3.8 Hydrology and Water Quality

3.8.1 Introduction

This section evaluates the potential for the proposed project to result in adverse impacts related to hydrology and water quality environmental impacts surface water and groundwater quality, stormwater drainage, and flooding. The analysis is based on review of available hydrology and water quality reports of the project area and vicinity, including site-specific investigations conducted for each of the four individual sites that comprise the proposed project site, the relevant statutes and regulations, and a discussion of the methodology and thresholds used to determine whether the proposed project would result in significant impacts. This section identifies the potential for both project-level and cumulative environmental impacts. Potential impacts to biological resources from water quality impacts are discussed in Section 3.3, *Biological Resources*. Potential water quality impacts associated with hazardous materials are discussed in Section 3.7, *Hazards and Hazardous Materials*. Potential impacts relative to water supply are discussed in Section 3.17, *Utilities and Service Systems*.

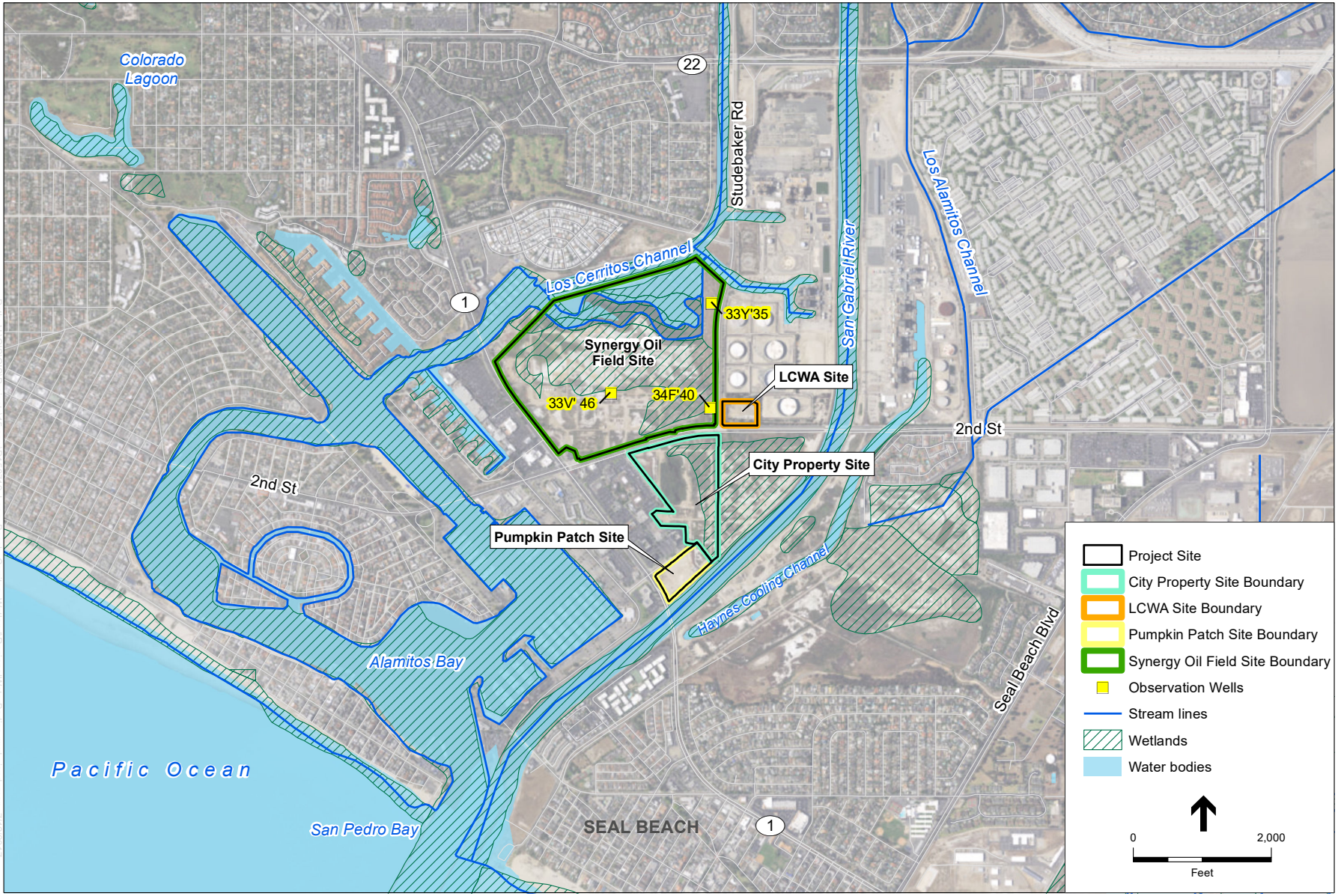
Data used in this section includes information obtained from the State Water Resources Control Board (SWRCB), the California Department of Water Resources (DWR), the Los Angeles Regional Water Quality Control Board (LARWQCB), the Federal Emergency Management Agency (FEMA), and the City of Long Beach. Related plans and policies are discussed, including the *Water Quality Control Plan, Los Angeles Region* (Basin Plan). In addition, technical studies including the *City of Long Beach Preliminary Drainage Study for Pumpkin Patch Site, LCWA Site, and Synergy Visitors Center* (Wilson Mikami 2016 [Appendix G1]); *Low Impact Development Plan* (Wilson Mikami 2017a [Appendix G2]); *Updated Sea Level Impact Analyses* (Moffatt and Nichol 2017 [Appendix G3]); and *First Semiannual Groundwater Monitoring Report, October 2016 to April 2017, Pumpkin Patch—Inactive Landfill Post-Closure Maintenance Monitoring and Reporting Program No. CI-2767 (File No. 60-089)* (AEC 2017 [Appendix G4]) were used during the preparation of this section. All information sources used are included as citations within the text; sources are listed in Section 3.8.5, References.

3.8.2 Environmental Setting

3.8.2.1 Regional Hydrology

The four individual sites (Synergy Oil Field, City Property, Pumpkin Patch, and Los Cerritos Wetlands Authority [LCWA] sites) are located in the 640-square-mile San Gabriel River Watershed, which is bounded by the San Gabriel Mountains to the north, most of San Bernardino/Orange County to the east, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south (LADPW 2017). The watershed drains to the San Gabriel River, which is fed by numerous tributaries and storm drains as it passes through 19 cities from its origin in the San Gabriel Mountains to its outlet at the Pacific Ocean.

The four individual sites are located near the San Gabriel River's outlet to the Pacific Ocean. The river flows southwest adjacent to the City Property and Pumpkin Patch sites. The Los Cerritos Channel runs southwest along the northern side of the Synergy Oil Field site and discharges into a portion of Alamitos Bay referred to as the Marine Stadium. Alamitos Bay is connected to the Pacific Ocean. A tidal channel referred to as Steamshovel Slough is fed by the Los Cerritos Channel and extends across the Synergy Site. The LCWA is not adjacent to any surface water bodies. **Figure 3.8-1, Regional Water Bodies**, shows waterbodies near the four individual sites.



SOURCE: ESRI; US Fish and Wildlife Service; USGS 2016

Long Beach Cerritos Wetland. 150712

Figure 3.8-1

Regional Water Bodies

3.8.2.2 Local Hydrology

Synergy Oil Field Site

As described in Chapter 2, *Project Description*, and depicted in Figure 2-4, Synergy Oil Field Site, the Synergy Oil Field site is divided between the southern active oil field and the northern remnant tidal marsh that includes an area of tidally influenced southern coastal salt marsh, tidal channels, mud flats, and the Steamshovel Slough. The Steamshovel Slough, separated from the oil operations areas by an earthen berm and varying expanses of open space, is considered a historic or "ancient" marsh in that it has not been modified through dredging or filling. Surface water in the northern area drains into the Steamshovel Slough or the Los Cerritos Channel, both of which are tidally influenced and drain west to Alamitos Bay.

A tide gate and series of pipes allow tidal water into limited western portions of the oil field area in the south, in order to restrict the tidal influence from interfering with oil operations. Much of the central portion of the site contains oil facilities and is not subject to tidal influence, but supports some salt marsh habitat and/or areas with non-native plant species. The southern portion of the site lacks tidal influence and contains the highest concentration of oil facilities including pipelines, tank farms, and numerous pads and roads.

The active oil field area in the center and south portion of the Synergy Oil Field site drains from west to east toward the existing access road to Studebaker Road. This portion of the site is very flat with a 0.2 percent slope, contains a few low points along the flow path toward the access road, and does not receive off-site run-on (Wilson Mikami 2016).

City Property Site

The City Property site drains from northeast to southwest towards an existing developed parcel. The site slopes down from its elevation in the northwest at 13 feet to roughly 6 feet on the remainder of the site. Although the southernmost border of this site is adjacent to the San Gabriel River, the site has no surface water features and does not drain to the river.

Pumpkin Patch Site

The Pumpkin Patch site drains from south to north and toward Studebaker Road; the site is relatively flat with a 1 percent slope and contains a defined flow path toward Studebaker Road (Wilson Mikami 2016, 2017a). Although the site is adjacent to the San Gabriel River to the southeast, the site has no surface water features and does not drain to the river. There are no impervious surfaces on the Pumpkin Patch site and the site does not receive off-site run-on.

LCWA Site

The LCWA site drains from east to west and toward an existing asphalt access road; portions of the on-site flow also sheet flow toward Studebaker Road and Westminster Avenue (Wilson Mikami 2016, 2017a). The LCWA site has no surface water features, is very flat with a slope of 0.4 percent, and contains a few low points along the flow path toward the access road. There are no impervious surfaces on the LCWA site and the site does not receive off-site run-on.

3.8.2.3 Surface Water Quality

Given its proximity to the Pacific Ocean through Alamitos Bay and the known tidal influence, the surface water quality in the wetlands area is saline to brackish. One surface water sample was collected from within the wetlands area between Steamshovel Slough and the Los Cerritos Channel on June 6, 2005 (CEDEN 2005). The surface water sample was analyzed for general anions (chloride, nitrate, nitrite, phosphate, sulfate), salinity, dissolved oxygen, metals (aluminum, cadmium, arsenic, chromium, copper, lead, mercury, manganese, nickel, selenium, silver, and zinc), pesticides (DDT, chlordane, and others), polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs). Pesticides, PCBs, and VOCs were not detected above reporting limits. The concentrations of chemical constituents detected above reporting limits are summarized on **Table 3.8-1, Summary of Surface Water Chemistry Results above Reporting Limits**, along with a comparison to maximum contaminant levels (MCLs) and total maximum daily loads (TMDLs) discussed further below.[67]

Table 3.8-1 Summary of Surface Water Chemistry Results above Reporting Limits

Chemical Parameter	Concentration	Units	MCL[a]	Los Cerritos Channel TMDL[b]
Metals				
Aluminum	0.00177	mg/L	0.2	nl
Arsenic	0.00068	mg/L	0.010	nl
Cadmium	0.00007	mg/L	0.005	nl
Copper	0.0033	mg/L	1	0.0039
Lead	0.00031	mg/L	0.015	0.0151
Manganese	0.00903	mg/L	0.05	nl
Mercury	0.00000052	mg/L	0.002	nl
Zinc	0.00197	mg/L	5	0.386
General Minerals				
Chloride	20,900	mg/L	250	nl
Nitrite as Nitrogen	0.0131	mg/L	1	nl
Total Kjeldahl Nitrogen	0.73	mg/L	ne	nl
Orthophosphate as Phosphorous	0.0284	mg/L	ne	nl
Dissolved Oxygen	12.82	mg/L	ne	nl
pH	8.49	pH units	ne	nl
Phosphorous	0.095	mg/L	ne	nl
Salinity	35,030	mg/L	ne	nl
Sulfate	2,720	mg/L	250	nl

SOURCE: CEDEN, 2005.
NOTES:
mg/L = milligrams per liter or parts per million;
ne = not established;
nl = not listed; the Los Cerritos Channel is not impaired for this chemical
a. Maximum contaminant levels, also known as drinking water standards; lists the lowest of the primary, secondary, or recommended MCLs.
b. Total maximum daily load listed in USEPA 2010.

[67] Maximum contaminant levels are drinking water standards set by federal or state law. Total maximum daily loads (TMDLs) is a regulatory term in the U.S. Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

Chloride and sulfate were detected at 20,900 and 2,720 milligrams per liter (mg/L), respectively, consistent with the typical seawater concentrations of 19,000 and 2,700 mg/L, respectively. The somewhat restricted flow of water in the wetlands likely causes some increase in concentrations due to evaporation. Based on these analytical results, the water quality of surface water in the wetlands area in and north of Steamshovel Slough is similar to seawater.

Within the Los Angeles Region, the LARWQCB has jurisdiction over all coastal drainages flowing to the Pacific Ocean. The Los Cerritos Channel, adjacent to the north side of the Synergy Oil Field site, has been identified by the LARWQCB as a Water Quality Limited Segment[68] due to ammonia, bis(2ethylhexyl)phthalate, chlordane (in sediment), coliform bacteria, copper, lead, trash, and zinc (LARWQCB 2016).

In response to the listing of the Los Cerritos Channel as a Water Quality Limited Segment, the LARWQCB has developed narrative TMDL actions to reduce the contaminant loading and specific numeric TMDLs as well as numeric water quality goals for copper, lead, and zinc. Since numeric goals have not been developed for the other constituents, those constituents without numeric TMDLs are compared to drinking water standards (more formally referred to as MCLs). Although MCLs are action levels for the water quality of drinking water and would not be applicable to a wetland habitat setting, concentrations below MCLs support that the given constituent is not present at concentrations that would be of ecological concern. All of the reported concentrations are below TMDLs and MCLs, indicating no water quality issues for these constituents.

3.8.2.4 Groundwater

Basins

The four individual sites are located within the Coastal Plain of Los Angeles Groundwater Basin, which is further subdivided into subbasins (USBR 2014). The four individual sites straddle the West Coast Subbasin, referred to as the West Coast Basin, and the Central Subbasin, referred to as the Central Basin. The border between basins is formed by the Newport Inglewood Fault Zone, shown on Figure 3.5-2, Newport-Inglewood Fault Zone. The Central Basin includes the entire LCWA site and the northeast portions of the Synergy Oil Field and City Property sites. The West Coast Basin includes the entire Pumpkin Patch site and the southwest portions of the Synergy Oil Field and City Property sites.

Groundwater enters the basins through surface and subsurface flow and by direct percolation of precipitation, stream flow, and applied water. Because of overdrafting (pumping exceeds recharge) of both basins, both basins have been adjudicated and groundwater use within the basins is managed by watermasters (USBR 2014; WRD 2017a, 2017b). When multiple parties withdraw water from the same aquifer, the aquifer may become overdrafted resulting in water supply conflicts among the users. Through adjudication, the courts assign specific water rights to specific water users and compel the cooperation of those who might otherwise refuse to limit their pumping of groundwater. Watermasters are appointed by the court to ensure that pumping conforms to the limits defined by the adjudication.

[68] Water Quality Limited Segments defined in the Clean Water Act as water bodies that do not meet water quality standards even after discharges of wastes from point sources have been treated by the minimum required levels of pollution control technology

Seawater Intrusion

Because of seawater intrusion along the coast, the County of Los Angeles Department of Public Works (LADPW) operates the Alamitos Barrier Project, located about 2 miles inland from the terminus of the San Gabriel River and 4,000 feet north, northeast, and east of the Synergy Oil Field site (OCWD 2013; LADPW 2014b). This is a system of injection wells that create a freshwater barrier in subsurface aquifers to prevent seawater from intruding further inland and degrading water quality in inland supply wells. In addition, the LACDPW monitors water levels and chloride concentrations in a number of wells. The four individual sites are all located on the ocean side of the barrier are thus within a seawater-intruded area, as discussed below.

Groundwater Levels and Water Quality

Synergy Oil Field and LCWA Sites

The Alamitos Barrier Project monitors three wells at the locations shown on Figure 3.8-1 within or adjacent to the Synergy Oil Field site (LADPW 2014b). Well 33Y’35 is located along Studebaker Road next to the wetlands north of Steamshovel Slough; Well 34F’40 is located along Studebaker Road and across from the LCWA site; Well 33V’46 is located in the center of the Synergy Oil Field site just northeast of the Newport-Inglewood Fault Zone. For the March through June 2014 monitoring events for shallow groundwater, groundwater elevations ranged from 3.2 to -3.0 feet relative to mean sea level (msl). As previously discussed, tidal influence affects groundwater levels. Chloride concentrations ranged from 22,400 mg/L at Well 33Y’35 to 5,120 mg/L at Well 33V’46. This indicates that shallow groundwater (as well as surface water) in the Steamshovel Slough and existing wetlands area is saline; chloride concentrations in seawater are typically about 19,000 mg/L. Salinity deceases in groundwater further away from the Steamshovel Slough and the wetlands but is still brackish; the secondary drinking water standard for chloride is 250 mg/L.

Soil and groundwater conditions were investigated for the LCWA site in 2004 (see Section 3.7, *Hazards and Hazardous Materials*) (AEC 2016b [Appendix F4]). The investigation indicated the depth to groundwater ranged from 12 to 15 feet on March 16, 2004. Grab groundwater samples were collected from four soil borings and analyzed for VOCs and semivolatile organic compounds (SVOCs). No VOCs or SVOCs were detected.

City Property Site

Groundwater beneath the City Property site is not known to have been monitored for depth or sampled for water quality. Given the location between the Synergy Oil Field, Pumpkin Patch, and LCWA sites, groundwater is expected to be brackish and at relatively shallow depths.

Pumpkin Patch Site

Soil and groundwater conditions at the Pumpkin Patch site were investigated in July 2016 due to the presence of a buried landfill (see Section 3.7, *Hazards and Hazardous Materials*). The investigation indicated the depth to groundwater ranged from 12.18 to 15.65 feet; groundwater elevations ranged from 1.61 to 3.74 feet NAVD88 (AEC 2016c, 2017). The investigation concluded that groundwater depths and elevations vary with tidal influence.

Groundwater samples from Wells AEC-1 and AEC-2 have consistently had a black discoloration and strong hydrogen sulfide odor most likely caused from the decomposition of the buried landfill waste. Groundwater samples were analyzed for total petroleum hydrocarbons (TPH; gasoline, diesel, motor oil range compounds); VOCs; Title 22 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead,

mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc); polynuclear aromatic hydrocarbons (PAHs, also abbreviated as PNAs); PCBs; and general water quality parameters of chloride, sulfate, and total dissolved solids (TDS). The February 2017 groundwater analytical results identified numerous detections of TPH as gasoline, diesel, and oil, along with various VOCs and PCBs with most detections in Wells AEC-1 and AEC-2, located near the landfill. The results from Well AEC-1 exceeded industrial land use environmental screening levels (ESLs) or MCLs for gasoline and diesel, the VOCs 1,4-dichlorobenzene, benzene, ethylbenzene, naphthalene, styrene, and tertiary butyl alcohol (TBA; a gasoline additive). Wells AEC-5 and EW-1[69] did not exhibit any TPH, VOC, SVOC, and/or PCB detections. Analytical results from Wells AEC-3 and AEC-4 exhibited trace to non-detectable concentrations of TPH and VOCs; non-detectable concentrations of SVOC; and no detection of PCBs. The chloride, sulfate, and TDS concentrations from all groundwater wells exceeded their respective Secondary MCLs of 250 mg/L, 250 mg/L, and 50 mg/L. Although located on the Pumpkin Patch site, Well EW-1 is located in the far southern corner of the site, away from the landfill materials and close to the San Gabriel River. The chloride concentration was 4,000 mg/L, indicting groundwater is brackish; the secondary drinking water standard is 250 mg/L.

3.8.2.5 Flooding

The FEMA identifies flood hazard areas on flood insurance rate maps, which delineate flood hazard areas, including areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in a given year; 1-percent annual chance flood is also referred to as the 100-year flood. The extent of the 100-year flood zone in the project area is shown on **Figure 3.8-2, 100-Year Flood Zones** (FEMA 2008). Steamshovel Slough is located within the 100-year flood zone. None of the other areas of the four individual sites are located within the 100-year flood zone. In addition, the project area is not located within a dam inundation area.

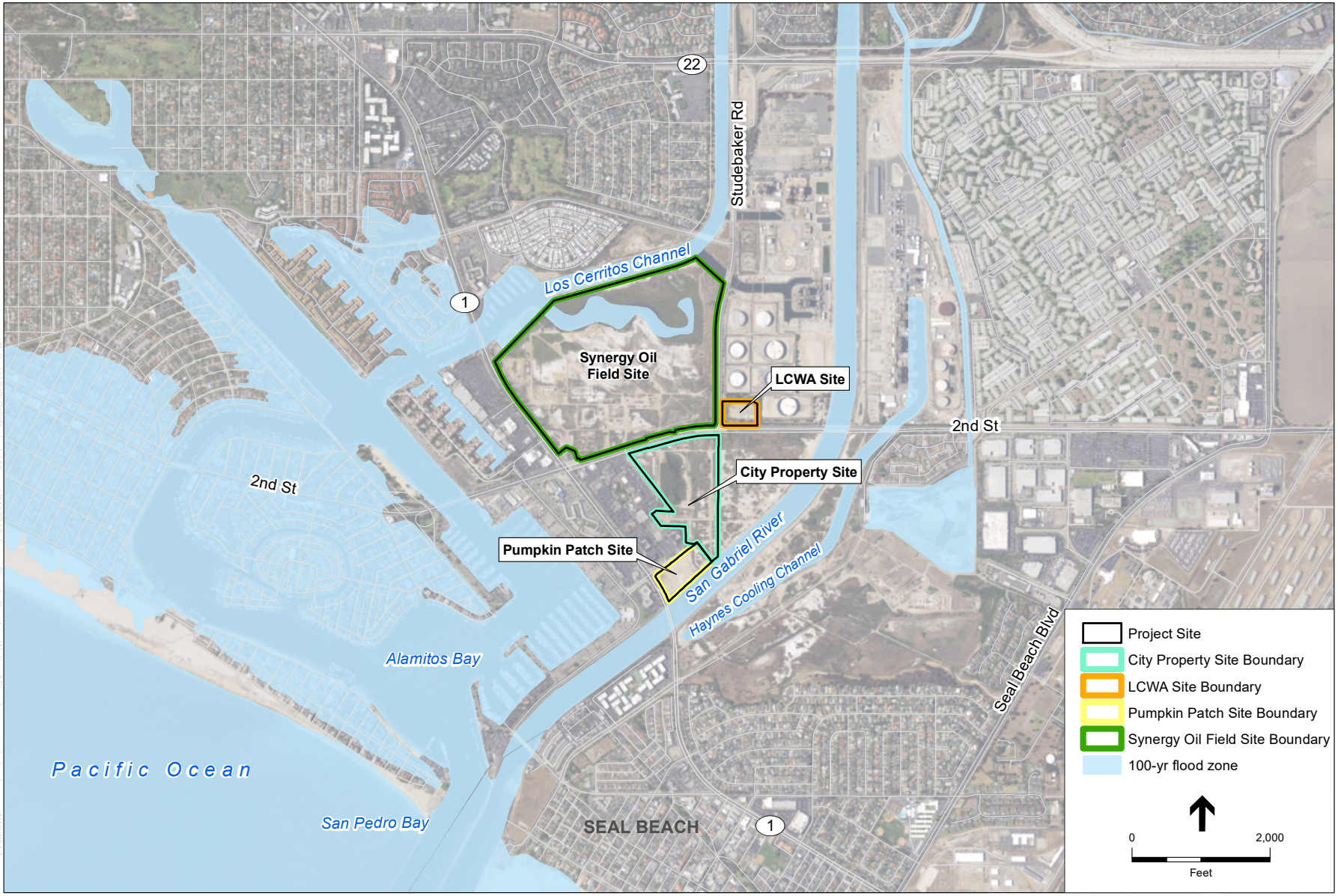
3.8.2.6 Tsunami, Seiche, and Mudflow

A tsunami is a series of ocean waves generated by sudden displacements in the sea floor, landslides, or volcanic activity (NOAA 2016). The four individual sites would be located within a tsunami inundation zone, meaning the sites could be inundated in an extreme yet realistic tsunami event (Cal EMA 2009). The Synergy Oil Field and the City Property sites contain some wetland habitat, which provides some protection from tsunamis and tidal surges (CMS 2017).

A seiche is a standing wave in an oscillating large body of water that can be caused by strong winds, tsunamis or seismic events (NOAA 2015). Since it is not completely enclosed, the Long Beach Marina located south of the four individual sites does not likely have seiche-generating potential; there are no large enclosed bodies of water adjacent to the project site.

Mudflows are rivers of liquid mud on the surface of normally dry land, and are typically caused by a combination of brush loss and subsequent heavy rains (FEMA 2016). The project site is relatively wet and is thus not prone to mudflows.

[69] Well EW-1 has been an existing well on site since 1987.



SOURCE: ESRI; US Fish and Wildlife Service 2016

Long Beach Cerritos Wetland. 150712

Figure 3.8-2

100-Year Flood Zones

3.8.3 Regulatory Framework

The project shall be required to be in compliance with the following laws, statutes, regulations, codes, and policies, which are defined as standard conditions for the project.

3.8.3.1 Federal

Clean Water Act

The Clean Water Act (CWA), also known as the Federal Water Pollution Control Act as amended by the Federal Water Pollution Control Act Amendments of 1972, (33 USC 1251–1376) is the major federal legislation governing water quality. The CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gave the U.S. Environmental Protection Agency (USEPA) the authority to implement pollution control programs, such as setting wastewater standards for industry. The CWA sets water quality standards for all contaminants in surface waters. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The U.S. Army Corps of Engineers (USACE) has jurisdiction over all waters of the U.S. including, but not limited to, perennial and intermittent streams, lakes, and ponds, as well as wetlands in marshes, wet meadows, and side hill seeps. The CWA states that the discharge of pollutants to waters of the United States from any point source is unlawful, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Amendments to the CWA established a framework for regulating municipal and industrial stormwater discharges under the NPDES program. In addition, the USEPA published final regulations that establish application requirements for stormwater permits in 1990.

The relevant sections of the CWA are summarized below.

Clean Water Act Section 401

Federal CWA Section 401 requires that any person applying for a federal permit or license that may result in the discharges of dredged or fill material or pollutants (including sediment) into waters of the United States must obtain a state certification that the activity complies with all applicable water quality standards, limitations, and restrictions. In California, this certification is administered in California by the SWRCB via the local RWQCB. No license or permit may be granted by a federal agency until certification required by Section 401 has been granted. Further, no license or permit may be issued if certification has been denied. An entity seeking a Section 401 water quality certification typically must obtain a CWA Section 404 permit from USACE. This certification ensures that the proposed activity does not violate state or federal water quality standards.

Clean Water Act Section 402

CWA Section 402 regulates discharges to surface waters of the United States through the NPDES program. In California, the USEPA authorizes the SWRCB to oversee the NPDES program through the local RWQCB. Stormwater discharges are also regulated under CWA Section 402. Construction activities disturbing 1 acre of land or greater must be covered under the NPDES Construction General Permit, discussed in Section 3.5.3, Regulatory Framework, of Section 3.5, *Geology, Seismicity, and Soils*, which requires the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) for construction activities that includes erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local plans, control of post-construction sediment, and maintenance responsibilities.

Clean Water Act Section 303—Water Quality Criteria and Standards

Under federal law, the USEPA has published water quality regulations under 40 CFR. CWA Section 303 requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: identified designated beneficial uses of the water body in question and criteria that protect the designated uses. Where multiple uses of a water body exist, water quality standards must protect the most sensitive use. In California, the USEPA has granted SWRCB and its local RWQCBs the authority to identify beneficial uses and adopt applicable water quality objectives.

Clean Water Act Section 303(d)

CWA Section 303(d) requires that each state identify water bodies or segments of water bodies that are "impaired" (i.e., do not meet one or more of the water quality standards established by the state). These waters are identified in the Section 303(d) list as waters that are polluted and need further attention to support their beneficial uses. Once the water body or segment is listed, the state is required to establish TMDLs for the pollutant.

A TMDL is a pollution budget, includes a calculation of the maximum amount of a pollutant that can occur in a waterbody, and allocates the necessary reductions to one or more pollutant sources. A TMDL serves as a planning tool and potential starting point for restoration or protection activities with the ultimate goal of attaining or maintaining water quality standards. Under CWA Section 303(d), states are required to submit lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet water quality standards. The law requires that the states establish priority rankings for waters on the lists and develop TMDLs for these waters. TMDLs can be narrative actions to reduce loading or numeric goals such as an amount of mercury in fish tissue, concentrations in water, or concentrations in sediment.

As of 2016, the Los Cerritos Channel is listed as a Water Quality Limited Segment for ammonia, bis(2ethylhexyl)phthalate, indicator bacteria (coliform), copper, lead, zinc, trash, and pH (LARWQCB 2016). In addition to narrative actions to reduce the pollutant loading, the LARWQCB has developed and the USEPA has accepted the following numeric TMDLs for the channel (USEPA 2010):

- Copper = 0.0039 mg/L;
- Lead = 0.0151 mg/L; and
- Zinc = 0.386 mg/L.

Clean Water Act Section 404

CWA Section 404 requires that any person conducting any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands, obtain a permit. USACE is responsible for issuing permits for the placement of fill or discharge of material into waters of the United States required under CWA Sections 401 and 404. Projects that involve construction in streams or wetlands trigger the need for these permits and related environmental reviews by USACE. Wetlands are generally considered to be areas that are periodically or permanently inundated by surface water or groundwater, and support vegetation adapted to life in saturated soil. Wetlands are recognized as important features on a regional and national level due to their high inherent value to fish and wildlife, use as storage areas for storm and floodwaters, and water recharge, filtration, and purification functions. Technical standards for delineating wetlands have been developed by the USACE, which generally defines wetlands through consideration of three criteria: hydrology, soils and vegetation. Under CWA Section 404, the ACOE is responsible for regulating the discharge of dredged or fill material into waters of

the United States. The term "waters of the United States" includes wetlands and non-wetland bodies of water that meet specific criteria as defined in the Code of Federal Regulations.

National Flood Insurance Program

The National Flood Insurance Program was created to reduce the impact of flooding private and public structures by providing affordable property insurance and encouraging communities to implement floodplain management regulations. FEMA implements NFIP and identifies flood hazard areas on flood insurance rate maps. FEMA requires minimum design standards are implemented in flood hazard areas.

National Weather Service TsunamiReady Communities

The National Weather Service established guidelines to be followed to ensure an area is prepared in the event of a tsunami. These guidelines are referred to as "TsunamiReady" Guidelines, and include mitigation, preparation and response guidelines. Examples of mitigation guidelines include designating and mapping tsunami hazard zones and installing signage identifying tsunami hazard zones and instructions to go to higher ground. Preparation guidelines include conducting public education and outreach efforts regarding tsunamis. Response guidelines include addressing tsunami hazards in emergency plans, having a reliable means for a 24-hour warning point to disseminate warnings to the public, and using weather receivers in critical facilities and public venues (NWS 2016). The County of Los Angeles is not yet considered a TsunamiReady community (NWS 2017). As of 2014, the County of Los Angeles was actively pursuing a TsunamiReady designation and working with cities and unincorporated communities to post tsunami signs in populated areas (County of Los Angeles 2014). Pacific Coast Highway is identified as a primary disaster route and runs adjacent to the western boundary of the Synergy Site (LADPW 2013); this roadway is designated for use in the event of an emergency to transport emergency personnel and supplies.

3.8.3.2 State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code Sections 13000–16104) (Porter-Cologne Act) provides the basis for water quality regulation within California and defines water quality objectives as the limits or levels of water constituents that are established for reasonable protection of beneficial uses. The SWRCB administers water rights, water pollution control, and water quality functions throughout the State, while the local water boards (in this case, LARWQCB) conducts planning, permitting, and enforcement activities. The Porter-Cologne Act requires the LARWQCB to establish water quality objectives, while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Beneficial uses, together with the corresponding water quality objectives, are defined as standards, per federal regulations. Therefore, the regional plans form the regulatory standards for meeting State and federal requirements for water quality control. Changes in water quality are only allowed if the change is consistent with the maximum beneficial use designated by the State, does not unreasonably affect the present or anticipated beneficial uses, and does not result in water quality less than that prescribed in the water quality control plans.

California Coastal Act

The California Coastal Act (CCA) establishes policies with respect to the review of new development projects by both State and local agencies. The CCA policies concerning hydrology and water quality are as follows:

> **Section 30230.** Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.
>
> **Section 30231.** The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.
>
> **Section 30232.** Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.
>
> **Section 30236.** Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (1) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the flood plain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.

In addition to these CCA policies, the Coastal Commission in August 2015 adopted a Sea Level Rise Policy Guidance document setting forth the means by which new development that may be subject to sea level rise should be analyzed (CCC 2015).

Senate Bill 610 (Water Code Sections 10910 et seq.)

Senate Bill 610 of 2001 (Water Code Sections 10910 et seq.) was promulgated to assist water suppliers, cities, and counties in integrating water and land use planning. In particular, the statute requires detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of specified large development projects in the form of a Water Supply Assessment. The statute applies to the following specified large development project types as cited in Water Code Section 10912:

- A proposed residential development of more than 500 dwelling units.
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
- A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
- A proposed hotel or motel, or both, having more than 500 rooms.
- A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
- A mixed-use project that includes one or more of the projects specified in this subdivision.

- A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling-unit project.

The proposed project does not include development of any of the above categories, nor does the project generate a water demand equal to or greater than the demand generated by a 500-dwelling unit project (i.e., approximately 125 acre-feet per year). Therefore, a water supply assessment is not required for the project.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) of 2014, effective January 1, 2015, gives local agencies the authority to manage groundwater in a sustainable manner and allows for limited state intervention when necessary to protect groundwater resources. The SGMA establishes a definition of sustainable groundwater management, establishes a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources, prioritizes basins with the greatest problems (ranked as high- and medium-priority) and sets a 20-year timeline for implementation. The initial basin prioritization under SGMA uses the prioritization conducted by the California Department of Water Resources (DWR) in 2014 under the California Statewide Groundwater Elevation Monitoring program. As previously noted, the Central Subbasin is ranked as high priority. SGMA requires the creation of a Groundwater Sustainability Agency that would develop and implement a Groundwater Sustainability Plan that would manage and use groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results, defined as follows:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply;
2. Significant and unreasonable reduction of groundwater storage;
3. Significant and unreasonable seawater intrusion;
4. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies;
5. Significant and unreasonable land subsidence that substantially interferes with surface land uses; or
6. Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

NPDES Construction General Permit

Construction associated with the proposed project would disturb more than 1 acre of land surface affecting the quality of stormwater discharges into waters of the U.S. The proposed project would, therefore, be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). The Construction General Permit, discussed in Section 3.5.3, Regulatory Framework, of Section 3.5, *Geology, Seismicity, and Soils*, requires the preparation and implementation of a SSWPPP for construction activities that includes erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local plans, control of post-construction sediment, and maintenance responsibilities.

Municipal Stormwater Permitting (MS4)

The State's Municipal Stormwater Permitting Program regulates stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s). MS4 Permits were issued in two phases. Phase I was initiated in 1990,

under which the RWQCBs adopted NPDES stormwater permits for medium (serving between 100,000 and 250,000 people) and large (serving more than 250,000 people) municipalities. The regional water quality control boards, including LARWQCB, have adopted an MS4 Permit specific to their region. As part of the Phase II of the MS4 Permit, the SWRCB adopted a General Permit for small MS4s (serving less than 100,000 people) and non-traditional small MS4s including governmental facilities such as military bases, public campuses, and hospital complexes. The Long Beach MS4 Permit is noted below but discussed in detail in Section 3.5.3.

3.8.3.3 Local[70]

Water Quality Control Plan for the Los Angeles Region (Basin Plan)

The Water Quality Control Plan for the Los Angeles Region (Basin Plan) is designed to preserve and enhance water quality and protect the beneficial uses of waters within the region. The Basin Plan (i) designates beneficial uses for surface and groundwater, (ii) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy, and (iii) describes implementation programs to protect all waters in the region. The Basin Plan incorporates pertinent water quality policies and regulations including applicable State and Regional Board plans and policies. The Basin Plan is a resource for the LARWQCB and others who use water and/or discharge wastewater in the Los Angeles Region. Other agencies and organizations involved in environmental permitting and resource management activities also use the Basin Plan. Finally, the Basin Plan provides valuable information to the public about local water quality issues. The Basin Plan is reviewed and updated as necessary. For the Los Cerritos Channel Watershed, the beneficial uses identified in the Basin Plan are listed below:

- Wetland Habitat (WET);
- Navigation (NAV);
- Commercial and Sport Fishing (COMM);
- Estuarine Habitat (EST);
- Estuarine Habitat (EST);
- Wildlife Habitat (WILD);
- Rare, Threatened, or Endangered Species (RARE);
- Migration of Aquatic Organisms (MIGR);
- Migration of Aquatic Organisms (MIGR);
- Shellfish Harvesting (SHELL);
- Water Contact Recreation (REC-1); and
- Non-contact Water Recreation (REC-2).

Wetland Beneficial Use Guidelines

Criteria for assessing sediment for wetland surface and foundation beneficial uses were first developed by the San Francisco Bay Regional Water Quality Control Board in the Draft Staff Report entitled *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines*, dated May 2000. The document was

[70] City regulatory requirements supersede County regulatory requirements where duplicative.

prepared to assist in planning beneficial reuse projects in the San Francisco Bay Area by establishing general screening guidelines and general sediment testing requirements, and included specific criteria for reuse of sediments in wetland and upland beneficial uses. Subsequent additional ambient sediment chemical and toxicity testing was performed along with a statistical analysis of the historical and more recent analytical data to develop a statically derived set of recommended sediment chemistry screening guidelines for beneficial reuse, as documented in *An Evaluation of Existing Sediment Screening Guidelines for Wetland Creation/Beneficial Reuse of Dredged Material in the San Francisco Bay Area along with a Proposed Approach for Alternative Guideline Development* prepared by Germano & Associates in 2004 and funded by the California State Coastal Conservancy. The subsequent recommended guidelines are based on predicting acute amphipod toxicity and, therefore, can be applied to sites outside of the San Francisco Bay area, as they are based on toxicity testing results rather than ambient concentrations in the Bay. The guidelines were applied to a restoration project at the Ballona Wetlands, located in a similar setting just north of Los Angeles International Airport (ESA 2015).

Long Beach MS4 Permit

The City of Long Beach is covered under the Long Beach MS4 Permit: Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach; Order No. R4-2014-0024 (LARWQCB 2014). The Long Beach MS4 Permit is discussed in detail in Section 3.5, *Geology, Seismicity, and Soils*. The MS4 Permit includes regulations that would apply to maintaining water quality.

Long Beach Storm Water Management Program

The City of Long Beach prepared and implemented a Storm Water Management Program, as required by the above-cited MS4 Permit. The Long Beach Storm Water Management Program is discussed in detail in in Section 3.5, *Geology, Seismicity, and Soils*. The Storm Water Management Program includes regulations that would apply to maintaining water quality.

Long Beach Low-Impact Development Manual

The City adopted low-impact development (LID) regulations for the purpose of encouraging the beneficial use of rainwater and urban runoff; reducing stormwater/urban runoff while improving water quality; reducing off-site runoff and providing increased groundwater recharge; reducing erosion and hydrologic impacts downstream; and enhancing the recreational and aesthetic values in our communities. The LID Manual is discussed in in Section 3.5, *Geology, Seismicity, and Soils*. The above-described Long Beach Storm Water Management Program requires that each project prepare and implement a project-specific LID Plan. The proposed project has prepared project-specific LID Plan (Wilson Mikami 2016b). The LID plan includes regulations that would apply to maintaining water quality.

Long Beach Municipal Code

The relevant portions of the Long Beach Municipal Code are discussed in Section 3.5.3 and include Chapter 8.96, Stormwater and Runoff Pollution Control, which reinforces the requirements of the CWA and the Porter-Cologne Act (including Construction General Permit requirements) within the City.

Southeast Area Development and Improvement Plan and Draft Southeast Area Specific Plan

Approved in 1977, the Southeast Area Development and Improvement Plan (SEADIP) was the first Planned Development district in the City of Long Beach. The SEADIP document was intended to guide land use and development in area that was experiencing a period of rapid growth and is identified as the zoning for the project site. The 1977 SEADIP included the following planning goals and objectives relevant to hydrology and water quality:

> **Goal 2. c):** Preservation, revitalization, and, if feasible, enlargement of the Cerritos wetlands as a wildlife reserve park.
>
> > **Environmental Objective: 3. b)** Enhance the natural environment, improving features that are renewable and preserving those that are unique.

The 1977 SEADIP also provided the following narrative environmental consideration:

> *"Protection of the Cerritos Wetlands was of primary consideration during the project planning. Area 33, which contains the marsh, is to be improved and enhanced so that it can serve its natural function and still serve the community by providing open space, visual quality, and peripheral trails. New wildlife habitats may also be established as a result of the projected improvement. In addition, protection of an endangered bird, the least tern, can result from these improvements."*

Subsequent revisions to SEADIP are provided in the SEADIP PD-1, which includes updates, revisions, and additions of the ordinance history through 2006. The additions through 2006 include narrative discussion of "The Wetlands" and "The Buffers," which would include the restoration area. Relative to hydrology and water quality, the narrative is largely permit-, process-, phasing-, and financially oriented.

In July 2016, the City of Long Beach circulated a draft of the Southeast Area Specific Plan (SEASP), which is intended to replace SEADIP as the applicable planning document for the project area, including re-designating land uses for the project site. Although the SEASP has not been adopted and is still in draft form, it is anticipated that the SEASP will be completed and issued in its final form within the lifetime of the proposed project and is discussed here for informational purposes. Portions of SEASP relevant to the proposed project are provided in Section 3.5.3 and include development standards for wetland buffers and storm drains that are also relevant to hydrology and water quality. In addition, the following objectives apply to sea level rise:

- Project the range of sea-level rise for the proposed project.
- Determine how impacts from sea-level rise may constrain the project site.
- Determine how the project may impact coastal resources, considering the influence of future sea-level rise on the landscape.

3.8.4 Analysis of Impacts

This section describes the impact analysis relating to hydrology and water quality for the proposed project. It describes the methods and applicable thresholds used to determine the impacts of the proposed project.

3.8.4.1 Significance Criteria

CEQA Guidelines Appendix G provides that a project would have a significant hydrology and water quality impact if it would:

- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planning uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off site;
- Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Place buildings, oil production infrastructure, workers, or the public within areas anticipated to be inundated due to sea level rise;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam;
- Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

It was determined in the NOP/IS (see Appendix A) that implementation of the proposed project would have no impact with regard to placing housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation maps because the proposed project does not propose the development of residential uses (Figure 3.8-2). Similarly, the proposed project would have no impact related to placement within a 100-year flood hazard area structures that would impede or redirect flood flows because, with the sole exception of Steamshovel Slough, the project site is not located within a 100-year floodplain as mapped by the Federal Emergency Management Agency. No structures would be placed within the slough. Therefore, these topics will not be discussed further in the EIR.

3.8.4.2 Methodology

General

This impact section assesses potential impacts related to hydrology and water quality based on the potential for the project to result in adverse impacts, using existing site conditions as a baseline for comparison. The potential for adverse impacts is analyzed using available data from site-specific investigations including geotechnical reports prepared for the project site (KCG 2016a, 2016b), Phase I environmental site assessments

(AEC 2016a, 2016b; Rincon 2015a, 2015b), a drainage study (Wilson Mikami 2016), the *Low Impact Development Plan* (Wilson Mikami 2017a), the *Updated Sea Level Impact Analyses* (Moffatt and Nichol 2017), and existing publications and maps completed by federal, state, and local agencies, such as the City of Long Beach. In addition, the severity and significance of hydrology and water quality impacts are analyzed in the context of existing regulations and policies.

For purposes of this analysis, construction activities would include the excavation of soils and previously landfilled materials, should landfill removal be necessary; removal of some existing oil production facilities (wells, piping, and associated infrastructure); construction of aboveground structures including the office building, oil production facilities, trail, parking lot, driveway improvements, and restored habitat; and the relocation of the Synergy office and placement on a new foundation. These construction activities would occur at various times spread out over time across the entire project site. Operations activities would include the operational phases of the office buildings, oil production facilities, trail, visitors center, parking lot, driveway and restored habitat, but do not include soil excavation. In addition, the operations activities include the post-treatment monitoring activities conducted to verify that remedial objectives have been achieved.

As stated in Chapter 1, *Introduction*, on April 28, 2016, the City sent an NOP to responsible, trustee, and federal agencies, as well as to organizations and individuals potentially interested in the project to identify the relevant environmental issues that should be addressed in the EIR. One comment received requested the project be consistent with SEADIP, summarized above in the Regulatory Framework. One comment was received about the use of fracking to install oil production wells; however, fracking is not proposed for use and the topic of fracking is not considered further (BOMP 2017a, 2017b). No other issues related to hydrology and water quality were identified in the received comments.

Hydraulic Modeling

Hydraulic modeling was a primary analytical tool used to evaluate proposed project impacts on flooding and erosion. This section describes the hydraulic model and how it was used to simulate the surface water response to the proposed project during typical tides and storm events. The results of the hydraulic modeling are presented in Appendix G3, in a report titled *Updated Sea Level Rise Impact Analyses* (Moffatt and Nichol 2017).

What is a Hydraulic Model?

Hydraulic models are computer simulations that represent water flow in the environment using mathematical equations. By mathematically representing a simplified version of a surface water system, reasonable scenarios can be predicted, tested, and compared. The applicability or usefulness of a model depends on how closely the mathematical equations approximate the physical system being modeled.

After a model has been set up for existing conditions, it then is verified against known information. Simulations are run for measured flow rates, and model results are compared to observed/measured water elevations or velocities. The various input parameters then are adjusted to better simulate observed conditions. When measured flow data are not available, model parameters are selected based on available information and professional judgment.

Model results for existing conditions then are used as a baseline for evaluating the potential hydraulic impacts of proposed changes, such as expansion of a floodplain, construction of a bridge, or enlargement of culverts.

For this analysis, the proposed project was modeled and the results were compared to the existing conditions model results to identify potential impacts.

Hydraulic Model Terminology

Certain terminology is used in hydraulic modeling to describe and illustrate the nature, extent, and movement of surface water and the responses to changes. Key terms are presented below:

- *100-year Flow/Flood/Storm/Event*—A storm/flood/event expected to occur once every 100 years or with a 1 percent annual probability of occurring. Any X-year event is expected to occur once every X years or with a 100/X percent chance of annual occurrence.
- *Freeboard*—The distance between the water surface and the lowest possible entry point along a levee or berm during flooding or large waves.
- *MLLW*—Mean lower low water, average height of the lowest tide each day.
- *MHHW*—Mean higher high water, average height of the highest tide each day.
- *Tidal prism*—The volume of water that is exchanged in a given tidal area between MLLW and MHHW.

Limitations of Hydraulic Models

Hydraulic models use simplified mathematical equations to represent extremely complex natural systems. Therefore, significant uncertainty is inherent in model results, even when parameters have been calibrated to measured data. Nonetheless, hydraulic modeling is a standard tool for project planning, design, and impact analysis, and the results provide a basis for comparing the hydraulic performance of different scenarios relative to a baseline.

Adaptive Hydraulics Model

Adaptive hydraulics (AdH) two-dimensional numerical models were created to simulate hydraulic conditions under the existing and proposed project conditions. The models were run for the following three sea level rise and storm flow conditions to assess potential impacts of the proposed project:

- The lower bound of sea level rise projections of 0.5 foot in year 2060;
- The upper bound of sea level rise projections of 2.6 feet in year 2060; and
- The upper bound of sea level rise projections of 2.6 feet in year 2060 together with a 50-year fluvial storm.

The models were also run for average tidal conditions to assess scour potential in Steamshovel Slough and the proposed project area.

3.8.4.3 Impact Evaluation

Impact HY-1: The project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality. (Less than Significant)

Construction

Construction of the proposed project facilities would involve drilling, trenching, excavation, grading, and other ground-disturbing activities, which would expose and rework soils for periods of time. Construction activities would involve the use of hazardous materials such as fuels and lubricants, paints and thinners, adhesives and

glues, and cleaning solvents for the operation of equipment and the construction of structures. If the excavation of soil releases sediment to surface waters or hazardous materials are accidentally released, these pollutants could mix with runoff on site and result in sedimentation and/or contamination of receiving water bodies such as the Los Cerritos Channel, Steamshovel Slough and associated wetlands, or the San Gabriel River. The drilling of oil wells could adversely impact the water quality of non-oil-production zones if drilling muds or oil escape the well boreholes and enter aquifers with beneficial uses other than oil production. The construction activities could damage the well seals of previously plugged and abandoned oil production wells or injection wells, which could contaminate aquifers.

Construction of Oil Wells

The proposed production and injection wells would be drilled using oil well drilling techniques, as summarized in Chapter 2, *Project Description*, and detailed in the Oil Drilling and Production Overview white paper (BOMP 2017a). Drilling fluids, such as a bentonite[71] and water mix, or a polymer-water mix, would be used to facilitate drilling and well construction to prevent the drilled materials from locking up the drill bit inside the boring. The drilling mud is circulated in a closed system, circulating from mud tanks to down the borehole and returning the cuttings to the mud tank. Conductor casing would be installed at shallower depths to seal off shallower aquifer zones and prevent fluids (drilling mud during construction or produced oil during operations) from entering shallower aquifers. Once the drilling reaches the desired oil production zone, the driller would pump out the drilling mud and place the cuttings and drilling mud in a storage container for off-site hauling and disposal. Non-corrosive, environmentally inert, biodegradable additives might be used with the drilling mud to keep the borehole open, prevent corrosion, increase mud weight, and prevent mud loss.

As discussed in Section 3.7, *Hazards and Hazardous Materials*, numerous regulations required by the state Division of Oil, Gas, and Geothermal Resources (DOGGR) would require measures for the safe transportation, storage, handling, and disposal of hazardous materials used for the drilling and construction of wells, including appropriate containers, and secondary containment to contain a potential release. In addition, as discussed above, conductor casing would be used to seal off non-oil-producing layers, preventing drilling mud or oil from entering aquifers. Because the well installation activities would be subject to the requirements noted above, impacts associated with pollutants entering surface water bodies or aquifers would be less than significant.

Construction over the Location of Wells

Over time, the volume of oil extracted from oil production wells decreases to below economic levels and the well is plugged and abandoned using the procedures described in the Well Plugging and Abandonment subsection in Section 2.5.1, Project Activities by Site. Injection wells for returning produced water to production zones may also no longer be used and are plugged and abandoned using the same procedures. The plugging of the wells seals off shallower aquifer zones and prevents the cross contamination of those aquifers. Construction activities have the potential to damage the plugged wells and break the subsurface seals to aquifers. Similarly, construction activities would have the potential to damage active and idle wells, with the same potential to cross contaminate aquifers.

Figure 2-3, Existing Oil Wells on the Project Site, shows the locations of all known active, idle, and plugged wells. The locations of wells on the Synergy Oil Field site are shown on Figure 2-16, Synergy Oil Field Site Grading Tidal Channel. The most northerly plugged wells would be located within the restoration area where

[71] Bentonite is a form of clay, also called montmorillonite, commonly used in well drilling.

grading activities would occur. The locations of the one active and one plugged well on the Pumpkin Patch site are shown on Figure 2-23, Pumpkin Patch Site Plan; these wells are located along the levee along the San Gabriel River and would not be within an area of construction. The location of the one plugged well on the LCWA site is shown on Figure 2-26, Los Cerritos Wetlands Authority (LCWA) Site Plan; this well is located along Second Street and would not be within an area of construction. The location of the wells on the City Property site are shown on Figure 2-20, Aboveground Pipeline Corridor and Utility Corridor; seven of these wells are located near but just west of the alignment of the proposed along the levee along the proposed aboveground pipeline system and utility corridor and would not be within an area of construction.

As discussed in Section 3.7, *Hazards and Hazardous Materials*, numerous regulations are required DOGGR to manage oil field operations. These requirements include site owners to track the locations of all wells in perpetuity, including previously plugged and abandoned wells, and to prohibit construction activities that would damage the well seals. Construction contractors would be required to mark and avoid all well locations (active, idle, and plugged) as a condition of project approval. Because the construction activities would be subject to DOGGR tracking and avoidance requirements, impacts associated with damaging pollutants entering surface water bodies or aquifers would be less than significant.

Landfill Remediation on Pumpkin Patch

If it is determined that removal of the landfill at the Pumpkin Patch site is required, remediation of the landfill would require the following work: (1) removal from the site of the dry trash, which would be hauled to a landfill for disposal (see Section 3.17, *Utilities and Service Systems*, for landfill locations and capacities), and (2) removal of "wet trash" using excavation equipment with a dredging bucket so that once the wet trash is removed, the water would be allowed to drain within the confines of the excavation. Wet trash excavation would require the placement of the wet trash on a rack or other platform in the landfill excavation pit where the trash would be allowed to dry before it is transported to a landfill. Analytical testing would be used to characterize the waste as hazardous or nonhazardous and identify the appropriate disposal location. Nonhazardous waste would be hauled to a Class II or III disposal facility and hazardous waste would be hauled to a Class I or Class II facility, likely the Kettleman Hills Landfill. It is assumed that approximately 63,000 cubic yards of waste would be exported, and approximately 45,000 cubic yards of clean dirt would be imported.

Construction of All Other Structures

Because the overall footprint of construction activities would exceed 1 acre, the proposed project's ground-disturbing activities would be required to comply with the NPDES Construction General Permit, discussed above in the Regulatory Framework. The Construction General Permit would require the preparation and implementation of a SWPPP, which would include implementation of BMPs to control run-on and run-off from construction work sites. The BMPs would include, but would not be limited to, physical barriers to prevent erosion and sedimentation, construction of sedimentation basins, limitations on work periods during storm events, protection of stockpiled materials, and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. In addition, the project would be required to comply with the Long Beach Municipal Code for stormwater control. Because proposed project construction activities would be subject to the requirements noted above, impacts associated with runoff carrying pollutants into water bodies would be less than significant for all four individual sites.

Operation

Operation of the proposed project facilities would include the extraction of oil, natural gas, and produced water at the Pumpkin Patch and LCWA sites. Operational activities would also occur at the Pumpkin Patch and LCWA sites (oil production, processing, and distribution) and the visitors center on the Synergy Oil Field site. In addition, maintenance activities would occur on the restored habitat on the northern portion of the Synergy Oil Field site. The production of oil and produced water could adversely impact water quality if not properly managed and/or the oil or produced water is discharged to surrounding surface water bodies. The new office buildings, landscaping, and parking areas could adversely affect surface water quality with sediment or other pollutants if surface water runoff is not properly managed. The restored northern portion of the Synergy Oil Field site would change the existing habitat and could adversely impact surface water quality via erosion if not properly maintained.

Oil Production at LCWA and Pumpkin Patch Sites

As discussed in Section 3.7, *Hazards and Hazardous Materials*, the operation of oil production and injection wells, pipelines, and associated infrastructure is regulated by DOGGR as per the applicable federal, State, and local regulations. For the operation of wells, storage of oil, and transportation of the oil to refineries through pipelines, regulations include measures to routinely monitor and inspect wells, pumps, pipelines, storage tanks, and associated equipment for leaks and pressure issues. Storage tanks would be required to have secondary containment. The wells would be installed in well cellars designed to contain fluids in the event of a leak. The wells, pipelines, and storage talks are required to have established emergency procedures in the event of a release or spill. The produced water that would be pumped out along with the oil is typically brackish to saline, but would be entirely injected back into the production zone from whence it came. Therefore, with proposed project compliance with existing regulations, impacts related to water quality from the operation of the wells would be less than significant.

Restored Habitat at Synergy Oil Field Site

As described in Chapter 2, *Project Description*, the berms in the northern portion of the Synergy Oil Field site would be removed to reconnect Steamshovel Slough with the marshplain to the south. Reconnection of the slough with the marshplain could cause erosion of the slough channel and adjacent areas, which could deliver sediment-laden runoff and associated constituents to Steamshovel Slough and Los Cerritos Channel. Constituents associated with these sediments could then settle out into the channel and marsh at concentrations that may adversely affect water quality based on Wetland Beneficial Use Guidelines (discussed above in Section 3.8.3, Regulatory Framework).

As discussed in Impact GEO-5 of Section 3.5.4, Analysis of Impacts, some erosion of the slough channel is expected initially, as the channel dimensions adapt and then equilibrate to the increased flow of water at the site. This could temporarily increase turbidity in Steamshovel Slough and Los Cerritos Channel, but the volume of sediment would be small and would be spread out over a period of several years as the channel erodes. In a stable estuary, mature marshes remain in a dynamic equilibrium between erosional and depositional processes. The marsh vegetation and its root structures help hold sediments in place. Additionally, tidal channels stay in equilibrium when appropriately sized.

As discussed in Section 3.7, *Hazards and Hazardous Materials*, one sediment sample was collected in 2005 in the area between Steamshovel Slough and Los Cerritos Channel. The sample was analyzed for metals;

organochlorine, organonitrogen, and organophosphorous pesticides; polychlorinated biphenyls (PCBs), and semivolatile organic compounds (SVOCs). Various isomers[72] of PCBs, the pesticides chlordane and a degraded form of DDT (DDE), various SVOCs (mostly naphthalene and related compounds), and metals were detected above the laboratory reporting limits. The chemical results are summarized in Table 3.7-1, Environmental Cases Identified within 0.25 Mile of the Project Area. Although metals are known to accumulate in marsh sediments, PCBs, chlordane, DDE, and SVOCs are not naturally occurring at elevated concentrations. The regrading activities for habitat restoration could result in the release of some of these compounds into Steamshovel Slough and Los Cerritos Channel.

Although the levels of cadmium, copper, mercury, and silver exceeded some of the listed Wetland Beneficial Use Guidelines, metals are known to accumulate in marsh sediments and the concentrations of all reported metals are within background levels also discovered in a similar setting at the Ballona Wetlands (see discussion in Section 3.7, *Hazards and Hazardous Materials*). The chemical constituents listed above that are not naturally occurring are likely the result of these constituents being transported downstream via the Los Cerritos Channel and have likely been accumulating for some years; however, as summarized in Table 3.7-1, the concentrations are all within background levels for the similar setting of the Ballona Wetlands. Given the low concentrations of the reported constituents, the reworking of the soils in the proposed restoration area would not be anticipated to release chemical constituents at concentrations above background levels or that are not already being transported by the Los Cerritos Channel. Therefore, the impact would be less than significant.

As discussed in Section 3.5, *Geology, Seismicity, and Soils*, the landfill along the eastern edge of the site is buried 25 feet deep, so any erosion at the site is not expected to reach levels that would expose this material.

The natural function of the salt marsh habitat would also improve water quality. The increased footprint of the marsh habitat would increase the capture of sediment and pollutants from upstream and upslope sources. The improved function of the marsh plants and the associated biological activity would serve to capture, filter, and naturally degrade pollutants and would potentially be a beneficial impact. The natural function of the salt marsh habitat would be monitored by the 5-year mitigation and monitoring program established for the mitigation bank. This program would include maintenance guidelines that are specifically tailored for tidal wetland establishment and would address potential problems that could arise from erosion, vandalism, competition from weeds and invasive species, unacceptable levels of disease and predation, and irrigation. The implementation of the mitigation and monitoring program would monitor and, if needed, adjust the restoration and functioning of the salt marsh and would result in a beneficial impact.

Tidal Inundation

By establishing tidal channels and connecting Steamshovel Slough to the marshplain to the south, the extent of tidal inundation would increase. The increased extent of tidal influence could increase the infiltration of salt water into the groundwater table throughout the site and could result in the inland advancement of sea water intrusion.

The groundwater beneath the project site is shallow and occurs under unconfined conditions in fine-grained sand, silt, and clay layers. As discussed in Section 3.8.2, Environmental Setting, the shallow water table is under tidal influence meaning that groundwater elevations fluctuate in response to tidal cycles in the Los Cerritos Channel and the San Gabriel River. Generally, freshwater from the inland water table flows toward the coast and mixes with salty groundwater making groundwater that is brackish (a mixture of salty and fresh

[72] Compounds with the same formula but a different arrangement of atoms in the molecule and different properties.

water); however, the project area is on the ocean side of the previously discussed Alamitos Barrier Project, a seawater intrusion barrier system located north, northeast, and east of the project area. Consequently, groundwater in this area will remain saline to brackish. As previously discussed in the Setting, groundwater is saline close to Steamshovel Slough and Los Cerritos Channel due to the direct connection to the ocean. Groundwater in areas just away from the Slough are brackish. As all of the local groundwater is non-potable, there are no wells in the vicinity of the project site that draw groundwater from the shallow water table for domestic or municipal use. Although the proposed project would increase tidal inundation through the restored marsh and possibly result in some localized increase in salinity within the restoration area, the change to water quality would not be considered to have an adverse impact on water resources because the groundwater in this area is all brackish to saline and is not used for domestic or municipal supply. The inland migration of saline groundwater, if any, would likely be limited and not extend much beyond the southern limits of the Synergy Oil Field area. While the increased inundation could cause more salt water to infiltrate to the water table, it would be infiltrating into an already brackish to saline estuarine water table that is not used for public or private supply. Therefore, the project would not contribute to a decline in groundwater supplies, and impacts would be less than significant.

All Other Project Components

The operation of the oil production system, office building, and visitors center would also use small quantities of cleaning products and occasional paints, solvents, and thinners for routine maintenance. As discussed in Section 3.7, *Hazards and Hazardous Materials*, the preparation and implementation of the Hazardous Materials Business Plan (HMBP) would require hazardous materials to be stored and labeled in appropriate containers. Compliance with existing regulations would reduce the potential for the release of chemicals that could adversely affect surface water quality.

In addition, and as described above in the Regulatory Framework, the proposed project would be required to implement various treatment, structural, and non-structural source control BMPs to reduce potential impacts to water quality from sediments and other pollutants, as recommended in the LID Plan prepared for the project. The discussion below in Impact HY-2 on impervious surfaces provides detail of the proposed BMPs in the LID plan. The installation of these BMPs would reduce impacts to water quality to a less-than-significant level.

Finally, and as described above in the Regulatory Framework, the proposed project would be required to comply with the requirements of the City of Long Beach MS4 Permit for various specific discharge categories, including landscape irrigation using potable water, landscape using reclaimed or recycled water, and street/sidewalk wash water. The MS4 Permit lists source control BMPs pertaining to pollutant-generating activities to be implemented at commercial and industrial facilities. With implementation of and compliance with the HMBP, LID Plan, and the MS4 Permit, impacts related to water quality during operation would be less than significant.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact HY-2: The project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the groundwater table. (Less than Significant)

Construction

Construction of the proposed project facilities would involve activities that would require the use of water, including the drilling of new oil production and produced-water injection wells (i.e., water for mixing with the drilling mud and concrete for the surface completions) and plugging of existing oil and injection wells (i.e., water for mixing with the drilling mud and cement grout) as wells are plugged and abandoned on the Synergy Oil Field and City Property sites and relocated to the Pumpkin Patch and LCWA sites. In addition, other construction activities such as concrete mixing and dust control for buildings, well cellars, and associated infrastructure would require water. The local water supply is served by the Long Beach Water District (LBWD), which receives a mix of groundwater, imported water and recycled water (see Section 3.17, *Utilities and Service Systems*, for more details on project area water supply and project demand). Therefore, construction water demand could contribute to a reduction groundwater supplies.

Oil Wells

Water supplies would be required for (1) the drilling of the oil wells for oil production and injection wells for produced water for the drilling mud and cleaning of equipment; (2) the plugging and abandonment of non-productive wells for the drilling mud, cement grout, and cleaning of equipment; and (3) the hydrostatic pressure testing of pipelines and storage tanks. The required water would be supplied by tapping into existing LBWD water lines. LBWD acquires its groundwater supply from the landward side of the Alamitos Barrier Project, described above in the Environmental Setting, and groundwater beneath the four individual sites is not used for potable water due to seawater intrusion.

The analysis of water supply from all sources, which includes groundwater, imported water, and recycled water, is provided in Section 3.17, *Utilities and Service Systems*, Impact UT-2 and includes Table 3.17-4, Summary of Projected Annual Water Usage, which summarizes the projected water use for construction and operation activities over the next 60 years. Both construction and operations water use are listed because the activities overlap over time. The listed years are the anticipated years; the actual years when well installations and abandonment would occur would vary depending on the actual rate of drilling new wells and the timing at which older existing wells become unproductive. In any case, the maximum combined construction and operations water use would be about 124 acre-feet from the third year through eleventh year when oil wells would be constructed at the Pumpkin Patch and LCWA sites. Water use would be less in all other years. As discussed in the Utilities section, the LBWD expects to have at least 76,983 acre-feet/year (AFY) of available surplus water, which far exceeds the needs of the proposed project for any year. Therefore, the impacts to groundwater supplies during construction would be less than significant.

All Other Non-Oil Wells Structures

Water required for construction activities such as concrete mixing and dust control would be supplied by tapping into existing LBWD water lines. Since the LBWD receives a mix of groundwater, imported water and recycled water, construction water demand could contribute to a reduction groundwater supplies. As discussed above, the LBWD expects to have at least 76,983 AFY of available surplus water, which far exceeds the needs of the proposed project for any year. Therefore, the impacts to groundwater supplies would be less than significant.

Operation

Oil Wells

As discussed in Chapter 2, *Project Description*, the extraction of oil also results in the extraction of brackish to saline water from the production zones. Although this water would not have a beneficial use without treatment, its removal from the production zones would reduce the amount of groundwater and could cause subsidence, which could damage and reduce the volume of overlying freshwater aquifers. As explained in Impact GEO-6 in Section 3.5, *Geology, Seismicity, and Soils*, this is the reason that oil production operations reinject the produced water back into the production zone to prevent subsidence and damage to overlying aquifers. The proposed project would implement this practice of returning the produced water to the depth levels from which it was extracted, reducing the potential impact to a less-than-significant level.

The processes of separating the oil from the produced water, as well as other operational activities, would require water supply, as discussed in Section 3.17, *Utilities and Service Systems*, and groundwater is the primary source of water for the LBWD; however, as previously discussed, the LBWD expects to have at least 76,983 AFY of available surplus water, which far exceeds the needs of the proposed project for any of the next 60 years. In addition, as previously discussed, groundwater beneath the four individual sites has been intruded by seawater for some years and consequently is not used for potable water. LBWD acquires its groundwater supply from the landward side of the Alamitos Barrier Project, described above in the Environmental Setting. Therefore, the impacts to groundwater supplies would be less than significant.

All Other Non-Oil Wells Structures

Operation of the proposed project would require water supply for various other uses, including irrigation of the restoration areas on the Synergy Oil Field site and operation of the office building and visitors center. Water would be provided by the LBWD, which receives some of its water from groundwater; however, as previously discussed, the LBWD expects to have at least 76,983 AFY of available surplus water, which far exceeds the needs of the proposed project for any of the next 60 years. In addition, as previously discussed, groundwater beneath the four individual sites has been intruded by seawater for some years and consequently is not used for potable water. LBWD acquires its groundwater supply from the landward side of the Alamitos Barrier Project, described above in the Environmental Setting. Therefore, the impacts to groundwater supplies would be less than significant.

Impervious Surfaces

For the Synergy Oil Field site, the existing office building would be relocated, placed on a new foundation approximately 5 feet above ground surface, and repurposed as a visitors center. A new parking lot would also be constructed adjacent to the visitors center. This would increase the extent of impervious area in the proposed location of the visitors center (Wilson Mikami 2017a); however, the extent of impervious area would decrease at the location of the existing oil field office building. The general footprint of the building will remain largely unchanged, resulting in no net change in impervious area for the overall Synergy Oil Field site. More importantly, the drainage would be conveyed to seven proposed bioretention basins designed for the 85th percentile 24-hour storm volume and located around the visitors center. Therefore, all of the rainfall that currently falls on the site will still continue to infiltrate back into the subsurface after supporting some landscaping. In addition, the Synergy Oil Field site would experience an overall net reduction in impervious surfaces following the eventual removal of its oil production infrastructure that consists of oil and injection

wells, wells pads, storage tanks, processing equipment, and access roads. No other impervious structures would be constructed on the Synergy Oil Field site.

The City Property site would experience an overall reduction in impervious surfaces following the plugging and abandonment of wells and eventual removal of its oil production infrastructure. The addition of the oil pipeline and utility lines that would cross the City Property site would not increase impervious surfaces because the lines would be protected by earthen berms with no surrounding pavement. Rain would flow around the lines and infiltrate into the subsurface similar to existing conditions. No other impervious structures would be constructed on the City Property site.

The proposed structures to be constructed on the Pumpkin Patch site would result in an increase of about 196,244 square feet (sf) (4.5 acres) of impervious surfaces (Wilson Mikami 2017a). Drainage on the Pumpkin Patch site currently flows north to Studebaker Road. Under the proposed project and in accordance with the LID Plan, drainage would be conveyed through proposed swales, gutters, and storm drains to the well cellars designed to contain a 25-year storm event. Larger storm flows would overflow from the well cellars to Studebaker Street, as is the current condition. Water collected in the well cellars would be conveyed to the on-site water treatment system and injected into the subsurface oil production zones, along with the produced water. Therefore, all of the rainfall that currently falls on the Pumpkin Patch site would be injected into the subsurface, recharging the volume of water in the oil production zones.

The proposed structures to be constructed on the LCWA site would result in an increase of about 121,314 sf (2.8 acres) of impervious surfaces (Wilson Mikami 2017a). Drainage on the LCWA site currently infiltrates on site or generally flows to Studebaker Road. Under the proposed project and in accordance with the LID Plan, drainage would be conveyed through proposed swales, gutters, and storm drains to the well cellars designed to contain a 25-year storm event. Larger storm flows would overflow from the well cellars to Studebaker Street, as it does under existing conditions. Water collected in the well cellars would be conveyed to the on-site water treatment system and injected into the subsurface oil production zones, along with the produced water. Therefore, all of the rainfall that currently falls on the site would be injected into the subsurface, recharging the volume of water in the oil production zones.

Based on the above-described water management actions, the impact relative to recharge would be less than significant.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact HY-3: The project would not substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion, siltation or flooding off site. (Less than Significant)

Construction

Construction of the proposed project would involve the demolition of existing structures and the construction of new structures on the project site, and would thereby alter the existing drainage patterns on site such that erosion, siltation, and flooding could occur. Construction of earthen berms, establishment of tidal channels,

removal of existing berms and roads, and lowering elevations on the Synergy Oil Field site could also result in erosion, siltation, or flooding.

As discussed above in Impact HY-1, the proposed project would be required to implement erosion and sediment control BMPs as specified in the SWPPP prepared in accordance with the Construction General Permit. This would prevent erosion and siltation from occurring during construction activities for both oil facilities and habitat restoration. Some of the BMPs implemented to reduce erosion and siltation would impede or slow the speed of stormwater runoff flow, and would reduce the potential for flooding to occur. Further, flooding in the Synergy Oil Field site near the restored areas is anticipated since it is naturally flooded by tidal channels; flooding would not be viewed as a negative impact during construction. Therefore, impacts related to erosion, siltation, and flooding caused by drainage pattern changes during project construction would be less than significant.

Operation

Operation of the proposed project would involve altered drainage patterns compared with the operation of the existing sites. As discussed above for Impact HY-2, the existing drainage patterns would be changed for the Synergy Oil Field, Pumpkin Patch, and LCWA sites; the drainage pattern for the City Property site would remain essentially unchanged. Per the recommendations of the project LID Plan (Wilson Mikami 2017a), water quality BMPs would be installed on all sites except the City Property site. Through the retention and infiltration of stormwater runoff, stormwater flow rates would be controlled to be equal or less than the predeveloped condition and would result in a less-than-significant impact.

As discussed in Section 3.5.4 Impact GEO-5, while some erosion of Steamshovel Slough is expected initially, the natural function and increased footprint of the marsh habitat would increase the capture of sediment in the long term, which would be a beneficial impact. The restoration area would be maintained by the 5-year mitigation and monitoring program established for the mitigation bank. It would include maintenance guidelines that are specifically tailored for tidal wetland establishment and would address potential problems that could arise from erosion, vandalism, competition from weeds and invasive species, unacceptable levels of disease and predation, and irrigation. Therefore, with implementation of the mitigation and monitoring program, the restoration and functioning of the salt marsh would be a beneficial impact.

The proposed restoration activities on the northern 76.52-acre Synergy Oil Field site would expand tidal connection, so that areas south of Steamshovel Slough that currently lack tidal connection would receive tidal flows. Although expanded tidal connections would increase flooding in these areas, increased flooding is the goal of the proposed restoration to recreate natural flooding conditions, and flooding would not be viewed as a negative impact.

As described in Section 3.8.4.2, Methodology, hydraulic modeling evaluated any changes to flood water elevations that would result due to the proposed project (Moffatt & Nichol 2017). Modeling was conducted for both existing and project conditions. The existing conditions model results indicate that both storm and tidal waters coming from Steamshovel Slough would be contained within the Synergy site without overtopping surrounding streets. Model results showed that for the proposed project condition, water levels would be the same as under existing conditions (4.3 feet NGVD29)[73] and both storm and tide water would be contained within the Phase 1 property boundary, due to flood protection provided by the proposed berm along the Phase 1 boundary. The proposed berm would have an elevation of 9.0 feet NGVD29, providing approximately 3.4 feet of

[73] National Geodetic Vertical Datum of 1929 (NGVD29) is one of several datums used for measuring elevation relative to sea level.

freeboard above the 100-year coastal flood event (1 percent annual change of occurrence) water level of 5.6 feet NGVD29. The existing berm along Steamshovel Slough ranges in elevation from 5.4 to 7.6 feet NGVD29, so the project would add an additional 2 to 3.6 feet of freeboard to achieve the 9.0 feet NAVD29 elevation. Since freeboard would increase with the project, this would be a beneficial impact. The proposed berm elevation of 9.0 feet NGVD29 was selected because of the sea level rise modeling results discussed below.

Sea level rise is projected to occur worldwide in the mid- to long-term future (Moffatt & Nichol 2017). The projections for the region south of Cape Mendocino based on the 2015 California Coastal Commission (CCC) guidance on sea level rise are between 0.5 foot and 2.6 feet for the year 2060, which were selected for modeling for the purpose of flood risk impact analyses. Based the measured highest anticipated tidal elevation, the 100-year flood elevation, and 2.6 feet of sea level rise in year 2060, the projected flood elevation would be modeled at 8.18 feet NAVD29, hence the conclusion to design the interim berm separating the two project phases at 9.0 feet NGVD29. Without the proposed project and the interim berm, an 8.18-foot water level would overtop both the Pacific Coast Highway and 2nd Street. Therefore, the proposed project with the proposed interim berm would improve the flood protection in the area and provide a beneficial impact.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact HY-4: The project would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. (Less than Significant)

Construction

As discussed above for Impact HY-1 and Impact HY-2, runoff water would be controlled in compliance with the Construction General Permit and the BMPs identified in the required SWPPP. Therefore, construction is not expected to generate an amount of runoff that would exceed storm water drainage system capacity, and impacts would be less than significant.

Operation

As discussed above for Impact HY-1 and Impact HY-2, once operational, runoff water would be routed to the well cellars for later injection into the oil production zones on the Pumpkin Patch and LCWA sites, and to bioretention basins on the Synergy Oil Field site to allow for infiltration of stormwater, both in compliance with the project LID plan. This would result in flow rates being equal or less than the predeveloped flow rate condition. All new storm drain facilities on site would provide capacity for a 25-year storm event. Therefore, the proposed project would not generate substantial stormwater runoff such that existing or planned drainage system capacities are exceeded. Impacts would be less than significant.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact HY-5: The project would not place buildings, oil production infrastructure, workers, or the public within areas anticipated to be inundated due to sea level rise. (Less than Significant)

Construction

During construction, there would be no impacts due to sea level rise because of the short-term nature of the construction work. Sea level rise is not anticipated occur over the 4-year construction period (when a majority of the construction work is being implemented). This impact would be less than significant.

Operation

The proposed restoration activities on the northern portion of the Synergy Oil Field site would expand tidal connection so that areas south of Steamshovel Slough that currently lack tidal connection would receive tidal flows. Increasing the tidal connections would increase flooding in these areas, and could increase the risk of flooding with sea level rise.

As described in Section 3.8.4.2, hydraulic modeling evaluated flood levels in the marsh with sea level rise. Modeling was conducted for both existing and proposed project conditions. Model results showed that water levels would be the same (6.9 feet NGVD29) for the proposed project condition and existing conditions with 2.6 feet of sea level rise (Moffat & Nichol 2016). The existing conditions modeling showed that the west bound lanes of 2nd Street just east of the PCH may be inundated if sea level rise is more than 2.6 feet; however, as discussed for Impact HY-3, the proposed project would increase flood protection from existing conditions through construction of the proposed berm. The berm was designed to consider sea level rise, so during the 100-year coastal flooding event with 2.6 feet of sea level rise, the berm would still maintain 0.82 feet of freeboard. Since freeboard would increase with the project, this would be a beneficial impact.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact HY-6: The project would not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam. (Less than Significant)

Construction

The project proposes to reconnect Steamshovel Slough to the surrounding marshplain by removing the existing berms, which could result in increased flooding within that local area; however, the proposed project would construct permanent sheet pile walls and an earthen berm along the perimeter of the southern edge of the restoration area to prevent tidal water spillover into the southern portion of the site that currently contains active oil operations. Additionally, the four individual sites are not in a dam inundation area. Therefore, people and structures would not be exposed to substantial flooding during project construction. Impacts would be less than significant.

Operation

The proposed project would increase public access to the Synergy Oil Field site and construct buildings, oil production operations, and associated infrastructure on the Pumpkin Patch and LCWA sites, which could increase the exposure of people and structures to flooding during operation in the event of a levee or dam failure.

As stated previously, reconnection of Steamshovel Slough to the surrounding marshplain on the Synergy Oil Field site would increase flooding potential on site and could increase flood risk to the surrounding areas; however, the goal of the berm removal is to allow for expansion of tidal influence in the northern 77.3-acre area to convert non-tidal areas to tidal wetlands; therefore, flooding of the tidal wetlands is expected and necessary, and would provide additional areas to contain flood waters. Further, the proposed sheet pile wall and earthen berm along the perimeter of the southern edge of the northern area would reduce the flood risk to the southern portion of the site that would contain the visitors center. As discussed for Impact HY-3, the proposed berm would actually increase the level of flood protection from existing conditions, resulting in a beneficial impact.

The new buildings, oil production operations, and associated infrastructure on the Pumpkin Patch and LCWA sites would result in the increased presence of people on those two sites. The LCWA site is not adjacent or near a levee and would have a low potential for flooding due to a distant levee failure. The Pumpkin Patch site is immediately adjacent to the San Gabriel River and would be dependent on the levees along the San Gabriel River for flood protection. Since the project does not propose to change these levees, the proposed project would not change the flood risk to the area. Additionally, roughly half the Pumpkin Patch site is at elevations equal to or greater than the levee elevation. The remaining areas of the site are above 13.5 feet NGVD, which is 5.3 feet higher than the 100-year coastal flood event with 2.6 feet of sea level rise, so flooding at this elevation would be extremely rare. Therefore, people and structures would not be exposed to substantial flooding during project operation. Impacts would be less than significant.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

Impact HY-7: The project would not expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow. (Less than Significant)

Construction

The proposed project is not located in an area that could be exposed to mudflows because the four individual sites are all relatively flat. By connecting Steamshovel Slough to the marshplain to the south, the proposed project would be creating a large basin that could potentially experience a seiche and overtop the berm to cause flooding; however, for a seiche to occur, the site would have to be filled with water, which would only occur during a large, infrequent storm event (e.g., 100-year event). It would be extremely unlikely that a large storm event would occur at the same time as a large earthquake induces a seiche. Additionally, the proposed project includes a berm that has 3.4 feet of freeboard during the 100-year event, so it is unlikely that a seiche would be large enough to overtop the berm and cause flooding.

The entire project area is located within a tsunami inundation area; therefore, existing and partially-constructed structures and construction workers could be exposed to tsunamis during project construction; however, the County of Los Angeles is in the process of becoming TsunamiReady, meaning it would implement mitigative, preparatory, and response measures to avoid or lessen substantial impacts to structures and persons associated with tsunami events, including 24-hour notice and evacuation route signs. Further, Pacific Coast Highway is located adjacent to the project site and is considered a disaster route used to bring in emergency personnel and supplies to aid in the event of a disaster, which includes tsunamis. Construction activities would not alter the

topography of the site so substantially that tsunami risks would be increased when compared to existing conditions. Therefore, impacts would be less than significant.

Operation

As stated previously, the entire project site is located in a tsunami inundation zone. Over a 40-year period, the oil production operations on the Synergy Oil Field and City Property sites would be removed and replaced with oil production operations on the Pumpkin Patch and LCWA sites, with about the same number of workers. Therefore, the project would not increase the number of workers being exposed to risk of a tsunami.

As previously discussed, the County of Los Angeles is working on becoming a TsunamiReady community that would implement measures to avoid or lessen potential tsunami impacts to structures and persons. The Pacific Coast Highway could be used to bring in emergency personnel and supplies to the project site in the event of a tsunami. Further, the project would restore the northern portion of the Synergy Oil Field site to wetland habitat. Wetlands provide protection from tsunamis and tidal surges and would thus help mitigate potential damage from a tsunami on the Synergy Site and adjacent areas. Impacts would be less than significant.

Mitigation Measures: None required.

Significance Determination: Less than Significant.

3.8.4.4 Cumulative Impacts

Geographically, the project area is hydraulically bounded by the Los Cerritos Channel along the north and west, and the San Gabriel River along the south and east, with Alamitos Bay to the southwest. Accordingly, the geographic scope of cumulative hydrologic and water quality impacts would be limited to the project area and the immediately downstream area to Alamitos Bay. The timeframe during which the proposed project could contribute to cumulative hydrologic and water quality effects includes the construction and operations phases.

Cumulative Impacts during Project Construction

Water Quality

As described in Impact HY-1, the construction of oil wells could adversely impact the water quality of non-oil production zones if drilling muds or oil escapes the well boreholes and enters aquifers with beneficial uses other than oil production. In addition, construction activities over the locations of active, idle, or plugged wells could damage well seals and cross contaminate aquifers; however, numerous regulations required by DOGGR would require measures for the safe transportation, storage, handling, and disposal of hazardous materials used for the drilling and construction of wells, including appropriate containers, and secondary containment to contain a potential release. In addition, as discussed above, conductor casing would be used to seal off non-oil-producing layers, preventing drilling mud or oil from entering aquifers, and construction activities that could damage active, idle, and plugged wells are prohibited. Because the well installation activities would be subject to the requirements noted above, impacts associated with pollutants entering surface water bodies or aquifers would be less than significant. These regulations would be required of any and all cumulative projects that drill oil wells. Therefore, with compliance with applicable regulations, the cumulative impacts would not be cumulatively considerable (less than significant).

As described in Impact HY-1, construction activities have the potential to cause soil erosion, which could impact water quality. If cumulative projects were constructed at the same time, the water quality effects could be cumulatively significant if appropriate measures were not taken; however, the state Construction General Permit and the Long Beach Storm Water Management Program would require each cumulative project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with the Construction General Permit, the potential for erosion impacts would be reduced to less-than-significant levels. The Construction General Permit has been developed to address cumulative conditions arising from construction throughout the state, and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, any two construction sites regardless of location would each be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites, including from erosion. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations below action levels and would not be cumulatively considerable (less than significant). Similarly, the impacts of the proposed project combined with other cumulative projects within the region would not cause a significant cumulative impact related to soil erosion and the proposed action's contribution to cumulative impacts on soil erosion would not be cumulatively considerable (less than significant).

Groundwater Supplies and Recharge

As discussed in Impact HY-2, construction of the proposed project facilities would involve activities that would require the use of water, including the drilling of new oil production and produced-water injection wells, and the plugging of existing oil and injection wells as wells are plugged and abandoned. In addition, other construction activities such as concrete mixing and dust control for buildings, well cellars, and associated infrastructure would require water. The local water supply is served by the LBWD, which receives a mix of groundwater, imported water and recycled water. Therefore, construction water demand could contribute to a reduction groundwater supplies; however, as discussed in Section 3.17, *Utilities and Service Systems*, the LBWD expects to have at least 76,983 AFY of available surplus water. LBWD's analysis considers the anticipated growth (effectively the summation of anticipated cumulative projects) within its area of service. Therefore, with compliance with applicable regulations, the cumulative impacts would not be cumulatively considerable (less than significant).

Changed Drainage Patterns; Exposure to Sea Level Rise; Failures of Levees or Dams; Inundation by Seiche, Tsunami, or Mudflow

Until the construction of structures has been completed, there would be no impacts from changed drainage patterns, the placement of structures in areas susceptible to sea level rise, levee or dam failure, seiches, tsunamis, or mudflows.

Cumulative Impacts during Project Operations

Water Quality

As described in Impact HY-1, the production of oil and produced water could adversely impact water quality if not properly managed and/or the oil or produced water is discharged to surrounding surface water bodies; however, oil production at the four individual sites and other oil production sites (e.g., the Thermo oil field located adjacent of northwest of the Synergy Oil Field site) would all be required to comply with the same

DOGGR regulations that include regulations to routinely monitor and inspect wells, pumps, pipelines, storage tanks, and associated equipment for leaks and pressure issues. Storage tanks would be required to have secondary containment. In the case of the proposed project, wells would be installed in well cellars designed to contain fluids in the event of a leak. The wells, pipelines, and storage talks are required to have established emergency procedures in the event of a release or spill. The produced water that would be pumped out along with the oil is typically brackish to saline, but would be entirely injected back into the production zone from whence it came. Therefore, with compliance with existing regulations, impacts related to water quality from the operation of oil well fields would not be cumulatively considerable (less than significant).

The new office buildings, landscaping, and parking areas could adversely affect surface water quality with sediment or other pollutants if surface water runoff is not properly managed; however, the proposed project and all cumulative projects would be required to prepare and implement HMBPs to manage any hazardous materials used by operations, including appropriate storage, labeling, and use. In addition, all facilities in the City of Long Beach would be required to comply with the Long Beach MS4 program and LID requirements that would require managing surface water on their respective facilities. Therefore, with compliance with existing regulations, impacts related to water quality from facility operations of the proposed project and cumulative projects would not be cumulatively considerable (less than significant).

Groundwater Supplies and Recharge

As discussed in Impact HY-2, the operation of the proposed project facilities would involve activities that would require the use of water, including the drilling of new oil production and produced-water injection wells, and the plugging of existing oil and injection wells as wells are plugged and abandoned. In addition, other construction activities such as concrete mixing and dust control for buildings, well cellars, and associated infrastructure would require water. The local water supply is served by the LBWD, which receives a mix of groundwater, imported water, and recycled water. It is assumed that the water supply for cumulative projects would also be the LBWD. Therefore, operational water demands could contribute to a reduction in groundwater supplies.

As previously discussed, the LBWD expects to have at least 76,983 AFY of available surplus water. LBWD's analysis considers the anticipated growth (effectively the summation of anticipated cumulative projects) within its area of service. Therefore, the cumulative impacts relative to groundwater supplies would not be cumulatively considerable (less than significant).

All facilities in the City of Long Beach would be required to comply with the Long Beach MS4 program and LID requirements that would require managing surface water on their respective facilities. This would include minimizing the impacts of adding impervious surface. Therefore, with compliance with existing regulations, the cumulative impacts relative to groundwater supplies would not be cumulatively considerable (less than significant).

Changed Drainage Patterns

As previously discussed, all projects within the local area would be required to comply with the city's LID and MS4 regulations that would require controlling surface water runoff and reducing impacts from sediment and other pollutants. These regulations would also apply to any cumulative projects that change drainage patterns. Therefore, with compliance with existing regulations, impacts related to water quality from facility operations of the proposed project and cumulative projects would not be cumulatively considerable (less than significant).

Exposure to Sea Level Rise

As previously discussed, the proposed project would be designed to account for sea level rise. Consequently, the proposed project would not cumulatively contribute to sea level rise issues with nearby cumulative projects and would not be cumulatively considerable (less than significant).

Failures of Levees or Dams

As previously discussed, the reworking of the four individual sites to a more natural wetland function and the improvement of berms would result in a beneficial impact. Therefore, the proposed project could not contribute to cumulative impacts.

Inundation by Seiche, Tsunami, or Mudflow

As previously discussed, the proposed project area is not within an area subject to seiches or mudflows, which would also be the case for nearby cumulative projects.

As previously discussed, the project area, which would include nearby cumulative projects, is located within a tsunami inundation area and could be exposed to tsunamis; however, the County of Los Angeles is in the process of becoming TsunamiReady, meaning it would implement mitigative, preparatory, and response measures to avoid or lessen substantial impacts to structures and persons associated with tsunami events, including 24-hour notice and evacuation route signs. This program would apply to all cumulative projects within the tsunami zone. Therefore, with compliance with tsunami program, impacts related to tsunamis would not be cumulatively considerable (less than significant).

3.8.5 References

Advanced Environmental Concepts, Inc. 2016a. *Phase I Environmental Site Assessment for Pumpkin Patch Property, 6701 East Pacific Coast Highway, County of Los Angeles, Long Beach, California*, April.

———. 2016b. *Phase I Environmental Site Assessment for LCWA Property, North of 2nd Street and East of Studebaker Road, County of Los Angeles, Long Beach, California*, May.

———. 2016c. *Soil and Groundwater Assessment for the Pumpkin Patch, 7001 East Pacific Coast Highway, County of Los Angeles, Long Beach, California*, July.

———. 2017. *First Semiannual Groundwater Monitoring Report, October 2016 to April 2017, Pumpkin Patch—Inactive Landfill Post-Closure Maintenance Monitoring and Reporting Program No. CI-2767 (File No. 60-089), Long Beach, California*, March 22.

Beach Oil Minerals Partners (BOMP). 2017a. *Los Cerritos Wetlands Oil Consolidation & Restoration Project, Oil Drilling and Production Overview White Paper*, February.

———. 2017b. *Los Cerritos Wetlands Oil Consolidation & Restoration Project, Induced Seismicity White Paper*, February.

California Coastal Commission (CCC). 2015. *California Coastal Commission Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits*, adopted August 12, 2015.

California Emergency Management Agency (Cal EMA). 2009. *Tsunami Inundation Map for Emergency Planning. Los Alamitos/Seal Beach Quadrangle*, March 1.

California Environmental Data Exchange Network (CEDEN). 2005. Water Quality Data at Station 405LSCTSW in Los Cerritos Wetlands on June 6, 2005. Available at http://ceden.waterboards.ca.gov/AdvancedQueryTool, accessed on May 6, 2017.

Convention on the Conservation of Migratory Species of Wild Animals (CMS). 2017. *Wetlands for Disaster Risk Reduction*, February 2.

County of Los Angeles. 2014. *All-Hazard Mitigation Plan*, February 24. Available at http://lacoa.org/PDF/hazmitgplan.pdf.

Environmental Science Associates (ESA). 2015. *Ballona Wetlands Restoration Project, Sediment Quality Investigation*, May.

Federal Emergency Management Agency (FEMA). 2008. *Flood Insurance Rate Map, Los Angeles County, California, Panel 1988 of 2350*, September 26.

———. 2016. *Definitions: Mudflow*. Last updated May 18.

Kling Consulting Group, Inc. (KCG). 2016a. *EIR Level Geotechnical Study, Proposed Wetlands Restoration and Oil Consolidation Project, Pumpkin Patch Site, 6701 East Pacific Coast Highway, City of Long Beach, California*, May 9.

———. 2016b. *EIR Level Geotechnical Study, Proposed Wetlands Restoration and Oil Consolidation Project. LCWA Site. Studebaker and Westminster Boulevard, City of Long Beach, California*, May 26.

Los Angeles County Department of Public Works (LADPW). 2013. *Disaster Routes: Los Angeles County Operational Area, Cities of Long Beach and Signal Hill*. Available at http://dpw.lacounty.gov/dsg/disasterroutes/, accessed May 21, 2017.

———. 2014a. *Low Impact Development. Standards Manual*, February 20.

———. 2014b. *Alamitos Barrier Project, Annual Report on the Control of Seawater Intrusion, 2013–2014*.

———. 2017. *San Gabriel River Watershed*. Available at http://ladpw.org/wmd/watershed/sg/; accessed on February 17, 2017.

Los Angeles Regional Water Quality Control Board (LARWQCB). 2016. *Water Quality Limited Segment, Los Cerritos Channel*. Available at http://www.waterboards.ca.gov/losangeles/water_issues/programs/regional_program/Water_Quality_and_Watersheds/los_cerritos_channel/303.shtml, accessed May 6, 2017.

———. 2017. *Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*. Available at http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/basin_plan/, accessed on May 15, 2017.

Moffatt & Nichol. 2017. *Los Cerritos Wetlands Restoration and Oil Consolidation Project. Beach Oil Minerals Partners. Updated Sea Level Impact Analyses*. Prepared for Glenn Lukos Associates, May.

National Weather Service (NWS). 2016, *TsunamiReady Guidelines*. Available at www.tsunamiready.noaa.gov/guidelines.shtml, accessed on May 21, 2017.

———. 2017. *TsunamiReady in California, TsunamiReady Communities*. Available at www.tsunamiready.noaa.gov/tr-maps/ca-tr.shtml, accessed on May 21, 2017.

National Oceanic and Atmospheric Administration (NOAA). 2015. *Ocean Facts: What is a seiche?* Revised October 29, 2015.

———. 2016. *Ocean Facts: What is a tsunami?* Revised June 29.

Orange County Water District (OCWD). 2013. *Geologist's/Engineer's Report, Alamitos Barrier Improvement Project, (Construction Unit 14)*, March.

Rincon Consultants, Inc. 2015a. *Phase I Environmental Site Assessment, 154-Acre Property, Pacific Coast Highway, Long Beach, California*, May 1.

———. 2015b. *Phase I Environmental Site Assessment, 154-Acre Property, Pacific Coast Highway, Long Beach, California*, May 1.

U.S. Bureau of Reclamation (USBR). 2014. *Los Angeles Basin Groundwater Adjudication Summary, Los Angeles Basin Stormwater Conservation Study*, July.

U.S. Environmental Protection Agency Region IX (USEPA). 2010. *Los Cerritos Channel Total Maximum Daily Loads for Metals*, March.

Water Replenishment District (WRD). 2017a. *Watermaster Service in the West Coast Basin - Los Angeles County, July 1, 2015 - June 30, 2016*, March 7.

———. 2017b. *Watermaster Service in the Central Basin—Los Angeles County, July 1, 2015 - June 30, 2016*, March 9.

Wilson Mikami Corporation. 2016. *City of Long Beach Preliminary Drainage Study for Pumpkin Patch Site, LCWA Site and Synergy Visitors Center*, May 10.

———. 2017a. *Low Impact Development Plan (LID Plan). Project Name: Los Cerritos Wetlands Restoration and Oil Consolidation Project*, June 27.

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