location about 18 mi to the southeast, offshore from Newport Beach.

Other known regional faults that could produce significant ground shaking at the site include the San Andreas fault, the Palos Verdes Fault Zone, and the Los Alamitos fault. A brief discussion of each of

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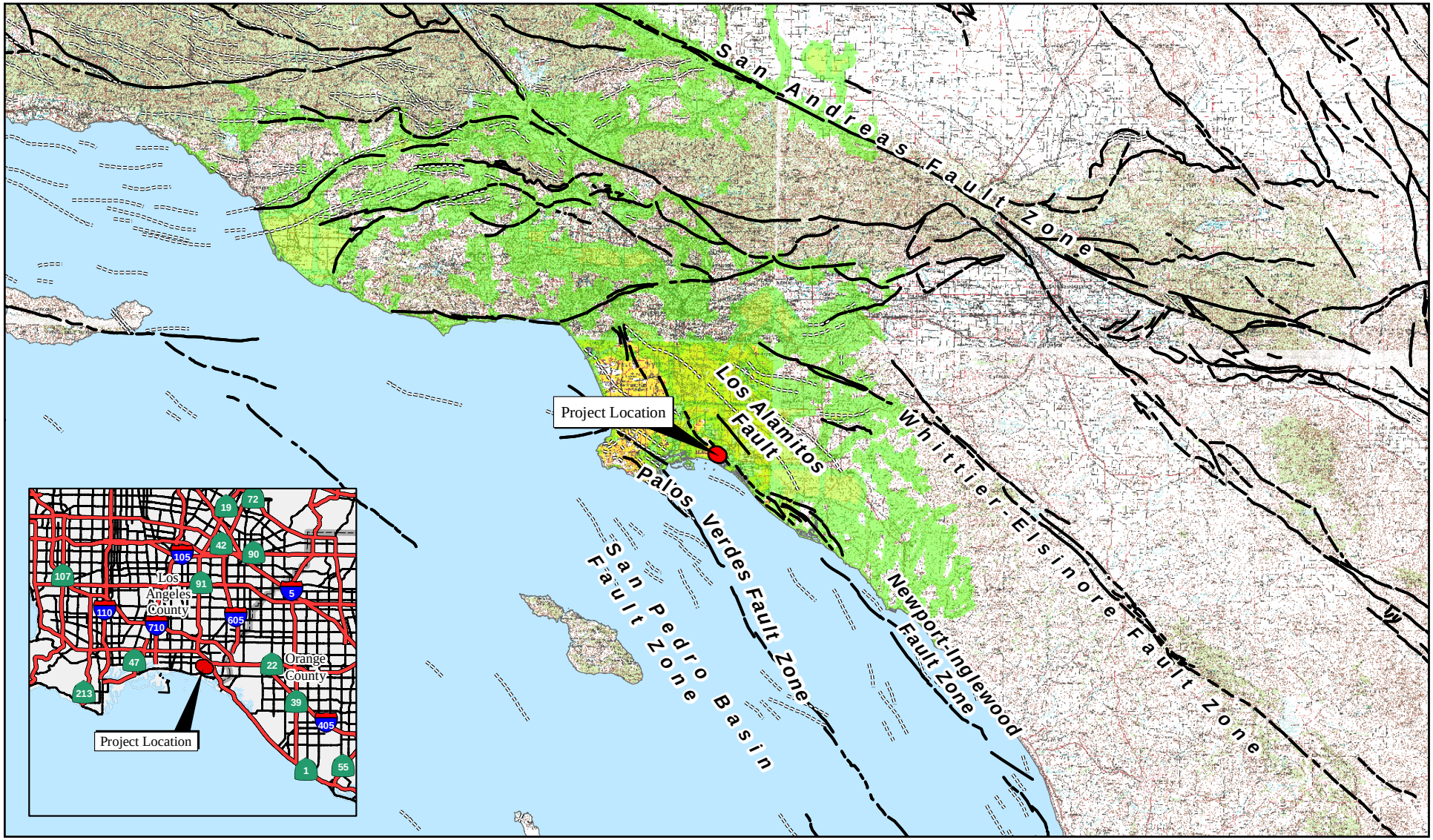
1 California Department of Conservation, Division of Mines and Geology. 1998. "Seismic Hazard Evaluation of the *Long Beach* 7.5-Minute Quadrangle, Los Angeles County, California," Open File Report 98-19. http://gmw.consrv.ca.gov/shmp/download/evalrpt/longb_eval.pdf, accessed October 17, 2007.

2 Ibid.



LSA

LEGEND

Project Boundary

Fault Lines

Alquist-Priolo Faults

Liquefaction Areas

N

0 10 20

Miles

FIGURE 4.5.1

Colorado Lagoon Restoration Project

Regional Geologic Constraints

SOURCE: California Seismic Hazard Mapping Program (2002), USGS 250K QUAD (1980).

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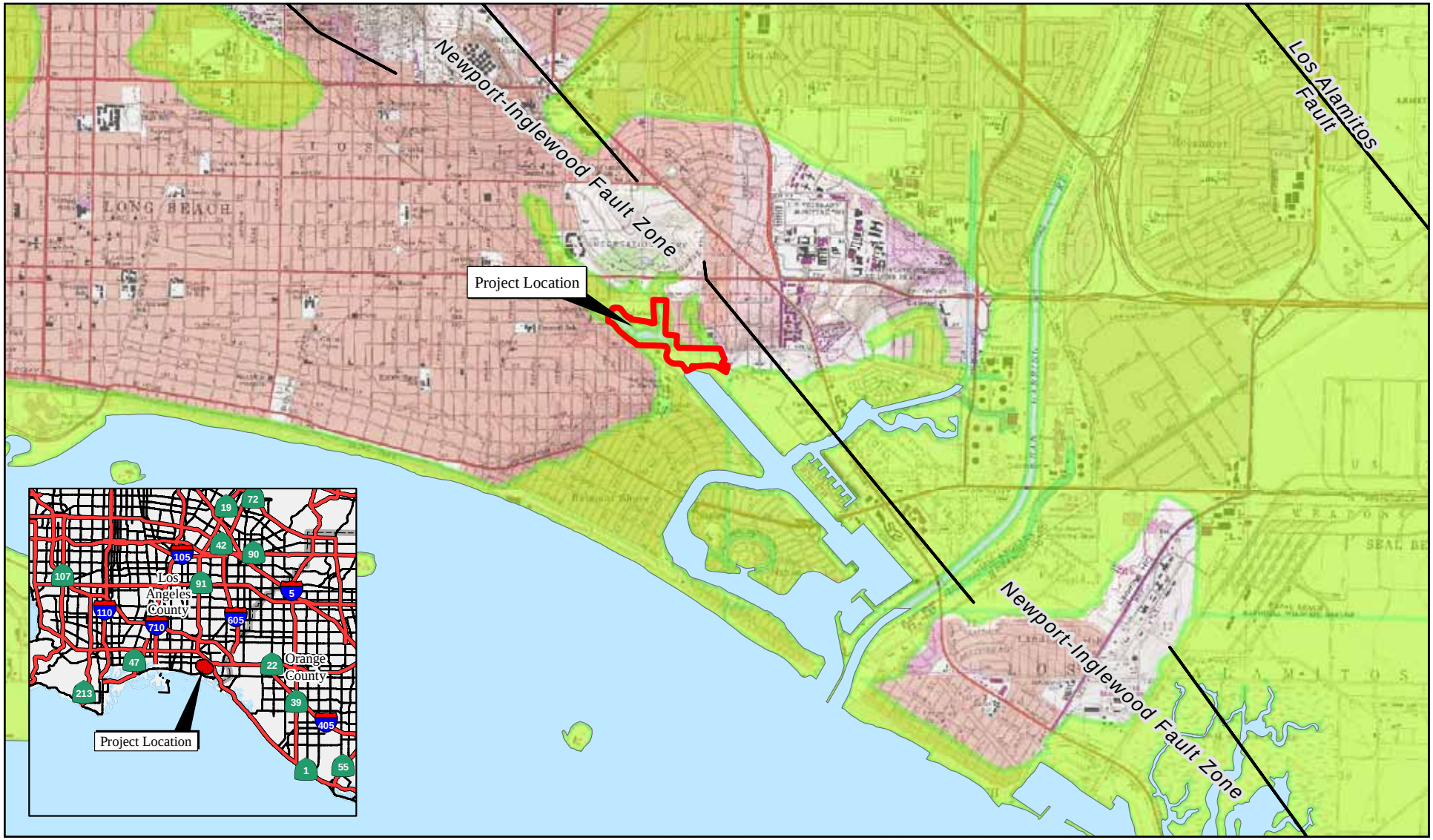

LSA

FIGURE 4.5.2

LEGEND

Project Boundary

Fault Lines

Liquefaction Areas

0 2,000 4,000 Feet

Colorado Lagoon Restoration Project

Local Geologic Constraints

SOURCE: California Seismic Hazard Mapping Program (2002), USGS 7.5' QUAD - LONG BEACH ('80).

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these fault systems is provided below. Figure 4.5.1 illustrates the approximate positions of the faults within the project region. Figure 4.5.2 shows the surface traces of the Newport-Inglewood Structural Zone with respect to the site.

San Andreas Fault Zone. The San Andreas Fault Zone extends from Northern California to near the Mexican border. The fault zone has been divided into several segments. In Southern California, the San Andreas fault consists of three segments: the Mojave, San Bernardino Mountains, and Coachella Valley segments. The project area is located approximately 56 mi southwest of the San Bernardino Mountains segment and approximately 72 mi east of the Mojave segment.

The last major rupture on the southern San Andreas occurred on January 9, 1857, along the Mojave segment. The magnitude is estimated to have been Mw 8.0. The interval between major ruptures averages about 140 years on the Mojave segment with a recurrence interval varying from under 20 years (in the City of Parkfield only, which is located directly over the most active region of the fault) to over 300 years. The San Andreas Fault Zone is a right-lateral, strike-slip fault that slips about 20 to 35 millimeters per year (mm/yr).

The Palos Verdes Fault Zone. The Palos Verdes Fault Zone is a 50 mi long, right-reverse fault lying near San Pedro, Redondo Beach, and Torrance. The most recent surface rupture of the offshore portion occurred in the Holocene, while the most recent surface rupture of the onshore portion occurred during the Late Quaternary. The slip rate along the fault is between 0.1 and 3.0 mm/yr, and the interval between ruptures is unknown. A probable magnitude of Mw 6.0 to 7.0 has been established for this fault, with the potential for larger earthquakes depending on fault geometry. The Palos Verdes Fault Zone includes two main faults, the Cabrillo fault and the Redondo Canyon fault, that are both capable of producing earthquakes of greater than 6.0 in magnitude. The proposed project is approximately 7 mi east of the Palos Verdes Fault Zone.

Whittier/Elsinore Fault System. The Whittier/Elsinore Fault System consists of several steep to near-vertical faults along a zone as much as 0.5 mi wide. The inferred sense of movement along these faults is predominately reverse slip west of the Chino area and right lateral, strike slip to the east. Offset of Holocene sediments and historic seismicity indicates that the fault system is active. The proposed project is approximately 32 mi west of the Whittier/Elsinore Fault Zone.

The Los Alamitos Fault. The Los Alamitos fault is an inferred blind thrust fault located within the south-central portion of the Los Angeles Basin. The closest portion of the vertical surface projection of the buried thrust fault is located approximately 8 mi northeast of the proposed project. Like other blind thrust faults in the Los Angeles area, the Compton-Los Alamitos thrust is not exposed at the surface and does not present a potential surface rupture hazard; however, the fault is active and capable of generating earthquakes.

Liquefaction

Soil liquefaction is a phenomenon that occurs during strong ground shaking, most commonly in generally low- to medium-density, saturated, low cohesion soils, where the soils experience a temporary loss of strength and behave essentially as a fluid. Areas most susceptible to liquefaction-induced damage are underlain by loose, water-saturated, granular sediment within 40 feet (ft) of the ground surface. Saturated conditions reduce the effective normal stress, thereby increasing the likelihood of earthquake-induced liquefaction. One of the major types of liquefaction-induced ground failures is lateral spreading of mildly sloping ground. Lateral spreading involves movement of earth materials due to ground shaking and is evidenced by near-vertical cracks with horizontal movement of the soil. Liquefaction-induced ground failure has historically been a major cause of earthquake damage in Southern California.

According to the Seismic Hazard Zones Maps for the *Long Beach* quadrangle, the site is located within an area where liquefiable materials are mapped and/or where liquefaction has occurred in the past. In the *Long Beach* quadrangle, the liquefaction zone is widespread due to shallow groundwater and abundant young alluvium. The zone covers the lowland terrain adjacent to the hills along the Newport-Inglewood uplift, the beaches, and the areas of artificial fill. Artificial fills that overlie beach sands and estuarine deposits are specifically more likely to be susceptible to liquefaction. Therefore, extensive low-lying areas of artificial fill have been included in the liquefaction hazard zone within the *Long Beach* quadrangle.

Therefore, due to the presence of loose, unconsolidated silty sands underlain by young alluvial, estuarine deposits and shallow groundwater (groundwater levels are approximately 5 ft below ground surface [bgs] at Marine Stadium), potential liquefaction and lateral spreading risks at the project site are considered high. The artificial fill areas within the project site also overlie young alluvial or estuarine deposits. Because artificial fills are usually too thin to change the liquefaction hazard, and the underlying estuarine and alluvial deposits have a high liquefaction susceptibility, the fill areas are also assumed to have a high susceptibility to liquefaction. The liquefaction hazard zone in the project vicinity is shown on Figure 4.5.2.

Landslides

Landslides and other slope failures are common occurrences during or soon after earthquakes. Areas that are most susceptible to earthquake-induced landslides are steep slopes in poorly cemented or highly fractured rocks, areas underlain by loose, weak soils, and areas on or adjacent to existing landslide deposits. Within the *Long Beach* quadrangle, the lack of steep terrain, except for a few slopes on Signal Hill and Reservoir Hill, results in only about 0.1 percent of the land (62 acres [ac]) lying within the earthquake-induced landslide zone for the quadrangle. The proposed project is not included or adjacent to the earthquake-induced landslide zone. In addition, the project area is relatively level. Therefore, the possibility of a seismically induced landslide is remote.

Subsidence

Subsidence is the lowering of surface elevation due to changes occurring underground. In the arid southwest, subsidence can be associated with earth fissures (i.e., cracks in the ground surface that form from horizontal movement of sediment and can be more than 100 ft deep). Because of the loose,

unconsolidated silty sands and shallow groundwater table, potential subsidence risks are considered to be moderate to high.

Expansive Soils

Expansive soils contain the types of clay minerals that occupy considerably more volume when they are wet or hydrated than when they are dry or dehydrated. Volume changes associated with changes in the moisture content of near-surface expansive soils can cause uplift or heave of the ground when they become wet or, less commonly, cause settlement when they dry out. Repeated cycles of wetting and drying in areas composed of expansive soils can produce incremental lateral and downslope movements known as "slope creep." Potential variability in the soil moisture content typically decreases with increasing depth, and the weight of overlying soil also tends to reduce the amount of volume change that can occur. Therefore, the deeper portion of the foundation soil profile tends to be less problematic with regard to expansive soils. The soils testing on the project site indicate a lot of variation with no consistent pattern of stratification among sites. The soil sample core logs, however, do indicate that clays and sandy clays are abundant in this area, which indicate a potential for volume changes. However, because groundwater levels are approximately 5 ft bgs at Marine Stadium, the soils are anticipated to remain relatively wet and are not anticipated to experience cycles of wetting and drying or volume changes, which would reduce the potential effects of the expansive soils on site.

4.5.2 METHODOLOGY

This section addresses the potential for damage to occur due to the local geology underlying the proposed project site, as well as slope instability, ground settlement, unstable soil conditions, and regional seismic conditions. Geologic/geotechnical conditions affecting the site are summarized from compiled information and analyses, including *A Seismic Hazard Evaluation of the Long Beach 7.5-minute Quadrangle* (CGS 1998).

4.5.3 THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the State CEQA Guidelines, project implementation may result in a significant impact to geologic resources and soils if it would result in any of the following conditions:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, strong seismic ground shaking, and seismic-related ground failure, including liquefaction or landslides
- Substantial soil erosion or the loss of topsoil
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property, or

- Be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater

4.5.4 IMPACTS AND MITIGATION MEASURES

The following impacts of the proposed project have been identified based on project characteristics and the significance thresholds defined above. Some of the impacts are considered less than significant while others are considered potentially significant. Both types of impacts are identified and discussed below.

Less Than Significant Impacts

The following impacts that could result from implementation of the proposed project were evaluated and determined to be less than significant.

Wastewater Disposal. The proposed project would utilize the existing sewer system. The project does not include the use of septic tanks or alternative methods for disposal of wastewater into the subsurface soils. Therefore, no impact related to this issue would occur.

Erosion Potential. There is the potential for soil erosion to occur at the site during implementation of the project. Large volumes of soils and sediment will be dredged and excavated, which will expose areas of soil to wind and water erosion. However, after the completion of dredging, slope recontouring, development of the open channel, and establishment of the landscaped areas, erosion potential will be minimal. All soils used in the project would be properly compacted in accordance with City of Long Beach (City) specifications. The project design incorporates the use of riprap, erosion control blankets, and other erosion controls to reduce erosion and scour through the open channel. The project would also be subject to Storm Water Pollution Prevention Plan (SWPPP) requirements for erosion and sedimentation control during construction (refer to Section 4.7, Hydrology and Water Quality). Best management practices (BMPs) would be undertaken to control runoff and erosion from earth-moving activities such as excavation, recontouring, and compaction. All trenching and recontouring activities would be performed under the observation of a qualified engineer. The project would be required to adhere to all applicable construction standards with regard to erosion control. Additionally, mitigation measures are required to reduce fugitive dust and transport of soil (refer to Section 4.2, Air Quality, and Section 4.7, Hydrology and Water Quality, respectively). With implementation of these standard control measures, soil erosion potential will be reduced to less than significant levels.

Potentially Significant Impacts

The following impacts that could result from implementation of the proposed project were evaluated and determined to be potentially significant.

Expansive Soils. The soils testing on the project site indicate a lot of variation with no consistent pattern of stratification among sites. The soil sample core logs, however, do indicate that clays and sandy clays are abundant in this area, which indicate a potential for volume changes. However, because groundwater levels are approximately 5 ft bgs at Marine Stadium, the soils are anticipated to remain relatively wet and are not anticipated to experience cycles of wetting and drying or volume changes, which would reduce the potential effects of the expansive soils on site.

Adherence to all applicable seismic codes and requirements during project implementation would reduce impacts related to expansive soils that could result from the proposed project components to a less than significant level. Mitigation Measure GEO-1 requires the City to review final design plans for structural engineering compliance and to approve the plans prior to the development of the structural components of the proposed project, such as the open channel and bridge development. Therefore, potential landslide impacts will be less than significant with mitigation incorporated.

Seismic Considerations. The project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone, nor is it currently identified by the regulatory community as being located within zones of either primary or secondary co-seismic surface deformation (e.g., pressure ridges, escarpments, fissures). Thus, the site is not expected to experience primary surface fault rupture or related ground deformation. However, since the site is 4 mi from the Newport-Inglewood Structural Zone (Figure 4.5.2), significant ground shaking or secondary seismic ground deformation effects would occur at the site should a major seismic event occur along the Newport-Inglewood Structural Zone. A peak ground acceleration of 0.49g can be expected at the site, with a 10 percent chance of exceedance in 50 years. The "predominant earthquake" that contributes most to the ground-shaking hazard at 10 percent probability of exceedance in 50 years is a Mw 6.8 event on the nearby portion of the Newport-Inglewood Fault Zone. This strong ground-motion potential could result in significant seismic ground shaking.

The project would not change the existing uses on site, affect any habitable structures, and no new buildings are proposed other than the replacement of two restroom structures. The restroom structures will be designed and built in conformance with the adopted Uniform Building Code, including the seismic safety standards. The two bridges spanning the open channel at East Colorado and East Eliot Streets would be designed and built in conformance with California Department of Transportation (Caltrans) and American Association of State Highway and Transportation Officials (AASHTO) standards. Mitigation Measure GEO-1 requires the City to review final design plans for structural engineering compliance and to approve the plans prior to the development of the structural components of the proposed project, such as the open channel and bridge development. In addition, Mitigation Measure GEO-2 requires a geotechnical report to be prepared for the construction of the bridges and open channel. Therefore, potential seismic ground-shaking impacts will be less than significant with mitigation incorporated.

Liquefaction, Lateral Spreading, and Subsidence. Due to the presence of loose, unconsolidated silty sands underlain by sandy silts and a shallow groundwater table (groundwater levels are 5 ft bgs at Marine Stadium), potential subsidence and liquefaction risks are considered moderate to high. According to the California Department of Conservation's Seismic Hazard Zones Map for the *Long Beach* quadrangle, the site is located within an area where liquefiable materials are mapped and/or

where liquefaction has occurred in the past, as shown on Figure 4.5.2. A potential result of soil liquefaction on site is lateral spreading, which is the differential movement of the ground surface due to open face excavations.

Impacts to the proposed project from liquefaction or subsidence would occur if loose, unconsolidated sediment surrounding the Lagoon, open channel, or proposed bridges was subjected to seismic shaking. This could cause the Lagoon slopes, open channel, or proposed bridges to move and potentially rupture as the supporting sediment surrounding them fail. In addition, facilities associated with the low-flow diversion system could also be subject to damage from liquefaction or lateral spreading.

The proposed project would be designed and implemented in accordance with the City's design standards and all applicable building codes, including Caltrans and AASHTO standards related to bridge design and construction. Since no habitable structures would be constructed (other than the two public restroom structures), applicable regulations would primarily involve soil compaction and bridge design requirements. Mitigation Measure GEO-1 requires the City to review final design plans for structural engineering compliance and to approve the plans prior to the development of the structural components of the proposed project, such as the open channel, slope recontouring, and bridge development. Also, Mitigation Measure GEO-2 requires a geotechnical report to be prepared for the construction of the bridges and open channel. Therefore, potential liquefaction, lateral spreading, and subsidence impacts will be less than significant with mitigation incorporated.

Landslides. The project area is surrounded by developed areas, and site topography is relatively level; therefore, the possibility of a seismically induced landslide is remote. Additionally, the site is located near any known historical landslides. According to the California Department of Conservation's Seismic Hazard Zones Map for the *Long Beach* quadrangle, the project area does not fall within any earthquake-induced landslide zones.

However, as part of the project, an open channel would be developed, portions of the Lagoon bed would be dredged and recontoured, and the Lagoon slopes would be recontoured. Adherence to all applicable seismic codes and requirements during project implementation would reduce to a less than significant level any impacts related to landslides that could result from these project components. Mitigation Measure GEO-1 requires the City to review final design plans for structural engineering compliance and to approve the plans prior to the development of the structural components of the proposed project, such as channel development and slope recontouring. Therefore, potential landslide impacts will be less than significant with mitigation incorporated.

Mitigation Measures

The following mitigation measure is incorporated to offset potentially significant adverse impacts of the proposed project.

GEO-1 Prior to issuance of building permits for the structural components of the proposed project, such as channel and bridge development and slope recontouring, the City of Long Beach Building Official (or designee) and the City of Long Beach Director of Public Works are required to review and approve final design plans to ensure that

geotechnical hazard-resistant designs have been incorporated into the final engineering drawings in accordance with the most current California Building Code and the recommended seismic design parameters of the Structural Engineers Association of California. Ultimate site seismic design acceleration shall be determined by the project structural engineer during the project design phase.

GEO-2 A project geotechnical report shall be submitted to the City of Long Beach Building Official prior to the issuance of permits to construct the proposed bridges and open channel. The geotechnical recommendations shall be incorporated into the design plans to the satisfaction of the Building Official and Director of Public Works.

4.5.5 CUMULATIVE IMPACTS

For the analysis of geology and soils, the study area considered for the cumulative impact of other projects consisted of: (1) the area that could be affected by proposed project activities; and (2) the areas affected by other projects whose activities could directly or indirectly affect the geology and soils of the proposed project site. In general, only projects occurring adjacent to or very close to the project site were considered. Neither the proposed project nor any of the identified projects with potential cumulative impacts entailed activities that would affect geology and soils at significant distances from the site (e.g., projects requiring significant structural blasting or drilling, high vibration activities, deep excavation).

The analysis indicated that there would be no significant cumulative impact of the proposed project related to geology and soils. This conclusion is based on the following:

- There are no rare or special geological features or soil types on site that would be affected by project activities.
- There are no other known activities or projects with activities that would affect the geology and soils of this site.

4.5.6 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The mitigation measures described above will reduce potential geologic, seismic, and soil-related impacts to below a level of significance. Therefore, there are no significant unavoidable adverse impacts of the proposed project related to geology and soils.

4.6 HAZARDS AND HAZARDOUS MATERIALS

INTRODUCTION

This section addresses potential hazardous materials impacts to human health and the environment as a result of implementation of the proposed project. This section is focused on the evaluation of potential impacts related to construction activities. Other topics related to airport or airstrip-related hazards, wildland fires, emergency response or evacuation plans, and hazardous material site lists were evaluated within the Initial Study (IS) prepared for the proposed project (Appendix A), were found to have less than significant impacts, and are not discussed further in this Environmental Impact Report (EIR). The proposed project would not change the existing recreation and open space uses of the project site and nor would it introduce new uses or equipment that would emit hazardous emissions or involve hazardous materials. Therefore, operation of the proposed project would not introduce new risks associated with hazardous materials.

The information contained in this section is based on several reports that characterized site sediments within the Colorado Lagoon (Lagoon) water body and the existing soil along the proposed channel alignment within Marina Vista Park in addition to the health risk evaluation that was prepared for the proposed project. These reports include:

- *Colorado Lagoon: Sediment Testing and Material Disposal Report*, prepared by Kinnetic Laboratories, Inc. and Moffatt & Nichol, July 30, 2004 (Revised October 27, 2006);
- *Colorado Lagoon Sediment Assessment Report*, Kinnetic Laboratories, Inc., January 2007;
- *Draft Colorado Lagoon/Marine Stadium Open Channel Route Soils Investigation*, prepared by Kinnetic Laboratories, March 2008; and
- *Draft Human Health Risk Assessment*, prepared by Mearns Consulting Corporation, April 2008.

These reports are available for review at the City of Long Beach.

4.6.1 EXISTING ENVIRONMENTAL SETTING

The project site is located in the southeastern portion of the City of Long Beach (City). The Lagoon lies northwest of the mouth of the San Gabriel River and is located north of Marine Stadium and Alamitos Bay. The Lagoon is an 11.7-acre (ac) tidal water body[1] connected to Alamitos Bay and the Pacific Ocean through an underground tidal culvert that traverses Marina Vista Park. The Lagoon serves three main functions: hosting estuarine habitat, providing public recreation (including swimming), and retaining and conveying storm water drainage. Marina Vista Park is located southeast of the Lagoon, on the south side of East Colorado Street. Marina Vista Park serves as an

[1] Lagoon water body acreage varies with tides and was estimated by LSA Associates, Inc. using Geographic Information System (GIS) data based on a 2006 aerial photo.

open space/recreational facility that includes two soccer fields, tennis courts, a baseball diamond, play equipment, and picnic areas.

The project area originally consisted of a tidal mudflat until extensive dredging of the Lagoon and Marine Stadium occurred in the 1920s. In the 1960s, the previously dredged area located between the south end of the Lagoon and the north end of Marine Stadium was filled and the existing underground box culvert was constructed.

As detailed in the project description (Section 3.0), the ecological health of the Lagoon is degraded. The Los Angeles Regional Water Quality Control Board (LARWQCB) listed the Lagoon on California's 303(d) list of impaired water bodies due to elevated levels of lead, zinc, chlordane, and polycyclic aromatic hydrocarbons (PAHs) in the sediment, and chlordane, dichloro-diphenyl-trichloroethane (DDT), dieldrin, and polychlorinated biphenyls (PCBs) in fish and mussel tissue. In addition, testing confirmed the presence of PCBs, cadmium, copper, mercury, and silver as secondary contaminants of concern. Bacterial contamination of the Lagoon water is also a major concern and indicator bacteria was added in 2006 to California's 303(d) list.

The Los Angeles RWQCB is currently developing TMDLs for organochlorine pesticides, PCBs, sediment toxicity, PAHs, and metals in the Lagoon. The development of TMDLs will provide numeric targets for water, sediment quality, and fish tissue. The Los Angeles RWQCB is aiming to complete TMDL allocations by July 2008 and obtain Regional Board approval by November 2008.

The TMDL study conducted by the RWQCB is considered a separate yet complementary project in relationship to the proposed project and is expected to characterize the condition of the Lagoon and provide limitations on the discharge quantities for pollutants of concern into the Lagoon for future development projects.

Concentrations of existing pollutants have been evaluated in the three areas of the Lagoon, which are identified as the western arm (CL-1), central Lagoon (CL-2), and northern arm (CL-3), by collecting three vibracore samples in each area. Results indicated that with the exception of elevated concentrations of lead in soil present in the western arm of the Lagoon, no organochlorine pesticide, PCBs, or PAHs were detected above the State levels for hazardous waste.

To analyze human health risks to the general public, including sensitive receptors (residential, hospitals, and school), associated with the proposed sediment removal from the western arm of the Lagoon and the proposed open culvert construction, a human health risk assessment (HRA) was conducted for the proposed project. This HRA followed the approaches in: the Cal-EPA DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual (DTSC 1999); the DTSC LeadSpread 7.0 Model; the EPA Risk Assessment Guidance for Superfund, Volume 1 - Human Health (RAGs) (EPA 1989); and the Massachusetts Department of Environmental Protection (MADEP) Guidance Manual for characterizing risks posed by petroleum contaminated sites (June 2001). A map of nearby schools under the jurisdiction of Long Beach Unified School District (LBUSD) can be referenced in Figure 4.11.2 of this EIR.

Existing Oil Wells

There are no existing oil wells within the project site. However, three abandoned oil wells identified as Breig 1, Wasem 1, and Park 1 are located approximately 360 miles (mi) northeast of the proposed open channel alignment. Breig 1 was abandoned in August 1927, and both Wasem 1 and Park 1 were abandoned the following year in January 1928[1] (Figure 4.6.1).

Offsite Releases

According to the Environmental Data Resources, Inc. (EDR) Radius Map with GeoCheck® prepared by EDR on December 21, 2007, two leaking underground storage tank (LUST) sites were identified within 0.3 mi of the project limits. The first LUST, identified as Mobil #18-M1A, is located approximately 0.2 mi north-northwest of the western arm of the Lagoon. Based on records from a file review obtained at the Los Angeles Regional Water Quality Control Board (LARWQCB), the Mobil #18-M1A site was issued underground storage tank (UST) case closure on September 4, 1996[2], and requires no further action related to the UST release. In addition, based on information provided in the First Semi-Annual Groundwater Monitoring Report[3] and Well Abandonment Report Request Letter[4], concentrations of benzene have been limited to the Mobil #18-M1A site and its immediate surrounding area. Therefore, it is unlikely that this site will pose a concern to groundwater within the project limits. The second LUST is identified as Southland Corp #25800 and is located approximately 0.28 mi northwest of the western arm of the Lagoon. A gasoline release that was reported on April 21, 1986, reportedly affected both soil and groundwater at the Southland Corp #25800 site. The LARWQCB issued a site closure letter on August 2, 1996. Therefore, it is unlikely that this site will pose a concern to groundwater within the project limits.

4.6.2 REGULATORY SETTING

State and Federal

Hazardous Waste. Federal and California laws provide for "cradle to grave" regulation of hazardous wastes. The federal hazardous waste law is known as the Resource Conservation and Recovery Act of 1976 (RCRA) (40 Code of Federal Regulations [CFR] 240 et seq.). California has merged its RCRA authority into ongoing implementation of the State Hazardous Waste Control Law (HWCL), which was initially adopted in 1972 (22 California Code of Regulations [CCR] sec 66260.1 et seq.).

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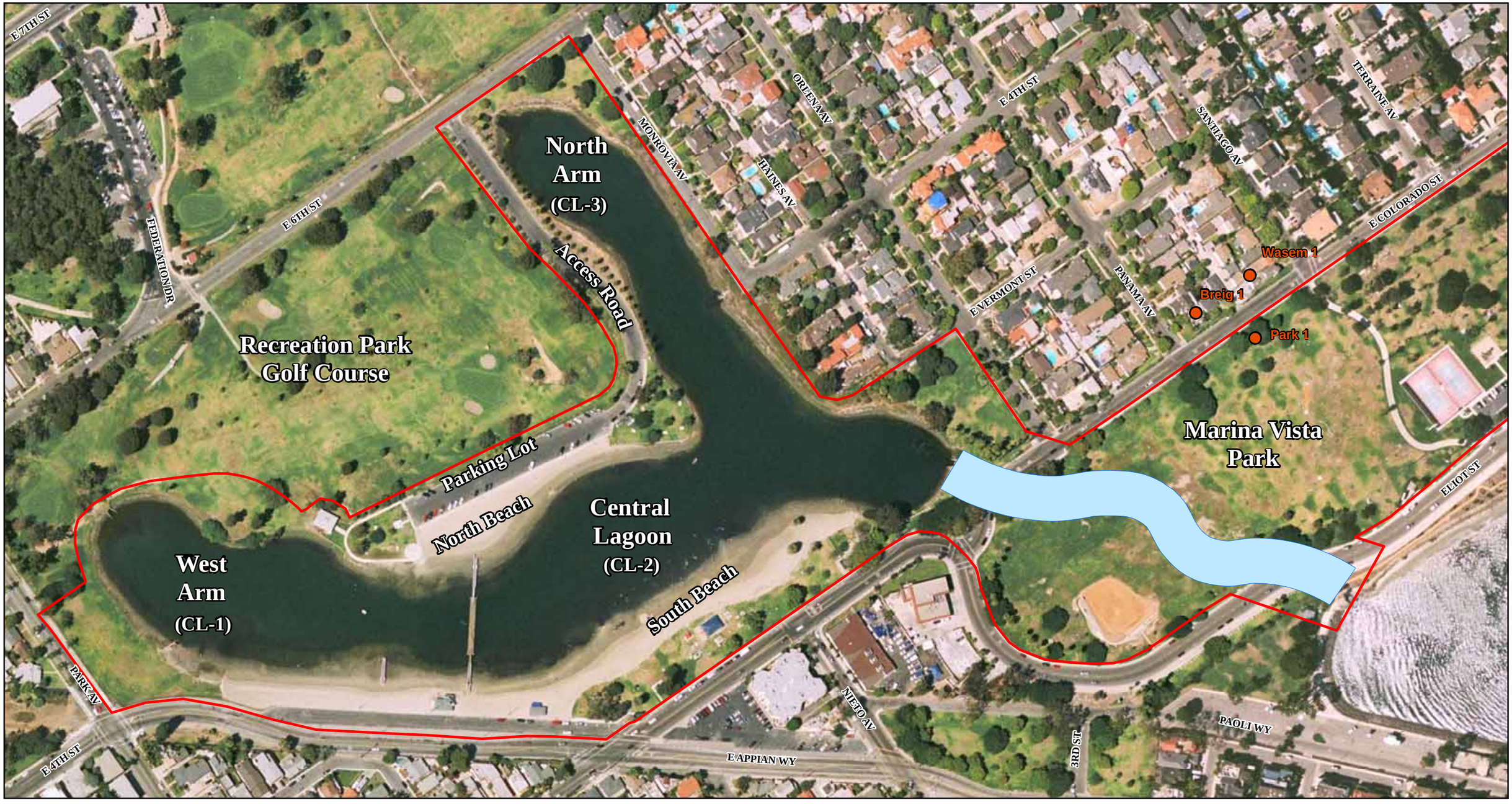
1 California State Mining Bureau Department of Petroleum and Gas, Notices of Intention to Abandon Well, 1927–1938.

2 Los Angeles Regional Water Quality Control Board, *Underground Storage Tank Case Closure – Mobil SS# 18-M1A*, September 4, 1996.

3 Kleinfelder Inc., *First Semi-Annual Groundwater Monitoring Report Mobil Station 18-M1A*, August 1995.

4 Kleinfelder Inc., *UST Case Closure Mobil Service Station #18-M1A Well Abandonment Report – Delivery Date Extension*, September 30, 1996.



LSA

LEGEND
- Project Boundary
- Proposed Channel
- Oil Well

0 100 200 Feet

FIGURE 4.6.1

SOURCE: Air Photo USA (2006), Moffat & Nichol (2007), Thomas Bros. (2007).

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Colorado Lagoon Restoration Project

Abandoned Oil Well Locations

The EPA has primary responsibility for implementing RCRA, and the California DTSC is the State's lead agency in implementing HWCL and RCRA provisions. California allows county health departments and other local agencies to implement certain HWCL provisions regulating hazardous waste generators under terms of Memoranda of Understanding (MOUs) with DTSC.

All RCRA-regulated and California-regulated hazardous waste must be recorded on hazardous waste manifests, with copies sent to DTSC. The manifest is a way of tracking hazardous waste from its inception to its disposal. The project site is subject to these requirements for disposal and transport of hazardous waste.

The City of Long Beach Fire Department provides emergency response for spills of hazardous materials or waste and conducts inspections with regard to storage of these substances. The oversight of remediation of soil and groundwater contamination is the responsibility of the Long Beach Certified Unified Program Agency (CUPA), the Local Enforcement Agency for State regulations.

Occupational Safety and Health. The federal Occupational Safety and Health Act of 1970 (OSH Act) (40 CFR 1902–1990) is the principal national law providing for worker safety and right to know. The broad policy goal of the act is "to assure so far as possible every working man and woman in the Nation a safe and healthful working environment." It is implemented by the United States Occupational Safety and Health Administration (OSHA), whose responsibilities include developing and promulgating occupational safety and health standards and assuring that these standards are administered and enforced nationwide.

The federal OSH Act allows states to administer OSHA requirements after submitting a State plan. Cal-OSHA administers OSHA standards applicable to private employers within the State, along with additional authority provided by the California Occupational Safety and Health Act of 1973 (State OSH Act) (8 CCR secs. 330-8618). These regulations are applicable to construction workers and City employees on the project site. Complaints regarding health and safety issues at the project site would be investigated by Cal-OSHA.

Air Quality. The federal Clean Air Act of 1970 (CAA) (40 CFR 50-95, 1400) creates a comprehensive national framework for maintaining and enhancing air quality. Title III of CAA defines hazardous air pollutants (HAPs), provides measures for their control, and establishes the Accidental Release Prevention (ARP) program.

California has integrated CAA requirements into its own comprehensive air quality control program. The California Air Resources Board (ARB) has statewide responsibility for administering federal and State requirements. Thirty-five Air Pollution Control Districts (APCDs) and AQMDs issue local rules, regulations, and permits for stationary sources.

The South Coast Air Quality Management District (SCAQMD) is the enforcement agency for the project site. Refer to Section 4.2, Air Quality, for further discussion of air quality regulations.

Lead. Lead has been used in commercial, residential, roadway, and ceramic paint products; in electric batteries and other devices; as a gasoline additive; for weighting in gunshot; and for other purposes. It is recognized as being toxic to human health and the environment and is widely regulated in the United States. Buildings constructed prior to 1978 are presumed to contain lead-based paint (LBP) unless proven otherwise, although buildings constructed after 1978 may also contain LBP. Lead is regulated as a "criteria" pollutant under the CAA, which has led to its elimination from automotive fuels. Aerially deposited lead (ADL) from past use of leaded fuels is a concern in unpaved areas adjacent to roadways. Lead is also regulated as a toxic pollutant under the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) as well as under the federal and California safe drinking water acts.

All LBP above regulatory thresholds should be removed from structures and disposed of in accordance with local, State, and federal regulations prior to renovation or demolition activities that would affect structures that contain LBP. Release of LBP into the environment is a violation of several laws, including the OSH Act, RCRA, CAA, and CWA.

The SCAQMD and the City of Long Beach Health Department are the enforcement agencies for the project site.

Polychlorinated Biphenyls (PCBs). Standard equipment generally suspected of potentially containing PCBs includes industrial-capacity transformers, fluorescent light ballasts, and oil-cooled machinery. All PCB-designated transformers were required to be replaced with non-PCB-designated transformers after PCBs were designated as a carcinogen by the EPA in 1977. Transformers are currently classified as PCB-containing if their cooling oils contain greater than 50 milligrams per liter (mg/L) total PCBs.

During the site visit performed on April 16, 2008, transformers were observed within areas of the project limits. Transformers within the project limits are suspected to contain PCB-containing oil, and due to the possibility of past leaks or spills, these transformers are considered a potential environmental concern until proven otherwise.

City of Long Beach General Plan

There are no specific goals or policies related to hazardous materials in the City's General Plan. The Public Safety Element lists general protection and remedial action goals for general safety hazards and for emergencies. Transport of hazardous materials is deferred to California Department of Transportation (Caltrans) requirements and is specified along designated truck routes.

City of Long Beach Municipal Code

The project is subject to the following chapters of the City of Long Beach Municipal Code with regard to hazardous materials:

Chapter 8.64 **Air Pollution.** Provides the City with authority to prevent injury or damage to businesses or property due to air pollution.

Chapter 8.86 **Hazardous Materials Release Response Plans and Inventory.** Designates the Long Beach/Signal Hill CUPA as the local authority to enforce Chapter 6.95 of Division 20 of the California Health & Safety Code.

Chapter 8.87 **Hazardous Waste Control.** Designates the Long Beach/Signal Hill CUPA as the local authority to enforce Chapter 6.5 of Division 20 of the California Health & Safety Code

Chapter 8.88 **Hazardous Materials Clean-up.** Requires site characterization, site remediation, and initial and final reports for contaminated sites in accordance with State and local laws and regulations.

Standard Regulatory Requirement – Health and Safety Plan

The City Department of Parks, Recreation, and Marine must prepare a Health and Safety Plan for all workers in accordance with federal, State, and local regulations for use during construction, subject to review and approval by the City of Long Beach Project Development Bureau Manager**,** Community Development Department. Federal regulations include the following:

- Occupational Safety and Health, Title 29 CFR, Regulations for General Industry (Part 1910) and Construction (Part 1926)
- EPA, Title 40 CFR, National Emissions Standard for Hazardous Air Pollutants (NESHAPS), (Part 61, Subpart A)
- United States Department of Transportation (USDOT) Regulations, Title 49 CFR

California State and local regulations include the following:

- Title 8 CCR, Cal-OSHA Regulations, Chapter 4, Division of Industrial Relations, General Industry Safety Orders and Construction Safety Orders
- Title 22 CCR, Social Security, Division 2, Department of Social Services - Department of Health Services, and Division 4, Environmental Health
- SCAQMD, Rules and Regulations

The Health and Safety Plan must include a summary of all potential risks to construction workers, monitoring programs, maximum exposure limits for all site chemicals, and emergency procedures. A Site Health and Safety Officer must be identified in the plan. The plan must specify methods of contact, phone number, office location, and responsibilities of the Site Health and Safety Officer. The Health and Safety Plan is required to be amended as needed if different site conditions are encountered by the Site Health and Safety Officer.

An on-site monitor will be provided to ensure compliance with mitigation related to dust control as addressed in Section 4.2, Air Quality (Mitigation Measure AQ-1). SCAQMD Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, SCAQMD Rule 402 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Compliance with SCAQMD Rules 402 and 403 is recommended in order to ensure that air conditions are safe and acceptable for on-site workers as well as residents and

workers of properties adjacent to the site. The City or the assigned contractor/developer is required by these existing regulations to stop, redirect, or otherwise change during any grading work or other subsurface trenching, drilling and/or subsurface disturbance in order to avoid the spread of fugitive dust.

Standard Regulatory Requirement – Handling and Storage of Hazardous Substances

Federal, State, and local codes for the handling and storage of any hazardous substances, including petroleum hydrocarbons, are to be followed at all times. This requirement shall apply both during construction and throughout the length of the project. These include proper storage and spill containment procedures. Prior to issuance of any building permits, the project applicant shall obtain permits from the City of Long Beach Fire Department and any other applicable regulatory agency for the storage or handling of any hazardous substances.

Standard Regulatory Requirement – Soil Management Plan

A soil management plan for the project must be completed and reviewed by the lead regulatory agency prior to the commencement of grading activities. This soil management plan will be predicated on the human health risk assessment and will incorporate applicable and relevant environmental rules and regulations such as the Air Quality Management District's Rules 1166, 402 and 403. During the excavation a technician trained and knowledgeable in the operation of an organic vapor analyzer (OVA) such as a photo-ion detector (PID) must be onsite monitoring the soils during the excavation and grading activities every 15 minutes. Field logs must be kept current. Soils that have PID readings in excess of 50 mg/kg but less than 1,000 mg/kg must be stockpiled. At no time must the stockpile exceed 2,000 cubic yards of volatile organic compound (VOC) contaminated soil. The soil stockpile must be watered and covered with plastic sheeting. The integrity of the cover and stockpile must be monitored daily. The stockpile must be disposed offsite in compliance with applicable environmental rules and regulations.

Additionally the soil management plan should reinforce best management practices for construction, including but not limited to, compliance with storm water runoff guidelines, mitigation of dust and containment of soils. Compliance can be achieved by placing sand bags around the circumference of the job site, placing shaker plates at points of ingress and egress and operating a water truck continuously during the excavation activities.

Storm Water Pollution Prevention Plan During Construction

The City is required to prepare a Storm Water Pollution Prevention Plan (SWPPP) for the construction of the proposed project. The SWPPP shall be submitted to the LARWQCB for approval. The SWPPP must specify toxic materials (in significant quantities) known to exist on the site; areas of storing, cleaning, and maintaining construction materials and equipment; Best Management Practices (BMPs) for controlling storm water and non-storm water discharges and contact with equipment and materials; and sampling and analysis for key chemicals of concern. The SWPPP must include provisions to control potential impact from off-site discharges of storm water and non-storm water that would come into contact with equipment, materials, and chemicals of concern on site during construction. Prior to obtaining a grading permit, the City Department of Parks, Recreation,

and Marine is required by these regulations to provide documentation that the SWPPP was approved by the LARWQCB, and shall provide a copy of the permit, including all conditions, to the City of Long Beach Director of Public Works. Please refer to Section 4.7, Hydrology and Water Quality, for additional information.

California Code of Regulations Title 22 Criteria

Hazardous materials and wastes are defined by the regulations listed within the California Code of Regulations (CCR), Title 22, Section 66261.1 through 66261.126. According to these regulations, a waste is considered toxic if it contains certain metals or organic substances at soluble concentrations greater than federal regulatory levels using a test method identified as the Toxicity Characteristic Leaching Procedure (TCLP), or it contains total concentrations of certain constituents that are greater than the Total Threshold Limit Concentration (TTLC) or soluble concentrations greater than the Soluble Threshold Limit Concentration (STLC).

EPA Preliminary Remediation Goals

Preliminary Remediation Goals (PRGs) established by the EPA are primarily used to evaluate and clean up contaminated sites. PRGs are risk based concentrations which are intended to assist risk assessors in initial screening level evaluations of environmental measurements. PRGs are viewed as guidelines and are not considered legally enforceable standards. PRGs are helpful in providing long-term targets during the evaluation of different remedial alternatives. The use of PRGs early in the decision-making process, can assist in streamlining the consideration of potentially feasible remedial alternatives.

4.6.3 METHODOLOGY

The evaluation of potential project impacts related to hazards and hazardous materials is based on several technical reports and testing of existing on-site materials that would be affected by implementation of the proposed project. As detailed below, sediment samples were collected from the Lagoon in 2004 and 2006 to characterize existing sediment on the Lagoon floor. In addition, sampling was completed in 2008 to characterize the existing soils within the proposed open channel alignment. An HRA was also completed in 2008 to identify any potential human health risks that may result from implementation of the proposed project.

Previous Environmental Investigations

Colorado Lagoon Sediment Testing and Material Disposal Report. The study prepared by Kinnetic Laboratories and Moffatt & Nichol documented the extent of sediment contamination in the Lagoon and evaluated potential sources of sediment contamination and methods of remediation. Potential disposal options for contaminated sediments were also evaluated within this study. A total of nine vibracore sediment samples were collected from various locations in three areas of the Lagoon floor over a 2-day period from June 30 through July 1, 2004. Sediment sampling locations are shown in Figure 4.6.2. Table 4.6.A provides the composite depths of each sample collected during the 2004 site study.

LSA

LEGEND

Project Boundary

2004 Vibracore Sampling Sites

0 150 300 Feet

FIGURE 4.6.2

Colorado Lagoon Restoration Project

2004 Sediment Sampling Locations

SOURCE: Air Photo USA (2007).

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Table 4.6.A: Core Depths of Composite Sections within Colorado Lagoon

Sampling Area	Core Identification	Composite Depth (feet)
CL-1 (western arm)	1a	3.5
	1b	2.5
	1c	4.5
CL-2 (central Lagoon)	2a	5.0
	2b	5.5
	2c	4.0
CL-3 (northern arm)	3a	1.5
	3b	3.0
	3c	3.5

Source: Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories (2006).

The sampling results indicate that greater concentrations of the constituents were detected in the western arm of the Lagoon. Because the western arm of the Lagoon does not benefit from tidal influx the same way the north arm and central portions of the Lagoon do, it is expected that the greatest detected concentrations of constituents would be found in the western arm of the Lagoon.

Results of sediment testing were reported both on a wet and dry weight basis. Wet weight is used to determine if the sediments would be considered hazardous under California's Title 22 criteria, and dry weight is used to evaluate constituent concentrations by ecological criteria. Results of all analyses were reported as milligrams per kilogram (mg/kg) in wet weight for consistency with TTLCs as cited in Title 22 criteria[1].

Tables 4.6.B and 4.6.C document concentrations of metals and organochlorine pesticides found within sediments collected from the western and central arms of the Lagoon.

Table 4.6.B: Metals within Colorado Lagoon Sediments

Analytes	Concentration (mg/kg)
Western Arm	
Cadmium	2.1
Copper	55
Lead	409
Mercury	0.33
Silver	1.2
Zinc	266
Central Arm	
Lead	81.3
Mercury	0.17
Silver	1.7

Source: Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories (2006).
mg/kg = milligrams per kilogram

[1] Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories, Inc., July 30, 2004 (Revised October 27, 2006).

Table 4.6.C: Organochlorine Pesticides with Colorado Lagoon Sediments

Analytes	Concentration (µg/kg)
Western Arm	
4,4-DDE	67
4,4-DDT	14
Total DDT	81
Total Chlordane	105
Dieldrin	27
Central Arm	
4,4'-DDE	16
Total DDT	20
Total Chlordane	3.30

Source: Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories (2006).
µg/kg = micrograms per kilogram

The western and central arms of the Lagoon sediments were sampled for the presence of PCBs and PAHs. Results are documented in Tables 4.6.D and 4.6.E.

Table 4.6.D: PCBs within the Lagoon Sediments

Analytes	Concentration (µg/kg)
Arochlor 1260	98
Total PCBs	98

Source: Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories (2006)

Table 4.6.E: PAHs within the Lagoon Sediments

Analytes	Concentration (µg/kg)
Western Arm	
Phenanthrene	253
Acenaphthene	17

Source: Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories (2006)

Based on several sources of scientific literature[1,2,3,4], concentrations detected in the Lagoon may affect both terrestrial and aquatic wildlife. This is evident in the benthic community surveys conducted in 2004, when a total of 35 taxa of invertebrates were collected in nine cores in the Lagoon[5]. Densities of organisms ranged from 18 species per square meter in the north arm to 26 species per square meter in the central Lagoon. Only four invertebrate taxa were collected in the western arm of the Lagoon, which showed a notable reduction in diversity in the west arm and indicates environmental stress in the area. The diminished biodiversity of benthic organisms in the western arm of the Lagoon may have been a result of several factors including, but not limited to, poor water quality, low dissolved oxygen, sediment contamination, or a combination of these or other factors. Although the poor biodiversity in the western arm of the Lagoon cannot be solely attributed to the contaminated sediment, this sediment more than likely is a contributing factor. Removal of the sediment would be expected to address this contributing factor. Increasing the circulation within the western arm through implementation of the project also would address the other two potentially contributing factors (i.e., water quality and low dissolved oxygen). As each factor typically contributes to low biodiversity, addressing all three through sediment removal and increased water circulation, volume, and flow will ensure the habitat within the western arm is suitable to sustain a more diverse benthic community in the future.

Comparison of Lagoon Sediments to EPA PRGs and Title 22 Criteria. Concentrations of lead in composite samples collected from the western arm of the Lagoon exceeded the State-modified EPA PRG for lead in residential soils of 150 mg/kg. Because these concentrations of lead exceed the State-modified PRG for lead in residential soil, the reuse of these western arm sediments on site is not feasible and requires off-site disposal at a State certified landfill or at a Port of Long Beach site.

Per state standards, any soluble constituent concentration exceeding the Title 22 STLC is classified as hazardous material. Results indicated that lead concentrations from the western arm of the Lagoon exceeded the STLC at 5.0 mg/L whereas concentrations present in the central Lagoon did not. Therefore, according to California's Title 22 regulations for hazardous waste, the sediments within the western arm of the Lagoon are considered hazardous.

Concentrations of lead in sediments within the western arm of the Lagoon floor were also evaluated by the Deionized Water Waste Extraction Test (DI-WET) leachate method. The DI-WET utilizes deionized water as an extractant instead of sodium citrate and generally yields lower concentrations

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1 Schiff, K., 1998. The effect and accumulation of sediment-adsorbed DDT in the polychaete, *Capitella capitata*. Bulletin of Marine Science 48:594.

2 Ecobichon, D.J., 1991. Toxic Effects of Pesticides in Casarett & Doull's Toxicology, The Basic Science of Poisons. 4th Edition. Amdur, M.O., J. Doull, C.D. Klaassen, editors. Pergamon Press, New York, pp. 565-622.

3 Turusov, V., V. Rakitsky, and L. Tomatis. February 2002. Dichlorodiphenyltrichloroethane: ubiquity, persistence, and risks - DDT - Research Review. http://finsarticles.com/p/articles/mi_0CYP/is_/ai_84303269**.**

4 Eisler, R. July 2007. Eisler's Encyclopedia of Environmentally Hazardous Priority Pollutants. Elsevier Press.

5 Chambers Group, *Habitat Assessment for the Colorado Lagoon Restoration Feasibility Study for the City of Long Beach*, July 2004

of the constituent than when using the Waste Extraction Test (WET) extract. The DI-WET extract is not considered an acceptable method to evaluate leaching potential for hazardous materials intended for disposal at a State landfill. However, alternative disposal facilities such as the Port of Long Beach consider the DI-WET extract to be an acceptable method for evaluating leaching. The DI-WET extract contained concentrations of lead that were below the detection limit of 0.02 mg/L. Therefore, sediments within the western arm of the Lagoon are acceptable for disposal at a designated Port of Long Beach landfill site.

In order to determine if the sediments within the western arm of the Lagoon would be considered hazardous by federal standards under the RCRA, leaching potential was evaluated using a TCLP. The TCLP extract contained 0.77 mg/L of lead, which is below the federal threshold of 5.0 mg/L. Therefore, the sediment is not considered hazardous under federal guidelines[1]. Table 4.6.F shows the sediment analysis of lead compared to Title 22 criteria.

Table 4.6.F: Colorado Lagoon Sediment Comparison of WET Elutriates with Title 22 Criteria

Sample Location	Total Lead (mg/kg)	WET Lead (mg/L)	DI-WET Lead (mg/L)	TCLP Lead (mg/L)	STLC (mg/L)	TTLC (mg/kg)
Western Arm	242	11	ND (<0.02)	0.77	5.0	1,000
Central Lagoon	53.6	2.1	–	–	5.0	1,000

Source: Sediment Testing and Material Disposal Report, July 30, 2004 (Revised October 27, 2006).
DI-WET = Deionized Water Waste Extraction Test
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
ND =– Non detect
STLC = Soluble Threshold Limit Concentration
TCLP = Toxicity Characteristic Leaching Procedure
TTLC = Total Threshold Limit Concentration
WET = Waste Extraction Test

Colorado Lagoon Sediment Assessment Report. As a follow-up to the Sediment Material Testing and Disposal Report initially completed in 2004, Kinnetic Laboratories conducted site investigations to determine the extent of the contaminated sediment within the Lagoon and to delineate the contaminated sediment removal area.

Kinnetic Laboratories tested Lagoon floor sediments by collecting three grab samples from the surface sediment located along each of the seven transects evaluated in the study (Figure 4.6.3). The three grab samples taken from each transect were then combined into one composite sample. Each composite sample was then analyzed for key Constituents of Concern (COCs), which included lead, organochlorine pesticides, and PCBs. Constituent concentrations of contaminants found within the sediments in the 2007 site investigation are detailed in Table 4.6.G. The results of this investigation indicated that concentrations of select COCs in surface sediments showed a rapid decline in concentration from west to east.

[1] Colorado Lagoon: Sediment Testing and Material Disposal Report, Kinnetic Laboratories, Inc., July 30, 2004 (Revised October 27, 2006).

LSA

FIGURE 4.6.3

LEGEND

Project Boundary

2006 Surface Grab Sites

0 150 300 Feet

Colorado Lagoon Restoration Project

2006 Sampling Transects

SOURCE: Air Photo USA (2007).

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Table 4.6.G: Sediment Transect Sample Concentrations

Analyte	Transect Composite Sample Locations						
	A	B	C	D	E	F	G
Metals (mg/kg)							
Arsenic	8.2	5.0	4.5	4.7	7.6	9.2	7.8
Copper	83.4	42.3	43.2	38.0	72.3	93.6	78.0
Lead	173.1	66.3	75.8	70.9	126.3	144.7	119.0
Nickel	20.1	11.9	12.1	11.3	19.9	25.3	21.6
Silver	0.2	1.6	0.05	0.1	0.2	0.2	0.2
Zinc	365	180	169	124	222	275	232
Organochlorine Pesticides (µg/kg)							
4,4-DDE	82	5	7.7	6.4	9.3	8.7	11.0
Total DDT	14.6	0.0	7.7	6.4	9.3	8.7	11.0
Total Chlordane	28.4	11.5	20.7	8.2	13.4	18.5	14.3

Source: Colorado Lagoon: Sediment Assessment Report, January 2007.
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram

Results indicated the highest lead concentrations along Transect A and lowest lead concentrations at Transects B, C and D[1]. WET testing was performed on four of the seven composite samples with the highest concentrations of lead. WET results from Transect E did not exceed the STLC and are not considered hazardous.

With the exception of 4,4-DDE, Total DDT, and Total Chlordane, concentrations of organochlorine pesticides evaluated in all seven transects were below the detection limits. Concentrations of PCBs were also below detection limits in sediments from all seven transects.

Based on the results of the Sediment Assessment Report (Kinnetic Laboratories, January 2007), it was concluded that the pedestrian bridge located between Transects C and D would serve as an appropriate eastern limit for the removal of the contaminated sediments in the western arm of the Lagoon.

Marina Vista Park Open Channel Route Soils Investigation. The proposed open channel location through Marina Vista Park, connecting Colorado Lagoon and Marine Stadium, is adjacent to several wells associated with the Seal Beach oil field, which was first discovered in 1924 and has been producing ever since.[2] There are no existing oil wells within the project limits. However, three inactive wells identified as Breig 1, Park 1, and Wasem 1 are located approximately 360 feet (ft) north-northeast from the proposed open channel alignment (refer to Figure 4.6.1 for abandoned well locations). Well abandonment records indicate that Breig 1 was abandoned in August 1927, and both Wasem 1 and Park 1 were abandoned in January 1928.

1 Colorado Lagoon: Sediment Assessment Report, Kinnetic Laboratories, Inc., January 2007.

2 State of California, Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOG). Gamache, M.T., and P.L. Frost, principal authors. 2003. Urban Development of Oil Fields in the Los Angeles Basin Area, 1983–2001. Publication No. TR52.

Kinnetic Laboratories sampled and tested soils along the proposed channel alignment traversing Marina Vista Park between December 6, 2007, and January 30, 2008 (Figure 4.6.4). A total of 18 soil borings were advanced within Marina Vista Park. Samples were taken at intervals of approximately 150 ft along each alignment. The composite soil samples were analyzed for particle size, pH, total recoverable petroleum hydrocarbons, total metals, phenols, phthalates, chlorinated pesticides, PAHs, and PCBs[1]. The results of the soils analysis are summarized in Table 4.6.H. Data from each composite group were compared to the PRG Residential Soil Criteria (EPA 2004) and the California Code of Regulations, Title 22 TTLC levels.

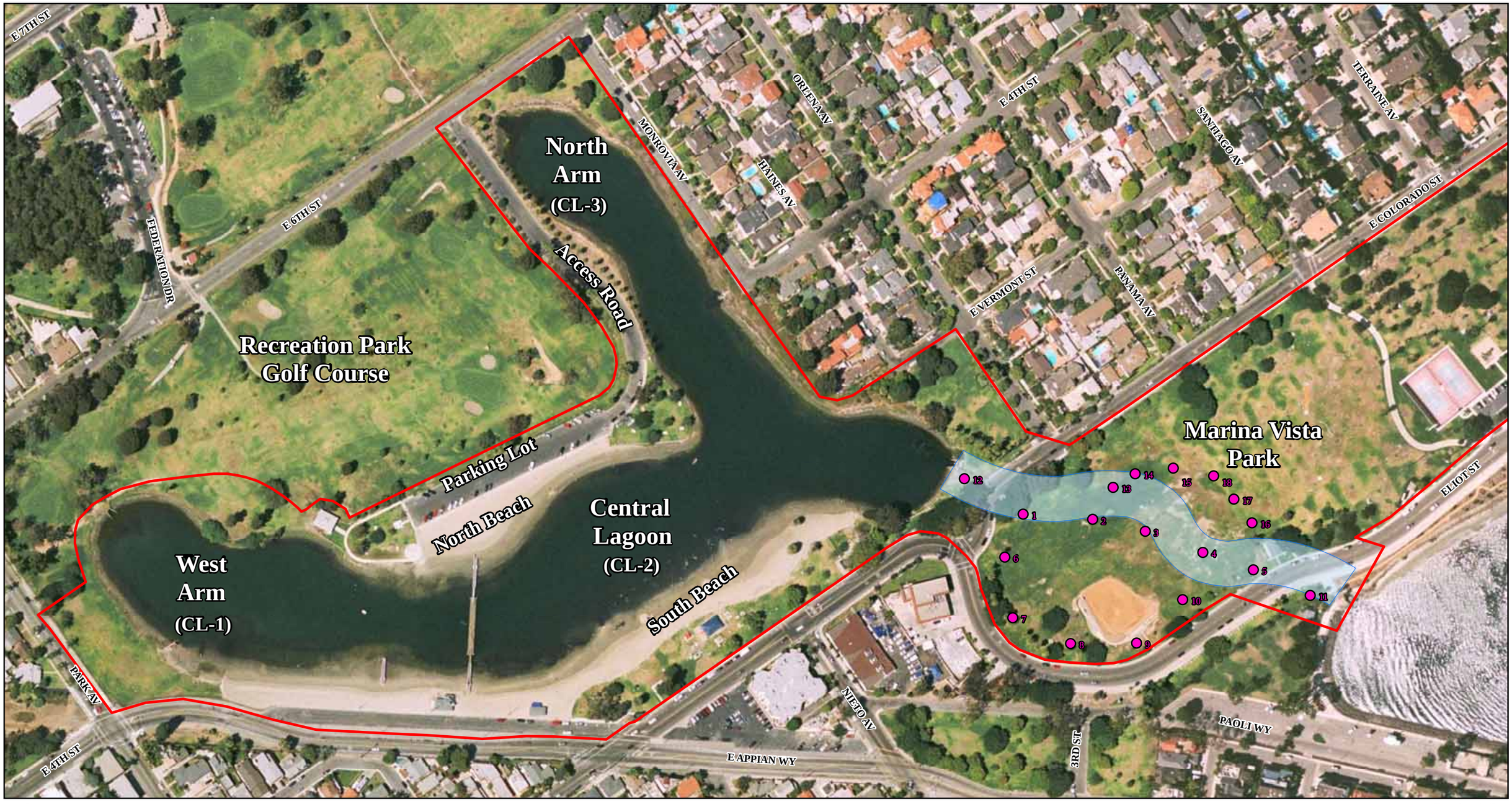
Table 4.6.H: Composite Sample Soil Chemistry Analysis

Analyte	Proposed Project Alignment (mg/kg)		PRG Residential Soil Criteria (mg/kg)	TTLC (mg/kg)
	Composite Sample A	Composite Sample B		
Antimony	0.39	0.495	31.3	--
Arsenic	**8.7**	**5.71**	0.0616[1]	500
Barium	122	123	5370	10,000
Cadmium	0.148	0.196	37	100
Chromium	27.8	22	211	2,500
Copper	23.1	31.2	3,130	2,500
Lead	19.8	24.4	150[1]	1,000
Mercury	0.056	0.05	23.5	20
Nickel	18.1	14	--	2,000
Selenium	0.231	0.2	--	100
Silver	0.102	0.111	391	500
Zinc	78.6	67.4	23,500	5,000

Source: Draft Colorado Lagoon/Marine Stadium Open Channel Route Soils Investigation, Kinnetic Laboratories, Inc., March 2008.
[1] California-modified PRG level
Bold numbers indicate concentrations exceeding the level established for California-Modified PRG for Residential Soils.
mg/kg = milligrams per kilogram
PRG = Preliminary Remediation Goals
TTLC = Total Threshold Limit Concentration

As shown in Table 4.6.H, concentrations of arsenic exceeded the level established for the California-Modified (Cal-Modified) PRG for Residential Soils. Background concentrations of arsenic in California soils have been reported at an average concentration of 3.5 mg/kg with a minimum concentration of 0.6 mg/kg to a maximum concentration of 11.0 mg/kg. The minimum background concentrations of arsenic found within California soils are greater than the value indicated for the Cal-modified PRG for arsenic in soils[2]. Additionally, the Cal-EPA DTSC has determined that a concentration of 6.0 mg/kg is considered "safe" for school sites[3]. Based on these results, it is suggested that the concentration of arsenic is likely attributed to naturally occurring or background arsenic concentrations.

1 *Draft Colorado Lagoon/Marin Stadium Open Channel Route Soils Investigation,* Kinnetic Laboratories, Inc., March 2008.
2 Background Concentrations of Trace and Major Elements in California Soils, Kearney Foundation of Soil Science, March 1996.
3 Final Report Background Metals at Los Angeles Unified School Sites – Arsenic, June 6, 2005.



LSA

FIGURE 4.6.4

LEGEND
- Project Boundary
- Proposed Channel
- Sample Location

0 100 200 Feet

SOURCE: Air Photo USA (2006), Moffat & Nichol (2007), Thomas Bros. (2007).

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Colorado Lagoon Restoration Project

2008 Open Channel Alignment Sampling Locations

Therefore, results of the Draft Colorado Lagoon/Marine Stadium Open Channel Route Soil Investigation indicate that soils within Marina Vista Park do not contain contaminants at levels of concern, as no constituent concentrations exceeded the EPA PRGs for residential soils along the proposed culvert alignment.

Summary of Previous Soil Investigations. Based on sampling activities conducted in 2004 and 2006, lead was found to be the primary constituent of concern in sediments contained within the western arm of the Lagoon. Concentrations of sediments sampled in the central arm of the Lagoon and in the area of the proposed open channel alignment do not contain contaminants at levels of concern.

Soils along the proposed open channel route within Marina Vista Park were characterized in 2008 for the presence of COCs, which may indicate the presence of petroleum hydrocarbons, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), TTLC metals, total petroleum hydrocarbons-gasoline range (TPH-g), total petroleum hydrocarbons-diesel range (TPH-d), speciated carbon chains, PCBs, and organochlorine pesticides. Results of the tests are summarized below.

A track-mounted, limited-access rig, direct push system was used to collect soil samples from two on-site borings on March 14, 2008. (Figure 4.6.5) Discrete soil samples were collected from these locations at depths of 5 ft bgs, 10 ft bgs or 15 ft bgs, which is the terminus of the borings. The two on-site boring locations were placed within the proposed alignment for the open channel within Marina Vista Park. Soil was collected in brass sleeves with Teflon liners and end caps with minimal headspace. Soil samples submitted for analysis of VOCs were collected in the field via United States Environmental Protection Agency (EPA) Method 5035. This method is mandated by both EPA and the California Environmental Protection Agency (Cal-EPA) as the only acceptable methodology to collect soil samples to be submitted for analysis of VOCs. The consultant can collect the soil samples using an Encore equivalent or actually preserve 5 grams of soil into five discrete volatile organic analyte (VOA) vials, each with a known premeasured fixative. The objective is to ensure the VOCs do not volatilize from the sample before the lab has an opportunity to measure them.

Four discrete soil samples were submitted to Sierra Analytical Labs, Inc. (Sierra) for analysis of TTLC via EPA Methods 6010B and 7471A (including mercury), VOCs via EPA Method 8260B, SVOCs via EPA Method 8270C, PCBs via EPA Method 8082, organochlorine pesticides via EPA Method 8081A, and TPH-g, TPH-d, and speciated carbon chains via EPA Method 8015B.

Results of the analysis concluded that with the exception of TPH-g and select metals, all other constituents analyzed for VOCs, SVOCs, PCBs, organochlorine pesticides, TPH-d, and speciated carbon chains did not exceed their respective reporting limits in all soil samples. TPH-g was detected in one soil sample at a concentration of 0.48 milligram per kilogram (mg/kg), and several metals, including silver, arsenic, cobalt, chromium, copper, lead, nickel, antimony, vanadium and zinc, were detected in site soils.

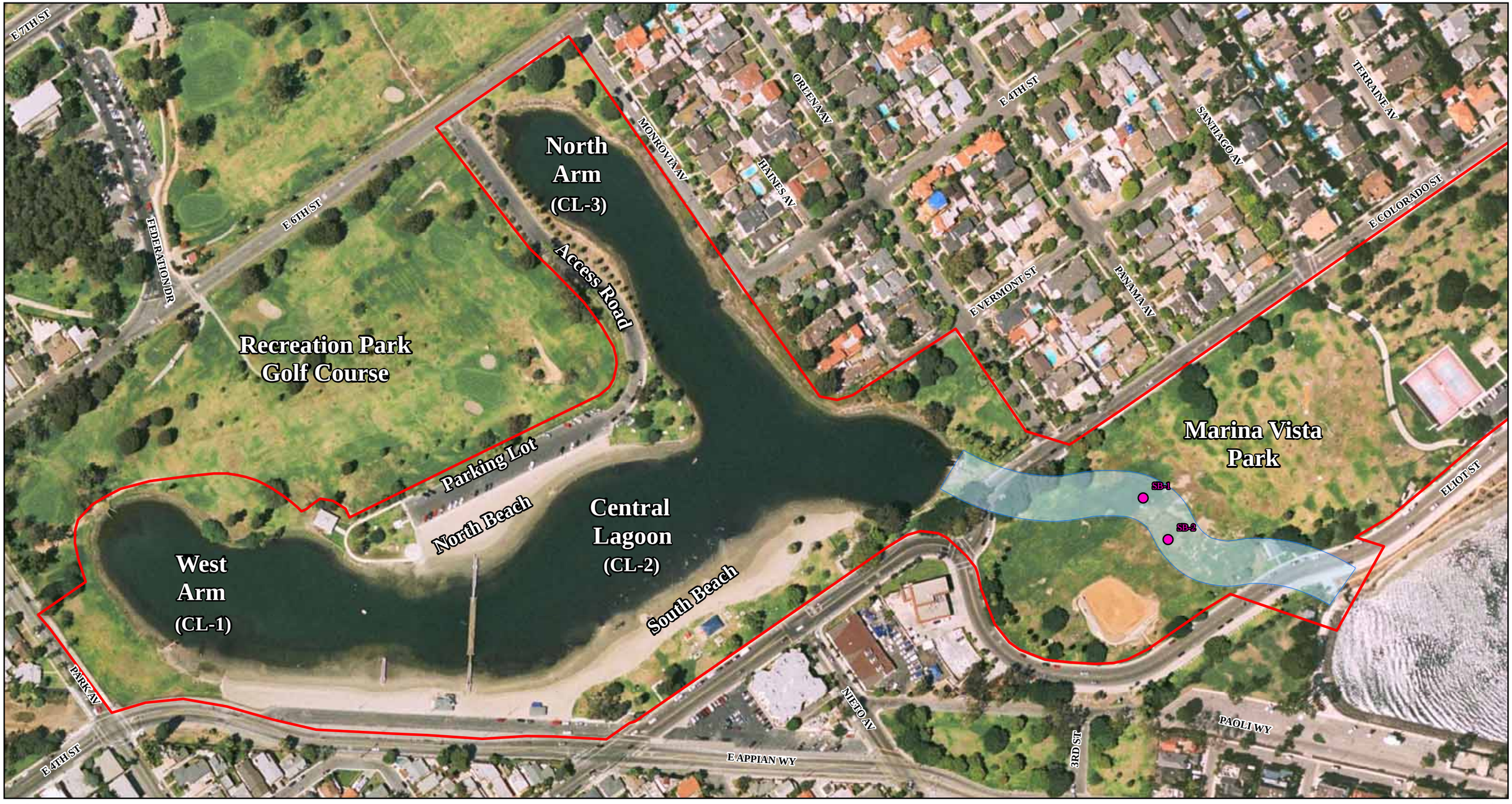

FIGURE 4.6.5

SOURCE: Air Photo USA (2006), Moffat & Nichol (2007), Thomas Bros. (2007).

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Colorado Lagoon Restoration Project

Human Health Risk Assessment Sampling Locations

Human Health Risk Assessment

An HRA was prepared for the site. This HRA followed the approaches in: the Cal-EPA DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual (DTSC 1999); the DTSC LeadSpread 7.0 Model; the EPA Risk Assessment Guidance for Superfund, Volume 1 - Human Health (RAGs) (EPA 1989); and the Massachusetts Department of Environmental Protection (MADEP) Guidance Manual for characterizing risks posed by petroleum contaminated sites (June 2001).

The LARWQCB is the Responsible Agency under the California Environmental Quality Act (CEQA) and is charged with approving the HRA for the site. There is an existing MOU between LARWQCB and the Cal-EPA Office of Environmental Health Hazard Assessment (OEHHA) that facilitates review of HRAs by the OEHHA when LARWQCB is the Lead or Responsible Agency for an HRA. As an enforcement agency, LARWQCB will issue a letter of closure (no further action required) for the project site if it concurs with the comments and findings provided by the OEHHA.

The risks and hazards to human health due to exposure to the metals silver, barium, copper, chromium, cobalt, nickel, lead, antimony, vanadium, and zinc in soils collected from 5 ft and 15 ft below ground surface (bgs) were estimated using Equations 2.3, 2.4, and 2.8 in the PEA Manual (DTSC 1999). The hazards to human health due to exposure to lead detected in soils was estimated using DTSC's LeadSpread 7.0 Model.

The DTSC LeadSpread 7.0 Model was used to evaluate potential health impacts due to exposure to lead in on-site soils via the ingestion and inhalation exposure routes. LeadSpread estimates the blood lead levels, expressed as micrograms per deciliter (µg/dl), in the blood of adults and children potentially exposed to the residual concentrations of lead. The model assumes these receptors will be exposed to the residual concentrations of lead in the air and through ingestion of soil and particulates, overly conservative (i.e., health protective assumptions).

The DTSC LeadSpread 7.0 Model estimates the hazard due to exposure to lead in air and on-site soils/dust for adults and children within the residential exposure scenario. Typically lead concentrations in air and water are not measured on site. Therefore the LeadSpread model extrapolates these concentrations from the measured concentrations of lead in on-site soils.

The following information contained within the LeadSpread model are model-derived values that represent the percent contribution for each exposure scenario evaluated when the exposure point concentration (EPC) is 4.2 mg/kg. The percent contributions of each exposure pathway will change as the EPCs change because they are model-derived.

Residential Exposure Scenario.

Adults:

Soil Contact	0%
Soil Ingestion	1%
Background Inhalation	8%

Site Inhalation 0%
Drinking Water Ingestion 50%
Background Food Ingestion 41%

Children:

Soil Contact 0%
Soil Ingestion 3%
Background Inhalation 4%
Site Inhalation 0%
Drinking Water Ingestion 35%
Background Food Ingestion 58%

Occupational Exposure Scenario.

Adults:

Soil Contact 0%
Soil Ingestion 0%
Background Inhalation 6%
Site Inhalation 0%
Drinking Water Ingestion 51%
Background Food Ingestion 43%

Exposure Parameters. The following information contained within the DTSC LeadSpread model are default values for the exposure parameters for both residential and occupational exposure scenarios.

Adults:

Days per Week ..... 7 (residential); 5 (occupational)
Geometric Standard Deviation 1.6
Blood Lead Level of Concern ..... 10 µg/dl
Skin Area ..... 5,700 square centimeters (cm^2) (residential); 2,900 cm^2 (occupational)
Soil Adherence ..... 70 micrograms per square centimeter ($\mu g/cm^2$)
Dermal Uptake Constant ..... 0.0001 µg/dl
Soil Ingestion ..... 50 milligrams per day (mg/day)
Ingestion Constant ..... 0.04 µg/dl
Bioavailability 0.44
Breathing Rate ..... 20 cubic meters per day (m^3/day)
Inhalation Constant ..... 0.08 µg/dl
Water Ingestion ..... 1.4 liters per day (L/day)
Food Ingestion ..... 1.9 kilograms per day (kg/day)
Lead in Store-Purchased Produce ..... 3.1 micrograms per kilogram (µg/kg)
Lead in Homegrown Produce ..... 1.9 µg/kg

Children:

Days per Week 7
Geometric Standard Deviation 1.6
Blood Lead Level of Concern ..... 10 µg/dl
Skin Area ..... 2,900 cm^2
Soil Adherence ..... 200 $\mu g/cm^2$
Dermal Uptake Constant ..... 0.0001 µg/dl
Soil Ingestion ..... 100 mg/day
Ingestion Constant ..... 0.16 µg/dl
Bioavailability 0.44
Breathing Rate ..... 6.8 m^3/day
Inhalation Constant ..... 0.19 µg/dl
Water Ingestion ..... 0.4 L/day
Food Ingestion ..... 1.0 kg/day
Lead in Store-Purchased Produce ..... 3.1 µg/kg
Lead in Homegrown Produce ..... 1.9 µg/kg

As the EPA and the OEHHA have not published toxicity values (i.e., Reference Doses [RfDs]) for TPH-g, the guidance in the MADEP approach to characterizing risks posed by petroleum-contaminated sites was used to obtain a surrogate RfD for TPH-g (MADEP, 2001). The potential adverse health impacts due to exposure to TPH-g in on-site soils was then assessed by following the appropriate equations in the DTSC PEA Guidance Manual.

To provide an evaluation of chronic risk along the ingestion and dermal contact pathways, the following equations (Equations 2.3) for risk and hazard were used consistent with PEA guidance (page 2-23; DTSC 1999).

Equations 2.3

$$Risk_{soil} = (SF_o \times C_s \times (1 .57x10^{-6})) + (SF_o \times C_s \times (1.87x10^{-5}) \times ABS)$$

$$Hazard_{soil} = (C_s/RfD_o) \times (128x10^{-5})) + (C_s/RfD_o) \times (1.20x10^{-4}) \times ABS)$$

Where:

SF_o = oral cancer slope factor (milligrams per kilogram per day [mg/kg/day])$^{-1}$
C_s = concentration in soil (mg/kg)
RfD_o = oral reference dose (mg/kg/day)
ABS = absorption fraction (dimensionless)

These equations incorporate the following default exposure factors for estimating chronic risk or hazard via the ingestion and dermal contact pathways:

Default Exposure Factors: Risk Assessment

Exposure Duration ..... 24 years (adults);
6 years (children)
Exposure Frequency (ingestion) ..... 350 days per year (days/year)

Exposure Frequency (dermal contact).... 100 days/year (adults);
350 days/year (children)
Body Weight ..... 70 kg (adults);
15 kg (children)
Incidental Soil Ingestion Rate ..... 100 mg/day (adults);
200 mg/day (children)
Exposed Skin Area ..... 5,800 cm^2 (adult);
2,000 cm^2 (children)
Soil to Skin Adherence Factor..... 1.00 mg/cm^2
Averaging Time..... 70 years

Default Exposure Factors: Hazard Assessment

Exposure Duration..... 6 years for children (birth to 6 years);
Exposure Frequency ..... 350 days/year (ingestion and dermal contact)
Incidental Soil Ingestion Rate ..... 200 mg/day (children)
Body Weight ..... 15 kg (children)
Exposed Skin Area ..... 2,000 cm^2 (children)
Soil to Skin Adherence Factor..... 1.00 mg/cm^2
Averaging Time..... 6 years

Chemical-specific values for the absorption fractions (ABS) parameter were obtained from Table 2 (page A-6, DTSC 1999). The default exposure factors provide a conservative estimate (i.e., a very health-protective estimate) of chronic risk to human health due to exposure to the metals and TPH-g via the ingestion and dermal contact routes of exposure.

To provide an evaluation of chronic risk and hazard along the inhalation pathway, the following equations (Equations 2.4 and 2.8) for risk and hazard were used consistent with PEA guidance (pages 2-24 and 2-30; DTSC 1999).

Equations 2.4

$$Risk_{air} = SF_i \times C_a \times 1.49$$

$$Hazard_{air} = C_a/RfD_i \times 0.639$$

Where:

SF_i = inhalation cancer slope factor $(mg/kg/day)^{-1}$
C_a = concentration in air (milligrams per cubic meter [mg/m^3]), derived from Equation 2.8
RfD_i = inhalation reference dose (mg/kg/day)

These equations incorporate the following default exposure factors for estimating chronic risk or hazard via the inhalation pathway:

Default Exposure Factors: Risk Assessment

Exposure Duration..... 24 years (adults);
6 years (children)
Exposure Frequency ..... 350 days/year

Inhalation rate..... 20 m^3/day (adults);
10 m^3/day (children)
Body Weight ..... 70 kg (adults);
15 kg (children)
Averaging Time..... 70 years

Default Exposure Factors: Hazard Assessment

Exposure Duration..... 6 years for children (birth to 6 years)
Exposure Frequency (inhalation) ..... 350 days/year
Inhalation Rate ..... 10 m^3/day (children)
Body Weight ..... 15 kg (children)
Averaging Time..... 6 years

These default exposure factors provide a conservative estimate (i.e., a very health-protective estimate) of chronic risk to human health due to exposure to metals via the inhalation route of exposure.

The potential adverse health impacts due to exposure via inhalation to metals were evaluated using Equations 2.4 and 2.8. The potential adverse health impacts due to exposure via inhalation to TPH-g was not estimated as a RfD_i for TPH-g in units of mg/kg/day was not available in the MADEP guidance (Table 4-12, page 34; MADEP, 2001).

Equation 2.8

$$C_a = C_s \times (5 \times 10^{-8} \text{ kg/m}^3)$$

Where:

C_a = concentration in air (mg/m^3)
C_s = concentration in soil (mg/kg)

The results of the HRA indicate that the estimated hazard index of the noncarcinogenic metals, silver, arsenic, barium, cobalt, chromium, copper, antimony, vanadium, and zinc, and TPH-g via the ingestion, dermal contact, and inhalation exposure routes is 0.863, which is less than the threshold of 1.0. The DTSC LeadSpread 7.0 Model results indicate the estimated hazard due to exposure to the noncarcinogenic compound lead is less than the threshold of 10 µg/dl of blood for both children and adult receptors. The results of the HRA indicate that the estimated summation of risks of the carcinogenic metals, arsenic, cobalt, and nickel via the ingestion, dermal contact, and inhalation exposure routes is 4.53×10^{-5}. This estimated risk value is within the EPA "safe and protective of public health" risk range of 1×10^{-4} to 1×10^{-6} (Federal Register 56(20):3535, 1991). A quantitative estimation of risks due to exposure to residual concentrations of chemicals is expressed as 1×10^{-4} to 1×10^{-6}, or a probability of 1 in 10,000 to 1 in 1 million that an individual may be at an increased risk of developing an adverse health impact that is attributable to the exposure.

Based on these estimated risks and hazards, the site in its existing condition does not pose an adverse impact to the current site users (i.e., Marina Vista Park recreational users); the construction workers associated with project site preparation and construction of the alignment, including grading contractors, that will be extensively grading the site to realize the future intended use of the site; or to the future passive recreational users, including children. In sum, all estimated risks and hazards are

either below thresholds or within an acceptable risk range. Risks were estimated for the current condition of the property.

4.6.4 THRESHOLDS OF SIGNIFICANCE

The IS contained in Appendix A of this document determined that the proposed project would not result in any significant impacts related to airport or airstrip-related hazards, wildland fires, emergency response or evacuation plans, and hazardous material site lists. Therefore, these topics are not discussed in this EIR.

Criteria for determining the significance of hazards impacts are based on the CEQA Guidelines. Project-related hazards impacts may be considered potentially significant and adverse if the proposed project would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials
- Create a significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school

4.6.5 PROPOSED PROJECT

The purpose of the proposed project is to restore the Lagoon's ecosystem, improve estuarine habitat, provide enhanced recreation facilities, improve water and sediment quality, and manage storm water. The proposed project would not change the existing recreation and open space uses of the project site, and operation of the proposed project would not introduce the use or transport of hazardous materials. The proposed project consists of the following components, which would improve the water and sediment quality within the Lagoon and provide habitat and recreational improvements.

- **Improvements Benefiting Water and Sediment Quality**
  - Clean culvert and remove tidal gates, sill, and other structural impedances.
  - Build an open channel between the Lagoon and Marine Stadium.
  - Remove contaminated sediment in the western arm of the Lagoon.
  - Remove sediment in the central Lagoon area.
  - Upgrade the storm drains with trash separation devices, a diversion system, and bioswales.
- **Habitat Improvements**
  - Remove the north parking lot and access road and develop native habitat.
  - Recontour the Lagoon side slopes to provide for additional intertidal areas.
  - Revegetate areas surrounding the Lagoon water body with various native plant species.

- Import and plant eelgrass in the Lagoon and open channel.
- Develop a bird island.

- **Recreation Improvements**
  - Construct a walking trail along the Lagoon and open channel.
  - Reconfigure the sports fields in Marina Vista Park.

- **Operational Components**
  - Implement trash management protocols.
  - Implement bird management protocols.
  - Modify sand nourishment practices.

Implementation of the proposed Colorado Lagoon Restoration project would occur in two phases. The first phase would involve the improvements at the Lagoon and the cleaning of the existing culvert, and the second phase would involve the improvements within Marina Vista Park. Improvements within Marina Vista Park are anticipated to occur at least 1 year following the commencement of Lagoon improvements depending upon the availability of funding. The project components of each phase are listed below.

- **Phase 1: Lagoon Improvements**
  - Clean culvert and remove tidal gates, sill, and other structural impedances at culvert.
  - Dredge western arm and central Lagoon areas.
  - Implement storm drain upgrades, including the development of a storm water diversion system and bioswales.
  - Remove the north parking lot, access road, and the restroom on the north shore of the Lagoon.
  - Recontour the Lagoon side slopes, develop the bird island, revegetate land areas, and plant eelgrass.
  - Develop the walking trail and viewing platform at the Lagoon.

- **Phase 2: Marina Vista Park Improvements**
  - Construct two roadway bridges spanning the open channel at East Colorado Street and East Eliot Street. Demolish and replace two public restrooms in channel alignment. Build an open channel between the Lagoon and Marine Stadium.
  - Develop the walking trail on the eastern side of the open channel and vegetation buffers on both sides of the open channel.

NOP Comments

DTSC submitted comments as an interested agency on the NOP for the project. These comments have been addressed in the narrative within the EIR. Section 3.3 identifies the current and historic uses of the project site. Section 4.6 addresses known or potentially contaminated sites within the proposed

project area and determines the project is not a border zone property. A Soil Management Plan that would determine the handling and disposition of any potentially contaminated soils discovered during excavation activities will be prepared and approved by the lead regulatory agency prior to the commencement of any excavation activities. Data from prior investigations and assessments are presented in tabular form within this EIR section. A human health risk assessment has been prepared and will be submitted to the lead regulatory agency.

Sediment Removal

During the first phase, sediment removal will occur within the western and central portions of the Lagoon. Approximately 16,000 cubic yards (cy) of sediment would be removed from the western arm of the Lagoon. There are two methods related to dredging and disposing of the contaminated sediment within the western arm of the Lagoon: a dry dredge method and a wet dredge method. The dry dredge method would install a temporary cofferdam just west of the footbridge to isolate the west arm of the Lagoon for dredging. The dredge area would be drained of water, and the bottom sediment would be dewatered. An excavator would be used to remove the dry sediment, which would be temporarily stockpiled in the parking lot along the Lagoon's north shore. Plastic tarps and containment structures would be placed under and around the stockpile area to minimize runoff back into the Lagoon and surrounding areas.

The wet dredge method would not dewater the west arm of the Lagoon prior to dredging. The dredge area would be isolated by a silt curtain to maintain water quality. Clamshell/bucket-type dredging equipment would be used and temporary shore-perpendicular berms or piers would be built into the Lagoon to allow the dredger to access depths not within reach from the Lagoon's shore. Similar to the first method, the dredged material would be temporarily stockpiled in the parking lot along the northern shore until it was drained and loaded onto trucks. Plastic tarps and containment structures would be placed under and around the stockpile areas to minimize runoff back into the Lagoon and surrounding areas.

As described previously, the sediments in the central region of the Lagoon do not contain contaminants at levels of concern. However, the project would remove sediment and sand that has eroded and been deposited into the Lagoon over the years. Approximately 5,500 cy of sediment would be removed from the central Lagoon utilizing the wet dredge method discussed previously. Approximately, 1,300 cy of central Lagoon sediment will be stockpiled and reused on site for creation of a dune on the north shore.

All sediments will be hauled off site as dry material. Therefore, the dredge material will be stockpiled in two designated holding areas until dry. The stockpile areas total approximately 56,000 square feet (sf) and will be located in the north parking lot and along the southwestern perimeter of the Lagoon, as shown in Figure 4.6.5. The main construction staging area will be located adjacent to the west arm of the Lagoon. All stockpiled material will be properly contained and secured, and dust will be minimized on site during the sediment evaporation process with mitigation measures described later in this section.

Due to the contamination levels of lead within the western arm of the Lagoon, the dredge materials from the western arm would be disposed of at an approved Port of Long Beach landfill site or a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) approved,

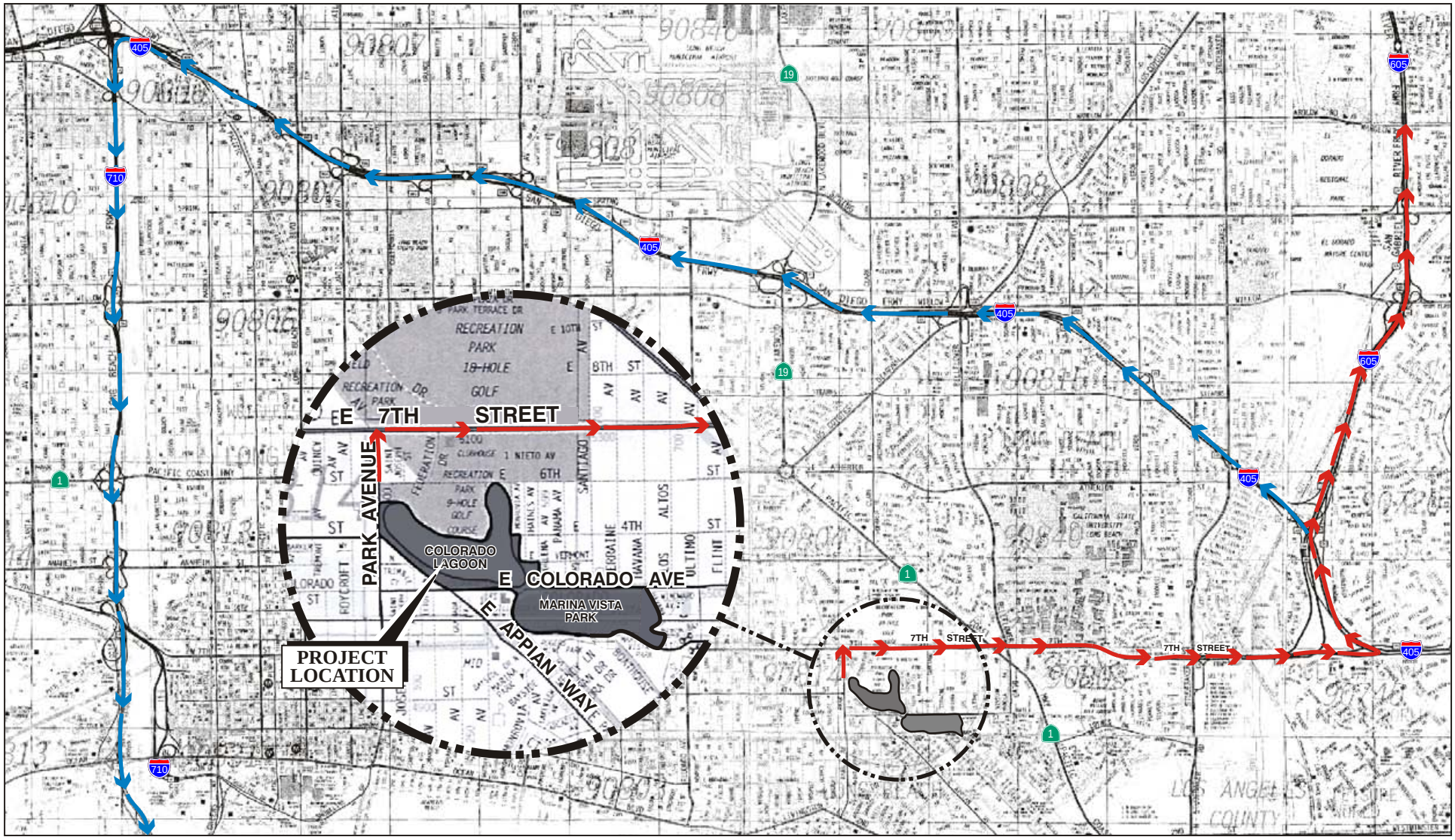
Class I landfill. The closest Class I landfill facility is the Kettleman Hills Landfill located in Kings County on the Interstate 5 (I-5) corridor, north of the City of Bakersfield. Due to the location, the preferred disposal location is at a designated Port of Long Beach landfill. As described in Section 4.10.1, the Port of Long Beach constructs landfill areas to provide additional land for the expansion of port facilities. Development of the landfill areas requires large amounts of rock and fill material. Several existing Port projects will require large volumes of fill material. However, disposing of the contaminated sediment at a Port landfill project is constrained by the timing between the Lagoon dredge activities and the construction of the Port landfill. If the timing of these activities do not coincide, the contaminated sediment would be hauled to the Kettleman Hills Landfill. The remainder of the demolition and excavation material from the construction of the proposed project will be disposed of at unclassified landfills. The truck routes to both the Port of Long Beach and State landfills are shown in Figure 4.6.6.

As previously stated, an HRA was prepared for the site following the approaches in the California Environmental Protection Agency, DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual (DTSC 1999), the DTSC LeadSpread 7.0 Model, EPA Risk Assessment Guidance for Superfund, Volume 1 - Human Health (RAGs) (EPA 1989), and the Massachusetts Department of Environmental Protection (MADEP) Guidance Manual for characterizing risks posed by petroleum-contaminated sites (June 2001). For detailed information regarding the soil sampling and HRA methodology, please see Section 4.6.2.

Open Channel Excavation

During Phase 2 of construction, the existing concrete box culvert will be demolished and a new open channel would be constructed to connect the Lagoon to Marine Stadium through Marina Vista Park. The proposed open channel alignment would follow the same general alignment as the existing culvert. The open channel will be constructed by excavating the soil above and along the sides of the concrete culvert. The culvert would remain operational during this period. Following soil excavation, the culvert would be plugged to prevent water flow through it, and water would be removed from inside the culvert via a pump. After the water was drained from the culvert, the culvert demolition would begin in the center of the culvert. The culvert would be demolished, debris removed, and the underlying soil would be excavated. After one section is complete, construction of the channel would move outward toward each end, demolishing the culvert and building the channel until both ends were reached. During the construction period, the ends of the culvert will be opened periodically to convey flows from/to the Lagoon through the remaining culvert sections and newly constructed open channel stretch. Following this tidal flushing, the culvert ends would be closed again, water pumped out, and culvert demolition/open channel construction would continue along a new section. This process would repeat until both ends are reached. The remaining culvert end sections would be demolished, the channel ends breached (at low tide), and the new tidal connection would be established. Construction of the open channel may take place during wet months, which may require the channel to be opened more frequently to allow storm flows to dissipate.

Soil sampling was performed in three locations along the proposed open channel alignment for the HRA. When results of the soil sampling were compared to human health risk parameters, no constituent concentrations posed a significant risk to human health.



LSA

LEGEND

TO PORT OF LONG BEACH

TO LANDFILL FACILITIES

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SOURCE: Thomas Guide, 2007

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FIGURE 4.6.6

Colorado Lagoon Restoration Project

Construction Haul Routes

4.6.6 IMPACTS AND MITIGATION MEASURES

Less Than Significant Impacts

The following impacts that could result from implementation of the proposed project were evaluated and considered less than significant.

Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Lagoon Facilities. The first phase of the proposed project will include dredging of contaminated sediments within the western arm of the Lagoon utilizing either a wet or dry excavation method. In addition, the project would remove noncontaminated sediments within the central Lagoon by utilizing the wet excavation method. All sediments removed from the western and central portions of the Lagoon will be stockpiled on site. To minimize the holding time during the evaporation process, all stockpiles will not exceed 3 ft in thickness.

The dredging, stockpiling and disposal process may involve the use of limited quantities of chemical agents, solvents, paints, vehicle fuel, and other hazardous materials. However, with the implementation of Hazardous Waste BMPs and compliance with local, State, and federal regulations regarding hazardous materials use and storage, potential impacts associated with the routine transport, use, or disposal of hazardous materials are considered less than significant. These standard measures include but are not limited to provisions in the SWPPP, Air Quality Rule 403, the General Construction Permit issued by LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.*

Marina Vista Park. The project will include constructing an open channel through Marina Vista Park to create a larger tidal exchange between the Lagoon and Marine Stadium. As stated previously in this section, results from soil sampling performed to characterize the soils along the open channel alignment indicated that no constituents exceeded their respective EPA PRG levels for residential soils, with the exception of concentrations of arsenic that had exceeded the Cal-modified PRG value. However, background concentrations of arsenic in California soils have been reported at a minimum concentration of 0.6 mg/kg. Since minimum background concentrations of arsenic found within California soils are greater than the value indicated for the Cal-modified PRG for arsenic in soils[1], it is suggested that the concentration of arsenic is likely attributed to naturally occurring or background arsenic concentrations. Therefore, the soils excavated during the construction of the open channel may be reused on site to reconfigure and level the existing sports fields, if needed. However, due to the high salinity of the existing soil at Marina Vista Park, and the difficulty in maintaining grass and landscaping as a result of the high salt levels, the Department of Parks, Recreation and Marine plans to haul and dispose of the excavated materials offsite. Excavated soils from Marina Vista Park will disposed of at an unclassified landfill.

Additional soil testing results from the HRA indicated that TPH-g was detected in one soil sample at a concentration of 0.48 mg/kg, and several metals, including silver, arsenic, cobalt, chromium,

[1] Background Concentrations of Trace and Major Elements in California Soils, Kearney Foundation of Soil Science, March 1996.

copper, lead, nickel, antimony, vanadium and zinc, were also detected in site soils. However, when results were compared to human health risk parameters, the constituents listed above did not pose a significant risk to human health; therefore, none of the detected constituent concentrations pose a concern to the proposed project.

Based on the results of the soil sampling performed for the soils at Marina Vista Park, the soils excavated as part of the proposed open channel construction are not anticipated to pose a concern to human health of the public or sensitive receptors such as residences, hospitals, or schools during routine transport, use or disposal. Therefore, impacts associated with the routine transport, use, or disposal of soils excavated from the open channel are considered less than significant.

Construction of the proposed channel alignment would involve the use of limited quantities of chemical agents, solvents, paints, vehicle fuel, and other hazardous materials. However, with the implementation of Hazardous Waste BMPs and compliance with local, State, and federal regulations regarding hazardous materials use and storage, potential impacts associated with the routine transport, use, or disposal of hazardous materials would be reduced to a less than significant level. These standard measures include but are not limited to provisions in the SWPPP, Air Quality Rule 403, the General Construction Permit issued by LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.*

Create a significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Lagoon Facilities. As previously discussed, the dredging, stockpiling, and disposal process may involve the use of limited quantities of chemical agents, solvents, paints, vehicle fuel, and other hazardous materials. However, with the implementation of Hazardous Waste BMPs and compliance with local, State, and federal regulations, impacts associated with reasonable foreseeable upset and accident conditions involving the release of hazardous materials are considered less than significant. These standard measures include but are not limited to provisions in the SWPPP, Air Quality Rule 403, the General Construction Permit issued by LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.*

Marina Vista Park. According to the Environmental Data Resources, Inc. (EDR) Radius Map with GeoCheck® prepared by EDR on December 21, 2007, two leaking underground storage tank (LUST) sites were identified within 0.3 mi of the project limits. One of the LUSTs has been issued case closure and is unlikely to pose a concern to the proposed project. However, the remaining LUST, identified as Mobil #18-M1A, is located approximately 0.2 mi north-northwest of the western arm of the Lagoon. A gasoline release that was discovered November 19, 1987, reportedly affected both soil and groundwater at the Mobil #18-M1A site. Based on records from a file review obtained at the LARWQCB, the Mobil #18-M1A site was issued UST case closure on September 4, 1996[1], and requires no further action related to the UST release. In addition, based on information provided in

[1] Los Angeles Regional Water Quality Control Board, *Underground Storage Tank Case Closure – Mobil SS# 18-M1A*, September 4, 1996.

the First Semi-Annual Groundwater Monitoring Report[1] and Well Abandonment Report Request Letter[2], concentrations of benzene have been limited to the Mobil #18-M1A site and its immediate surrounding area. Therefore, it is unlikely that this site will pose a concern to groundwater within the project limits.

As discussed previously, conclusions drawn from the HRA indicate that the site in its existing condition does not pose an adverse impact to the current site users, construction workers associated with the proposed project, or other sensitive receptors, including children. Therefore, no human health impacts are anticipated during the construction activities associated with the proposed project, and impacts associated with upset and accident conditions involving the release of hazardous materials to the environment are considered less than significant.

As discussed above, construction of the proposed channel alignment would involve the use of limited quantities of chemical agents, solvents, paints, vehicle fuel, and other hazardous materials. However, with the implementation of Hazardous Waste BMPs and compliance with local, State, and federal regulations regarding hazardous materials use and storage, potential impacts associated with upset and accident conditions involving the release of hazardous materials to the environment are considered less than significant. These standard measures include but are not limited to provisions in the SWPPP, Air Quality Rule 403, the General Construction Permit issued by LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.*

Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school.

Lagoon Facilities. As previously discussed, the dredging, stockpiling, and disposal process may involve the use of limited quantities of chemical agents, solvents, paints, vehicle fuel, and other hazardous materials. However, with the implementation of Hazardous Waste BMPs and compliance with local, State, and federal regulations, impacts associated with reasonable foreseeable upset and accident conditions involving the release of hazardous materials are considered less than significant. These standard measures include but are not limited to provisions in the SWPPP, Air Quality Rule 403, the General Construction Permit issued by LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.*

As discussed previously, conclusions drawn from the HRA indicate that the site in its existing condition does not pose an adverse impact to the current site users, construction workers associated with the proposed project, or other sensitive receptors, including children. Therefore, no human health impacts are anticipated during the construction activities associated with the proposed project, and impacts from hazardous emissions or handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school are considered less than significant.

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1 Kleinfelder Inc., *First Semi-Annual Groundwater Monitoring Report Mobil Station 18-M1A*, August 1995.

2 Kleinfelder Inc., *UST Case Closure Mobil Service Station #18-M1A Well Abandonment Report – Delivery Date Extension*, September 30, 1996.

Marina Vista Park. As previously discussed, the EDR Radius Map with GeoCheck® prepared by EDR on December 21, 2007, indicated that two LUST sites were identified within 0.3 mi of the project limits. Both LUSTs have been issued case closure and are unlikely to pose a concern to the proposed project.

As discussed above, construction of the proposed channel alignment would involve the use of limited quantities of chemical agents, solvents, paints, vehicle fuel, and other hazardous materials. However, with implementation of Hazardous Waste BMPs and compliance with local, State, and federal regulations regarding hazardous materials use and storage, the potential to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school is considered less than significant. These standard measures include but are not limited to provisions in the SWPPP, Air Quality Rule 403, the General Construction Permit issued by LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties.*

Potentially Significant Impacts

The following impacts that could result from implementation of the proposed project were evaluated and considered potentially significant.

Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Lagoon Facilities. As previously discussed, the first phase of the proposed project will involve the dredging of the western arm and central area of the Lagoon. Based on sampling performed for the Lagoon sediments, sediments excavated from the Lagoon may be potentially impacted. In order to ensure that all materials being stored on site would not be accidentally released into the environment, soil stockpiles will be covered in accordance with the Soil Management Plan discussed in Mitigation Measure HAZ-4, and all dredging, transport, and disposal of Lagoon sediments will be in compliance with the Health and Safety Plan discussed in Mitigation Measure HAZ-3. After the loading, covering, and manifesting the trucks containing the impacted soils, the trucks destined for the Kettleman Hills Landfill will be routed north on Park Avenue, east on East 7th Street, north on Interstate 605 (I-605), and then north on Interstate 5 (I-5). Removal trucks transporting materials to Class III landfills in the region would also be routed north on Park Avenue, east on East 7th Street, and north on I-605. Removal vehicles destined for the Port would travel east on East 7th Street, north on Interstate 405 (I-405), and then south on Interstate 710 (I-710). The haul routes are shown on Figure 4.6.6. The implementation of Mitigation Measures HAZ-3 and HAZ-4 would ensure that construction impacts related to the routine transport and disposal of potentially impacted sediments would be less than significant.

In addition, as part of the proposed project, the existing restroom located on the north shore of the Lagoon will be demolished. The existing restroom at the north shore of the Lagoon was constructed in 1951. Due to the age of the existing restroom structures, there is potential for LBP and/or PCBs to be present within the structures. With the implementation of Mitigation Measure HAZ-1, potential impacts from the routine transport, use, or disposal of hazardous materials would be considered less than significant.

Marina Vista Park. The second phase of the project will include the demolition and replacement of one existing restroom within Marina Vista Park and another existing restroom located in Marine Stadium, at the end of the proposed open channel. The existing restroom at Marine Stadium was constructed in 1951. The existing Marina Vista Park restroom was constructed in 1991. Based on the estimated age of the Marina Vista Park and Marine Stadium restrooms, there is potential for LBP and/or PCBs to be present within the structures. With the implementation of predemolition surveys as discussed in Mitigation Measure HAZ-1, the potential impacts from the routine transport, use, or disposal of hazardous materials would be considered less than significant.

Create a significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Lagoon Facilities. As previously discussed, the first phase of the proposed project will involve the dredging of the western arm and central area of the Lagoon. Based on sampling performed for the Lagoon sediments, sediments excavated from the Lagoon may be potentially impacted. The implementation of Mitigation Measures HAZ-3 and HAZ-4 require preparation and implementation of a Health and Safety Plan and Soil Management Plan. These measures would ensure that impacts from reasonable foreseeable upset and accident conditions involving the release of hazardous materials would be less than significant.

The first phase of the proposed project will also include the removal of the north parking lot and the creation of an East 6th Street access road. Proposed grading activities are anticipated as part of the proposed project and may require the removal or relocation of existing PCB-containing transformers. During the proposed project activities, all soil surrounding existing transformers should be sampled prior to disturbance. Mitigation Measure HAZ-2 will ensure that impacts from reasonable foreseeable upset and accident conditions involving the release of hazardous materials would be less than significant.

As previously discussed, the proposed project plans to demolish the existing restroom located on the north shore of the Lagoon. Due to the age of the existing restroom structure, there is potential for LBP and/or PCBs to be present within the structure. With the implementation of Mitigation Measure HAZ-1, potential impacts from reasonable foreseeable upset and accident conditions involving the release of hazardous materials would be less than significant.

Marina Vista Park. The second phase of the project will include the demolition and replacement of existing restrooms in Marina Vista Park and Marine Stadium. Due to the age of the existing restroom structures, there is potential for LBP and/or PCBs to be present within the structures. With the implementation of predemolition surveys as discussed in Mitigation Measure HAZ-1, the potential impacts from reasonable foreseeable upset and accident conditions involving the release of hazardous materials would be less than significant.

Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school.

Lagoon Facilities. The first phase of the proposed project will involve the dredging of the western arm and central area of the Lagoon. Based on sampling performed for the Lagoon sediments, sediments excavated from the Lagoon may be potentially impacted. The implementation of Mitigation Measures HAZ-3 and HAZ-4 require preparation and implementation of a Health and Safety Plan and Soil Management Plan. These measures would ensure that impacts from hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school would be considered less than significant.

As discussed above, the first phase of the proposed project will also include the removal of the north parking lot and the creation of an East 6th Street access road. Proposed grading activities are anticipated as part of the proposed project and may require the removal or relocation of existing PCB-containing transformers. During the proposed project activities, all soil surrounding existing transformers should be sampled prior to disturbance. Mitigation Measure HAZ-2 will ensure that impacts from hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school would be considered less than significant.

As previously discussed, the proposed project plans to demolish the existing restroom located on the north shore of the Lagoon. Due to the age of the existing restroom structure, there is a potential for LBP and/or PCBs to be present within the structure. With the implementation of Mitigation Measure HAZ-1, requiring predemolition surveys, potential impacts from hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school would be considered less than significant.

Marina Vista Park. The second phase of the project will include the demolition and replacement of existing restrooms in Marina Vista Park and Marine Stadium. Due to the age of the existing restroom structures, there is potential for LBP and/or PCBs to be present within the structures. With the implementation of predemolition surveys as discussed in Mitigation Measure HAZ-1, the potential impacts from hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mi of an existing or proposed school would be considered less than significant.

Mitigation Measures

The following mitigation measures have been identified to reduce or eliminate the identified potential construction impacts resulting from the proposed project:

HAZ-1 **Pre-Demolition Surveys:** Prior to issuance of any demolition, grading, or street work permits for the project, a pre-demolition survey for polychlorinated biphenyls (PCBs) and lead-based paints (LBPs) will be performed. All inspections, surveys, and analyses shall be performed by appropriately licensed and qualified individuals in accordance with applicable regulations (e.g., ASTM E 1527-00, and 40 CFR, Subchapter R, Toxic Substances Control Act [TSCA], Part 716). All identified PCBs and LBPs shall be removed, handled, and properly disposed of by appropriately licensed contractors

according to all applicable regulations during demolition of structures (40 CFR, Subchapter R, TSCA, Parts 745, 761, 763). Air monitoring shall be completed by appropriately licensed and qualified individuals in accordance with applicable regulations both to ensure adherence to applicable regulations and to provide safety to workers and the adjacent community (e.g., South Coast Air Quality Management District [SCAQMD]). The City of Long Beach Public Works Department shall provide documentation (including all required waste manifests, sampling and air monitoring analytical results, etc.) to the Department of Human and Health Services that abatement of any LBPs has been completed in full compliance with all applicable regulations and approved by the appropriate regulatory agency(ies) (40 CFR, Subchapter R, TSCA, Parts 716, 745, 761, 763, 795).

HAZ-2 The City of Long Beach or their designated consultant will ensure that all utility pole-mounted transformers or pad mounted transformers within the project area will be inspected for leaks prior to disturbance or removal. Leaking transformers should be considered a potential for PCB hazard, unless tested, and should be handled accordingly.

HAZ-3 **Health and Safety Plan:** Prior to issuance of any demolition, grading, or street work permits for the project, a Health and Safety Plan shall be prepared by the designated contractor and reviewed by the City of Long Beach or their designated consultant to ensure that all workers are in compliance with federal, State, and local regulations during construction. The Health and Safety Plan shall include:

- A summary of all potential risks to construction workers, monitoring programs, maximum exposure limits for all site chemicals, and emergency procedures.
- The identification of a Site Health and Safety Officer.
- Methods of contact and the phone number, office location, and responsibilities of the Site Health and Safety Officer.
- Specification that the Site Health and Safety Officer shall be contacted immediately by the contractor should any potentially toxic chemical, other than the chemicals already disclosed, be detected above the exposure limits or if evidence of undocumented soil contamination is encountered during site preparation and construction.
- Any potentially contaminated groundwater encountered during construction activities must be properly characterized and removed in accordance to all applicable State and federal policies.

The Health and Safety Plan is to be provided to all contractors on the project site. The Health and Safety Plan is required to be amended as needed if different site conditions are encountered by the Site Health and Safety Officer.

HAZ-4 **Soil Management Plan:** The Office of Environmental Health Hazard Assessment (OEHHA) shall review the removal workplan and shall list any additional requirements. Implementation of the workplan shall be overseen by the OEHHA for compliance with local, State, and federal regulations. Any additional sampling or contaminant material

removal shall be subject to these same regulations. As part of the soil management plan, all disposal material will be characterized prior to disposal at a State landfill site. All hazardous waste will be disposed of in a Class I landfill. All other soils or solid waste will be disposed of at an unclassified landfill. In addition, during construction activities of the potentially impacted soils on site, monitoring will be required by the SCAQMD. This on-site monitoring will be performed in conformance with the SCAQMD Site Specific Rule 1166 Permit obtained by the City of Long Beach prior to commencement of grading activities. Typically a field instrument such as an organic vapor analyzer (OVA) will be used to record the concentrations of volatile organic compounds (VOCs) detected in potentially impacted soils while these soils are being excavated and/or treated on site. A daily log of the OVA readings, in addition to a copy of the Site-Specific Rule 1166 Permit, will be kept on site by the construction team for the duration of the work performed with these potentially impacted soils.

The Site Health and Safety Officer shall contact the City of Long Beach if evidence of potential soil contamination is encountered during site preparation, demolition, or construction activities. Evidence of potential soil contamination may include discolored soils, soils that behave differently when compacted, and/or soils with an odor.

After inspection by personnel from the City of Long Beach, these potentially impacted soils may be segregated. Soil samples collected and submitted for appropriate analyses and the soils may either be transported off site for appropriate disposal or may be treated on site with appropriate regulatory agency oversight.

If excavation of potentially impacted soils is necessary, the excavated sediments/soil will be passed through a sieve to ensure that debris 4-inches circumference and greater is removed form the material. During the sieving process a mixture of Simple Green and water (10:1) will be lightly applied to the excavated sediments/soils. The excavated sediments/soils will be evenly spread to facilitate the efforts of workers as they manually pick through the material to remove any debris 4-inches circumference and greater that managed to pass through the sieve. Upon completion of debris removal this material will be stockpiled and covered with plastic sheeting to comply with the Rule 1166 permit, if warranted, i.e., if the volatile organic compound (VOC) monitoring of the excavation, sieving process and stockpiles exceeds 50 milligrams per kilogram (mg/kg).

4.6.7 CUMULATIVE IMPACTS

The assessment of potential cumulative impacts with regard to hazards and hazardous materials relates to the possibility for impacts to occur off site in combination with on-site activities. The hazardous materials study area considered for cumulative impacts consisted of: (1) the area that could be affected by proposed project activities, and (2) the areas affected by other projects whose activities could directly or indirectly affect the presence or fate of hazardous materials on the proposed project site. In general, only projects occurring adjacent to or very close to the project site are considered due to the limited potential impact area associated with the release of hazardous materials into the environment.

The Termino Avenue Drain Project (TADP), which is described in Section 4.8.7, is the only one of the five related projects that is located adjacent to the proposed project. The Los Angeles County Department of Public Works is proposing to replace and reroute the Termino Avenue Drain that currently drains into the Lagoon. The project would extend and reroute the drain to empty into Marine Stadium, bypassing the Lagoon. This project would also redirect flows from three other local storm drains located on the south shore of the Lagoon that currently discharge into the Lagoon. TADP construction that would occur adjacent to the Lagoon project area would occur along East Appian Way, which is adjacent to the south shore of the Lagoon.

The existing sediments within the western arm of the Lagoon have been characterized as hazardous for disposal at a State-certified landfill. Due to elevated levels of lead, contaminated sediments will be removed as a part of the proposed project. This is considered only a temporary condition that is subject to regulatory oversight. Once the project site is considered "clean" by the United States Army Corps of Engineers, project operation would involve the use and storage of hazardous materials typical to public facility maintenance operations and would not present a significant hazard to the environment with regulatory compliance procedures in place.

Hazardous waste releases associated with the construction activities for the proposed project and the TADP would not result in cumulatively significant effects with compliance with the standard measures listed above that include, but are not limited to, provisions stated within the General Construction Permit referenced in Section 4.7 of this EIR, Rule 403, the SCAQMD *Air Quality Handbook*, and the General Construction Permit issued by the LARWQCB. Implementation of the standard measures included within this section of the EIR will ensure that there will be no significant hazardous waste impacts to the environment as a result of construction activities of the proposed project. In addition, local police and fire departments are trained in emergency response procedures for safely responding to accidental spills of hazardous substances on public roads, further reducing potential impacts. Therefore, cumulative impacts related to hazards and hazardous wastes would be considered less than significant.

Analysis indicates:

- The sediment removal and disposal activities related to implementation of the proposed project entail only impacts to the project site and properties immediately downwind. Compliance with regulatory procedures outlined in Mitigation Measure HAZ-4 and standard measures outlined in Rule 403, the SCAQMD *Air Quality Handbook*, and the General Construction Permit issued by the LARWQCB, and *Waste Discharge Requirement for Discharges of Groundwater from Construction and Project Dewatering to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties*, will result in any potential impact being controlled and confined to the immediate site.
- There are no other known projects near the site with activities that affect the hazardous materials on site.
- Transport of hazardous materials is subject to strict regulations, and local agencies are trained in emergency response procedures. Therefore, the temporary transport of lead-impacted sediments to a designated disposal facility does not present a significant cumulative hazard.

Other properties within the City of Long Beach with known hazardous waste contamination are required to remediate their contamination in accordance with federal and State regulations. Since the proposed project does not include uses that would generate or use substantial amounts of hazardous waste, and since construction activities or site operation would not cause additional short-term or long-term health risks (after implementation of the standard measures and mitigation identified in this section), the project does not contribute to potential cumulative impacts from hazards and hazardous materials. Therefore, cumulative health and safety hazard impacts are considered less than significant.

4.6.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of the standard measures provided within this section of the EIR, and Mitigation Measures HAZ-1 through HAZ-4, would reduce potentially significant hazards and hazardous material impacts that may result from the proposed project to a less than significant level. Therefore, no significant and unavoidable impacts related to hazards and hazardous materials would result from implementation of the proposed project.