SECTION III.M HYDROLOGY AND WATER QUALITY

III.M.1 Introduction

This section describes the existing hydrology and water quality conditions within the Project site and vicinity and evaluates the potential for the Project to result in environmental impacts related to surface and groundwater quality, stormwater drainage, and flooding. This section discusses construction and operational impacts associated with stormwater runoff, combined sewer overflows, flood risk (including potential effects from future sea level rise and seismically induced events), marina basin dredging, and Yosemite Slough bridge construction. This section identifies both Project-level and cumulative environmental impacts, as well as feasible mitigation measures that could reduce or avoid the identified impacts. Potential water quality impacts associated with hazardous materials are discussed in Section III.K (Hazards and Hazardous Materials). Potential impacts to biological resources from water quality impacts are discussed in Section III.N (Biological Resources).

Information sources for the analysis presented in this section include contacts with public agency staff and reference documents from the State Water Resources Control Board (SWRCB), the California Department of Water Resources (DWR), the San Francisco Bay Regional Water Quality Control Board (SFRWQCB), the San Francisco Bay Conservation and Development Commission (BCDC), the Association of Bay Area Governments (ABAG), the Federal Emergency Management Agency (FEMA), the San Francisco Public Utilities Commission (SFPUC), and several City departments. Related plans and policies are discussed, including the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan),[427] the *City and County of San Francisco Stormwater Management Plan* (January 2004),[428] *San Francisco Bay Plan*,[429] the *Draft San Francisco Stormwater Design Guidelines*.[430] In addition, the Baseline Stormwater calculations conducted by PBS&J (refer to Appendix M1 [Stormwater Runoff Calculations]) and several technical reports and analyses prepared by consultants on behalf of Lennar Urban were used during the preparation of this section, and are listed as cited sources.

III.M.2 Setting

Regional Hydrology

The Bay Area climate is generally characterized as dry-summer subtropical (often referred to as Mediterranean), with cool wet winters and relatively warm dry summers. San Francisco exemplifies a particular type of Mediterranean climate that, due to the proximity of coastal waters, experiences cool, often cloudy summers. The approximate annualized average high temperature is 64 degrees Fahrenheit (ºF); the average low temperature is 51ºF. The average annual rainfall in the vicinity of the Project site, for the period between 1914 and 2008, is approximately 21.1 inches, the majority of which occurs from

[427] San Francisco Regional Water Quality Control Board, *San Francisco Bay Basin Water Quality Control Plan (Basin Plan)*, As amended, January 18, 2007. Available: http://www.swrcb.ca.gov/sanfranciscobay/basin_planning.
[428] City and County of San Francisco, *Stormwater Management Plan*, January, 2004.
[429] San Francisco Bay Conservation and Development Commission, *San Francisco Bay Plan*, June 1998.
[430] City of San Francisco, San Francisco Public Utilities Commission and Port of San Francisco, *Draft – San Francisco Stormwater Design Guidelines*, 2009.

October through April.[431] During the period of record, annual rainfall has varied from 8.7 inches (1976) to 43.8 inches (1983), with a one-day high of 5.5 inches of precipitation on November 5, 1994. Analysis of long-term precipitation records indicates that wetter and drier cycles lasting several years are common in the region. Severe, damaging rainstorms occur at a frequency of about once every three years.[432]

San Francisco Bay (Bay) borders the Project site to the north, east, and south. The amount and timing of precipitation, air temperature, tidal cycle, and wind patterns influence the Bay's freshwater inflow, salinity, currents, and suspended sediments. The Bay is subject to strong westerly winds, which exert stress on the water surface generating waves. Wind-generated waves suspend sediments creating turbid conditions and dispersing sediments throughout the Bay. Candlestick Point and HPS Phase II are located on peninsulas that extend into the Bay, (refer to Figure III.M-1 [Combined and Separate Storm Sewer System and Receiving Water Bodies]). Yosemite Slough, a tidal inlet, and South Basin, an embayment,[433] separate Candlestick Point and HPS Phase II.

The portion of the Bay east of the Project site is referred to in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) as the San Francisco Bay Lower (Lower Bay) in the South Basin Hydrologic Planning Area. Major water features along the Lower Bay shoreline in the vicinity of the Project site, from north to south, include Islais Creek Channel, India Basin, South Basin, Yosemite Slough, and Candlestick Cove (refer to Figure III.M-1). Freshwater flow into the South Basin is limited to flow from creeks and stormwater outfalls.[434] Circulation is limited because the basin's location restricts exposure to tidal action, especially when compared to other portions of the Bay. In constricted areas such as Islais Creek and Yosemite Slough, circulation is even more limited than in India Basin, South Basin, and Candlestick Cove. The San Francisco Bay Central (Central Bay) to the north has better circulation than the Lower Bay because of constant mixing of freshwater from the Sacramento/San Joaquin Delta and saltwater from the Pacific Ocean.

Watersheds and Surface Water Bodies

Project Site Watersheds

Precipitation drains as surface runoff into a network of underground and surface drainage pathways. Generally, these pathways converge into drainage culverts, streams, and/or creeks, which become progressively larger as the runoff moves downstream, eventually reaching a common discharge location. The terms "watershed" or "drainage basin" describe the area of land that drains downslope to such a location.

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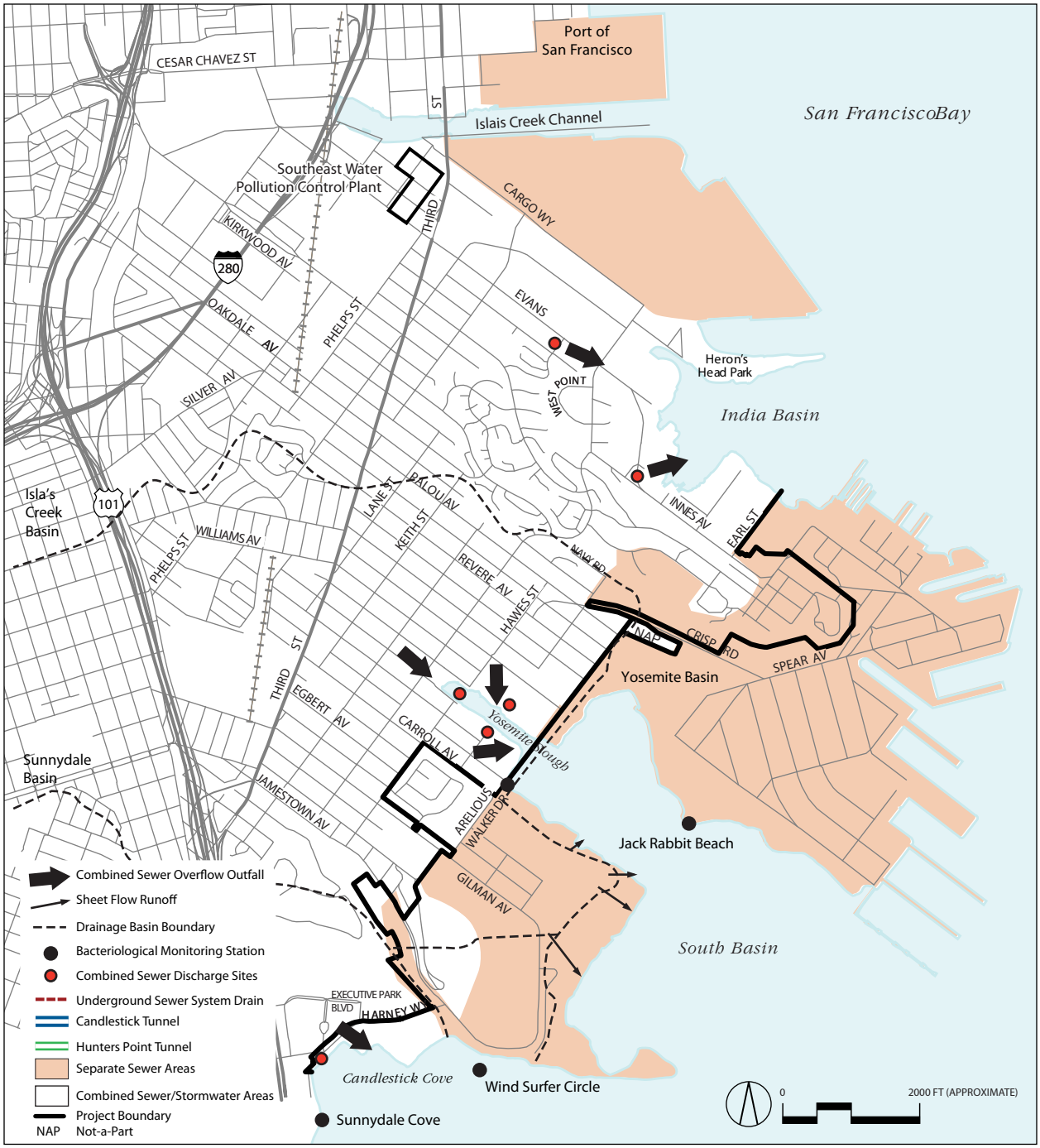
431 Western Regional Climate Center, website: General Climate Summary: San Francisco Mission Dolores Station (047772), website: www.wrcc.dri.edu, accessed July 20, 2009.

432 Brown, William M. III, 1988, *Historical Setting of the Storm: Perspectives on Population, Development, and Damaging Rainstorms in the San Francisco Bay Region, in Landslides, Floods, and Marine Effects of the Storm of January 3-5, 1982, in the San Francisco Bay Region, California*, Stephen D. Ellen and Gerald F. Wieczorek, Eds., US Geological Survey Professional Paper 1434.

433 An embayment is a small bay or any small semi-enclosed coastal water body whose opening to a large body of water is restricted.

434 An outfall is a pipe that discharges treated stormwater and wastewater flows into a receiving water body.



SOURCE: SFPUC, Maps and Resources, Isla is Creek Basin: http://sfwater.org/mto_ma_cfm/mc_ID/14/MSC_ID/361/MTO_ID/565.

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FIGURE III.M-1

COMBINED AND SEPARATE STORM SEWER SYSTEM AND RECEIVING WATER BODIES

Historically, small creeks near the Project site, including Yosemite Creek and Islais Creek, flowed from the east side of the City to the Lower Bay, forming the Islais Creek Basin and the Yosemite Basin.[435] However, most of the creeks in San Francisco were filled or converted to underground drains during development of the City, and as a result, there are no natural freshwater bodies or streams within the Project site.[436] Development has obscured and modified the historic drainage basin boundaries. Figure III.M-1 shows drainage basins in the Bayview Hunters Point neighborhood based on current hydrological conditions.

Islais Creek Basin

The Islais Creek Basin encompasses ten square miles,[437] and includes the northern portion of HPS Phase II. Islais Creek originates in Glen Canyon, over three miles west and slightly north of the Project site. The only remaining surface extents of the historic creek channel are in Glen Canyon and at the San Francisco Bay waterfront near the foot of Potrero Hill and Cesar Chavez Street. Flows from Islais Creek are conveyed to the combined sewer system. Surface inflow to Islais Creek Channel occurs during the rainy season from direct stormwater runoff from areas adjacent to the channel and from treated wastewater discharged from the combined sewer system (described in more detail below) through the Quint Street outfall. Four deep water combined sewer overflow (CSO) structures[438] are also located along the Islais Creek Channel.[439]

Yosemite Basin

The Yosemite Basin encompasses approximately three square miles[440] and contains the southern portion of HPS Phase II and Candlestick Point. Yosemite Creek historically originated from a hilltop spring in McLaren Park and ran through what are now the Portola and Bayview neighborhoods before discharging into San Francisco Bay via Yosemite Slough. The creek is culverted and channelized, and the channel receives direct stormwater runoff from areas adjacent to the channel and from two CSO structures with nearshore discharges.

Surface Water Bodies

Yosemite Slough

Yosemite Slough is located along the southwestern shoreline of HPS Phase II and along the northern shoreline of Candlestick Point. Historically, Yosemite Slough was part of a much broader tidal marsh and

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435 San Francisco Public Utilities Commission, *Urban Watershed Planning Charrette, Bayside Basins Summary Report*, May 2008.
436 Oakland Museum of California, *Creek and Watershed Map of San Francisco,* 2007.
437 San Francisco Public Utilities Commission, *Urban Watershed Planning Charrette, Bayside Basins Summary Report*, May 2008.
438 A combined sewer overflow (CSO) structure discharges flows that exceed the capacity of the combined sewer system during heavy rain. Such discharges receive primary (flow-through) treatment in underground storage/transport boxes. Refer to the description of the City's combined sewer system later in this section.
439 San Francisco Redevelopment Agency and San Francisco Planning Department, *Bayview Hunters Point Redevelopment Projects and Rezoning Draft Environmental Impact Report*, October 19, 2004. File No. 1996.546E, p. III.M-3.
440 San Francisco Redevelopment Agency and San Francisco Planning Department, *Bayview Hunters Point Redevelopment Projects and Rezoning Draft Environmental Impact Report*, October 19, 2004. File No. 1996.546E, p. III.M-3.

mudflat complex that served as the transition between Yosemite Creek to the west and the Bay to the east. Starting in the late 1800s, Yosemite Slough was filled for residential and industrial use, raising the ground surface to a level approximately 5 to 20 feet above sea level. Filling of the tidelands continued through the 1960s, until the approximate current shoreline became established in 1972.[441] As noted above, surface inflow into the remnant channel of Yosemite Slough occurs during the rainy season from treated wastewater discharged from the combined sewer system through three nearshore CSO structures and from direct stormwater runoff from areas adjacent to the slough. A planned restoration of Yosemite Slough includes restoring 12 acres of upland fill back to tidally influenced wetlands. The restoration project is being implemented by the California State Parks Foundation in collaboration with local environmental groups.

South Basin

South Basin is located along the southern shoreline of HPS Phase II and the eastern shoreline of Candlestick Point. The South Basin is an embayment with direct and open tidal exchange with the Lower Bay. Yosemite Slough flows into South Basin from the west, and South Basin also receives stormwater discharges from separate drainage systems located in HPS Phase II and Candlestick Point.[442]

Candlestick Cove

Candlestick Cove is located along the southern shoreline of Candlestick Point. Historically, there were two small creeks flowing from the adjacent uplands to the Lower Bay in this vicinity; however, both creeks have been filled. This portion of the Lower Bay receives surface drainage from one nearshore CSO structure and from direct stormwater runoff and discharge from a separate storm sewer outfall.[443]

Groundwater Basins

Groundwater basins in the vicinity of the Project site, as defined in the Basin Plan, include (from north to south) Islais Valley (Basin ID: 2-33; area: 9.2 square miles), South San Francisco (Basin ID: 2-37; area: 3.4 square miles), and Visitacion Valley (Basin ID: 2-32 area: 9 square miles).[444] Hydrologic regions and basin identification numbers are designated by DWR.

Sources of recharge into the groundwater basins include infiltration of rainfall, landscape irrigation, and leakage from water, wastewater, and storm drain pipes. A study performed in 1993, found that the average groundwater recharge for the water years 1987 to 1988 was 1,836 acre-feet per year in Islais Valley, 696 acre-feet per year in South San Francisco, and 269 acre-feet per year in the Visitacion Valley

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441 California Department of Parks and Recreation, 2006, Candlestick Point State Recreation Area, *Yosemite Slough Restoration Project, Initial Study Mitigated Negative Declaration*, June, page 6.
442 San Francisco Redevelopment Agency and San Francisco Planning Department, *Bayview Hunters Point Redevelopment Projects and Rezoning Draft Environmental Impact Report*, October 19, 2004. File No. 1996.546E.
443 San Francisco Redevelopment Agency and San Francisco Planning Department, *Bayview Hunters Point Redevelopment Projects and Rezoning Draft Environmental Impact Report*, October 19, 2004. File No. 1996.546E.
444 California Regional Water Quality Control Board San Francisco Bay Region (Water Board), *2007, San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*, January 18.

groundwater basin.[445] Generally, the basins in the Project site, which are not used for water supply, have maintained stable groundwater levels.[446]

Stormwater Drainage

Combined Sewer System

Facilities and Operation

Most stormwater runoff in the City is collected via a combined sewer system managed by the SFPUC. This system combines stormwater runoff and wastewater flows in the same network of pipes, conveying flows to facilities where they are treated prior to discharge to the Lower Bay or Pacific Ocean through outfall structures along the shoreline. Discharges from the combined sewer system are regulated under two individual National Pollutant Discharge Elimination System (NPDES) permits (waste discharge requirements [WDRs]) issued by the SFRWQCB. The Project site discharges to east side facilities that discharge to the Lower Bay. The applicable NPDES Permit/WDR is discussed in the Regulatory Setting section.

The combined sewer system is designed to ensure that most wastewater receives secondary treatment (removal of settleable materials and partial removal of dissolved materials). During dry weather, wastewater and any dry-weather runoff (e.g., from irrigation runoff, discharge from underground springs, or pipe leaks) from the eastern portions of the City is conveyed to the Southeast Water Pollution Control Plant (SWPCP), at Phelps Street between Jerrold and Evans Avenues, just northwest of the Project site (refer to Figure III.M-2 [Existing SFPUC Major Water Quality Features]). The SWPCP treats approximately 67 million gallons per day (MGD) during dry weather (approximately 80 percent of the City's total wastewater flow)[447] and has the capacity to treat 150 MGD to a secondary treatment standard. Secondary treatment uses pure oxygen to encourage growth of microorganisms that consume organic material and improve the purity of the wastewater. Wastewater is then put into a second round of settling tanks where the microorganisms are separated from the cleaned water, and disinfected. Treated, dechlorinated wastewater is then discharged through the Southeast Plant deep water outfall at Pier 80.

If the combined wet-weather flows exceed 150 MGD, the plant can also treat an additional 100 MGD to a primary treatment standard (removal of settleable materials) plus subsequent disinfection and dechlorination.[448] Wet weather flows that are treated to the primary standard (plus disinfection) are only discharged from the Southeast Pollution Control Outfall (Pier 80 outfall), while flows treated to the secondary standard and disinfected are discharged through the Quint Street outfall to the Islais Creek Channel when maximum capacity of the plant is reached.

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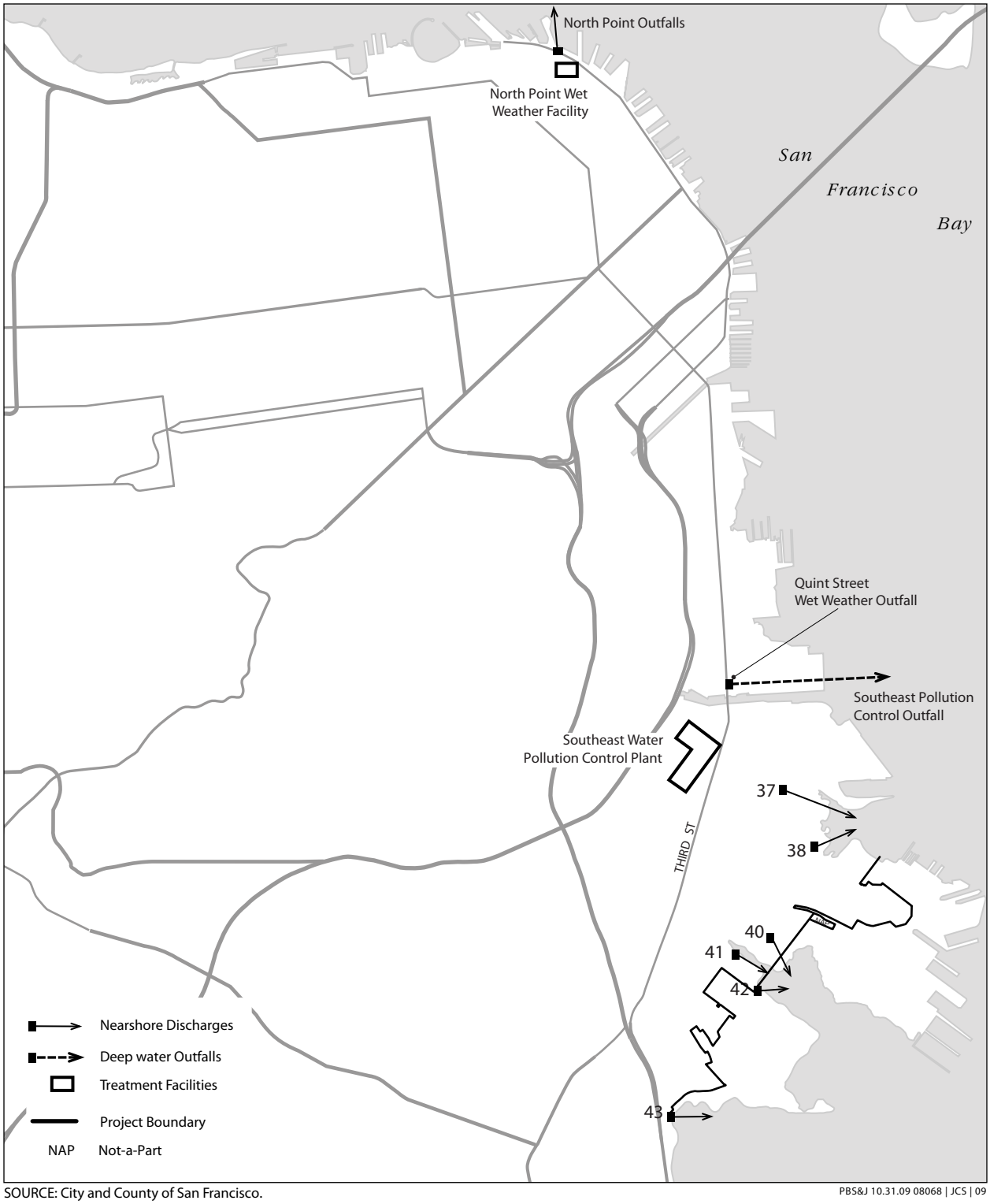
445 California Department of Water Resources (DWR), *California's Groundwater Bulletin 118, Update 2003*.
446 California Department of Water Resources (DWR), *California's Groundwater Bulletin 118, Update 2003*.
447 San Francisco Public Utilities Commission, website:
http://sfwater.org/mto_main.cfm/MC_ID/14/MSC_ID/117/MTO_ID/225, accessed July 22, 2009.
448 San Francisco Public Utilities Commission, 2008. *System Overview: Wastewater System Map.* Accessed online November 6, 2008 at: http://sfwater.org.



SOURCE: City and County of San Francisco.

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EXISTING SFPUC MAJOR WATER QUALITY FEATURES

FIGURE III.M-2

During larger storm events, excess flows that cannot be treated at the SWPCP are treated and discharged through the Bayside Wet Weather Facilities (BWWF), which consist of a series of interconnected underground tanks, tunnels, and outfall structures. During dry weather, the BWWFs transport combined wastewater to the SWPCP. During wet weather, the underground transport tunnels provide a total storage capacity of approximately 193 million gallons, while pumps continue to transfer combined wastewater and stormwater to the SWPCP. The BWWFs were designed, in accordance with the NPDES permit, to capture and store sufficient volumes of sewage and stormwater to limit discharges from the BWWF to specified long-term average numbers of annual discharges (CSOs). The Project site discharges to the system that was designed to achieve a long-term annual average of ten, eight, four, or one CSO events, depending upon location. When the treatment capacity of the SWPCP is fully maximized, the wet weather facilities retain storm flows for later treatment. The tanks allow floatable and settleable solid materials to be removed, similar to primary treatment processes. The materials retained in the storage and transport boxes are flushed to the treatment plants after storms. This level of treatment meets the minimum treatment specified by the US Environmental Protection Agency (US EPA) Combined Sewer Overflow Control Policy (CSO Policy) I50 FR 18688; April 11, 1994.

During very large storm events that cause flow to the SWPCP to exceed 110 MGD, and when the treatment and storage capacities of the combined system are exceeded, excess flows receive "flow-through treatment," similar to primary treatment, to remove settleable solids and floatable materials and flows are then discharged into the Lower Bay through any one of 29 CSO structures located along the City's Bayside waterfront from Fisherman's Wharf to Candlestick Point. The volume of a CSO discharge is a function of the storm intensity, storm duration, treatment rate, and available storage. CSO discharges typically consist of about 6 percent sewage and 94 percent stormwater.[449] All solids that settle out in the storage/transport structures are flushed to the SWPCP after the rainstorm. There are six CSO structures in the vicinity of the Project site, in Yosemite Slough/South Basin and Candlestick Cove (CSO-37 through CSO-43 as depicted on Figure III.M-2).

At Candlestick Point, the Candlestick Park stadium and Alice Griffith public housing site discharge stormwater runoff to the combined sewer system, while the Candlestick Point State Recreation Area (CPSRA) and portions of the stadium parking lots have separate storm sewer systems (refer to description below). Stormwater at HPS Phase II does not flow to the City's combined sewer system, but is discharged to the Bay via separate stormwater system outfalls and overland flows (refer to description below).

Current Combined Sewer System Planning Efforts

The SFPUC is preparing a long-term strategy for the management of the City's wastewater and stormwater, to be presented in a Sewer System Master Plan.[450] The Sewer System Master Plan will examine the capacity, condition, and long-term management strategies for the City's combined sewer system infrastructure and facilities.

[449] City of San Francisco, San Francisco Public Utilities Commission, and Port of San Francisco, 2009, op. cit.
[450] City of San Francisco, San Francisco Public Utilities Commission, 2009. *SF Sewer System Master Plan Overview,* website: http://sfwater.org/msc_main.cfm/MC_ID/14/MSC_ID/120, accessed July 20, 2009.

As part of the long-term planning process, the SFPUC is examining alternative discharge options for treated combined sewer flows. In 2006, the SFPUC updated the Recycled Water Master Plan (described in the Regulatory Framework), to develop a terrestrial discharge option for treated wastewater for landscaping purposes. The Recycled Water Master Plan identifies where and how San Francisco could most feasibly develop recycled water in the City and provides a strategy for implementing the recycled water projects.[451]

Separate Storm Sewer Systems

Approximately ten percent of the City is served by separate storm sewer systems or is lacking storm sewer infrastructure. Existing separate storm sewer systems do not generally provide treatment prior to discharge to the Lower Bay.[452] Similarly, in areas lacking storm sewer infrastructure, untreated surface runoff drains directly to the Bay.[453] The separate storm sewer systems are regulated under the NPDES, also discussed in the Regulatory Framework.

The portions of the Project site that have a separate storm sewer system are shown in Figure III.M-1. Approximately 47 acres surrounding the Candlestick Park stadium discharge to a separate storm sewer system.[454] The San Francisco Recreation and Park Department maintains the storm drain system for this area, including catch basins, piping, pump stations, and outfalls, and the SFPUC provides assistance on outfall maintenance. This storm sewer system is more than 30 years old, and historic flooding has occurred because of the inadequate capacity of the system.[455] Approximately 120.2 acres of the 154-acre Candlestick Park State Recreation Area (CPSRA) are within the Project site and are served by a separate storm sewer system, managed under the jurisdiction of the California Department of Parks and Recreation.[456]

HPS Phase II had a combined sewer system in the 1940s; however, the Navy implemented a series of projects in 1958, 1973, and 1976 to separate the wastewater and storm sewer systems. Most of HPS Phase II is served by the separate storm sewer system; however, areas along the shoreline drain directly to the Lower Bay via overland flow and subsurface migration of infiltrated water.[457] The Navy has obtained Waste Discharge Identification Number (241S011455) for HPS Phase II stormwater discharge under the Industrial General Permit (discussed in the Regulatory Framework). In accordance with this permit, HPS Phase II stormwater is discharged to San Francisco Bay through 33 storm water outfalls along the perimeter of HPS Phase II. HPS Phase II wastewater is conveyed to the SWPCP through a force main at Crisp Road.

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[451] City of San Francisco, San Francisco Public Utilities Commission, 2009. *Our Recycled Water,* website: http://sfwater.org/mto_main.cfm/MC_ID/13/MSC_ID/375/MTO_ID/566, accessed December 9, 2008.
[452] It should be noted, however, that proposed separate sewer systems at the Project site would include treatment mechanisms and BMPs.
[453] City of San Francisco, San Francisco Public Utilities Commission, and Port of San Francisco, 2009, *Draft San Francisco Stormwater Design Guidelines*, February 24.
[454] San Francisco Redevelopment Agency and San Francisco Planning Department, 2004, op. cit.
[455] Ibid.
[456] San Francisco Public Utilities Commission, *Storm Water Management Plan 2003-2004*, January 2004.
[457] City and County of San Francisco Planning Department and San Francisco Redevelopment Agency, *Hunters Point Shipyard Reuse Final Environmental Impact Report*, certified February 8, 2000. File No. 1994.061E.

Flood Protection

Flood management within the Project site is the responsibility of CPSRA and property owners (for Candlestick Point) and the Navy (for the HPS Phase II), who are responsible for the development and maintenance of flood protection facilities. The flood protection facilities primarily consist of stormwater collection systems and coastal protection features, including sea walls and various forms of shoreline armoring (such as rock rip-rap).

Dam Failure Inundation Risk

The Project site is not within a mapped dam failure inundation area (refer to Figure III.M-3 [Dam Failure Inundation Areas in the Project Vicinity]). However, an area adjacent to the Project site, between Yosemite Slough and US-101, has been mapped as a dam failure inundation zone for the University Mound Reservoir.

Existing Flood Risk

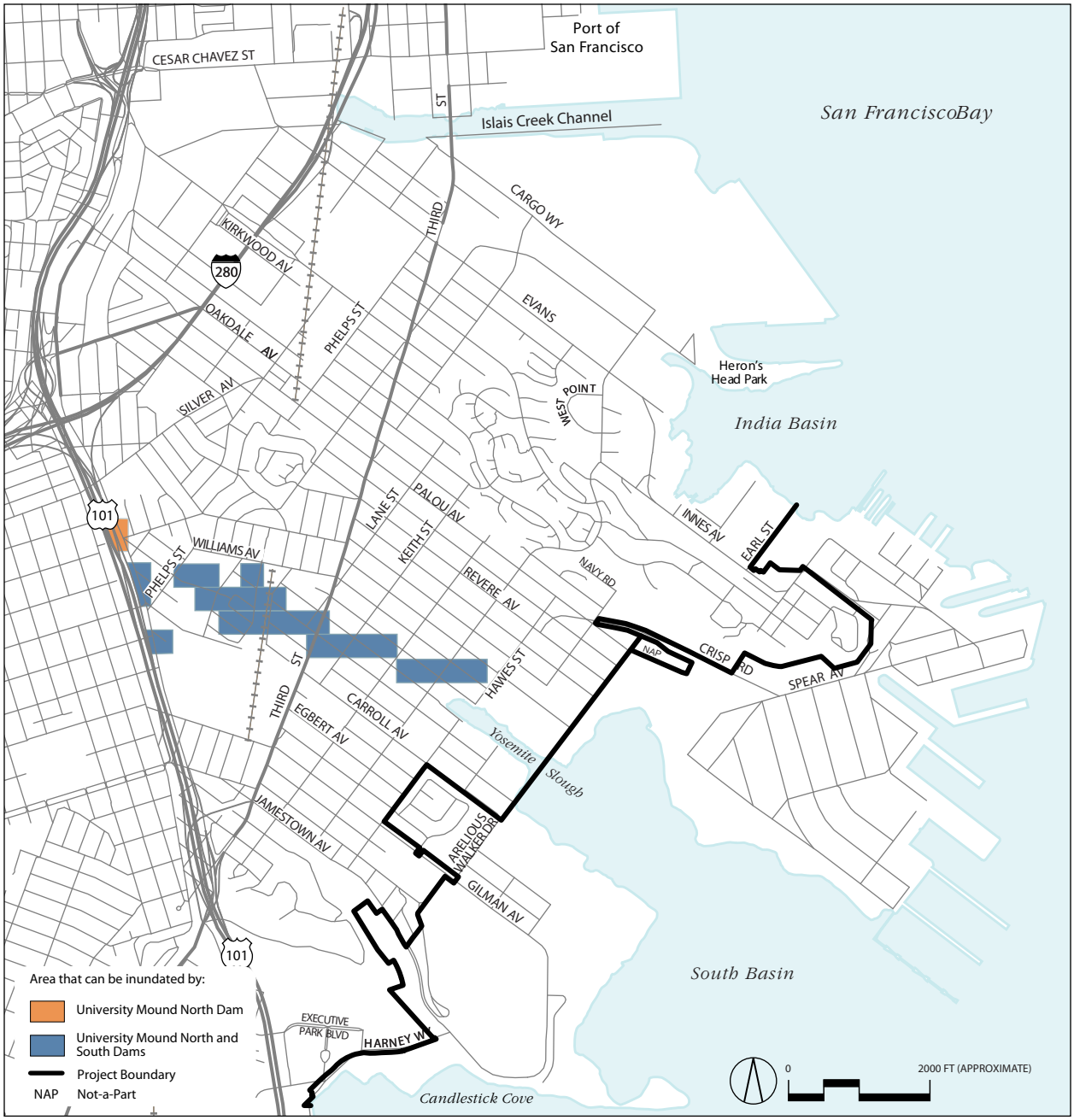
The Federal Emergency Management Agency (FEMA) implements the National Flood Insurance Program (NFIP) under its Flood Insurance Administration, which prepares Flood Insurance Rate Maps (FIRMs) that identify areas subject to flood inundation, most often from a flood having a one percent chance of occurrence in a given year (also known as a "base flood" or "100-year flood"). FEMA refers to the portion of the floodplain or coastal area that is at risk from a flood of this magnitude as a Special Flood Hazard Area (SFHA). For SFHAs, FIRMs may specify the anticipated water surface elevation during the base flood, or Base Flood Elevation. When a Base Flood Elevation has not been formally established for a SFHA, the Base Flood Elevation may be estimated by a qualified engineer. In coastal areas, the Base Flood Elevation may be the equivalent of the height of tidal waters during an extreme high tide event, coupled with flooding from a large storm.

No FIRMs have been formally published by FEMA for the City; thus, the Base Flood Elevation for a 100-year flood event has not been formally established. However, on September 21, 2007, FEMA issued a preliminary FIRM for San Francisco, which tentatively identified SFHAs along the City's shoreline, including portions of the Project site.

Until finalization of the FIRMs, Interim Floodplain Maps have been prepared under the City's Floodplain Management Program to delineate SFHAs subject to the City's floodplain development requirements (see Regulatory section for details). The floodplain management regulations in this ordinance are consistent with the NFIP requirements for communities like San Francisco, where FEMA is in the process of preparing, but has not completed a final FIRM.

As shown on Figure III.M-4 (Preliminary 100-Year Flood Zones within and Adjacent to the Project), portions of Candlestick Point and HPS Phase II are within or adjacent to the following mapped 100-year flood hazard areas on the preliminary FIRM:

- Zone A: Areas with a one percent annual chance of flooding; no Base Flood Elevations determined



SOURCE: ABAG, 1995.

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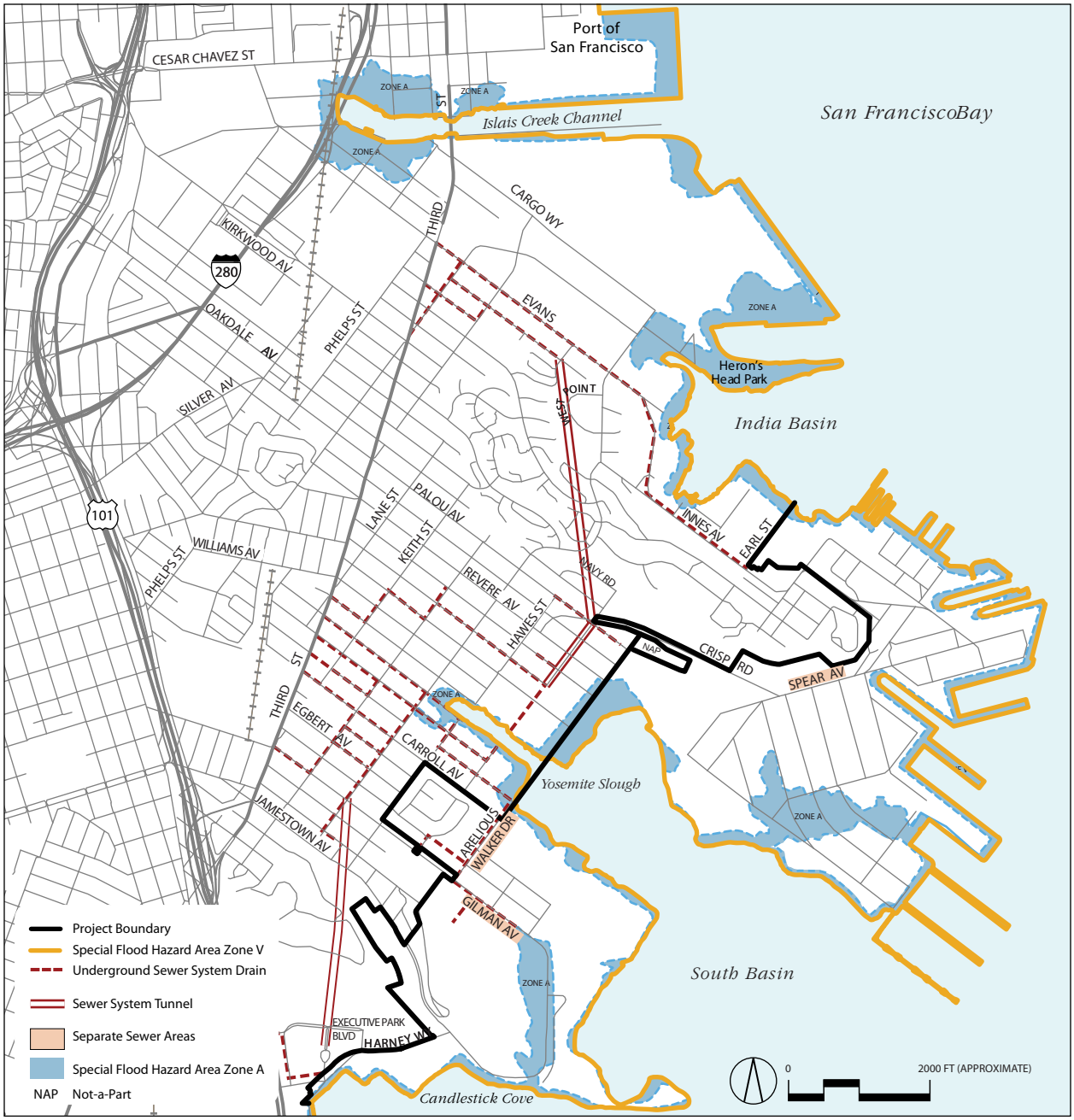
FIGURE III.M-3

DAM FAILURE INUNDATION AREAS IN THE PROJECT VICINITY



SOURCE: FEMA firm (Draft).

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Candlestick Point — Hunters Point Shipyard Phase II EIR

FIGURE III.M-4

PRELIMINARY 100-YEAR FLOOD ZONES WITHIN AND ADJACENT TO THE PROJECT

- Zone V: Coastal areas with a 1 percent or greater chance of flooding and an additional hazard associated with storm waves; no Base Flood Elevations determined[458]

Within the Project site, tidal flooding of the HPS Phase II storm drain system has been identified during high tides in low-lying areas throughout HPS Phase II. In addition, tidal flooding has also been identified within the storm drain system at Candlestick Point.

The extent of the Zone A SFHAs shown for the Project site on the preliminary FIRM and the City's Interim Floodplain Maps is essentially the same.[459] However, the City has submitted comments to FEMA on the preliminary FIRM requesting revision of the Zone V (coastal flooding area) SFHA designation. After reviewing comments and appeals related to the preliminary FIRM, FEMA will finalize the FIRMs and publish them for flood insurance and floodplain management purposes. If final FIRMs are published prior to development of the Project, development within designated SFHAs would be subject to applicable FEMA floodplain development regulations (as described in the Regulatory Framework).

Existing Shoreline Conditions

Based on a 2009 shoreline evaluation by Moffatt and Nichol, the shoreline along the Project site consists of armored embankments (riprap of concrete debris, unprotected embankments, bulkheads, pile-supported wharves, and seawalls.[460] There are two low-lying areas along the shoreline at HPS Phase II and Candlestick Point that have been preliminarily mapped by the City Administrator and FEMA as Zone A SFHAs. The shoreline evaluation determined that the shorelines adjacent to these areas need improvement because wave-induced run-up could result in coastal flooding unless the condition or elevation of the existing shoreline protection features along these areas is improved.

Extreme High Tide, Tsunamis, Seiches and Mudflows

Because of the proximity of the Project site to San Francisco Bay, coastal flooding hazards, including tsunamis, seiches, and extreme high tides could occur. The range of tides within the Bay is variable, and the Army Corps of Engineers (USACE) has developed tidal stage (i.e., height) and frequency relationships from long-term tidal measurements to estimate extreme high tide conditions within San Francisco Bay.

The estimated 100-year high tide at the Hunters Point tidal gauge (the closest gauge to both HPS Phase II and Candlestick Point) is +6.7 feet based on the National Geodetic Vertical Datum (NGVD29),[461,462] equivalent to -1.77 feet based on the San Francisco City Datum (SFCD).[463]

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[458] NFIP regulations require coastal communities to ensure that buildings built in Zone V are anchored to resist wind and water loads acting simultaneously. Buildings in Zone V are subject to a greater hazard than buildings built in other types of floodplains. Not only do they have to be elevated above the Base Flood Elevation, they must be protected from the impact of waves, hurricane-force winds and erosion.

[459] Linda Yeung, San Francisco Floodplain Administrator, City and County of San Francisco City Administrator's Office, personal communication with Randi Adair, PBS&J, October 16, 2009.

[460] Moffatt & Nichol, *Candlestick Point/Hunters Point Development Project Initial Shoreline Assessment*, prepared for Lennar Urban, February, 2009. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

[461] Ibid.

In addition to storm-related flooding and extreme high tides, the Project site could potentially be affected by tsunamis. Tsunamis are waves caused by earthquakes that disturb the ocean floor or by large submarine landslides. The potential hazard related to tsunamis in San Francisco Bay has been analyzed in regional studies. The expected 100-year tsunami wave run-up height at South Basin (which is adjacent to both Candlestick Point and HPS Phase II) is +4.8 feet NGVD29 (-3.8 feet SFCD).[464]

A seiche is an oscillation of a body of water. Seiches occur most frequently in enclosed or semi-enclosed basins, such as lakes, bays, or harbors, and may be triggered by strong winds, changes in atmospheric pressure, earthquakes, tsunamis, or tides. Triggering forces that set off a seiche are most effective if they operate at specific frequencies relative to the size of an enclosed basin. Coastal measurements of sea level often show seiches with amplitudes of a few centimeters and periods of a few minutes, caused by oscillations of the local harbor, estuary, or bay, superimposed on the normal tidal changes. Tidal records for San Francisco Bay have been maintained for over 100 years, and during this period, a damaging seiche has not occurred. A seiche of approximately four inches occurred during the 1906 earthquake, an event of magnitude 8.3 on the Richter scale. It is probable an earthquake similar to the 1906 event would be the largest experienced in the Bay Area;[465] consequently a seiche larger than four inches is considered unlikely to occur.

A mudflow is a type of landslide that occurs when runoff saturates the ground. Soil that is dry during dry weather turns into a viscous solution that slides downhill. Mudflows typically cause more damage than clear-water flooding because debris-filled water moves with greater force. Refer to Section III.L (Geology and Soils), Impact GE-6 through Impact GE-8, for a discussion of the potential for landslides to occur at the Project site.

Future Flood Risks

The current potential for coastal flooding will likely be exacerbated in the foreseeable future because of rising sea levels. Globally, sea level has been rising for the past 10,000 years as the result of the end of the last glacial epoch.[466] The global rate of sea level rise had been relatively consistent over the last 5,000 years, at approximately 0.0039 feet/year.[467] However, the current average rate of sea level rise for the San

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[462] NGVD29 is roughly equivalent to mean sea level.

[463] Conversion among mean sea level, NGVD29, and NAVD88 were conducted using the National Oceanic and Atmospheric Administration Vertical Datums Transformation Tool v. 2.2.4, last modified July 13, 2009, website: http://vdatum.noaa.gov/. San Francisco City Datum (SFCD) is a local vertical geodetic reference elevation established by the City Engineer for the City and County of San Francisco. SFCD = NAVD88 + 11.17 feet or NGVD29 + 8.48 feet.

[464] Garcia, A.W. and Houston, J.R., 1975. *Type 16 Flood Insurance Study: Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound*, United States Army Corps of Engineers Technical Report H-75-17. Figure 58. Elevations in the Corps study are referenced to mean sea level and have been converted to NGVD29 and SFCD.

[465] Working Group On California Earthquake Probabilities, *Earthquake Probabilities in the San Francisco Bay Region: 2002–2031*, United States Geological Survey Open-File Report 03-214, Appendix D. "Magnitude and Area Data for Strike Slip Earthquakes," Dr. William L. Ellsworth, Research Seismologist, USGS, 2003.

[466] Gornitz, V., January 2007, *Sea Level Rise, After the Ice Melted and Today.* Goddard Institute for Space Studies Science Briefs, website: http;://www.giss.nasa.gov/research/briefs/gornitz_09/, accessed September 18, 2009.

[467] San Francisco Bay Conservation and Development Commission (BCDC), October 1988, op. cit.

Francisco Bay area is 0.0066 feet/year at the San Francisco tide station.[468] The difference between the rate of sea level rise measured in the Bay Area and the rate of global sea level rise can be accounted for by local changes in ground surface elevation, such as tectonic uplift or subsidence. The rate of relative sea level change is variable even on a local scale.[469]

There is also evidence that sea level rise is accelerating. The cause of the measured acceleration in the rate of sea level rise is primarily attributed to ocean warming (thermal expansion), continental ice melt, and land elevation changes.[470,471,472] The most common explanation for the increased rate of sea level rise is an increase in global temperatures associated with emission of greenhouse gases.[473] Section III.S (Greenhouse Gas Emissions) contains a discussion of the relationship between greenhouse gas emissions and climate change effects.

State and federal regulatory agencies review a range of possible scenarios when evaluating the potential risks and costs of sea level rise for future development projects. For planning purposes, the USACE evaluates three scenarios of sea level rise; low risk, assuming the current rate of sea level rise, or 19.7 inches (0.5 meter) by 2100; moderate risk, assuming a sea level rise of 39.4 inches (1.0 meter) by 2100; and, high risk, assuming a sea level rise of 59.0 inches (1.5 meters) by 2100.[474] California Executive Order S-13-08 (November 14, 2008) states that all state agencies planning construction projects in areas vulnerable to future sea level rise shall consider a range of sea level rise scenarios for the years 2050 and 2100 to assess project vulnerability, and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. This Executive Order also directs the California Resources Agency, in cooperation with the Department of Water Resources and the California Energy Commission, to prepare a Sea Level Rise Assessment Report by December 1, 2010 to advise how California should plan for future sea level rise. The Governor of California's Delta Vision Blue Ribbon Task Force has adopted a sea level rise of 55 inches by 2100 for planning purposes, until issuance of an Executive Order determining otherwise.[475] The San Francisco Bay Conservation and Development Commission (BCDC) has prepared maps for areas inundated by 16 inches of sea level rise by 2050 and 55 inches of sea level rise by 2100.[476] Therefore, extrapolating BCDC projections to the 2075 mid-point, sea level rise would be

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[468] National Oceanic and Atmospheric Administration (NOAA), NOAA Tides and Currents. *Mean Sea Level Trend 9414290 San Francisco, California 1887-2006,* website: http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9414290, accessed September 18, 2009.
[469] Moffatt and Nichol, Engineers, December 1988, *Sea Level Rise: Predictions and Implications for San Francisco Bay,* prepared for the San Francisco Bay Conservation and Development Commission, December 1987, revised October 1988.
[470] US EPA, No date. *Coastal Zones and Sea Level Rise*, website: http://www.epa.gov/climatechange/effects/coastal. Accessed September 8, 2009.
[471] Cayan, D., P. Bromirski, K. Hayhoe, M. Tyree, M. Dettinger, and R. Flick. March 2006, White Paper: Projecting Future Sea Level, A Report from: California Climate Change Center CEC-500-2005-202-SF p. 12-13.
[472] US Army Corps of Engineers, July 1, 2009. Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs. Circular No. 1165-2-211, p. B-1 to B-13.
[473] Stanford SOLAR Center, 2008, *Global Warming,* website: http://solar-center.standford.edu/sun-on-earth/glob-warm.html, accessed September 18, 2009.
[474] US Army Corps of Engineers, July 1, 2009. Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs. Circular No. 1165-2-211, p. B-1 to B-13.
[475] Delta Vision Blue Ribbon Task Force, State of California Resources Agency, March 24, 2008, *Letter to Governor Schwarzenegger,* Agenda Item 2, Attachment 1.
[476] San Francisco Bay Conservation and Development Commission (BCDC), April 7, 2009, *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline,* Draft Staff Report.

about 36 inches (3 feet), although some studies have concluded this rise would not occur until after the year 2100.[477]

Sea level rise presents an important issue in the planning of development and hazard analysis in coastal areas.[478] Within the Project site, this includes the potential for increased risk of flooding because of higher sea surface levels. A determination or conservative estimate of the potential magnitude of future sea level rise is needed to assess potential impacts related to sea level rise and to identify mitigation measures found to be appropriate to address the impact(s)[479,480] and is provided in the analysis.

Although FEMA has not formally defined the Base Flood Elevations for the Project site, Moffatt and Nichol[481] has evaluated extreme high tide water level elevations for the Project site using NOAA tide gauge data. The Moffatt and Nichol study estimates that development at the Project site constructed at a level less than +6.7 feet NGVD29 (-1.8 feet SFCD), could be susceptible to flooding associated with the 100-year extreme high tide event. However, as sea level rises, coastal flood hazards associated with storm-related flooding, extreme high tides, and/or tsunamis adjacent to or affecting the Project site would increase. Assuming a 36-inch rise in sea level by 2075, the future base flood (100-year event) elevation would be +9.7 feet NGVD29 (+1.2 feet SFCD).[482] Projected inundation zones for the future Base Flood Elevation, given a 36-inch increase in sea level, are shown in Figure III.M-5 (Flood Zones [Existing and with a 36-Inch Sea Level Rise]). This figure reflects the proposed condition without fill and without shoreline improvements.

Water Quality

Impaired Water Bodies and Total Maximum Daily Loads

The Lower Bay has been identified as an impaired water body by the SWRCB in compliance with Section 303(d) of the *Clean Water Act of 1977* (CWA), because it does not meet the water quality objectives of the Basin Plan, California Toxics Rule (CTR), or National Toxics Rule (NTR) for listed beneficial uses (industrial service supply; ocean, commercial and sport fishing; shellfish harvesting; estuarine habitat; fish migration; preservation of rare and endangered species; fish spawning; wildlife habitat; water contact recreation; non-contact water recreation; and navigation). The pollutants that have been identified as causing impairment in the Lower Bay are chlordane, dichloro-diphenyl-trichloroethane (DDT), dieldrin, dioxin compounds, exotic species, furan compounds, mercury, and polychlorinated

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477 Moffatt & Nichol, *Candlestick Point/Hunters Point Development Project Initial Shoreline Assessment*, prepared for Lennar Urban, February, 2009, op. cit.
478 California Natural Resources Agency, 2009, *2009 California Climate Adaptation Strategy Discussion Draft: A Report to the Governor of the State of California in Response to Executive Order S-13-2008*. p. 4-10.
479 Ibid.
480 Department of the Army, United States Army Corps of Engineers (Corps), July 1, 2009, Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs, Circular No. 1165-2-211. Available at: http://140.194.76.129/publications/eng-circulars/ec1165-2-211/ec1165-2-211.pdf.
481 Moffatt & Nichol, 2009, op. cit.
482 Ibid.

SOURCE: RHAA, 2009.

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FIGURE III.M-5

Candlestick Point — Hunters Point Shipyard Phase II EIR

FLOOD ZONE (EXISTING AND WITH A 36-INCH SEA LEVEL RISE)

biphenyls (PCBs).[483] Islais Creek, north of the Project site, is listed as an impaired water body because of ammonia, chlordane, dieldrin, hydrogen sulfide, polynuclear aromatic hydrocarbons (PAHs), and sediment toxicity. Candlestick Cove is listed as an impaired water body for indicator bacteria. The potential sources of pollutants identified in the impaired water bodies adjacent to the Project site include non-point sources[484], CSOs, industrial and municipal point sources[485], atmospheric deposition, ballast water,[486] resource extraction, natural sources, and unknown sources. A Total Maximum Daily Load (TMDL)[487] for the entire San Francisco Bay has been developed for mercury and has been incorporated by amendment into the Basin Plan. A TMDL for the entire San Francisco Bay has also been developed for PCBs, and its adoption is pending approval by the SWRCB and the US EPA.

Regional Monitoring Program

The quality of surface water and groundwater in the vicinity of the Project site is affected by past and current land uses at the site. Water quality within the watershed is also affected by the composition of local geologic materials. In 1993, the San Francisco Estuary Institute initiated the Regional Monitoring Program (RMP) for the San Francisco Bay for the general purposes of assessing regional water quality conditions and characterizing patterns and trends of contaminant concentrations and distribution in water and sediment, as well as identifying general sources of contamination to the Bay. The program has established a database of water quality and sediment quality in the estuary, particularly with regard to toxic and potentially toxic trace elements and organic contaminants. However, there are no water quality RMP monitoring stations (fixed locations or random sites) in close proximity to the Project site[488]; therefore, the trends identified by this monitoring program reflect regional, rather than site-specific, water quality conditions. Based on monitoring results from the RMP for 2002 to 2006, water column samples collected from the Lower Bay did not contain contaminant concentrations above regulatory thresholds as listed in Table III.M-1 (Lower Bay Regulatory Thresholds).[489] A TMDL is in effect for mercury for the entire San Francisco Bay.

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[483] US EPA, 2007. 2006 CWA Section 303(d) List of Water Quality Limited Segments, June 28, 2007.
[484] Non-point sources are diffuse sources of pollutants, generated over a large area, and not discharged at a discrete location, such as runoff from a natural watershed.
[485] Point sources are pollutant sources discharged at a discrete location, such as a wastewater treatment plant outfall.
[486] Water used to weight a ship to the water's surface, preventing toppling during heavy winds.
[487] On a broad level, the TMDL process leads to a "pollution budget" designed to restore the health of a polluted body of water. The TMDL process provides a quantitative assessment of water quality problems, contributing sources of pollution, and the pollutant load reductions or control actions needed to restore and protect the beneficial uses of an individual waterbody impaired from loading of a particular pollutant. More specifically, a TMDL is defined as the sum of the individual waste load allocations for point sources, load allocations for non-point sources, and natural background such that the capacity of the water body to assimilate pollutant loading (the loading capacity) is not exceeded (40 CFR Section 130.2). In other words, a TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards which will ensure the protection of beneficial uses.
[488] There are, however, sediment quality sampling sites located near the Project site, as described below, under 'Sediment Quality'.
[489] San Francisco Estuary Institute (SFEI), 2007, *The 2006 RMP Annual Monitoring Results.* San Francisco Estuary and the Regional Monitoring Program for Water Quality in the San Francisco Estuary. SFEI Contribution No. 542, p. 43.

Table III.M-1 Lower Bay Regulatory Thresholds

Compound	*Units*[a]	*4-day Average*	*1-hour Average*	*24-hour Average*
Dissolved Arsenic	µg/L	36	69	NA
Dissolved Cadmium	mg/L	9.3	42	NA
Dissolved Chromium VI	mg/L	50	1,100	NA
Dissolved Copper[b]	µg/L	3.1	4.8	NA
Dissolved Lead	µg/L	8.1	210	NA
Total Mercury	µg/L	0.025	2.1	NA
Dissolved Nickel	µg/L	8.2	74	NA
Dissolved Silver	µg/L	NA	1.9	NA
Total Selenium	µg/L	5.0	20	NA
Dissolved Zinc	µg/L	81	90	NA
Polynuclear Aromatic Hydrocarbons	µg/L	NA	NA	15
Chlordane[d]	µg/L	0.004	0.09	NA
Chlorpyrifos[d]	µg/L	0.0056	0.011	NA
Dieldrin	µg/L	0.0019	0.71	NA
Endrin[d]	µg/L	0.0023	0.037	NA
Gamma-HCH[d]	µg/L	NA	0.16	NA
Heptachlor[d]	µg/L	0.0036	0.053	NA
Heptachlor Epoxide[d]	µg/L	0.0036	0.053	NA
p,p'-DDT[d]	µg/L	0.001	0.13	NA
Mirex[d]	µg/L	0.001	NA	NA

Others	*Units*	*Value*	*Description*
Dissolved Oxygen	mg/L	5.0	Minimum
pH	SU	6.5-8.5	No change greater than 0.5 SU from natural conditions by controllable factors
Temperature	Degrees Fahrenheit	5°F increase	No increase greater than 5°F from natural conditions by controllable factors
Turbidity	NTU	10 percent increase	No increase greater than 10 percent from natural conditions by controllable factors where natural turbidity is greater than 50 NTU
Unionized ammonia	mg/L	0.025 (median) 0.40 (maximum)	Lower Bay
Fecal coliforms	MPN/100 mL	<14 (geometric mean) <43 (90th percentile)	Most limiting use; shellfish harvesting
Toxicity (acute)[c]	Test Organism Survival Rate	> 90 percent (median) > 70 percent (90th percentile)	96 hour static or continuous flow tests
Toxicity (chronic) [c]		NA	No chronic toxicity allowed

Table III.M-1 Lower Bay Regulatory Thresholds

SOURCE: California Regional Water Quality Control Board San Francisco Bay Region, *San Francisco Bay Basin (Region 2) Water Quality Control Plan* (Basin Plan), January 18, 2007.

NA = not applicable

a. Where mg/L = milligrams per liter (parts per thousand), mg/L = micrograms per liter (parts per million), mL = milliliters, SU = standard units, NTU = Nephelometric Turbidity Units, MPN = Most Probable Number, geometric mean = logarithmic average of at least 5 samples per month.

b. US EPA may update these values without requiring a Basin Plan amendment. Source of current limit: Central Valley Regional Water Quality Control Board, 2008, Water Quality Limits for Constituents and Parameters, A Compilation of Water Quality Goals July 2008 Edition, Available at: http://www.swrcb.ca.gov/water_issues/programs/water_quality_goals/index.shtml

c. Acute refers to sudden, episodic conditions; chronic refers to long term conditions

d. Source: San Francisco Estuary Institute (SFEI), 2007, The 2006 RMP Annual Monitoring Results. San Francisco Estuary and the Regional Monitoring Program for Water Quality in the San Francisco Estuary. SFEI Contribution No. 542. San Francisco Estuary Institute, Oakland, CA, p. 49

Occurrence of CSO Events

In accordance with the Long-Term Control Plan required under the City's NPDES Wastewater Discharge Permit (see Regulatory Framework, below) SFPUC designed its combined sewer system based on historical rainfall to achieve the long-term average goal of only one CSO event per year along the southeast sector of the City. This wet weather performance criteria (no more than one CSO per year) is a long-term average and is not to be used to determine compliance or non-compliance with the wastewater operations NPDES permit/WDR because some years are wetter than others and may contribute more flow to the treatment system than anticipated and designed.[490] However, the SFPUC is also required to optimize the operation of its system to minimize overflows and maximize pollutant removal. No CSO events are untreated because all discharges receive at least primary treatment in the storage and transport system.[491]

The principal pollutants in CSOs are pathogens, oxygen depleting substances, TSS, toxics (metals, petroleum hydrocarbons, man-made organic chemicals), nutrients, and floatables. CSOs can adversely affect some beneficial uses of the Lower Bay such as aquatic life support, fish consumption, shellfish harvesting, and recreation. On the 303(d) list, CSOs are listed as a source of pollutants causing impairment in Islais Creek. Wet weather beach water quality data collected by the SFPUC and San Francisco Department of Public Health (DPH) in the vicinity of the Project, which includes the effects of CSOs, discharges from separate storm drain systems, and runoff discharging directly into the Bay, indicate levels above those presented in the Basin Plan water quality objective for total coliform bacteria. Also, the other pathogen indicators that are monitored have significantly higher concentrations in wet weather than in dry weather.

Beach Water Quality

The SFPUC and the DPH collaboratively implement a shoreline beach water quality monitoring program. The monitoring program consists of year-round weekly sampling at 14 locations around the

[490] The California Regional Water Quality Control Board, San Francisco Bay Region recognizes that some years are wetter than others and may contribute more flow than anticipated in the system design criteria.

[491] California Regional Water Quality Control Board, San Francisco Bay Region. 2008, Order No. R2-2008-0007 and NPDES No. CA0037664, Waste Discharge Requirements for the City and County of San Francisco Southeast Water Pollution Control Plant, North Point Wet Weather Facility, and Bayside Wet Weather Facilities and Wastewater Collection System, adopted January 30, 2008.

perimeter of San Francisco where water contact recreation may occur (including three stations near the Project site). Additional monitoring is conducted whenever CSO events occur that could affect a monitored beach. Samples are analyzed at the SFPUC Microbiology Laboratory for pathogen indicator bacteria[492] that include total coliform, Escherichia coli, and enterococcus bacteria.

Adjacent to the Project site are the sampling locations at Jack Rabbit Beach, Windsurfer Circle, and Sunnydale Cove. The Windsurfer Circle and Sunnydale Cove sampling locations are nearest to CSO 043 (Candlestick Cove) and the Jack Rabbit Beach sampling location is south of CSO 042 (South Basin), as shown on Figure III.M-1 and Figure III.M-2.

Water quality in the vicinity of the three beach water quality locations is affected by both separate sewer system discharges and combined sewer discharges. Jack Rabbit Beach has the lowest pathogen indicator concentrations for both wet- and dry-weather conditions, and Windsurfer Circle has the highest concentrations. Pathogen indicator concentrations are significantly higher in wet-weather than in dry-weather for all stations. Twenty wet-weather samples exceeded the Basin Plan single sample objective for total coliforms (10,000 Most Probable Number [MPN] per 100 milliliters) at Sunnydale Cove; 40 wet-weather samples exceeded this objective at Windsurfer Circle; and, no wet-weather samples exceeded this objective at Jack Rabbit Beach. Thirteen dry weather samples exceeded the single sample objective for total coliforms at Windsurfer Circle; two dry weather samples exceeded this objective at Jack Rabbit Beach; and, no dry weather samples exceeded this objective at Sunnydale Cove. The data summary for the three locations in the vicinity of the Project site is provided in Appendix M2 (Water Quality Data Analysis). Because the beach water quality samples were collected within the Bay, the data do not indicate any violations of wastewater discharge permit conditions (the wastewater discharge permit regulates the discharge of treated combined sewer flows into the Bay).

Stormwater Discharge Quality

As runoff water flows over the landscape, it picks up dissolved chemicals, particulate material, and gross debris from the surface it flows over, prior to discharge into a water body. The effects of this runoff water on surface water quality depend upon the amount and type of material being picked up and transported, as well as the amount of water or flow rate in the receiving water. Constituents and concentrations within runoff water vary according to land cover, land use, topography, and the amount of impervious cover, as well as the intensity and frequency of irrigation or rainfall. Runoff from undeveloped areas will reflect the natural chemistry and ecology of the watershed. Runoff in developed areas may typically contain oil, grease, and metals accumulated in streets, driveways, parking lots, and rooftops, as well as pesticides, herbicides, particulate matter, nutrients, animal waste, and other oxygen-demanding substances from landscaped areas. Runoff from open space areas and parks may typically contain nutrients, pesticides, organic debris, bacteria, sediment, and others.

Candlestick Point

Site-specific data on stormwater runoff quality from Candlestick Point are not available. However, stormwater runoff quality is highly dependent on the natural and human-influenced nature of the

[492] Although they are not generally harmful themselves, pathogen indicators indicate the possible presence of disease-causing bacteria, viruses, and protozoa.

drainage area. As such, stormwater runoff from urban land uses, like the current land uses at Candlestick Point, would likely contain pathogens, metals, nutrients, sediment, trash and debris, oxygen-demanding substances, various organic chemicals, pesticides, PCBs, and mercury.

Hunters Point Shipyard Phase II

The stormwater runoff from HPS Phase II is currently permitted under the General NPDES Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) (Water Quality Order 97-03-DWQ; General Permit No. CAS000001). Water quality monitoring is performed according to terms specified in the Industrial General Permit (see Regulatory Framework), which requires sampling of stormwater runoff from all outfalls that produce a discharge and analysis of basic indicator parameters. By comparing US EPA stormwater quality benchmarks[493] to the stormwater monitoring data from the HPS Phase II site, the extent to which stormwater pollutant concentrations are elevated above those benchmarks can be identified. Indicator parameters exceeding the benchmarks do not necessarily constitute a violation of water quality standards or an exceedance of permit conditions. Parameter benchmarks are designed to indicate a potential problem and to measure if existing BMPs are effective.

Six annual reports for stormwater discharges at HPS Phase II representing the 2002/03 through 2007/08 reporting periods were available at the SFRWQCB for review.[494,495,496,497,498,499] With the exception of the Annual Report for the 2007-2008 reporting period, separate reports were prepared for the inactive industrial landfill and the remainder of HPS Phase II. Landfill monitoring data were available in Annual Reports for the 2004/05, 2006/07, and 2007/08 reporting periods. Summaries of the data contained in these reports are included in Appendix M2. The basic indicator parameters are as follows:

pH. pH is a numeric measurement of the hydrogen-ion concentration in water. The neutral range is usually considered to be within 6.5 to 8.5. At values less than 6.5, the water is considered acidic; above

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493 The Draft Final 2005 Industrial General Permit contains parameter benchmark concentrations for certain constituents that are derived from US EPA's Multi-Sector General Permit (MSGP). The benchmarks will take effect when the Draft Final Permit is adopted. The benchmarks are not numeric discharge limits, but are used to assess if site Best Management Practices (BMPs) are effective for reducing concentrations of pollutants of concern. The Draft Permit requires that if runoff concentrations are above one or more benchmarks, the discharger must revise its Storm Water Pollution Prevention Plan (SWPPP) to include more effective BMPs, and collect samples from the next two consecutive qualifying storms.

494 Department of the Navy Base Realignment and Closure Program Management Office West, 2002/2003 *Annual Report for Storm Water Discharges Associated with Industrial Activities at Hunters Point Shipyard, San Francisco, California*, No date.

495 Department of the Navy Base Realignment and Closure Program Management Office West, 2004-2005 *Annual Report for Storm Water Discharge Management IR-01/21, Industrial Landfill, Parcel E-2, Hunters Point Shipyard, San Francisco, California*, June 30, 2005. Prepared by AFA Construction Group/EEC.

496 Department of the Navy Base Realignment and Closure Program Management Office West, *2005-2006 Storm Water Monitoring Report, Hunters Point Shipyard, San Francisco, California*, June 2006.

497 Department of the Navy Base Realignment and Closure Program Management Office West*, 2006/2007 Storm Water Monitoring Report, Hunters Point Shipyard, San Francisco, California*, 2007.

498 Department of the Navy Base Realignment and Closure Program Management Office West, *2004-2005 Annual Report for Storm Water Discharge Management IR-01/21, Industrial Landfill, Parcel E-2, Hunters Point Shipyard, San Francisco, California*, July 31, 2007. Prepared by AFA Construction Group/EEC.

499 Department of the Navy Base Realignment and Closure Program Management Office West, *2007/2008 Annual Report for Storm Water Discharges Associated with Industrial Activities, Hunters Point Shipyard, San Francisco, California*, June 2008. Prepared by Marrs Services, Inc. and MACTEC Engineering & Consulting, Inc.

8.5 it is considered alkaline or basic. Pure rainfall tends to have a pH of a little less than 7. Many industrial facilities handle materials that can affect pH. pH is not listed on the 303(d) list as impairing water quality in the Lower Bay.

Specific Conductance (SC). SC is a numerical expression of the ability of water to carry an electric current. It provides an indication of the degree of mineralization, salinity, or the total dissolved solids present (TDS) in stormwater discharges. Rainwater has a SC of close to zero and seawater has a very high SC. High SC could affect the usability of waters for drinking, irrigation, and other commercial or industrial use. SC is not listed on the 303(d) list as impairing water quality in the Lower Bay.

Total Suspended Solids (TSS). TSS is an indicator of the undissolved solids in stormwater runoff. Sources of TSS include sediment from erosion and dirt from impervious areas, as well as other particulates. Because many pollutants can adhere to sediment particles, reducing sediment can reduce the amount of these pollutants in stormwater discharges. TSS is not listed on the 303(d) list as impairing water quality in the Lower Bay.

Total Organic Carbon (TOC). TOC is an indicator of the total organic matter present in water. Organic matter can be natural (such as from plants and animals) or man-made (synthetic organics such as fuels and pesticides). Natural organic matter can deplete the receiving waters of oxygen as it biodegrades. Synthetic organics, even when discharged at low concentrations, can be harmful to and, in some cases, bioaccumulate in aquatic life. TOC is not listed on the 303(d) list as impairing water quality in the Lower Bay.

Oil and Grease (O&G). At very low concentrations, O&G can cause sheen on the surface of water. O&G can adversely affect aquatic life, create unsightly floating material, and make water undrinkable. Sources of O&G at industrial facilities include maintenance shops, vehicles, machines, and roads. O&G is not listed on the 303(d) list as impairing water quality in the Lower Bay.

Metals. Emissions from automobiles and many artificial surfaces of the urban environment (e.g., those covered with galvanized metal, paint, or preserved wood), contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Metals are often associated with sediments in stormwater. Metals are of concern because they are toxic to aquatic organisms and can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish, which can be a health hazard if consumed by other aquatic organisms or people). Metals are listed on the 303(d) list as impairing the water quality of the Lower Bay. Mercury in particular is a pollutant of concern in the Lower Bay and is the focus of a TMDL. Sources of mercury in urban runoff include mercury-containing instruments, switches and thermostats, and fluorescent lighting.[500]

In addition to the basic indicator parameters described above, certain industrial facilities, as determined by the facility's Standard Industrial Classification (SIC), must analyze stormwater runoff samples for additional parameters. HPS Phase II contains many parcels that are leased to other entities; therefore, the

[500] L. Mckee and P. Mangarella, San Francisco Estuary Institute (SFEI) Poster: Mercury budget for stormwater conveyances in the San Francisco Bay Area: Towards achieving TMDL management goals for sediment and fish tissues, SFEI website: http://www.sfei.org/presentations_posters/MERCURYCONF_06/Mercury06_poster_mcKee_final.pdf, Accessed July 18, 2009.

additional parameters monitored at each outfall depend on the SIC(s) of the facilities discharging to the outfall. The additional parameters generally include heavy metals, such as copper and zinc. In addition, runoff from the industrial landfill portion of HPS Phase II is monitored for additional parameters that could potentially be present at the landfill, in accordance with the facility's Storm Water Discharge Management Plan; additional constituents analyzed in runoff from the industrial landfill include semi-volatile organic compounds, PCBs, and metals.

At each outfall, there was at least one parameter whose mean concentration exceeded the benchmark. Parameter benchmarks were exceeded for conductivity, total suspended solids (TSS), total copper, total zinc, and total lead; benchmarks for conductivity and TSS were exceeded most frequently.

Sediment Quality

Regional sediment sampling is being conducted by the San Francisco Estuary Institute as part of the RMP. The sampling occurs throughout the Bay, and a few samples have been taken near the Project site. Elevated levels of methylmercury, PCBs, and PAHs were identified in nearshore sediments samples taken near the Project site.[501] The SFRWQCB also conducted and/or reviewed sediment quality data as part of the Bay Protection and Toxic Cleanup Plan for sites throughout the Bay.[502] Lower Islais Creek was listed as a toxic hot spot[503] because of sediment contamination and impacts to aquatic life; the constituents of concern included PCBs, chlordane, dieldrin, endosulfan, hydrogen sulfide, ammonia, and PAHs. The SFRWQCB indicates the most likely source of pollutants is stormwater entering the channel directly or through the CSOs. Another possible source is the SWPCP outfall at Quint Street. However, because of recent improvements in the treatment of discharges from the CSOs and the Quint Street outfall, historic discharges from these sources may have had a more significant impact than current discharges.[504]

In 2004, the SFPUC prepared a study to evaluate ecological risk from sediment quality around Yosemite Slough.[505] Sampling occurred between 1998 and 2001, and 32 samples were collected in the slough. Samples were taken up to a depth of four feet below ground surface (bgs). Chemical analyses included heavy metals, PCBs, PAHs, and chlorinated pesticides. Sample data were compared to data from six reference sites in the Bay, as well as Effects Range-Medians (ERMs).[506]

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[501] San Francisco Estuary Institute (SFEI), 2007, *The Pulse of the Estuary: Monitoring and Managing Water Quality in the San Francisco Estuary. SFEI Contribution 532.* San Francisco Estuary Institute, Oakland, CA, pp. 34, 39, 42.
[502] State Water Resources Control Board (SWRCB), *Consolidated Toxic Hot Spots Cleanup Plan*, June 1999.
[503] According to SFEI, toxic hot spots can be defined as: "Locations in enclosed bays, estuaries, or the ocean where pollutants have accumulated in the water or sediment to levels which (1) may pose a hazard to aquatic life, wildlife, fisheries, or human health, (2) may impact beneficial uses, or (3) exceed State Water Resources Control Board or Regional Water Quality Control Board-adopted water quality or sediment quality objectives." SFEI, 2009, *Glossary of Terms*, website: http://www.sfei.org/rmp/rmp_glossary.html#top (accessed September 30, 2009).
[504] State Water Resources Control Board (SWRCB), *Consolidated Toxic Hot Spots Cleanup Plan*, June 1999.
[505] San Francisco Public Utilities Commission (SFPUC), Draft Final Sediment Investigation at Yosemite Creek, October 1998-May 2000, July, 2004.
[506] The Effects Range Median (ERM) is the concentration above which effects are frequently or always observed among most species of biota.

Mercury and nickel in surface samples exceeded SFPUC reference site concentrations and ERMs; however, even the SFPUC reference sites exceeded the nickel ERM.[507] Most other heavy metal concentrations were elevated compared to reference site concentrations, but did not exceed ERMs. Subsurface metals concentrations generally decreased with depth, and generally concentrations below two feet were consistent with SFPUC reference site surface sediment concentrations.

No surface sediment samples collected from Yosemite Slough exceeded the PAH ERM, and only one subsurface sample exceeded the PAH ERM. Most surface samples for PCBs exceeded the ERM, and all samples were at least an order of magnitude higher than the mean SFPUC reference site concentration. For subsurface samples, generally the highest concentrations were in the surface to one-foot deep (one foot bgs) core samples, and PCB ERMs were exceeded in almost all cases.

Many chlorinated pesticides were not detected above the analytical practical quantification limit.[508] Total chlordane, DDT, and dieldrin were detected most frequently in samples. All concentrations were elevated compared to the SFPUC reference site mean concentrations, and most mean concentrations exceeded ERMs.[509] Therefore, these data indicate that sediments in Yosemite Slough have been adversely impacted by historic land uses, and sediment quality (for mercury and organic chemicals) could impair the beneficial uses of the Bay.

As noted in Section III.K, a shoreline investigation of sediment contamination was conducted for the 440 acres of underwater land surrounding all portions of the HPS Phase II site to the north, east, south, and southwest. This investigation evaluated whether contamination in Parcels E and E-2 had the potential to migrate (or had migrated) to sediments in the adjacent offshore area or to affect benthic invertebrates, birds, and mammals in the shoreline area. Copper, mercury, and PCBs were identified as the primary risk drivers. These chemicals exceeded concentrations considered safe for benthic invertebrates directly exposed to sediment. PCBs also were shown to cause potential risk to humans if they were to consume shellfish collected at HPS Phase II. However, results of statistical comparisons of fish tissue data at HPS Phase II indicated the potential PCBs risk at HPS Phase II was similar to regional levels.[510] The report concluded that no unacceptable ecological risk was indicated by sediments in India Basin or the wetlands east of the Slough.

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[507] San Francisco Public Utilities Commission (SFPUC), Draft Final Sediment Investigation at Yosemite Creek, October 1998-May 2000, July, 2004.

[508] The lowest level of certainty that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

[509] San Francisco Public Utilities Commission (SFPUC), Draft Final Sediment Investigation at Yosemite Creek, October 1998-May 2000, July, 2004.

[510] Health concerns associated with fish consumption in San Francisco Bay is a regional issue. Concentrations of six chemicals or groups—including mercury, PCBs, dioxins, dieldrin, DDT, and chlordane in fish collected throughout the San Francisco Bay—are elevated enough to pose a potential risk to recreational anglers and have resulted in health advisory warnings.
Barajas and Associates, *Final Feasibility Study Report for Parcel F Hunters Point Shipyard,* April 30. 2008; Jonas and Associates, *Final Second Five-Year Review of Remedial Actions Hunters Point Shipyard*, November 11, 2008. These documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

Groundwater Quality

Portions of the Islais Valley, Visitacion Valley, and South San Francisco groundwater basins underlie the Project site. Existing designated beneficial uses are industrial service and process supplies.[511] Potential beneficial uses of these groundwater basins include municipal and domestic supplies (drinking water) and agricultural supplies; however, the underlying groundwater is not suitable as a drinking water supply.[512]

Principal contaminants in groundwater come from both nonpoint and point sources and include nitrates, pesticides, and industrial chemicals such as solvents.[513] Most groundwater contamination is local in scale.[514] The majority of groundwater pollutants from nonpoint sources[515] are salts and nitrates, which adversely affect approximately 10 to 15 percent of California's water wells, followed by pesticides and industrial contaminants.[516] Pathogens can also migrate to groundwater and contaminate groundwater resources.[517] These contaminants, often associated with septic systems and animal wastes, are transported by water percolating from the soil to the water table, where they enter the groundwater.[518]

The degree of groundwater pollution from point and nonpoint sources depends on a number of factors:[519]

- **Point Sources (PSs)**—The number and intensity of point sources discharge directly to groundwater or to land surfaces.
- **Nonpoint sources (NPSs)**—The number and intensity or strength of NPS pollution activities within the source area of a well or a spring. A large number of low-grade NPS pollution sources may have a cumulative effect similar to that of a few more-intense NPS pollution sources.
- **Percolation rate**—The rate of percolation from the land surface to groundwater. A significant amount of chemicals or pathogens may reach groundwater when the water percolation rate is high.
- **Natural attenuation**—The ability of the soil or aquifer to retain or degrade the chemical before it reaches a well, spring, stream, or lake. The more a chemical is degraded or retained in the subsurface, the less likely it will be to reach a nearby well or stream. This is also a function of the pollutant; certain pollutants are more likely to be retained or degraded compared to others that are readily transported to or within groundwater.

Groundwater beneath the Project site flows from the west towards the Lower Bay. [520] As it passes beneath the Project site, it may become contaminated with bacteria and nutrients from leaky sewers,

511 Basin Plan, 2007.
512 Basin Plan, 2007.
513 Harter, T., 2003, Reference: Groundwater Quality and Groundwater Pollution, University of California Division of Agriculture and Natural Resources Publication 8084.
514 Harter, T., 2003, Reference: Groundwater Quality and Groundwater Pollution, University of California Division of Agriculture and Natural Resources Publication 8084.
515 Nonpoint sources of pollution are diffuse sources, dispersed over a large area and not conveyed in a pipe or other conveyance structure or discharged at a discrete location.
516 Harter, T., 2003, Reference: Groundwater Quality and Groundwater Pollution, University of California Division of Agriculture and Natural Resources Publication 8084.
517 Ibid.
518 Ibid.
519 Ibid.

septic tanks, lawn fertilizers, pet waste, and other sources.[521] Historic land uses within the Project site may have resulted in the contamination of soil or groundwater with hazardous materials, as noted in Section III.K. Finally, groundwater near the shoreline may also mix with saltwater that ebbs and flows into coastal waters with the pull of the tides. [522] Local anomalies in groundwater elevation can also be caused by the interaction of subsurface utilities (sanitary sewer, storm sewer, and water supply lines) with the regional groundwater regime.[523] Storm/sanitary sewer lines and backfill in the utility trenches can serve as preferential pathways for groundwater flow and can either discharge or receive water.[524] Local anomalies in groundwater elevation have also been caused by groundwater injection/extraction activities associated with treatability studies.[525,526]

DWR has limited information on the water quality of the groundwater basins underlying the Project site, but indicates that elevated nitrate concentrations are the most common water quality problem with wells in the San Francisco Peninsula. High chloride concentrations were also observed in some wells.[527]

Within the boundaries of the Project site, there are numerous locations where the underlying groundwater has been affected by releases of various inorganic and organic constituents associated with current and previous land uses, as noted in Section III.K. Figure III.M-6 (Existing Groundwater Contamination) depicts the locations of groundwater contamination at the Project site as well as inferred depth to groundwater. Groundwater remediation within these areas is at various stages of completion.

Only low levels of a few organic compounds have been detected in groundwater beneath Candlestick Point. However, the portions of Candlestick Point bayward of the high tide elevation are covered with fill material that may contain hydrocarbons, heavy metals, oil and grease, and semi-volatile organic compounds (SVOCs).

The primary contaminants found in groundwater associated with HPS Phase II include volatile organic compounds (VOCs), SVOCs, total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs),

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[520] CE2-Kleinfelder Joint Venture, 2009, Semiannual Groundwater Monitoring Report (April-September 2008) Hunters Point Shipyard San Francisco, California, February 2009. P. 2-3. Prepared for Department of the Navy Base Realignment and Closure Program Management Office West, February 2009.
[521] Johnson, C.S., February 6, 2006. In Search of the Source of Beach Pollution, Scientists Monitor Groundwater: New Sea Grant Study to Look at Beaches in Santa Cruz and Bolinas, NOAA Research Archive of Spotlight Features. http://www.oar.noaa.gov/spotlite/archive/spot_beachpollution.html (accessed September 20, 2009).
[522] Johnson, C.S., February 6, 2006. In Search of the Source of Beach Pollution, Scientists Monitor Groundwater: New Sea Grant Study to Look at Beaches in Santa Cruz and Bolinas, NOAA Research Archive of Spotlight Features. http://www.oar.noaa.gov/spotlite/archive/spot_beachpollution.html Accessed September 20, 2009.
[523] CE2-Kleinfelder Joint Venture, 2009, Semiannual Groundwater Monitoring Report (April-September 2008) Hunters Point Shipyard San Francisco, California, February 2009. P. 2-4. Prepared for Department of the Navy Base Realignment and Closure Program Management Office West, February 2009.
[524] Ibid.
[525] Ibid.
[526] Treatability studies are pilot-scale type tests conducted at hazardous wastes sites to determine if a treatment technology will work for that site's particular set of environmental conditions. Such studies have been conducted at HPS Phase II to address the sources of contamination described in Section K, Hazards and Hazardous Materials.
[527] California Department of Water Resources (DWR), 2003, op. cit.

SOURCE: ARUP, 2009.

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FIGURE III.M-6

Candlestick Point — Hunters Point Shipyard Phase II EIR

EXISTING GROUNDWATER CONTAMINATION

pesticides, cyanide, metals, and radionuclides.[528] VOCs and certain metals have exceeded water quality criteria in groundwater at HPS Phase II. The landfill on HPS Phase II also contains radium dials that could contribute to groundwater contamination.[529] Potential threats may also be presented by off-gas from VOCs, particularly vinyl chloride, present in hot spots in soil and groundwater. [530] The Navy's Radiological Defense Laboratory program operated at HPS Phase II from the 1940s to 1969, and various radionuclides, primarily radium 226 and cesium 137, have also been found in the groundwater.[531]

Refer to Section III.K for further discussion of groundwater quality conditions related to hazardous materials contamination and remediation activities.

III.M.3 Regulatory Framework

Federal

Clean Water Act

The *Clean Water Act of 1977* (CWA) (33 US Code [USC] Section 1251 et seq.), which amended the federal *Water Pollution Control Act of 1972*, established the basic structure for regulating discharges of pollutants into waters of the United States (not including groundwater) and waters of the State of California. Waters of the United States (defined in 40 CFR 230.3(s)) include water bodies that are used in interstate or foreign commerce, waters which are subject to the ebb and flow of the tide, interstate waters, tributaries of such waters, and wetlands adjacent to such waters. Waters of the State are defined by the SWRCB as any surface water or groundwater, including saline waters, within the boundaries of the State. Examples include, but are not limited to, rivers, streams, lakes, bays, marshes, mudflats, unvegetated seasonally ponded areas, drainage swales, sloughs, wet meadows, natural ponds, vernal pools, diked baylands, seasonal wetlands, and riparian woodlands. Impacts to waters of the United States and impacts to waters of the State can differ because of the differing laws and regulations that address these impacts. As interpreted by the regional US EPA and SWRCB, CWA permits and other regulatory mechanisms may refer to only one of the two categories. For example, CWA Section 401 Water Quality Certifications apply to waters of the State, while NPDES permits apply to waters of the United States.

The CWA delegates authority to the US EPA to implement pollution control programs. Under the CWA, it is unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a NPDES permit is obtained. In addition, the CWA requires each state to adopt water quality standards for receiving water bodies and to have those standards approved by the US EPA. Water quality standards consist of designated beneficial uses for a particular receiving water body (e.g. wildlife habitat, agricultural supply, fishing etc.), along with water quality objectives necessary to support those uses.

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528 CE2-Kleinfelder Joint Venture, 2009, Semiannual Groundwater Monitoring Report (April-September 2008) Hunters Point Shipyard San Francisco, California, February 2009. P. 2-2. Prepared for Department of the Navy Base Realignment and Closure Program Management Office West, February 2009.
529 USEPA, July 29th 2009, Region 9: Superfund Hunters Point Naval Shipyard EPA#:CA1170090087. http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/vwsoalphabetic/Hunters+Point+Naval+Shipyard?OpenDocument#threats (accessed September 23, 2009).
530 Ibid.
531 Ibid.

CWA Section 303 Water Quality Standards

Section 303(c)(2)(b) of the CWA requires states to adopt water quality standards for all surface waters of the United States based on the water body's designated beneficial use. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards. Water quality standards applicable to the Project are listed in the San Francisco Bay Basin Water Quality Control Plan Basin (Basin Plan) and are described in the Impacts discussion below.

CWA Section 303 Impaired Water Bodies and Total Maximum Daily Loads

Under CWA Section 303(d) of the CWA, the SWRCB is required to develop a list of impaired water bodies that do not meet water quality standards (promulgated under the National Toxics Rule or California Toxics Rule) after the minimum technology-based effluent limitations and water quality-based effluent limitations have been implemented for non-stormwater runoff permitted point sources. Lists are to be priority ranked for development of a total maximum daily load (TMDL). A TMDL is a calculation of the total maximum daily load (or "amount") of a pollutant that a water body can receive on a daily basis and still safely meet water quality standards. The SWRCB, Regional Water Quality Control Boards (RWQCB) and US EPA are responsible for establishing TMDL waste load allocations and incorporating approved TMDLs into water quality control plans, NPDES permits, and WDRs in accordance with a specified schedule for completion.

A mercury TMDL for San Francisco Bay has been completed, and on February 12, 2008, the US EPA approved a Basin Plan amendment incorporating the mercury TMDL into the Basin Plan.[532] A PCB TMDL has also been developed for San Francisco Bay and the SFRWQCB adopted a Basin Plan amendment on February 13, 2008, which is still pending final approval from the SWRCB and US EPA. A selenium TMDL is being developed for the North Bay (from the Sacramento-San Joaquin Delta to the central Bay), which is not in the vicinity of the Project site.

The mercury and PCB TMDLs include numeric targets for concentrations in suspended sediment and/or fish tissue. The TMDLs also include waste load allocations[533] for urban stormwater runoff and municipal and industrial wastewater discharges, with allocations apportioned for individual municipal separate storm sewer systems (MS4s)[534] and wastewater treatment plants including those in San Francisco. For stormwater, load reductions would be required to meet the TMDL waste load allocations within the 20 years required by the TMDLs. Load reduction efforts for TMDLs are implemented

[532] San Francisco Bay Regional Water Quality Control Board (Water Board), website: http://www.swrcb.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaymercurytmdl.shtml, accessed November 20, 2008.

[533] The maximum load of pollutants each discharger of waste is allowed to release into a particular waterway. Discharge limits are usually required for each specific water quality criterion.

[534] A Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works. The term MS4 also refers to the jurisdiction that operates such a system.

through municipal NPDES stormwater permits and individual NPDES permits (e.g., NPDES permit for water treatment plant discharges and others).

CWA Section 401 Water Quality Certification

Section 401 of the CWA specifies that states must certify that any activity subject to a permit issued by a federal agency, such as the USACE, meets all state water quality standards. In California, the SWRCB and the nine RWQCBs are responsible for taking certification actions for activities subject to any permit issued by the Corps pursuant to Section 404 (or for any other Corps' permit, such as permits issued pursuant to Section 10 of the *Rivers and Harbors Act of 1899*). Such certification actions, also known as 401 certification or water quality certification, include issuing a 401 certification that the activity subject to the federal permit complies with state water quality standards, issuing a 401 certification with conditions, denying 401 certification, or denying 401 certification without prejudice, should procedural matters preclude taking timely action on a 401 certification application. If 401 certification is denied, the permit pertaining to the proposed federal action is denied as well.

In practice, most RWQCBs rely on applications for Section 401 certification to evaluate whether WDRs would also need to also be issued for a project. The RWQCB must review final CEQA documentation prior to taking an action on an application for water quality certification and/or WDRs.

CWA Section 402 Stormwater NPDES Permits

Section 402(p) of the CWA regulates point source discharges of pollutants under the NPDES program. This section of the CWA was amended in 1987 to require the US EPA to establish regulations for permitting of municipal and industrial stormwater discharges (including discharges from active construction sites) under the NPDES permit program. The US EPA published final regulations for industrial and municipal stormwater discharges on November 16, 1990. The NPDES program requires all industrial facilities and municipalities of a certain size that discharge pollutants into waters of the United States to obtain a permit. Stormwater discharges into the San Francisco Bay region are commonly controlled through general and individual NPDES permits, which are adopted by the SWRCB (general permits) or SFRWQCB (individual permits), and are administered by the SFRWQCB. Water quality criteria in NPDES permits for discharges to receiving waters are based on criteria specified in the National Toxics Rule, the California Toxics Rule, and Basin Plans (discussed below). The US EPA requires NPDES permits to be revised to incorporate waste load allocations for TMDLs when the TMDLs are approved by US EPA (40 CFR 122).

CWA Section 402 Combined Sewer Overflow Control Policy

Combined sewer facilities are subject to Section 402(q) of the CWA, which codified the Combined Sewer Overflow Control Policy. Wet weather flows are governed by compliance with the nine minimum controls and long-term control plan requirements contained in the CSO Control Policy (59FR 18688-18698) and further described in Combined Sewer Overflows, Guidance for Nine Minimum Controls, US EPA 832-B-95-003 (May 1995). Communities with combined sewer systems are also expected to develop long-term CSO control plans that will ultimately provide for full compliance with the CWA, including attainment of water quality standards. The SFPUC implemented a Long-Term Control Plan (per the conditions of its NPDES Wastewater Discharge Permit) during the mid-1990s. The general goals for

combined sewer systems under the CSO Control Policy are to provide storage capacity for wet weather flows, to maximize flow to treatment facilities, and to minimize CSO discharges. The requirements of the CSO Policy are implemented through the City's NPDES permits issued by the SFRWQCB.

CWA Section 404 Discharge of Fill or Dredge Materials

Section 404 of the CWA regulates temporary and permanent fill and disturbance of wetlands and waters of the United States. The discharge (temporary or permanent) of dredged or fill material into waters of the United States, including wetlands, typically requires authorization from USACE pursuant to Section 404 of the CWA through either a Nationwide (general categories of discharges with minimal effects) or Individual Permit. USACE-regulated activities under Section 404 involve the discharge of dredged or fill material, including, but not limited to, grading, placing riprap for erosion control, pouring concrete, laying sod, and stockpiling excavated material, into waters of the United States. Activities that generally do not involve a regulated discharge (if performed specifically in a manner to avoid discharges) include driving pilings, some drainage channel maintenance activities, constructing temporary mining and farm/forest roads, and excavating without stockpiling. The US EPA and the USACE have issued Section 404(b)(1) Guidelines (40 CFR 230) that regulate dredge and fill activities, including the water quality aspects of such activities. Subpart C Sections 230.20 through 230.25 contain water quality regulations applicable to dredge and fill activities. Among other topics, these guidelines address discharges that alter substrate elevation or contours, suspended particulates, water clarity, nutrients and chemical content, current patterns and water circulation, water fluctuations (including those that alter erosion or sediment rates), and salinity gradients.

River and Harbors Act Section 10

The *Rivers and Harbors Acts of 1890* (superseded) and *1899* (33 USC 401, et seq.) are the legislative origin of the USACE regulatory program. Various sections establish permit requirements to prevent unauthorized obstruction or alteration of any navigable water of the United States. Regulations implementing Section 10 of the *Rivers and Harbors Act* are coordinated with CWA Section 404 regulations. Section 10 (33 USC 403) covers construction, excavation, or deposition of materials in, over, or under such waters, or any work which would affect the course, location, condition, or capacity of those waters. Activities requiring Section 10 permits include structures (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, transmission lines) and work such as dredging or disposal of dredged material, or excavation, filling, or other modifications to the navigable waters of the United States. Bridge construction does not require a Section 10 permit, but does, however, require authorization for discharges of fill or dredge material under CWA Section 404.[535]

Executive Order 11988-Floodplain Management

Executive Order 11988 requires federal agencies to recognize the values of floodplains and to consider the public benefits of restoring and preserving floodplains. Under this order, the USACE has the responsibility for reviewing flood protection projects that may affect navigable waters. The USACE is required to take action and provide leadership to avoid development in the base floodplain; reduce the

[535] California Natural Resources Agency, website: http://ceres.ca.gov/wetlands/permitting/RHA_summary.html, accessed July 16, 2009.

risk and hazard associated with floods; minimize the impact of floods on human health, welfare, and safety; and restore and preserve the beneficial and natural values of the base floodplain.

National Flood Insurance Act and Flood Disaster Protection Act

The *National Flood Insurance Act of 1968* and the *Flood Disaster Protection Act of 1973* were enacted to reduce the need for flood protection structures and to limit disaster relief costs by restricting development in floodplains. FEMA was created in 1979. One of its duties is to administer the NFIP and to develop standards for fluvial and coastal floodplain delineation. The NFIP is a federal program enabling property owners in participating communities to purchase insurance as protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages.[536]

The preliminary FIRM for San Francisco identifies several areas along the San Francisco bayfront, including Bayview Hunters Point, HPS Phase II, and Candlestick Point as coastal flood hazard zones, including a Zone A designation (in areas subject to inundation by tidal surge) and a Zone V designation (high coastal flooding zones subject to wave hazards) (SFHAs). Refer to Figure III.M-4. The City Administrator has submitted comments on the preliminary FIRM to FEMA, which questions the inclusion of portions of the Project site in a Zone V SFHA. The City Administrator has suggested it may seek a variance from FEMA if a final FIRM retains the SFHAs identified on the preliminary FIRMs. If the Project site is deemed to be within an area defined as a SFHA on a final FIRM, published prior to development of the Project, the Project would be subject to applicable floodplain development requirements.

State

Responsibility for the protection of water quality in California resides with the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs). The SWRCB establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and state water quality statutes and regulations. The RWQCBs develop and implement Water Quality Control Plans (Basin Plans) that consider regional beneficial uses, water quality characteristics, and water quality problems. The San Francisco Bay Region Regional Water Quality Control Board (SFRWQCB) implements a number of federal and State laws, the most important of which are the *State Porter-Cologne Water Quality Control Act* and the federal CWA.

Porter-Cologne Water Quality Control Act

The *Porter-Cologne Water Quality Control Act* (PCWQCA) is the principal law governing water quality in California. Under the PCWQCA, the SWRCB and the nine RWQCBs were established as statewide and regional water quality planning agencies, respectively. The PCWQCA requires the development of statewide and regional Water Quality Control Plans (Basin Plans) to protect the quality of surface water and groundwater. The SWRCB and RWQCBs are required to designate beneficial uses of surface waters and groundwater, establish water quality objectives to protect beneficial uses, and develop implementation programs to meet the water quality objectives. The SWRCB and RWQCBs have

[536] Federal Emergency Management Agency, National Flood Insurance Program, Available at: www.fema.gov/business/nfip/, Accessed: June 19, 2008.

permitting and enforcement authority to prevent and control waste discharges that could affect waters of the state through the issuance of NPDES permits and WDRs. The Project site is located in the San Francisco Bay Basin and subject to regulatory requirements of the SFRWQCB.

State Implementation Plan for Toxics Standards for Surface Waters

In March 2000, the SWRCB adopted the State Implementation Plan (SIP) in Resolution No. 2000-015. The SIP establishes (1) implementation provisions for priority pollutant criteria promulgated by the US EPA through the National Toxics Rule (40 CFR 131.36) (promulgated on December 22, 1992 and amended on May 4, 1995) and through the California Toxics Rule (40 CFR 131.38) (promulgated on May 18, 2000 and amended on February 13, 2001), and for priority pollutant objectives established by RWQCBs in their Water Quality Control Plans; (2) monitoring requirements for 2,3,7,8-TCDD equivalents (dioxin); and (3) chronic toxicity control provisions. In addition, this policy includes special provisions for certain types of discharges and factors that could affect the application of other provisions in this policy. A list of priority pollutants and associated criteria can be found in the CFR, Section 40, Part 131 (Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the state of California, May 18, 2000).

California Toxics Rule (CTR)

In cases where the Basin Plan does not contain a standard for a particular pollutant, other criteria are used to establish a standard. These may be applied from SWRCB documents (e.g., the Inland Surface Waters Plan and the Pollutant Policy Document) or from water quality criteria developed under Section 304(a) of the CWA (e.g., California Toxics Rule). Numeric criteria are required by the CWA for many priority toxic pollutants. However, in 1994, a state court overturned the state's water quality control plans containing water quality criteria for priority toxic pollutants. To address the issue of toxic pollutants, on May 18, 2000, the US EPA promulgated the California Toxics Rule based on the Administrator's determination that numeric criteria are necessary in the State of California to protect human health and the environment. These federal criteria are numeric water quality criteria for priority toxic pollutants and other provisions for water quality standards legally applicable in the state of California for inland surface waters, enclosed bays, and estuaries for all purposes and programs under the CWA.

Waste Discharge Requirements (WDRs) Program

Under the PCWQCA, the RWQCBs regulate the "discharge of waste" to "waters of the State". All parties proposing to discharge waste that could affect waters of the state must file a report of waste discharge (ROWD) with the appropriate RWQCB. The RWQCB then responds to the ROWD by issuing WDRs in a public hearing, or by waiving WDRs (with or without conditions) for the proposed discharge.

Both of the terms "discharge of waste" and "waters of the State" are broadly defined in the PCWQCA, such that discharges of waste include fill, any material resulting from human activity, or any other discharge that may directly or indirectly impact waters of the State. While all waters of the United States that are within the borders of California are also waters of the State, the converse is not true; waters of the United States are a subset of waters of the State.

While Section 404 permits and 401 certifications are required when the an activity results in fill or discharge directly below the ordinary high water line of waters of the United States, any activity that results or may result in a discharge that directly or indirectly impacts waters of the state or the beneficial uses of those waters are subject to WDRs. In practice, most RWQCB rely on applications for 401 certification to determine whether WDRs also need be issued for a proposed project. The SFRWQCB has produced a combined 401 certification/waiver of WDRs application form to ensure that applicants do not need to file both a ROWD and an application for 401 certification. WDRs for discharges directly to surface waters are also NPDES permits.

Anti-Degradation Policy

A key policy of California's water quality program is the State's Antidegradation Policy. This policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses. Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters must (1) be consistent with maximum benefit to the people of the state; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies, (i.e., will not result in exceedances of water quality objectives).[537]

Construction General Permit

Pursuant to the CWA Section 402, discharges from construction projects are prohibited unless such practices comply with an NPDES permit. The SWRCB adopted a statewide *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit) (Order No. 2009-0009-DWQ, NPDES No. CAS000002) on September 2, 2009 to meet CWA requirements and the water quality goals of the PCWQCA. Every construction project that disturbs one or more acres of land surface (or that is part of a common plan of development or sale that disturbs more than one acre of land) requires coverage under the Construction General Permit. To obtain coverage under the Construction General Permit, the landowner or other applicable entity must file Permit Registration Documents (PRDs) prior to the commencement of construction activity, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by the Construction General Permit. Every regulated construction project is required to seek coverage under the new Construction General Permit by July 1, 2010. Because the Project would disturb more than one acre, construction of the Project would be subject to the Construction General Permit requirements.

Construction activities subject to the Construction General Permit include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, that result in soil disturbances of at least one acre of total land area. The SWPPP that must be prepared by every individual construction project under the Construction General Permit has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges; and (2) to describe and

[537] SWRCB, 1968, Statement of Policy with Respect to Maintaining High Quality of Waters in California. Resolution No. 68-16.

ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in stormwater, as well as non-stormwater discharges. BMPs must be implemented to meet the performance standard of Best Available Technology/Best Conventional Technology (BAT/BCT).[538]

The Construction General Permit requires specific minimum BMPs, depending upon the project sediment risk (Risk Level 1 through 3). Sediment risk is determined based on the sensitivity of the receiving water to sediment and the potential for site erosion and sediment transport. For moderate sediment risk projects (Risk Level 2), Numeric Action Levels (NALs) for turbidity and pH are imposed, and for high sediment risk projects (Risk Level 3), Numeric Effluent Limitations (NELs) for turbidity and pH are imposed. Post-construction stormwater performance standards are also included for sites not covered by a municipal stormwater permit. The Construction General Permit requires effluent and receiving water (only for some Risk Level 3 sites) monitoring to demonstrate compliance with permit requirements, and corrective action must be taken if these limits are exceeded. The results of monitoring and corrective actions must be reported annually to the SWRCB. This permit also specifies minimum qualifications for SWPPP developers and construction site inspectors.

Industrial General Permit

Pursuant to the CWA Section 402(p), the SWRCB has issued a statewide *NPDES General Industrial Permit for Discharges of Storm Water Associated with Industrial Activities* (Industrial General Permit)(Order No. 97-03-DWQ, NPDES General Permit No. CAS000001). A wide range of industries is covered under the Industrial General Permit, as determined by the facility Standard Industrial Classification (SIC) code, a four-digit code that refers to the type of business conducted.

The Industrial General Permit requires control of pollutant discharges using BAT/BCT to meet water quality standards specified in the Basin Plan. The Industrial General Permit generally requires facility operators to (1) eliminate unauthorized non-stormwater discharges; (2) develop and implement a SWPPP; and (3) perform monitoring of stormwater discharges and authorized non-stormwater discharges.

In 2005, the SWRCB issued a Draft Final Industrial General Permit that revises the current permit from 1997. Significant changes include modifications to SWPPP requirements, the monitoring program, and group monitoring requirements. In addition, the Draft Final Permit includes parameter benchmarks[539] for

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[538] As defined by US EPA, Best Available Technology (BAT) is a technology-based standard established by the CWA as the most appropriate means available on a national basis for controlling the direct discharge of toxic and non-conventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable. Best Conventional Technology (BCT) is a technology-based standard that applies to treatment of conventional pollutants, such as total suspended solids.

[539] The Draft Final 2005 Industrial General Permit contains parameter benchmark concentrations for constituents commonly found in stormwater runoff from industrial facilities (indicator parameters), which are derived from US EPA's Multi-Sector General Permit; the Multi-Sector General Permit provides coverage for industrial facilities located in five states, in certain Native-American lands, as well as for various federal facilities, where US EPA is the NPDES permit authority. The benchmarks are not numeric effluent limits; however, the benchmarks represent pollutant concentrations above which are levels of concern. The benchmarks will be used in the Draft Final Permit to evaluate if the facility's Best Management Practices (BMPs) are effective in reducing concentrations of pollutants, but are not intended to be used to determine whether or not discharges are causing or contributing to a water quality impairment. The Draft Final Permit requires that if runoff concentrations are above one or more benchmarks, the discharger must

certain indicator parameters based on US EPA's Multi-Sector Permit, as an additional method to evaluate the effectiveness of BMPs. Under the current 1997 permit, light industry was excluded from coverage if there was no exposure of industrial materials to stormwater. Under the Draft Final permit, such facilities would not be automatically excluded from coverage but would need to apply for a Conditional Exclusion. To obtain this exclusion, dischargers must submit a certification for a Conditional Exclusion to demonstrate that there would be no contact of pollutants with stormwater.

Industrial stormwater discharges from HPS Phase II are regulated under the Industrial General Permit. It is possible that future tenants within the Project site may include industrial facilities that would be covered under the Industrial General Permit. For example, a marina classified as SIC 4493 is required to obtain coverage under the Industrial General Permit if vehicle maintenance activities such as rehabilitation, mechanical repairs, painting, fueling, and lubrication or equipment cleaning operations are conducted.

Municipal Stormwater General Permit

The SWRCB regulates discharges from MS4s under a Phase I program for medium and large municipalities (serving 100,000 or more people) and under a Phase II program for small municipalities (serving 100,000 or less people), and governmental facilities such as military bases and public campuses. The relatively small portions of the City that drain to MS4 areas (approximately 10 percent of the City) are regulated under the statewide *Phase II NPDES General Permit for Storm Water Discharges from Small MS4s* (Municipal Stormwater General Permit)(Order No. 2003-0005-DWQ).

In accordance with the Municipal Stormwater General Permit, the City must develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the MS4 by ensuring that post-construction controls are in place that would prevent or minimize water quality impacts. The Municipal Stormwater General Permit requires covered municipalities to prepare a Stormwater Management Plan (SWMP) with the goal of reducing the discharge of pollutants to the maximum extent possible (MEP), as defined in and implemented by the General Permit. The MEP approach is an ever evolving, flexible, and advancing concept, which considers technical and economic feasibility. Consequently, the definition of MEP evolves with an increased knowledge about controlling urban runoff.

In accordance with the Municipal Stormwater General Permit, the SWMP must describe Minimum Control measures—BMPs, measurable goals, and timetables for implementation—in the following six program areas: (1) Public Education; (2) Public Participation; (3) Illicit Discharge Detection and Elimination; (4) Construction Site Storm Water Runoff Control; (5) Post Construction Stormwater Management; and (6) Pollution Prevention/Good Housekeeping for Municipal Operations.

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revise its Storm Water Pollution Prevention Plan (SWPPP) to include more effective BMPs, and collect samples from the next two consecutive qualifying storms. Industrial facilities regulated under the Industrial General Permit are currently not subject to the parameter benchmarks; however the benchmarks will take effect when the Draft Final Permit is adopted.

The SFPUC has prepared a SWMP that establishes a framework for achieving the MEP standard for the discharge of pollutants from MS4s within their jurisdiction in accordance with the Phase II stormwater regulations. Additionally, the City has developed Draft San Francisco Stormwater Design Guidelines in compliance with the Municipal NPDES Permit requirements that are expected to be approved and adopted by December 2009.

In the operational phase of the Project, stormwater discharging to areas served by the combined sewer system would be regulated under the Wastewater Discharge NPDES Permit, described further below. However, at build out, the Project site would be served by a separate storm sewer system and subject to the requirements of the Municipal Stormwater General Permit and associated SWMP and San Francisco Stormwater Guidelines, described further below.

Recycled Water General Permit for Landscape Irrigation

In July 2009, the SWRCB released General Waste Discharge Requirements for Landscaping Irrigation Uses of Municipal Recycled Water (Recycled Water General Permit), allowing municipal entities to distribute disinfected tertiary-treated recycled water to select customers for landscape irrigation (Order No. 2009-0006-DWQ). The Recycled Water General Permit is intended to further the state's Recycled Water Policy (*California Code of Regulations* [CCR] Title 22) and *California Water Code* Section 13552.5, both of which encourage recycled water for non-potable uses.

Under the Recycled Water General Permit, "recycled water" is limited to recycled water produced by a public entity at a municipal wastewater treatment plant. The Recycled Water General Permit does not apply to water produced from the treatment of other non-municipal wastewaters (e.g., oil field production, food processing, stormwater, etc.) and other types of treatment facilities (e.g., industrial wastewater treatment plants). To obtain coverage under the Recycled Water General Permit, the producer/distributor of recycled water must submit a Notice of Intent (NOI) and Operations and Maintenance Plan to the SWRCB. The Operations and Maintenance Plan must contain a detailed operations plan for use areas, including procedures for implementation of regulations regarding recycled water use and maintenance of equipment and emergency backup systems to maintain compliance with the conditions of the Recycled Water General Permit. In addition, it must have an irrigation management plan specifying measures to ensure that recycled water is applied efficiently, at an agronomic rate, and using practices necessary to minimize application of salinity constituents to use areas. Characteristics of the soil, the recycled water, plant species being irrigated, climatic conditions, and other relevant conditions must be considered in this plan.

The Recycled Water General Permit notes that the use of recycled water may not be appropriate for all scenarios because of unique site-specific characteristics and conditions. In addition, because there are certain public health concerns associated with recycled water, the Recycled Water General Permit includes exposure control measures, including minimum setback distances, signage, method of application, and use restrictions and only allows use of water treated to CCR Title 22 tertiary treatment requirements. Other potential public health issues, such as cross-contamination of recycled water and potable water sources, control of recycled water salinity, and chlorination are regulated under the Recycled Water Policy and the *Water Code*. If the Project would use recycled water, landscape irrigation

with recycled water would require coverage under this Recycled Water General Permit or an individual permit.

SWRCB Low Impact Development Policy

On January 20, 2005, the SWRCB adopted the Low Impact Development (LID) Policy which, at its core, promotes the idea of "sustainability" as a key parameter to be prioritized during the design and planning process for future development. The SWRCB has directed its staff to consider sustainability in all future policies, guidelines, and regulatory actions.

The sustainability practice promotes LID to benefit water supply and contribute to water quality protection. LID has been a proven approach in other parts of the country and is seen in California as an alternative to conventional stormwater management. The RWQCBs are advancing LID in California in various ways, including provisions for LID requirements in renewed Phase I municipal stormwater NPDES permits.

San Francisco Bay Basin Plan

As a function of the PCWQCA, the Basin Plan[540] identifies the beneficial uses, water quality objectives, and actions necessary to control non-point and point sources of pollution to receiving waters in the San Francisco Bay region. Existing and potential beneficial uses for the Lower Bay, as identified in the Basin Plan, are industrial service supply; ocean, commercial and sport fishing; shellfish harvesting; estuarine habitat; fish migration; preservation of rare and endangered species; fish spawning; wildlife habitat; water contact recreation; non-contact water recreation; and navigation. Existing and potential beneficial uses of the Islais Valley, South San Francisco, and Visitacion Valley groundwater basins are municipal and domestic water supply (potential), industrial process water supply (existing), industrial service water supply (existing), and agricultural water supply (potential).

Basin Plan narrative and numeric water quality objectives are used to define appropriate levels of environmental quality and to control activities that could adversely affect individual aquatic systems and the Bay Basin in general. The narrative water quality objectives describe pollution conditions to be avoided but no numeric limit is imposed. The numeric water quality objectives describe the maximum concentrations of a given pollutant that can remain in a body of water without adversely affecting the aquatic system. Beneficial uses, together with applicable water quality objectives, comprise the relevant water quality standards.

Water Quality Control Plan for Enclosed Bays and Estuaries

The SWRCB adopted Part 1 of the Water Quality Control Plan for Enclosed Bays and Estuaries in August, 2009 to comply with the requirements of *California Water Code* Section 13393 to adopt State sediment quality objectives (SQOs). Part 1 integrates chemical and biological measures to accomplish two narrative SQOs: (1) to protect human health, and (2) to ensure that pollutants in sediments are present in quantities that, alone or in combination, are not toxic to benthic[541] communities in enclosed

[540] California Regional Water Quality Control Board San Francisco Bay Region (SFRWQCB), *2007,* op. cit.
[541] Living on or in bottom of the ocean, bays, and estuaries, or in the streambed.

bays and estuaries of California.[542] Part 1 is not intended to address low dissolved oxygen, pathogens, or nutrients, including ammonia.

The narrative SOQs are to be implemented through a multiple lines of evidence (MLOE) approach. The MLOE approach includes periodic assessment of three indicators ("lines of evidence"): sediment toxicity, benthic community condition, and sediment chemistry. Part 1 specifies testing and assessment procedures for these indicators as well as guidelines for interpretation. With respect to dredging, Part 1 states that the RWQCB "shall not approve a dredging project that involves the dredging of sediment that exceeds the objectives in Part 1." Moreover, the SWRCB must apply SQOs as receiving water limits if discharge of a toxic pollutant to bay or estuarine waters has the reasonable potential to cause or contribute to an exceedance of the SQOs. Exceedance of the SQO could constitute violation of an NPDES permit, such as a municipal stormwater permit.

Cleanup of contaminated sediment is subject to Resolution No. 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under *Water Code* Section 13304). Part 1 also allows the RWQCB to develop site-specific sediment management guidelines where appropriate, for example, where toxic stressors have been identified and controllable sources of these stressors exist or remedial goals are desired.

Wastewater Discharge Permit (Combined Sewer System)

Discharges from the SWPCP, NPWWF, and BWWF are regulated under the NPDES permit[543] set forth in Order No. R2-2008-0007 and NPDES No. CA0037664. This NPDES permit does not apply to all wastewater collection systems and CSOs within the City and County of San Francisco, but is specific to the facilities referenced in this NPDES permit. Because the Project would discharge to these permitted facilities, the Wastewater Discharge Permit is an applicable WDR for evaluation of potential Project impacts.

This NPDES permit includes technology-based effluent limits for dry and wet weather discharges, water quality-based effluent limits for dry weather discharges from the SWPCP, receiving water limitations based on water quality objectives in the Basin Plan, and various additional provisions, such as monitoring and reporting program requirements. This NPDES permit also requires adherence to provisions consistent with the CSO Control Policy (refer to the above discussion under Federal CWA, Combined Sewer Overflow Control Policy), which include:

- Revision and update of a Combined Sewer System Operation and Maintenance Plan
- Implementation of the nine minimum technology-based controls
- Conduct proper operations and regular maintenance programs
- Maximize use of the collection system as inline storage capacity
- Review and modify the pretreatment program if practical and feasible
- Maximize the flow to the SWPCP and NPWWF during wet weather flow conditions

[542] Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes San Francisco Bay.
[543] An NPDES Permit is also a waste discharge requirement (WDR).

- Prohibit CSOs during dry weather
- Control solid and floatable materials by ensuring that overflows are baffled or volumes of floatables are reduced by other means, and removing materials captured in the storage/transport system prior to discharge to receiving waters
- Develop and implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters
- Notify the public of overflows
- Monitor wet weather outfalls to effectively characterize overflow impacts and the efficacy of CSO controls

Long-Term Control Plan

The City has implemented the Long-Term Control Plan required by the CSO Policy by designing and constructing facilities to capture and treat 100 percent of the sewage and stormwater generated in combined sewer areas within the City. Provisions of the Long-Term Control Plan include:

Wet Weather Performance Criteria. The City designed its combined sewer system based on historical rainfall to achieve the long-term average goal of only one CSO event per year along the southeast sector of the City. This wet weather performance criteria is a long-term average and will not be used to determine compliance or non-compliance with the NPDES permit because rainfall patterns vary.[544]

Wet Weather Operation of Bayside Facilities. Specific activation and operation criteria for pump stations and facilities of the Bayside Facilities are required. Activation and operation of these facilities depends on rainfall, forecasts, and storage conditions in the North Drainage Basin and the Central Drainage Basin.

Post Rain Activities. Treatment at the SWPCP and NPWWF continues until North, Central and Southeast Drainage Basin storage/transports are substantially empty of stormwater flows.

The combined storm sewer treatment program, implemented by the City and the SFPUC in compliance with the CSO Control Policy and the NPDES permit, provides 100 percent capture and treatment of the combined sewer flows rather than the 85 percent minimum as required by the CSO Control Policy. San Francisco has no untreated overflow events because the combined flows receive the equivalent of primary treatment within the storage/transport boxes. Primary treatment of these overflows consists of removal of floatable materials and settleable solids. Portions of the Project site currently discharge both stormwater and wastewater to the combined storm sewer system.

Temporary Construction Dewatering Requirements for Separate Storm Sewer Areas

Generally speaking, for construction occurring in areas not served by a combined sewer system and depending on the nature and degree of residual groundwater contamination present when construction begins, temporary groundwater dewatering could be required and would be regulated under the Construction General Permit for minor amounts of dewatering of non-polluted groundwater; one of

[544] The SWRCB recognizes that some years are wetter than others and may contribute more flow than anticipated in the system design criteria.

three NPDES general dewatering permits issued by the SFRWQCB, depending on the residual pollutants in a particular portion of a site; or an individual NPDES Permit/WDR if none of the General Permits are applicable. The three SFRWQCB dewatering general permits are as follows:

- Order No. R2-2004-0055 NPDES No. CAG912003, General Waste Discharge Requirements for: Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds
- Order No. R2-2006-0075 NPDES No. CAG912002 General Waste Discharge Requirements for: Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Fuel Leaks and Other Related Wastes at Service Stations and Similar Sites
- Order No. R2-2007-0033, NPDES No. CAG912004. General Waste Discharge Requirements for: Discharge or Reuse of Extracted Brackish Groundwater and Reverse Osmosis Concentrate Resulting from Treatment of Groundwater by Reverse Osmosis and Discharge and Reuse of Extracted and Treated Groundwater Resulting from Structural Dewatering.

The above general permits could also apply to the operational phase of a project if significant dewatering was required to the separate storm drain system within areas of contaminated groundwater or if long term dewatering were required (e.g., a below-grade parking lot installed below the local water table). If none of the dewatering general permits were applicable to a project or a specific temporary dewatering activity, an individual NPDES permit with WDRs could be required.[545]

Long-Term Management Strategy for the Placement of Dredged Material

In 1990 the US EPA, USACE, SWRCB, and BCDC joined with navigation interests, fishing groups, environmental organizations, and other interested parties to form the Long-Term Management Strategy (LTMS) program for dredged material from the San Francisco Bay Area. The LTMS provides the basis for uniform federal and state dredged material disposal policies and regulations. The California Coastal Conservancy, CDFG, and US Fish and Wildlife Service also participate in the LTMS as necessary to implement beneficial reuse options. The goals of the LTMS are to manage dredging and dredge material disposal in an economically and environmentally sound manner, maximize the beneficial use of dredged material, and develop a coordinated permit application review process for dredging and disposal projects. Specific guidance for conducting dredging and material disposal activities is summarized in the LTMS Management Plan.[546]

The Dredged Material Management Office (DMMO) was established as part of the LTMS to consolidate the processing of dredging permit applications by the staff of the LTMS agencies and the State Lands Commission. (The State Lands Commission holds title to all ungranted tide and submerged lands in California, including some tidelands and submerged lands in the Project site.) The DMMO provides a single application form that meets the requirements of its member agencies and unified processing of applications for dredging permits.

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[545] Farhad Azimzadeh, San Francisco Bay Regional Water Quality Control Board, Enforcement, General Permits, Pretreatment Section, telephone communication with BASELINE Environmental Consulting, December 16, 2008.
[546] US Army Corps of Engineers, US EPA, BCDC, and Water Board, *Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay, Management Plan 2001*.

The process for obtaining approvals for dredging or dredge materials disposal has three phases: (1) suitability determination, (2) permit process, and (3) episode approval. The suitability determination process occurs at the DMMO level. The DMMO member agencies make a joint recommendation to the individual member agencies on whether the sediments to be dredged are appropriate, in terms of potential for environmental impacts, for the proposed disposal or reuse site. The recommendation is usually based on the results of sediment testing. The applicant must submit results from recent sediment testing or submit sufficient data to support a finding by the agencies that the sediments are suitable for the proposed disposal environment. The applicant should submit to the DMMO either a sediment Sampling and Analysis Plan and Quality Assurance Project Plan, or a written request (with supporting information) requesting an exclusion from testing requirements based on factors such as previous testing history and physical characteristics of the material proposed for dredging, if applicable. The applicant must submit the sampling results to the DMMO for review, and the DMMO would make a decision about where the materials can be disposed.

Section 404 of the CWA and BCDC's Bay Plan do not authorize aquatic disposal of dredged material unless an analysis of potential alternatives is first performed and the alternatives prove to be either environmentally unacceptable or infeasible. In order for projects proposing the discharge of dredged material to waters of the United States to be approved under Section 404 of the CWA, it must be shown that there is no practicable alternative to the proposed discharge that would have less impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. Applicants for permits to dispose of dredge spoils must submit a written analysis of the alternatives to the DMMO. The DMMO has developed a list of questions to guide applicants in preparing the discussion.

Although the DMMO provides initial review of permit applications and suitability recommendations, applicants must eventually obtain separate approval from the appropriate DMMO member agencies (such as CWA Section 404 Permit from USACE, CWA Section 401 Water Quality Certification from the SFRWQCB, and approval by BCDC); each agency issues permit conditions and specific requirements about how the project is to be performed.

Some permits for maintenance dredging projects authorize multiple dredging and disposal episodes over a period of several years. Such permits require that permittees obtain formal approval, after a recommendation of suitability by the DMMO, for each dredging episode under the permit. Episode approvals, when required, are issued by the individual DMMO member agencies.

San Francisco Bay Conservation and Development Commission

The BCDC is a federally designated state coastal management agency for the San Francisco Bay. In accordance with the *McAteer-Petris Act of 1965*, the BCDC is responsible for maintaining and carrying out the policies of the San Francisco Bay Plan (Bay Plan). Bay shoreline construction projects, such as filling or dredging in the Bay, work adjacent to certain tributaries to the Bay, work adjacent to or within salt ponds, and work adjacent to managed wetlands around the Bay, or grading within 100 feet of the Bay shoreline, require permit approval from the BCDC. The BCDC issues an Administrative Permit for minor repairs or improvements along the Bay shoreline and a Major Permit for more extensive projects.

The Bay Plan, adopted in 1969 and more recently amended in 2008, specifies goals, objectives and policies for existing and proposed waterfront land uses use and other BCDC jurisdictions. Part III of the Bay Plan contains findings and policies pertinent to the development of the Project.

The Project would involve the construction of a marina, a bridge across Yosemite Slough, and various shoreline improvements. Such activities would require a permit from BCDC.

Joint Aquatic Resources Permit Application

The Joint Aquatic Resources Permit Application (JARPA) process streamlines federal, state, and local environmental permitting processes for applicants proposing construction, fill placement, public access impingement, and other development activities that occur along the San Francisco Bay and the coastline, including projects near or in wetlands or creeks that flow to the Bay. Under the JARPA process, agencies that would regulate the Project such as the SWRCB, SFRWQCB, BCDC, and the California Department of Fish and Game (CDFG), receive the same permit application information, which may improve coordination between the agencies. Generally, the project must comply with CEQA requirements before various agencies issue permits under JARPA. Examples of certifications/permits that can be issued under JARPA include CWA Section 401 and Section 404 permits.

Local

City of San Francisco General Plan

Refer to Land Use and Plans of this EIR for a description of the General Plan. Objectives and policies relevant to water quality and hydrology are found in the Environmental Protection element and are listed below:

Objective 1	Achieve a proper balance among the conservation, utilization, and development of San Francisco's natural resources.	
	Policy 1.1	Conserve and protect the natural resources of San Francisco.
	Policy 1.2	Improve the quality of natural resources.
	Policy 1.4	Assure that all new development meets strict environmental quality standards and recognizes human needs.
Objective 2	Implement broad and effective management of natural resources.	
Objective 3	Maintain and improve the quality of the bay, ocean, and shoreline areas.	
	Policy 3.1	Cooperate with and otherwise support regulatory programs of existing regional, state, and Federal agencies dealing with the Bay, Ocean, and Shorelines.

Storm Water Management Plan

In January 2004, San Francisco completed a SWMP for those portions of the City discharging to MS4s, in compliance with the Municipal Stormwater General Permit.[547] The SWMP does not apply to those

[547] San Francisco Public Utilities Commission, *Storm Water Management Plan*, January 2004, available at: http://sfwater.org/mto_main.cfm/MC_ID/14/MSC_ID/361/MTO_ID/542 Accessed July 16, 2009.

areas of the City where stormwater discharges into the combined sewer system, portions of Candlestick Point managed by the California Department of Parks and Recreation, or HPS Phase II, which is covered under the Industrial General Permit. Thus, at this time, only those portions of the Candlestick Point served by MS4s under the jurisdiction of the SFPUC would require compliance with the San Francisco SWMP. If development proceeded and separate storm sewer systems were installed, the Project site would become an MS4 area. Therefore, the entire Project site would require compliance with the San Francisco SWMP because the City must comply with the Municipal General Stormwater Permit conditions for MS4 areas. SWMP measures that could be applicable to the Project site would fall into five broad categories: (1) Public Education, (2) Public Participation, (3) Illicit Discharge Detection and Elimination, (4) Construction Site Storm Water Runoff Control, and (5) Post Construction Stormwater Management.

City of San Francisco Construction Site Water Pollution Prevention Program

The City of San Francisco Construction Site Water Pollution Prevention Program requires stormwater quality BMPs at all construction sites, regardless of the area of the site and whether the site drains to the combined or separate sewer system. Pollution prevention measures that must be implemented at all construction sites include:

- Develop SWPPP.
- Identify all storm drains and catch basins near the construction site and ensure all workers are aware of their locations to prevent pollutants from entering them.
- Protect all storm drain and catch basin inlets.
- Develop spill response and containment procedures.
- Inspect site regularly to ensure that BMPs are intact.
- Conduct daily site cleanings as needed.
- Educate employees and subcontractors about BMPs.
- Regularly maintain all BMPs at project site.

For sites that disturb one or more acres and drain to the separate sewer system, compliance with the Construction General Permit and preparation and implementation of a SWPPP that meets Construction General Permit conditions is required. For sites that discharge to the combined sewer system, a SWPPP that includes an Erosion and Sediment Control Plan and meets SFPUC requirements must be submitted.

San Francisco Green Building Ordinance

In 2008, the City adopted Chapter 13C (Green Building Requirements) into *San Francisco Building Code*. The purpose of the requirements is to promote the health, safety, and welfare of San Francisco residents, workers, and visitors by minimizing the use and waste of energy, water and other resources in the construction and operation of City's buildings and by providing a healthy indoor environment. The ordinance requires compliance with the applicable LEED® performance standards for New Construction, Version 2.2, criteria SS6.1 and SS6.2 for stormwater management, as well as the BMPs and Stormwater Design Guidelines of the SFPUC (1304C.0.3). Additionally, for high-rise residential buildings (1304C.1.3), new group B and M occupancy buildings (1304C.2), and new large commercial buildings

(1304C.2.2),water efficient landscaping (LEED® WE1.1) and water conservation are required (LEED® WE3.2).

LEED® SS6.2 addresses stormwater management and has been adopted by the San Francisco Stormwater Design Guidelines for MS4s. The stormwater management program seeks to reduce impervious cover, promote infiltration, and capture and treat 90 percent of the runoff from an average annual rainfall event (for semi-arid watersheds; in San Francisco, treatment of 90 percent is interpreted as treating runoff produced by a rain event generating 0.75 inches) using acceptable BMPs. In addition, BMPs used to treat runoff must be capable of removing 80 percent of the average annual post-development total suspended solid load contained in stormwater runoff. The BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there are filed performance monitoring data that demonstrate compliance with the criteria. LEED® WE1.1 addresses water efficient landscaping. Permit applicants must submit documentation verifying a minimum of 50 percent reduction in use of potable water for landscaping (compared to the mid-summer baseline case). LEED® WE3.2 addresses water use reduction. Permit applicants must submit documentation demonstrating achievement of a minimum 20 percent reduction in the use of potable water. Effective January 1, 2011, the required reduction in use of water is 30 percent (compared to the water use baseline calculated for the building [not including irrigation] after meeting the US EPA Energy Policy Act of 1992 requirements).[548] Although not specified in the Green Building ordinance, for the purposes of the project it was assumed that the reduction would be compared to the Maximum Applied Water Allowance established in the pending California Water Efficient Landscape Ordinance.[549]

City of San Francisco Codes

Storm Drain System Design Criteria

San Francisco Subdivision Regulations. In 1982, the San Francisco Bureau of Engineering prepared the San Francisco Subdivision Regulations, general guidelines for the planning and improvement of subdivided lands, pursuant to Section 1311 of the *San Francisco Subdivision Code*. Chapters IV, XIII, and XIV of the Subdivision Regulations contain standards pertaining to the design and capacity of storm sewer systems.

HPS Stormwater Design Guidelines. The SFPUC has prepared stormwater design standards for HPS referred to as the Design Criteria and Standards, Combined Sewer, Separate Sanitary and Storm Systems, and Upstream Stormwater Management Systems, Hunters Point Shipyard (HPS Stormwater Design Guidelines). These provisions currently apply to HPS through the HPS Subdivision process and it is anticipated that the HPS Subdivision Code will be amended to include Candlestick Point. In accordance with these regulations, and for both HPS Phase II and Candlestick Point storm drain systems, the specific design criteria are:

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[548] The Energy Policy Act of 1992 set goals, created mandates, and amended utility laws to increase clean energy use and improve overall energy efficiency in the United States. The Act consists of twenty-seven titles detailing various measures designed to lessen the nation's dependence on imported energy, provide incentives for clean and renewable energy, and promote energy conservation in buildings.

[549] Arup, Candlestick Point / Hunters Point Shipyard Phase II Water Demand Memorandum, October 15, 2009.

- Piped storm drain systems designed for stormwater runoff from up to the 5-year storm event when flowing full or surcharged.
- Flow from the 5-year storm event up to the 100-year storm event conveyed in streets and drainage channel rights-of-way.

Public Works Code, Article 4.1

In compliance with the Municipal NPDES Permit, Article 4.1 (Section 123) of the *San Francisco Public Works Code*, the City requires that all dischargers must comply with all state and federal orders issued to the City including all of the City's NPDES permits. The *Public Works Code* also prohibits the discharge of hazardous waste (including stormwater runoff) and other pollutants that would violate the City's federal and state discharge permits. The following are specific provisions of Article 4.1 that apply to construction activities:

- **Construction Requirements for Areas Served by the Combined Sewer System.** For construction sites served by the combined sewer system, the City requires the development and implementation of a SWPPP, which includes an Erosion and Sediment Control Plan (ESCP), and compliance with the City's Construction Site Water Pollution Prevention Program, to reduce the impacts of construction site runoff. The SWPPP must be submitted to the SFPUC prior to the initiation of construction. The SFPUC conducts periodic inspections to ensure compliance with the SWPPP. Article 4.1 of the *San Francisco Public Works Code* also regulates the quantity and quality wastewater discharges (such as dewatering from construction sites) to the combined sewer system.
- **Construction Requirements for Areas Served by the Separate Sewer System.** For separate sewer systems, Article 4.1 requires compliance with applicable NPDES permits, including compliance with the Construction General Permit and preparation and implementation of a SWPPP, compliance with the SWMP, and compliance with the City's Construction Site Runoff Water Pollution Prevention Program, including implementation of erosion and sediment control BMPs.
- **Dewatering Discharges to the Combined Sewer System.** Discharges of temporary dewatering from construction sites to the combined sewer system are regulated by a Batch Wastewater Discharge permit issued by the SFPUC, under Article 4.1 of the *San Francisco Public Works Code*. As such, the Project Applicant must obtain a Batch Wastewater Discharge permit from the SFPUC prior to the beginning of groundwater dewatering to the combined sewer system. Specific permit terms and conditions are imposed by the SFPUC to maintain SFPUC's compliance with its own Wastewater Discharge Permit issued by the SFRWQCB. Under the Batch Wastewater Discharge permit, the discharge must meet specific numeric effluent limitations for toxic and conventional pollutants, and monitoring is required to ensure compliance.

San Francisco Stormwater Design Guidelines

The City, the SFPUC, and the Port have jointly developed the *Draft San Francisco Stormwater Design Guidelines* (Stormwater Design Guidelines)[550] that describe the planning, engineering, and regulatory framework for designing post-construction stormwater controls at the parcel level in the separate storm sewer areas in San Francisco. When finalized, the Stormwater Design Guidelines[551] are anticipated to

[550] City of San Francisco, San Francisco Public Utilities Commission, and Port of San Francisco, 2009, o*p. cit.*
[551] Draft Stormwater Design Guidelines were released in February 2009[551] and are expected to be adopted by the end of 2009.

apply to all projects greater than 5,000 square feet, and projects in areas subject to San Francisco's Green Building Ordinance. The Guidelines require applicants for new and redevelopment projects to prepare a Stormwater Control Plan (SCP) that demonstrates how the project will:

- Capture and treat a precipitation depth of 0.75 inch using volume-based BMPs (LEED® SS6.2) or
- Capture and treat a rainfall intensity of 0.2 inch per hour using flow-based BMPs

The SCP also requires inclusion of source control BMPs for the following portions of a development: 100,000 square foot commercial development, restaurants, retail gasoline outlets, automotive repair shops, and parking lots. The SCP requires development of an Operations and Maintenance Plan that identifies responsible parties, funding sources, maintenance activities and schedules for all BMPs.

Floodplain Management Program

FEMA Floodplain Management Program

The NFIP was created to provide financial backing for affordable flood insurance in exchange for the adoption of floodplain management regulations by communities participating in the program. On March 28, 2008, the San Francisco Board of Supervisors adopted Resolution No. 352-08, authorizing the City's enrollment in the NFIP. As a requirement for joining the NFIP, the City must adopt and enforce a floodplain management ordinance that governs new construction and substantial improvements to existing buildings in flood-prone areas. San Francisco subsequently adopted Ordinance No. 188-08 establishing a floodplain management program, and the interim controls in this ordinance will remain in place until FEMA has published the final FIRM for San Francisco, at which time San Francisco will adopt permanent controls for floodplain management. In July 2008, the City released Interim Floodplain Maps to implement the City's floodplain management ordinance until the final FIRMs are released by FEMA.

The NFIP regulations allow a local jurisdiction to issue variances to its floodplain management ordinance under certain narrow circumstances, without jeopardizing the local jurisdiction's eligibility in the NFIP. However, the particular projects that are granted variances by the local jurisdiction may be deemed ineligible for federally backed flood insurance by FEMA. In correspondence between the Office of the City Administrator and FEMA dated July 11, 2008,[552] the City advised FEMA of its intention to issue a variance in the permanent floodplain management controls to address the requirements for new construction and substantial improvements to structures on piers in coastal high hazard areas (V-Zones).[553] NFIP regulations prohibit construction seaward of mean high tide in a V-Zone, however, the City will develop engineering controls to ensure that structures built in or over the water can be constructed to withstand a 100-year flood if:

- The pier deck of the structure is above the 100-year elevation
- Companion engineering analysis of the structure demonstrates its ability to withstand lateral forces generated by a 100-year flood

[552] Linda Yeung, Deputy City Administrator, City and County of San Francisco Office of the City Administrator, letter to Gregory Blackburn, FEMA Region IX, July 11, 2008.
[553] Note that FEMA refers to these zones as both V-Zones and Zone V.

Although resolution of this issue with FEMA is pending, development within the Project site would be subject to the interim controls in the floodplain management program, unless alternative requirements are adopted prior to the issuance of building permits.

City of San Francisco

In August, 2008, the City of San Francisco adopted an ordinance establishing a floodplain management program (Article XX, Sections 2A.280 through 2A.285 of the *San Francisco Administrative Code*), designating the City Administrator as the floodplain administrator and providing requirements for designating floodplains and for construction and development in floodplains.

Development in a floodplain or flood-prone area, as designated by the Floodplain Administrator, requires a permit and demonstrated compliance with the floodplain management standards. Article XX, Sections 2A.280 through 2A.285 require that all new construction and substantial improvements in designated flood prone areas shall:

- Be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy
- Be constructed with materials and utility equipment resistant to flood damage and using methods and practices that minimize flood damage
- Include electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding

The ordinance requires that subdivision proposals in flood-prone areas be reviewed to ensure that:

- All such proposals are consistent with the need to minimize flood damage within the flood-prone area
- All public utilities and facilities such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage
- Adequate drainage is provided to reduce exposure to flood hazards

All new and replacement water supply and sanitary sewage systems must be designed to minimize or eliminate infiltration of flood waters into the systems, and discharges from systems into flood waters.

The Chief Harbor Engineer of the Port of San Francisco and the City Floodplain Administrator are required to consult and coordinate with FEMA to create appropriate building standards for developing any finger piers in flood prone areas within the Port's jurisdiction. The floodplain management regulations in this ordinance are consistent with the NFIP requirements for communities like San Francisco, where FEMA is in the process of preparing, but has not completed a final FIRM. When FEMA issues a final FIRM designating SFHAs in San Francisco, NFIP regulations require that the adopted floodplain management program be reviewed and modified by the City to ensure consistency with NFIP requirements applicable to FEMA-mapped communities.

III.M.4 Impacts

Significance Criteria

The CCSF and Agency have not formally adopted significance standards for impacts related to hydrology and water quality, but generally consider that implementation of the Project would have significant impacts if it were to:

- M.a Violate any water quality standards or waste discharge requirements
- M.b 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 (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)
- M.c 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 site or off site
- M.d Substantially alter the existing drainage pattern of the 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 site or off site
- M.e Create or contribute runoff water that would exceed the capacity of existing or planned storm sewer systems or provide substantial additional sources of polluted runoff
- M.f Otherwise substantially degrade water quality
- M.g 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
- M.h Place within a 100-year flood hazard area structures that would impede or redirect flood flows
- M.i 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
- M.j Expose people or structures to inundation by seiche, tsunami, or mudflow

Analytic Method

Hydrology and water quality would be affected by the amount of impervious surfaces, the introduction of new pollutants, migration of existing pollutants, and sea level rise. As described in Chapter II (Project Description), the Project would result in the demolition of existing surface improvements, reflective of past land uses within Candlestick Point and HPS Phase II, and the creation of new land uses, which could affect water quality in the Lower Bay. The focus of the hydrology and water quality analysis is on those portions of the Project site that would be subject to development, and both construction and operational impacts are addressed in this section. Criteria for evaluating effects on surface and groundwater quality in the San Francisco Bay Area are based on water quality standards established in the Basin Plan, including TMDLs, and whether the Project could cause or contribute to water quality degradation.

Additionally, Project impacts are assessed in light of existing regulatory requirements that would serve to mitigate potential impacts. The effectiveness of existing regulations to mitigate potential impacts is often

affected by discretionary requirements, site characteristics or project features not yet detailed, and design-level considerations. Because there is some discretion in how these regulations are applied, they are presented as mitigation measures to outline the specific process by which the Project will comply with these regulations.

Under the Project, existing improvements and impervious surfaces would be replaced with new structures and infrastructure, including roads, parking areas, and utilities. This would generally result in the replacement of impervious surfaces, because much of the area subject to development is already occupied by existing buildings and other impervious surfaces. The installation of new impervious surfaces and changes in site drainage patterns could increase the rate and amount of stormwater runoff from the Project site. Identification of impervious cover involved an analysis, using available Geographic Information Systems (GIS) data of existing land uses, to estimate the extent of coverage by existing structures, roads, parking lots, and other impervious surfaces. Site plans for the Project were analyzed to determine the extent of future impervious cover for the proposed future uses.

Stormwater Runoff

Potential Project operational effects on the amount of stormwater runoff were estimated based on Project changes in surface runoff characteristics, as affected by the amount of impervious surfaces, the time it would take runoff to travel to the storm drain system or directly to the Lower Bay, and precipitation records. Details of the stormwater runoff and pollutant load analysis are presented in Appendix M1. The construction and development of new land uses, compared to existing land uses and new or replaced infrastructure, could result in the introduction of various pollutants into stormwater runoff. Thus, the analysis also estimates the potential for an increase in runoff to occur and whether the introduction of new land uses would result in adverse impacts to water quality. At this time, runoff volumes and rates can only be estimated because the precise mix, size, and routing of stormwater BMPs that would be used to collect, treat, infiltrate, and discharge runoff have not been identified; the type of BMPs, their locations, and sizes could all affect stormwater flow by detention and retention.[554] Therefore, the runoff estimates do not include BMPs.

Stormwater Quality

Potential Project effects on water quality are estimated based on Project changes in land use and site runoff characteristics and reported literature values for pollutant concentrations in runoff from land use categories for some of the identified the constituents of concern (COCs). Annual pollutant loads for chemical constituents were estimated as a product of annual runoff volume and typical values for pollutant concentrations in stormwater runoff as a function of land use. As such, an increase in stormwater runoff would result in an increase in pollutant load, if expected pollutant concentrations in stormwater runoff from varying land uses remains the same or similar. Conversely, a reduction in stormwater runoff can still result in an increase in pollutant load if the concentration of the pollutant in stormwater runoff is expected to increase substantially. This calculation of pollutant loading provides an estimate of the relative amount (i.e., total pounds) of pollutant that would enter the receiving water

[554] Detention refers to slowing down, temporary storing, and releasing stormwater runoff at a controlled rate. Retention refers to capturing stormwater runoff and preventing discharge from the detention device. Retention can be accomplished by storage or infiltration.

during an average year. Not all COCs are included in the pollutant load analysis because sufficient data is not available. Details of the stormwater runoff and pollutant load analysis are presented in Appendix M1.

Surface Water Constituents of Concern

Surface water COCs for the Project would include those pollutants likely to be present in stormwater runoff from the Project site and those for which the receiving water(s) (Lower Bay, Candlestick cove) are listed as impaired or for which there is an existing TMDL. COCs also include the pollutants of concern targeted by the SWMP, prepared in compliance with the Municipal Stormwater General Permit: suspended solids (sediments), litter, heavy metals, and petroleum hydrocarbons. Additionally, the potential for the Project to transport existing contaminants to surface waters are addressed in this impacts analysis. Table III.M-2 (Pollutants Likely to Be Present in Stormwater Runoff from Project Land Uses) lists the potential pollutants in stormwater runoff from the Project. Consequently, the Project COCs include sediment, nutrients, pesticides, oil and grease, metals (including mercury), trash and debris, pathogens, organic compounds (including PCBs), and oxygen-demanding substances and are described below.

- **Bacteria and Viruses (Pathogens).** Bacteria and viruses are common contaminants in stormwater. For separate storm drain systems, sources may include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to closures of water bodies to contact recreation such as swimming. Pathogens are not listed on the 303(d) list as impairing the water quality of the Lower Bay.

Table III.M-2 Pollutants Likely to Be Present in Stormwater Runoff from Project Land Uses

	General Pollutant Categories								
Priority Project Categories	*Pathogens*	*Heavy Metals*	*Nutrients*	*Pesticides*	*Organic Compounds*	*Sediments*	*Trash & Debris*	*Oxygen Demanding Substances*	*Oil & Grease*
Residential Development	X		X	X		X	X	P[a]	P[b]
Commercial/Industrial Development	P[c]		P[a]	P[e]	P[b]	P[a]	X	P[e]	X
Parking Lots		X	P[a]	P[b]		P[a]	X	P[e]	X
Streets		X	P[a]		X[d]	X	X	P[e]	X

SOURCE: California Stormwater Quality Association, *Stormwater Best Management Practice Handbook- New Development and Redevelopment*, January, 2003.

X = Expected pollutant; P = Potential pollutant; a blank cell indicates the pollutant is neither an expected nor a potential pollutant

a. A potential pollutant if landscaping exists on site
b. A potential pollutant if the site includes uncovered parking areas
c. A potential pollutant if land use involves food or animal waste products
d. Including petroleum hydrocarbons
e. Including solvents

- **Metals.** Emissions from automobiles and many artificial surfaces of the urban environment (e.g., those covered with galvanized metal, paint, or preserved wood), contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Metals are often associated with sediments in stormwater. Metals are of concern because they are toxic to aquatic organisms and can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish, which can be a health

hazard if consumed by other aquatic organisms or people). Mercury is a metal listed on the 303(d) list as impairing the water quality of the Lower Bay.

Mercury in particular is a pollutant of concern in the Lower Bay and is the subject of a TMDL. Sources of mercury in urban runoff include mercury-containing instruments, switches and thermostats, and fluorescent lighting.[555]

- **Nutrients.** Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. The discharge of nutrients into water bodies can cause excessive aquatic algae and plant growth (i.e., eutrophication) resulting in water body impairment. Nutrients are not listed on the 303(d) list as impairing the water quality of the Lower Bay.
- **Sediment.** Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it such as nutrients, trace metals, pesticides, and petroleum hydrocarbons. Sediments are not listed on the 303(d) list as impairing the water quality of the Lower Bay.
- **Trash and Debris.** Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and debris (biodegradable organic matter such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high oxygen demand in a water body causing degradation of water quality. In addition, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide. Trash and debris are not listed on the 303(d) list as impairing the water quality of the Lower Bay.
- **Oxygen-Demanding Substances.** Oxygen-demanding substances include biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. For example, food and pet wastes are oxygen-demanding substances. The oxygen demand of a substance can reduce the dissolved oxygen concentration of a water body and cause impairment such as fish kills. Oxygen-demanding substances are not listed on the 303(d) list as impairing the water quality of the Lower Bay.
- **Oil and Grease.** Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, improper disposal of cooking oils/fats at restaurants, and improper waste oil disposal. Oil and grease are not listed on the 303(d) list as impairing water quality of the Lower Bay.
- **Pesticides.** Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. Pyrethroids, which are an emerging class of pesticide that is a primary replacement for pesticides recently phased out from urban use by US EPA (diazinon and

[555] L. Mckee and P. Mangarella, San Francisco Estuary Institute (SFEI) Poster: Mercury budget for stormwater conveyances in the San Francisco Bay Area: Towards achieving TMDL management goals for sediment and fish tissues, SFEI website: http://www.sfei.org/presentations_posters/MERCURYCONF_06/Mercury06_poster_mcKee_final.pdf, Accessed July 18, 2009.

chlorpyrifos), have been demonstrated to be toxic to organisms dwelling in the shallow sediments of California's surface water bodies; and it has been shown that toxicity is more severe and widespread in urban areas than in agricultural areas. The likely sources of the pyrethroids causing the identified toxicity are pest control applications around buildings and to a lesser extent, applications on lawns and gardens. Legacy pesticides (e.g., chlordane, dieldrin, and DDT) are listed on the 303(d) list as impairing water quality of the Lower Bay.

- **Organic Compounds.** Organic compounds may be found in stormwater at concentrations that may be toxic to aquatic organisms. Man-made organic compounds (e.g., adhesives, cleaners, sealants, solvents) are widely applied, may be improperly stored and disposed, and come into contact with stormwater. In addition, illegal and deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways. Polychlorinated biphenyls (PCBs), dioxins, and furans are listed on the 303(d) list as causing impairing water quality of the Lower Bay.

  PCBs are specific pollutants of concern at the Project site because of the pending TMDL. PCBs were manufactured in the United States between 1929 and 1977 for a variety of uses, until US EPA banned the manufacture and distribution of materials containing detectable PCBs in 1984.[556,557] Therefore, PCB contamination often originates in older sites and materials (e.g., building caulk).[558] However, PCBs are still in use to some extent today (e.g., in transformers) and the potential for continued PCB releases into the environment remains.[559] PCBs in sediment originating from contaminated areas can come into contact with urban runoff and may be discharged into receiving waters.

Groundwater Constituents of Concern

COCs for groundwater quality are those chemicals that could rapidly reach the groundwater aquifer via infiltration of stormwater runoff, as well as those constituents that DWR indicates are elevated in local groundwater. The potential for residual contamination to mobilize and migrate as a result of implementation of the Project is addressed in this impacts analysis. Constituents in stormwater runoff that could infiltrate into groundwater are mobile constituents that would not be filtered or bound by soils located above the groundwater table. These constituents include total dissolved solids (measures the dissolved content of water including many constituents that are mobile), chloride, and nitrate. Nitrate and chloride are also groundwater COCs because DWR has indicated local groundwater may have elevated

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556 J.A. Davis, F. Hetzel, J.J. Oram, and L.J. McKee, "Polychlorinated biphenyls (PCBs) in San Francisco Bay", *Environmental Research* 105, 2007, pp. 67-86. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

557 L. Mckee and P. Mangarella, San Francisco Estuary Institute (SFEI) Poster: Mercury budget for stormwater conveyances in the San Francisco Bay Area: Towards achieving TMDL management goals for sediment and fish tissues, SFEI website: http://www.sfei.org/presentations_posters/MERCURYCONF_06/Mercury06_poster_mcKee_final.pdf, Accessed July 18, 2009. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

558 US EPA, PCBs in Building Caulk, website: http://www.epa.gov/waste/hazard/tsd/pcbs/pubs/caulk/index.htm, Accessed July 18, 2009.

559 Clean Estuary Project, PCB Implementation Plan Development, May 2006. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

concentrations of these constituents. Total dissolved solids (TDS), chloride, and nitrate are described below.

- **Total Dissolved Solids.** Total dissolved solids (TDS) are commonly referred to as "salts," although metals and other dissolved solids can contribute to TDS concentrations. The source of salts (including nutrients) are the water soluble inorganic and organic constituents in imported water, soil materials/minerals, animal wastes, fertilizers and other soil amendments, land use, and industrial wastes.[560] Water with a TDS above 500 mg/l is not recommended for use as drinking water (EPA secondary drinking water guidelines) and water with a TDS above 1,500 to 2,600 mg/l is generally considered problematic for irrigation use on crops with low or medium salt tolerance.[561] An elevated TDS concentration also indicates that groundwater may contain elevated levels of ions that are above the Primary or Secondary Drinking Water Standards, such as an elevated level of nitrate, arsenic, aluminum, copper, lead, and others.[562]
- **Chloride.** Sources of chloride could include seawater intrusion, thermal water, and dissolved minerals from marine and volcanic rocks.[563] Large concentrations of chloride can make water unusable for drinking and can also be toxic to plants.[564]
- **Nitrate.** The major sources of nitrates in urban groundwater are mostly related to wastewater disposal (including leaky sewers) and solid waste disposal.[565] Groundwater contamination by nitrate can occur as a result of sewage infiltration, water supply leakage, contaminated land, and highway and urban runoff.[566] High nitrate concentrations can cause methemoglobinemia (a blood disease) in infants.[567]

Flood Hazards

Criteria for evaluating flooding hazards are based on SFPUC stormwater drainage system design criteria and the proposed 100-year flood zones as established by FEMA and the City Administrator's Interim Floodplain Maps. Although a Base Flood Elevation has not been formally adopted for the Project site, the Base Flood Elevation was estimated by Moffatt and Nichol for this analysis.[568] In addition to the

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[560] SWRCB, 2009, State Water Resources Control Board Water Quality Order No. 2009-0006-DWQ General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water.
[561] Hartner, T., 2003, Reference: Groundwater Quality and Groundwater Pollution, University of California Division of Agriculture and Natural Resources Publication 8084.
[562] Wilkes University Center for Environmental Quality Environmental Engineering and Earth Sciences, No date, Total Dissolved Solids, http://www.water-research.net/totaldissolvedsolids.htm, Accessed October 7, 2009.
[563] Planert, M., and J.S. Williams, No date, Ground Water Atlas of the United States – Segment 1 California Nevada: Coastal Basins Aquifer North San Francisco Bay Area Valleys Ground-Water Quality, Hydrologic Investigations Atlas 730-B. http://ca.water.usgs.gov/groundwater/gwatlas/coastal/quality2.html. Accessed September 20, 2009.
[564] Planert, M., and J.S. Williams, No date, Ground Water Atlas of the United States – Segment 1 California Nevada: Coastal Basins Aquifer North San Francisco Bay Area Valleys Ground-Water Quality, Hydrologic Investigations Atlas 730-B. http://ca.water.usgs.gov/groundwater/gwatlas/coastal/quality2.html. Accessed September 20, 2009.
[565] Ibid.
[566] Wakida, F.T. August 22, 2008, *Sources of Nitrate in Urban Groundwater.* SciTopics: Research Summaries by Experts. Available at: http://www.scitopics.com/Sources_of_nitrate_in_urban_groundwater.html. Accessed September 20, 2009.
[567] Planert, M., and J.S. Williams, No date, *Ground Water Atlas of the United States – Segment 1 California Nevada: Coastal Basins Aquifer North San Francisco Bay Area Valleys Ground-Water Quality,* Hydrologic Investigations Atlas 730-B. http://ca.water.usgs.gov/groundwater/gwatlas/coastal/quality2.html. Accessed September 20, 2009.
[568] Moffatt & Nichol, *Candlestick Point/Hunters Point Development Project Initial Shoreline Assessment*, prepared for Lennar Urban, February, 2009, op. cit.

potential for the Project to increase runoff and cause or contribute to on- or off-site flooding hazards, given the proximity of the Project site to the Bay, the analysis also considers the potential for development to result in flooding hazards associated with a rise in sea level. These features would be designed to protect development at HPS Phase II from existing coastal flooding in addition to a rise in sea level of up to 16 inches with a development setback to allow any future increases in elevation to accommodate higher SLR values, should they occur.

Cumulative Impacts

The Project's potential contribution to cumulative hydrology and water quality impacts are also evaluated in the context of past, present, and reasonably foreseeable future development expected to occur in the Project vicinity.

Construction Impacts

Impact HY–1: Water Quality Standards and Waste Discharge Requirements

Impact of Candlestick Point

This discussion addresses whether the Project could result in a violation of either water quality standards or waste discharge requirements. As previously mentioned, the CWA requires each state to adopt water quality standards for receiving water bodies and to have those standards approved by the US EPA. Water quality standards consist of designated beneficial uses for a particular receiving water body (e.g. wildlife habitat, agricultural supply, fishing etc.), along with water quality objectives necessary to support those uses. Discharges from the combined sewer system are regulated under two individual National Pollutant Discharge Elimination System (NPDES) permits issued by the SFRWQCB that identify specific waste discharge requirements (WDRs). The SFRWQCB incorporates conditions into WDRs to be protective of water quality and comply with water quality standards.[569] In some places in this section, the WDRs contained in the NPDES permits issued by the SFRWQCB are also referred to as Waste Discharge Permits.

In addition, a key policy of California's water quality program is the State's Antidegradation Policy. This policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses. Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters must: (1) be consistent with maximum benefit to the people of the State; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies, (i.e., will not result in exceedances of water quality objectives). [570]

[569] California Regional Water Quality Control Board San Francisco Bay Region, 2008, Order No. R2-2008-007 and NPDES No. CA0037664.
[570] SWRCB, 1968, Statement of Policy with Respect to Maintaining High Quality of Waters in California. Resolution No. 68-16.

Impact HY–1a **Construction at Candlestick Point would not cause an exceedance of water quality standards or contribute to or cause a violation of waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

The discharge of sediment-laden runoff, groundwater from temporary construction dewatering activities, the incidental or accidental release of construction materials or products into the combined sewer system, separate storm sewer systems, or directly to receiving waters within or adjacent to the Project site, or the exposure of surface water or groundwater to contaminated soils could impair water quality.

Construction activities within Candlestick Point would include demolition of existing facilities, the clearing and grading of development areas (including excavation, trenching, movement of soil, and the importation of fill soils), and the subsequent construction of new facilities and associated infrastructure. Construction activities would expose soils to rainfall and runoff, construction vehicle traffic, and wind, which could result in the erosion of soils and the mobilization and deposition of dust from disturbed development areas.

Construction activities could also result in the incidental release of construction materials or the accidental spill of substances commonly used in construction (e.g., paints, solvents, petroleum products, equipment leakage, and others). The incidental release or accidental spill of such substances could result in the introduction of those substances directly to the Lower Bay, or into stormwater runoff that would subsequently discharge into the combined or separate sewer system.

Construction activities could also disturb contaminated soils and increase their exposure to surface water runoff and cause or contribute to surface water or groundwater quality degradation. Historic land uses within Candlestick Point may have resulted in the contamination of soil or groundwater by hazardous materials. Although the potential for residual hazardous materials to occur at Candlestick Point is not high, portions of Candlestick Point (bayward from the high tide mark) are primarily fill material and could, therefore, contain a variety of contaminants; in addition, unknown contamination may also be present. The potential for such contamination to be encountered during construction is addressed in Section III.K. Mitigation measures MM HZ-1a (Article 22 Site Mitigation Plan), MM HZ-2a.1 (Unknown Contaminant Contingency Plan), MM HZ-15 (Asbestos Dust Control Plan) would reduce the potential for hazardous materials that may be present in soils to be mobilized as pollutants in stormwater runoff as a result of construction activities.

Construction of the Project would require excavation of portions of the site for building foundations, basements, utilities, or mechanical equipment that may be installed below grade. Excavation and grading could encounter groundwater, which has generally been found at locations between 10 and 15 feet below the ground surface. Historically, depths to groundwater have been measured at depths as shallow as three feet in the lowland areas, and as deep as 30 feet bgs in the upland areas.[571] The installation of below-grade building elements could, therefore, require temporary dewatering and the short-term discharge of groundwater to either the combined sewer system or separate storm sewer systems.

[571] PRC, et al., *Parcel E Remediation Investigation Draft Report, Hunters Point Shipyard, San Francisco, CA*, 1997, Part of Comprehensive Long Term Environmental Action Navy (Clean II).

As previously discussed, portions of Candlestick Point drain to the combined sewer system, while other portions discharge directly to the Lower Bay or drain to separate sewer systems that then drain to the Lower Bay. Construction activities could result in construction-related discharges to the combined sewer system, separate sewer systems, sheet flow to the Lower Bay, or direct discharges to surface waters. The combined sewer system collects and treats stormwater flows prior to discharge to the Lower Bay; however, there is currently no treatment of stormwater runoff that drains to the Lower Bay via direct discharges or separate sewer systems.

Combined Sewer System

Erosion and Sediment Control

Construction-related discharges to the combined system would be subject to the City's Construction Site Runoff Pollution Prevention Program requirements that are described in the City's Construction Site Water Pollution Prevention Program. The City's Construction Site Runoff Pollution Prevention Procedures were established to ensure that all businesses comply with all appropriate stormwater laws and other City requirements, and includes inspection of construction sites to ensure compliance. Under this program, all construction sites must prepare a SWPPP, which includes an ESCP. The SWPPP must be submitted to the City and include BMPs that prevent illicit discharge into the combined sewer system. The City conducts periodic inspections to ensure compliance with the SWPPP, thereby reducing the potential for pollutants in stormwater runoff to enter the combined sewer system and cause or contribute to violation of the SWPCP Wastewater Discharge Permit. The SWPPP is a design-phase document that would depend on site specific conditions, final grading plans, staging areas, topography, and other conditions. As such, preparation of an SWPPP allows for discretionary selection of many BMPs and plan elements by the Project Applicant.

The construction BMPs contained in the SWPPP shall be implemented to prevent transport of sediment and residual contaminants to the combined sewer system or Lower Bay. Perimeter protection would minimize transport of sediment off-site or into the combined sewer system. Materials and waste handling BMPs prevent spills, contact of rainwater with pollutants, and provide for quick and effective clean up in the event of a spill. These BMPs would reduce the potential for sediment and pollutants to enter the combined sewer system in a manner that would exceed water quality standards or cause or contribute to a violation of the applicable WDRs.

To reduce construction-related pollutants in stormwater runoff, the following mitigation measure shall be implemented:

MM HY-1a.1 *Storm Water Pollution Prevention Plan: Combined Storm Sewer System. In compliance with the Article 4.1 of the Public Works Code and the City's Construction Site Water Pollution Prevention Program, the Project Applicant shall submit a site-specific Storm Water Pollution Prevention Plan (SWPPP) to the SFPUC for approval, prior to initiating construction activities in areas draining to the combined sewer system. The SFPUC requires implementation of appropriate Best Management Practices (BMPs) from the California Stormwater Quality Association Stormwater BMP*

Handbook- Construction[572] *or the Caltrans Construction Site BMPs Manual.*[573] *In accordance with SFPUC's requirements, the SWPPP shall include:*

- *An Erosion and Sediment Control Plan that includes a site map illustrating the BMPs that will be used to minimize on-site erosion and the sediment discharge into the combined sewer system, and a narrative description of those BMPs. Appropriate BMPs for Erosion and Sediment Control Plan may include:*
  - *Scheduling—Develop a schedule that includes sequencing of construction activities with the implementation of appropriate BMPs. Perform construction activities and control practices in accordance with the planned schedule. Schedule work to minimize soil-disturbing activities during the rainy season. Schedule major grading operations for the dry season when practical. Monitor the weather forecast for rainfall and adjust the schedule as appropriate.*
  - *Erosion Control BMPs—Preserve existing vegetation where feasible, apply mulch or hydroseed areas until permanent stabilization is established, and use soil binders, geotextiles and mats, earth dikes and drainage swales, velocity dissipation devices, slope drains, or polyacrylamide to protect soil from erosion.*
  - *Wind Erosion BMPs—Apply water or other dust palliatives to prevent dust nuisance; prevent overwatering which can cause erosion. Alternatively, cover small stockpiles or areas that remain inactive for seven or more days.*
  - *Sediment Control BMPs—Install silt fences, sediment basins, sediment traps, check dams, fiber rolls, sand or gravel bag barriers, straw bale barriers, approved chemical treatment, and storm drain inlet protection to minimize the discharge of sediment. Employ street sweeping to remove sediment from streets.*
  - *Tracking Controls—Stabilize the construction site entrance to prevent tracking of sediment onto public roads by construction vehicles. Stabilize on-site vehicle transportation routes immediately after grading to prevent erosion and control dust. Install a tire wash area to remove sediment from tires and under carriages.*
- *Non-Stormwater Management BMPs that may include water conservation practices; dewatering practices that minimize sediment discharges; and BMPs for: paving and grinding activities; identifying illicit connections and illegal dumping; irrigation and other planned or unplanned discharges of potable water; vehicle and equipment cleaning, fueling, and maintenance; concrete curing and finishing; temporary batch plants; implementing shoreline improvements and working over water. Discharges from dewatering activities shall comply with the SFPUC's Batch Wastewater Discharge Requirements that regulate influent concentrations for various constituents.*
- *Waste Management BMPs shall be implemented for material delivery, use, and storage; stockpile management; spill prevention and control; solid and liquid waste management; hazardous waste management; contaminated soil management; concrete waste management; and septic/sanitary waste management.*
- *SWPPP Training Requirements—Construction personnel will receive training on the SWPPP and BMP implementation.*

[572] California Stormwater Quality Association, 2003, *Stormwater BMP Handbook- Construction*, January 2003 with revisions through 2004.
[573] Caltrans, 2003, *Caltrans Stormwater Quality Handbook Construction Site Best Management Practices Manual*, March 1, 2003.

- *Site Inspections and BMP Maintenance—An inspector identified in the SWPPP will inspect the site on a regular basis, before and after a storm event, and once each 24-hour period during extended storms to identify BMP effectiveness and implement corrective actions if required. The SWPPP shall include checklists that document when the inspections occurred, the results of the inspection, required corrective measures, and when corrective measures were implemented. Required BMP maintenance related to a storm event shall be completed within 48 hours of the storm event.*

Groundwater Dewatering

For construction activities that discharge to the combined system, discharge of groundwater from temporary construction dewatering activities would be regulated under Article 4.1 of the *San Francisco Public Works Code*, which prohibits the discharge of hazardous waste and other pollutants that violate the City's federal and state NPDES permits. As previously mentioned, these NPDES Permits establish the waste discharge requirements for the combined sewer system.

Pursuant to Article 4.1 of the *San Francisco Public Works Code*, discharges of dewatering water to the combined sewer system would also be regulated under a Batch Wastewater Discharge permit that would be requested by the Applicant and issued by the SFPUC. Specific permit terms and conditions are imposed by the SFPUC to maintain SFPUC's compliance with its own Wastewater Discharge Permit issued by the SFRWQCB. Under the Batch Wastewater Discharge permit, the discharge must meet specific numeric effluent limitations for toxic and conventional pollutants and monitoring is required to ensure compliance.[574]

Summary (Combined Sewer System)

With respect to erosion and sediment control, implementation of mitigation measures MM HY-1a.1 (Stormwater Pollution Prevention Plan and Erosion and Sediment Control Plan), MM HZ-1a (Article 22 Site Mitigation Plan), and MM HZ-2a.1 (Unknown Contaminant Contingency Plan) would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the combined sewer system. Compliance with Article 4.1, including regulation under SFPUC's Batch Wastewater Discharge permit, would reduce the potential for pollutant discharges caused by groundwater dewatering to enter the combined sewer system. Water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Separate Storm Sewer System

Erosion and Sediment Control

In areas that drain to a separate storm sewer system, construction runoff would not be treated in the sanitary sewer system. In these areas, or in areas that discharge runoff directly to the Bay (such as sheet flow from the CPSRA), the Project Applicant would be required to comply with the state's Construction General Permit, including development, implementation, and submittal of a SWPPP (which is required by mitigation measure MM HY-1a.2) that includes minimum BMP requirements, depending upon the Risk Level determination in accordance with the Construction General Permit.

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[574] San Francisco Public Utilities Commission, 2008, Requirements for Batch Wastewater Discharges and associated Appendixes, July 10, 2008.

The Construction General Permit specifies a risk-based permitting approach based on the potential for the project to cause or contribute to sedimentation of the receiving water (in this case, the Lower Bay), as well as the sensitivity of the receiving water to sedimentation. It contains numeric action levels (moderate risk, Risk Level 2) and effluent limitations (high risk, Risk Level 3) for pH and turbidity. The Construction General Permit also requires effluent and receiving water (only for some Risk Level 3 sites) monitoring to demonstrate compliance with permit requirements, and corrective action must be taken if these limitations are exceeded or visual observations indicate the presence of pollutants. The results of the monitoring and corrective actions must be reported annually to the SWRCB.

The Construction General Permit requires that the Project Applicant file Permit Registration Documents prior to beginning of construction activities. These documents include a NOI, risk assessment, site map, a SWPPP, annual fee, and signed certification statement. The SWPPP must include measures to ensure that all pollutants and their sources are controlled; non-stormwater discharges are identified and either eliminated, controlled, or treated; site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges; and BMPs installed to reduce or eliminate pollutants after construction are completed and maintained. The SWPPP must demonstrate that calculations and design details, as well as BMP controls for site run-on, are complete and correct. The Construction General Permit also includes specific minimum BMPs required for stormwater control, based on the risk level determined for the Project site.

The Construction General Permit specifies minimum qualifications for the Qualified SWPPP Developer and Qualified SWPPP Practitioner to ensure that: (1) an appropriate SWPPP is developed; (2) BMPs are correctly installed and inspected; and (3) monitoring and reporting is correctly conducted.

Because the Project site does not discharge to a sediment-sensitive water body, which is defined as a sediment impaired water body or a water body with a beneficial use of cold freshwater habitat, fish spawning, and fish migration, the Project would likely be determined to be either a Risk Level 1 (low) or 2 (moderate) project, depending upon the Project site erosion potential. Therefore, construction in the separate storm sewer system areas would have to implement and incorporate at least Risk Level 1 or 2 minimum requirements into the SWPPP.

Compliance with the requirements of the Construction General Permit would serve to reduce pollutants in construction stormwater runoff from Candlestick Point to the separate storm sewer system and sheet flow to the Lower Bay. While the Construction General Permit contains specific minimum required BMPs, additional, discretionary BMPs could also be identified. Additionally, the SWPPP is an adaptive management tool; the SWPPP must be updated as additional considerations arise and if additional BMPs are required to comply with discharge requirements. The following mitigation measure shall be implemented to reduce construction-related pollutants in stormwater runoff:

MM HY-1a.2 *Stormwater Pollution Prevention Plan: Separate Storm Sewer System. Consistent with the requirements of the SWRCB General Permit for Storm Water Discharges Associated with Construction and Land Disturbing Activities (Construction General Permit), the Project Applicant shall undertake the proposed Project in accordance with a project-specific Storm Water Pollution Prevention Plan (SWPPP) prepared by Qualified SWPPP Developer. The SFRWQCB, the primary agency responsible for protecting water quality within the project area, is responsible for*

reviewing and ensuring compliance with the SWPPP. This review is based on the Construction General Permit issued by the SWRCB.

The SWPPP shall include, as applicable, all Best Management Practices (BMPs) required in Attachment C of the Construction General Permit for Risk Level 1 dischargers, Attachment D for Risk Level 2 dischargers, or Attachment E for Risk Level 3 dischargers. In addition, recommended BMPs, subject to review and approval by the SFRWQCB, include the measures listed below. However, the measures themselves may be altered, supplemented, or deleted during the SFRWQCB's review process, since the SFRWQCB has final authority over the terms of the SWPPP.

- *Scheduling:*
  - *To reduce the potential for erosion and sediment discharge, schedule construction to minimize ground disturbance during the rainy season. Schedule major grading operations during the dry season when practical, and allow enough time before rainfall begins to stabilize the soil with vegetation or to install sediment-trapping devices.*
  - *Sequence construction activities to minimize the amount of time that soils remain disturbed.*
  - *Stabilize all disturbed soils as soon as possible following the completion of ground disturbing work.*
  - *Install erosion and sediment control BMPs prior to the start of any ground-disturbing activities.*
- *Erosion and Sedimentation:*
  - *Preserve existing vegetation in areas where no construction activity is planned or where construction activity will occur at a later date.*
  - *Stabilize and re-vegetate disturbed areas as soon as possible after construction with planting, seeding, and/or mulch (e.g., straw or hay, erosion control blankets, hydromulch, or other similar material) except in actively cultivated areas.*
  - *Install silt fences, coir rolls, and other suitable measures around the perimeter of the areas affected by construction and staging areas and around riparian buffers, storm drains, temporary stockpiles, spoil areas, stream channels, swales, down-slope of all exposed soil areas, and in other locations determined necessary to prevent off-site sedimentation.*
  - *Install temporary slope breakers during the rainy season on slopes greater than 5 percent where the base of the slope is less than 50 feet from a water body, wetland, or road crossing at spacing intervals required by the SFRWQCB.*
  - *Use filter fabric or other appropriate measures to prevent sediment from entering storm drain inlets.*
  - *Detain and treat stormwater using sedimentation basins, sediment traps, baker tanks, or other measures to ensure that discharges to receiving waters meet applicable water quality objectives.*
  - *Install check dams, where applicable, to reduce flow velocities. Check dams reduce erosion and allow sediment to settle out of runoff.*
  - *Install outlet protection/energy dissipation, where applicable, to prevent scour of the soil caused by concentrated high velocity flows.*

- *Implement control measures such as spraying water or other dust palliatives to alleviate nuisance caused by dust.*

- *Groundwater/Dewatering:*
  - *Prepare a dewatering plan prior to excavation specifying methods of water collection, transport, treatment, and discharge of all water produced by construction site dewatering.*
  - *Impound water produced by dewatering in sediment retention basins or other holding facilities to settle the solids and provide other treatment as necessary prior to discharge to receiving waters. Locate sedimentation basins and other retention and treatment facilities away from waterways to prevent sediment-laden water from reaching streams.*
  - *Control discharges of water produced by dewatering to prevent erosion.*
  - *If contaminated groundwater is encountered, contact the SFRWQCB for appropriate disposal options. Depending on the constituents of concern, such discharges may be disallowed altogether, or require regulation under a separate general or individual permit that would impose appropriate treatment requirements prior to discharge to the stormwater drainage system.*
- *Tracking Controls:*
  - *Grade and stabilize construction site entrances and exits to prevent runoff from the site and to prevent erosion.*
  - *Install a tire washing facility at the site access to allow for tire washing when vehicles exit the site.*
  - *Remove any soil or sediment tracked off paved roads during construction by street sweeping.*
- *Non-stormwater Controls:*
  - *Place drip pans under construction vehicles and all parked equipment.*
  - *Check construction equipment for leaks regularly.*
  - *Wash construction equipment in a designated enclosed area regularly.*
  - *Contain vehicle and equipment wash water for percolation or evaporative drying away from storm drain inlets.*
  - *Refuel vehicles and equipment away from receiving waters and storm drain inlets, contain the area to prevent run-on and run-off, and promptly cleanup spills.*
  - *Cover all storm drain inlets when paving or applying seals or similar materials to prevent the discharge of these materials.*
- *Waste Management and Hazardous Materials Pollution Control:*
  - *Remove trash and construction debris from the project area daily.*
  - *Locate sanitary facilities a minimum of 300 feet from receiving waters. Maintain sanitary facilities regularly.*
  - *Store all hazardous materials in an area protected from rainfall and stormwater run-on and prevent the off-site discharge of hazardous materials.*

- > *Minimize the potential for contamination of receiving waters by maintaining spill containment and cleanup equipment on site, and by properly labeling and disposing of hazardous wastes.*
- > *Locate waste collection areas close to construction entrances and away from roadways, storm drains, and receiving waters.*
- > *Inspect dumpsters and other waste and debris containers regularly for leaks and remove and properly dispose of any hazardous materials and liquid wastes placed in these containers.*
- > *Train construction personnel in proper material delivery, handling, storage, cleanup, and disposal procedures.*
- > *Implement construction materials management BMPs for:*
  - o *Road paving, surfacing and asphalt removal activities.*
  - o *Handling and disposal of concrete and cement.*

■ *BMP Inspection, Maintenance, and Repair:*

- > *Inspect all BMPs on a regular basis to confirm proper installation and function. Inspect BMPs daily during storms.*
- > *Immediately repair or replace BMPs that have failed. Provide sufficient devices and materials (e.g., silt fence, coir rolls, erosion blankets, etc.) throughout project construction to enable immediate corrective action for failed BMPs.*

■ *Monitoring and Reporting:*

- > *Provide the required documentation for SWPPP inspections, maintenance, and repair requirements. Personnel that will perform monitoring and inspection activities shall be identified in the SWPPP.*
- > *Maintain written records of inspections, spills, BMP-related maintenance activities, corrective actions, and visual observations of off-site discharges of sediment or other pollutants, as required by the SFRWQCB.*
- > *Monitor the water quality of discharges from the site to assess the effectiveness of control measures.*

■ *Implement Shoreline Improvements and work over water BMPs to minimize the potential transport of sediment, debris, and construction materials to the Lower Bay during construction of shoreline improvements.*

■ *Post-construction BMPs:*

- > *Re-vegetate all temporarily disturbed areas as required after construction activities are completed.*
- > *Remove any remaining construction debris and trash from the project site and area upon project completion.*
- > *Phase the removal of temporary BMPs as necessary to ensure stabilization of the site.*
- > *Maintain post-construction site conditions to avoid formation of unintended drainage channels, erosion, or areas of sedimentation.*
- > *Correct post-construction site conditions as necessary to comply with the SWPPP and any other pertinent SFRWQCB requirements.*

- *Train construction site personnel on components of the SWPPP and BMP implementation. Train personnel that will perform inspection and monitoring activities.*

Groundwater Dewatering

For construction activities that discharge to the separate storm sewer system, discharge of groundwater from temporary construction dewatering activities would be regulated by the SFRWQCB by one of several mechanisms, depending on the quality and quantity of groundwater and its potential to cause or contribute to violation of water quality standards. The permitting options are coverage under (1) the Construction General Permit; (2) one of the three General NPDES Permits regulating the discharge of extracted and treated groundwater to the storm drain system; or (3) an individual NPDES permit/WDR.[575] These permits include provisions for discharge limitations, peak flow and flow duration restrictions, other dewatering discharge requirements, and monitoring and reporting requirements.

Because permit conditions will depend upon the quality of the water discharged and the anticipated discharge rates, mitigation measure MM HY-1a.3 will require the preparation and implementation of a Groundwater Dewatering Plan to protect water quality, which shall be incorporated into the SWPPP:

MM HY-1a.3 *Groundwater Dewatering Plan. Prior to commencement of construction activities and to minimize potential impacts to receiving water quality during the construction period, the Project Applicant shall through the proper implementation of this dewatering plan, show compliance with SFRWQCB/NPDES requirements, whichever are applicable.*

The Dewatering Plan shall specify how the water would be collected, contained, treated, monitored, and/or discharged to the vicinity drainage system or Lower Bay. Subject to the review and approval of the SFRWQCB, the Dewatering Plan shall include, at a minimum:

- *Identification of methods for collecting and handling water on site for treatment prior to discharge, including locations and capacity of settling basins, infiltration basins (where not restricted by site conditions), treatment ponds, and/or holding tanks*
- *Identification of methods for treating water on site prior to discharge, such as filtration, coagulation, sedimentation settlement areas, oil skimmers, pH adjustment, and other BMPs*
- *Procedures and methods for maintaining and monitoring dewatering operations to ensure that no breach in the process occurs that could result in an exceedance of applicable water quality objectives*
- *Identification of discharge locations and inclusion of details on how the discharge would be conducted to minimize erosion and scour*
- *Identification of maximum discharge rates to prevent exceedance of storm drain system capacities*
- *Additional requirements of the applicable General Permit or NPDES Permit/WDR (including effluent and discharge limitations and reporting and monitoring requirements, as applicable) shall be incorporated into the Dewatering Plan*

Any exceedance of established narrative or numeric water quality objectives shall be reported to the SFRWQCB and corrective action taken as required by the SFRWQCB and the Dewatering Plan. Corrective action may include increased residence time in treatment features (e.g., longer holding time in

[575] An NPDES permit also serves as a WDR.

settling basins) and/or incorporation of additional treatment measures (e.g., addition of sand filtration prior to discharge).

Groundwater dewatering activities could also alter the gradient of groundwater flow. However, the altered groundwater flow gradient would not be expected to cause or contribute to discharge of contaminated groundwater to the Lower Bay; groundwater would flow towards the point(s) of dewatering (internal to the site) and not towards the Lower Bay. In addition, refer to Impact HZ-5b and mitigation measure MM HZ-5a (Foundation Support Piles Installation Plan) in Section III.K for a discussion of foundation support piles installation, including the potential for groundwater contamination.

Summary (Separate Storm Sewer System)

With respect to erosion and sediment control, implementation of mitigation measures MM HY-1a.2 (SWPPP-Separate Storm Sewer System), MM HZ-1a (Article 22 Site Mitigation Plan), MM HZ-2a.1 (Unknown Contaminant Contingency Plan), MM-HZ-5a (Foundation Support Piles Installation Plan) and MM HZ-15 (Asbestos Dust Mitigation and Control Plan) would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the separate sewer system. Compliance mitigation measure MM HY-1a.3 would require the preparation and implementation of a Groundwater Dewatering Plan to protect water quality. Water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Shoreline Activities

Development at Candlestick Point would include the repair and upgrade of existing shoreline protection features (e.g., riprap) along the majority of the shoreline (as further described and illustrated in Chapter II). Improvements to the shoreline along Candlestick Point would include the placement of additional riprap (rock) to improve the flood protection function of the existing riprap shoreline edge, the creation of a sandy recreational beach at the mid-point of the Wind Meadow reach along the Eastern Shoreline; and the creation of new tidal habitat in several locations. This would involve construction activities along the shoreline that could result in the discharge of pollutants in stormwater runoff and/or the incidental or accidental discharge of substances and materials commonly used in construction directly to the Lower Bay.

Construction activities along the shore would expose soils to rainfall, runoff, wind, and wave action, which could result in the erosion of soils, the mobilization and deposition of dust from affected areas, and the mobilization and transport of residual hazardous materials in soils to the Lower Bay. These activities could contribute construction debris and materials directly to surface waters, cause suspension of particulates, or cause re-suspension of toxic sediment-bound pollutants into the water column. The specific construction methods for in-water construction would be determined during detailed Project design, and the agencies that would provide oversight would be determined during the permit application review process.

Various permits would be likely be required to construction the Project, such as a CWA Section 404 Permit and associated CWA section 401 Water Quality Certification, a Section 10 of the *Rivers and*

Harbors Act Permit, and/or a permit issued by BCDC under the *McAteer-Petris Act*. For example, in order for a Project Applicant to discharge dredged material to any water of the US, including navigable waters, Section 404 of the CWA requires an evaluation to demonstrate that there is no practicable alternative to the proposed discharge that would have less impact on the aquatic ecosystem. Most RWQCBs rely on applications for a CWA 401 Water Quality Certification (or a waiver thereof) to determine whether WDRs need to be issued for a project. Refer to Section III.N for a detailed discussion of the potential impacts to biological resources resulting from in-water construction, the permitting processes that would likely be required, and the mitigation measures that have been identified in this EIR to address biological impacts at Candlestick Point (e.g., Impact BI-4a and mitigation measures MM BI-4a.1 and MM BI-4a.2; and Impact BI-12a). Specifically, mitigation measures MM BI-4a.1 and MM BI-4a.2 provide measures to protect biological resources during construction of the shoreline improvements and also include BMPs to reduce potential effects on water quality.

It is anticipated that any permit(s) issued could include or otherwise reference the construction-related BMPs identified by the Project Applicant in the SWPPPs to reduce potential impacts to water quality (refer to mitigation measures MM HY-1a.1 and HY-1a.2). Further, additional BMPs may be specified by the agencies to further protect water quality along the shoreline. For example, typical BCDC permit conditions include requirements to construct, guarantee, and maintain public access to the Bay, specified construction methods to ensure safety or to protect water quality, plan review requirements that must be met before construction can begin, and mitigation requirements to offset adverse environmental impacts.

With respect to water quality impacts caused by the shoreline improvements at Candlestick Point, including pollutants transported through erosion and sedimentation, the incidental release of construction materials, or the accidental spill of substances commonly used in construction directly to the Lower Bay, implementation of mitigation measures MM HY-1a.1 (SWPPP and ESCP – Combined Sewer System), MM HY-1a.2 (SWPPP – Separate Storm Sewer System), MM HZ-1a (Article 22 Site Mitigation Plan), and MM HZ-2a.1 (Unknown Contaminant Contingency Plan) would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the Lower Bay. While mitigation measures MM HY-1a.1 and MM HY-1a.2, each of which require the preparation of a SWPPP, are intended to address runoff that enters either the combined or separate sewer systems, the BMPs could also address shoreline improvement activities.

Summary of Impact at Candlestick Point

These mitigation measures, which shall be implemented by the Project Applicant, would ensure that water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Impact of Hunters Point Shipyard Phase II

Impact HY-1b **Construction at HPS Phase II would not cause an exceedance of water quality standards or contribute to or cause a violation of waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

The discharge of sediment-laden runoff, groundwater from temporary construction dewatering activities, the incidental or accidental release of construction materials or products into the combined sewer system,

separate storm sewer systems, or directly to receiving waters within or adjacent to the Project site, or the exposure of surface water or groundwater to contaminated soils could impair water quality.

Construction activities within HPS Phase II would include demolition of existing facilities, the clearing and grading of development areas (including excavation, trenching, movement of soil, and the importation of fill soils), and the subsequent construction of new facilities and associated infrastructure. Construction activities would expose soils to rainfall and runoff, construction vehicle traffic, and wind, which could result in the erosion of soils and the mobilization and deposition of dust from disturbed development areas.

Construction activities could also result in the incidental release of construction materials or the accidental spill of substances commonly used in construction (e.g., paints, solvents, petroleum products, equipment leakage, and others). The incidental release or accidental spill of such substances could result in the introduction of those substances directly to the Lower Bay or into stormwater runoff, and their subsequent discharge to the separate sewer system.

Construction activities could also disturb contaminated soils and increase their exposure to surface water runoff and cause or contribute to surface water or groundwater quality degradation. The historic uses at HPS Phase II by both the Navy and its tenants resulted in a number of hazardous materials release sites that are presently undergoing remediation by the Navy under federal law and under the supervision of federal and state environmental agencies. The potential for such contamination to be encountered during construction is addressed in Section III.K.

Construction of the Project would require excavation of portions of the site for building foundations, basements, utilities, or mechanical equipment that may be installed below grade. Excavation and grading could encounter groundwater. The installation of below-grade building elements could, therefore, require temporary dewatering and the short-term discharge of groundwater to the separate storm sewer system.

Separate Storm Sewer System

Erosion and Sediment Control

As discussed in Impact HY-1a, in areas that drain to a separate storm sewer system, construction runoff would not be treated in the combined sewer system, which could result in the potential for pollutants in stormwater runoff to discharge to the Bay. In these areas, or in areas that discharge runoff directly to the Bay (such as sheet flow from the CPSRA), the Project Applicant would be required to comply with the state's Construction General Permit, including development, implementation, and submittal of a SWPPP (which is required by mitigation measure MM HY-1a.2 (SWPPP-Separate Storm Sewer System) that includes minimum BMP requirements, depending upon the Risk Level Determination. The discussion provided in Impact HY-1a regarding the regulatory systems in place that address the potential for pollutants to be transported in stormwater to the separate storm sewer system (thereby affecting water quality) would also apply to HPS Phase II.

The historic uses at HPS Phase II by both the Navy and its tenants resulted in a number of hazardous materials release sites that are presently undergoing remediation by the Navy under federal law and under the supervision of federal and state environmental agencies. Prior to the transfer of HPS Phase II property to the City, the Navy must ensure, to the satisfaction of the Federal Facilities Agreement (FFA)

signatories, that the Project site is suitable for conveyance for the use intended and that the intended use is consistent with the protection of human health and the environment (refer also to Section III.K for further detail). As discussed in Section III.K, the Navy would be required to implement Institutional Controls (ICs) for cleanup at HPS Phase II. ICs are legal and administrative mechanisms to implement land use restrictions to limit the exposure of future landowners and users to hazardous materials and to ensure the integrity of remedial activities. ICs are required when a property is remediated to cleanup levels that do not allow for unlimited use and unrestricted exposure. As noted in Section III.K., the HPS Phase II site is contaminated by past use and would likely continue to retain residual hazardous material contamination after transfer of the site from the Navy to San Francisco Redevelopment Agency and the Project Applicant.

During construction, stormwater runoff over disturbed, contaminated soils could transport contaminated sediment to surface water or mobilize residual pollutants and transport them to surface waters. Additionally, infiltration of rainfall through disturbed areas, including disturbance of interim or permanent caps and covers, could alter the local groundwater gradient and cause or contribute to migration of groundwater pollutants to the Lower Bay. However, when determined necessary by Article 22A of the Health Code, mitigation measures MM HZ-1a (Article 22 Site Mitigation Plan) would require a Site Mitigation Plan and MM HZ-2a.1 (Unknown Contaminant Contingency Plan) would require a contingency plan to address the discovery of unknown contaminated areas. Implementation of mitigation measure MM HY-1a.2 (SWPPP-Separate Storm Sewer System) would require the identification of BMPs to protect water quality during construction activities. Implementation of mitigation measure MM HZ-12 (Compliance with Administrative Order of Consent at Early Transferred Parcels) would require compliance by the Agency or Project Applicant with all requirements incorporated into remedial design documents, dust control plans, and any other document required under the Administrative Order of Consent. Implementation of mitigation measure MM HZ-15 (Asbestos Dust Mitigation and Control Plans) would require implementation of appropriate plans control dust that may contain naturally-occurring asbestos.

Water quality standards would not be exceeded nor would the development at HPS Phase II cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Groundwater Dewatering

For construction activities that discharge to the separate storm sewer system, discharge of groundwater from temporary construction dewatering activities would be regulated by the SFRWQCB by one of several mechanisms, depending on the quality and quantity of groundwater and its potential to cause or contribute to violation of water quality standards. The permitting options are coverage under (1) the Construction General Permit; (2) one of the three General NPDES Permits regulating the discharge of extracted and treated groundwater to the storm drain system; or (3) an individual NPDES permit/WDR.[576] These permits include provisions for discharge limitations, peak flow and flow duration restrictions, other dewatering discharge requirements, and monitoring and reporting requirements.

Because permit conditions will depend upon the quality of the water discharged and the anticipated discharge rates, mitigation measure MM HY-1a.3 will require the preparation and implementation of a

[576] An NPDES permit also serves as a WDR.

Groundwater Dewatering Plan to protect water quality. Compliance mitigation measure MM HY-1a.3 would protect water quality. Water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Shoreline Activities

Development at HPS Phase II would include the repair and upgrade of existing shoreline protection features (e.g., riprap) and the construction of new shoreline protection features along the majority of the shoreline (as further described and illustrated in Chapter II). Along some areas of the HPS Phase II shoreline, piers and wharves have deteriorated due to structure age and lack of maintenance, and near-shore settlement has occurred. Repairs of existing HPS Phase II shoreline structures vary based on type of edge and include repair of piles and deck, concrete crack repairs and rock buttresses along base of the drydocks, removal of upper portion of fill along bulkheads, and rip-rap placement. Several piers and drydocks would be modified by the removal of short section of piers and/or bulkheads (near the shore) to preclude public access, thereby creating opportunities for waterbirds to roost on the retained portions of these structures.

The Shipyard currently includes seven piers and six drydocks along the shoreline (refer to Figure II-2). As part of the base closure and conveyance process described in Chapter I (Introduction), the Navy will remove Piers B and C and timber portions (concrete walls would remain) of Drydocks 5, 6, and 7 prior to conveyance of HPS Phase II to the City and County of San Francisco. Drydocks 2 and 3 and four supporting buildings (Buildings 140, 204, 205, and 207) were previously identified as historic resources eligible for listing in the National Register of Historic Places.[577] Heritage Park is proposed at Drydocks 2 and 3 and would display interpretive elements related to the history of HPS. Drydocks 4, 5, 6 and 7 and the Re-Gunning Pier and crane would remain. Piers 1, 2, and 3 consist of long, narrow concrete piers in the southeastern portion of HPS Phase II. These pier structures would remain in place, but portions of the pier would be removed to prevent public access for safety reasons. The Re-gunning Pier would be reconfigured for wildlife habitat uses. Some pier areas would require cleaning and repaving. The North and South Piers would be the sites of the proposed marina.

Construction at HPS Phase II would also involve the installation of a marina and the installation of breakwaters to protect the marina. The 300-slip marina will require the construction of two breakwater sections ranging between 300 and 650 feet in length. To accommodate the proposed marina, breakwaters will be constructed using two 10.7 to 11.3 acres basins. They will be constructed off site using concrete sheet pile supported by batter piles and installed using water-based equipment.

These improvements would involve construction activities along the shoreline that could result in the discharge of pollutants in stormwater runoff and/or the incidental or accidental discharge of substances and materials commonly used in construction directly to the Lower Bay.

The demolition of existing piers or parts of piers could generate dust and debris and mobilize underwater sediments in vicinity of the removed pilings. The construction of new in-water pilings, shoreline

[577] City and County of San Francisco and San Francisco Redevelopment Agency, Final Environmental Impact Report for the Reuse of Hunters Point Shipyard, February 8, 2000. This document is on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

abutments, and the breakwater could also mobilize underwater sediments, re-suspend sediment-associated contaminants in the water column, as well as potentially result in the incidental release of construction materials (i.e., sawdust, metal fragments, concrete) or the accidental spill of construction materials (i.e., paints and solvents) or substances commonly used in construction equipment (i.e., petroleum products).

The discussion provided in Impact HY-1a regarding the regulatory systems in place that address in-water construction (thereby affecting water quality) would also apply to HPS Phase II. In addition, refer to Impact HZ-5a and mitigation measure MM HZ-5a in Section III.K for a discussion of installation of foundation support piles, including the potential for groundwater contamination. Refer to Impact HZ-10 and mitigation measures MM HZ-10b (Regulatory Agency Approved Workplans and Permits for Shoreline Improvements), for a discussion of methods to reduce the potential of encountering contaminated sediments while implementing shoreline improvements.

The shoreline improvements at HPS Phase II are more extensive than those proposed for Candlestick Point. With respect to water quality impacts caused by the shoreline improvements at HPS Phase II, including pollutants transported through erosion and sedimentation or the incidental release of construction materials or the accidental spill of substances commonly used in construction directly to the Lower Bay, implementation of mitigation measures MM HY-1a.1 (SWPPP—Combined Sewer System), MM HY-1a.2 (SWPPP—Separate Storm Sewer System), MM HZ-1a (Article 22 Site Mitigation Plan), and MM HZ-2a.1 (Unknown Contaminant Contingency Plan) would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the Lower Bay. While mitigation measures MM HY-1a.1 and MM HY-1a.2, each of which require the preparation of a SWPPP, are intended to address runoff that enters either the combined or separate sewer systems, the BMPs could also address shoreline improvement activities.

Refer to Section III.N for a detailed discussion of the potential impacts to biological resources resulting from in-water construction, the permitting processes that would likely be required, and the mitigation measures that have been identified in this EIR to address biological impacts at HPS Phase II (e.g., Impact BI-4a and mitigation measures MM BI-4a.1 (Wetlands and Jurisdictional/Regulated Waters Mitigation for Temporary and/or Permanent Impacts) and MM BI-4a.2 (Wetlands and Jurisdictional/Regulated Waters Impact Minimization for Construction-Related Impacts); Impact BI-5b and mitigation measure MM BI-5b.4 (Eelgrass Water Quality BMPs); and Impact BI-12b and mitigation measures MM BI-12b.1 (Essential Fish Habitat Avoidance and Minimization Measures) and MM BI-12b.2 (Deconstruction/Construction Debris Recovery). Each of these mitigation measures provides specific mechanisms to protect biological resources and reduce potential effects on water quality during construction of the shoreline improvements.

Summary of Impact at Hunters Point Shipyard, Phase II

All of the mitigation measures referenced in this discussion would ensure that water quality standards would not be exceeded nor would construction and HPS Phase II cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Impact of Yosemite Slough Bridge

Impact HY-1c **Construction of the Yosemite Slough bridge would not cause an exceedance of water quality standards or contribute to or cause a violation of waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

The Yosemite Slough bridge would involve the installation of pilings in the slough, bridge foundations along either edge of the slough, and the installation of the bridge deck surface, which is proposed to include both paved and turf-covered areas. Installation of the bridge pilings could require the installation of sheet piles on either side of the bridge location to form a barrier on either side of the construction site from which water would be removed, followed by the subsequent installation of the bridge pilings and the bridge deck. The installation of sheet piles that form coffer dams on either side of the bridge, bridge pilings, and the bridge foundations could mobilize underwater sediments and re-suspend sediment-associated contaminants into the water column, and result in the incidental release of construction materials (e.g., sawdust, metal fragments, concrete), or the accidental spill of construction materials (e.g., paints and solvents) or substances commonly used in construction equipment (e.g., petroleum products).

With respect to water quality impacts caused by construction of the Yosemite Slough bridge, including pollutants transported through erosion and sedimentation or the incidental release of construction materials or the accidental spill of substances commonly used in construction directly to the Lower Bay, implementation of mitigation measures MM HY-1a.1 (SWPPP—Combined Sewer System), MM HY-1a.2 (SWPPP—Separate Storm Sewer System), MM HZ-1a (Article 22 Site Mitigation Plan), MM HZ-2a.1 (Unknown Contaminant Contingency Plan), and MM HZ-9 (Navy-Approved Workplans for Construction and Remediation Activities on Navy-Owned Property) would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the Lower Bay. While mitigation measures MM HY-1a.1 and MM HY-1a.2, each of which require the preparation of a SWPPP, are intended to address runoff that enters either the combined or separate sewer systems, the BMPs could also address bridge construction activities. In addition, because the bridge would be constructed using piles driven in dry conditions (behind coffer dams), water quality impacts would be minimized.

Refer to Section III.N for a detailed discussion of the potential impacts to biological resources resulting from in-water construction, the permitting processes that would likely be required, and the mitigation measures that have been identified in this EIR to address biological impacts associated with construction of the Yosemite Slough bridge. Implementation of mitigation measures MM BI-4a.1 (Wetlands and Jurisdictional/Regulated Waters Mitigation for Temporary and/or Permanent Impacts), MM BI-4a.2 (Wetlands and Jurisdictional/Regulated Waters Impact Minimization for Construction-Related Impacts); MM BI-12b.1 (Essential Fish Habitat Avoidance and Minimization Measures) and MM BI-12b.2 (Deconstruction/Construction Debris Recovery) would provide specific mechanisms to protect biological resources and reduce potential effects on water quality during construction of Yosemite Slough bridge.

Summary of Impact at Hunters Point Shipyard, Phase II

All of the mitigation measures referenced in this discussion would ensure that water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Combined Impact of Candlestick Point, Hunters Point Shipyard Phase II, and Yosemite Slough Bridge

Impact HY-1 **Construction activities associated with the Project would not cause an exceedance of water quality standards or contribute to or cause a violation of waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

As previously discussed, the discharge of sediment-laden runoff, groundwater from temporary construction dewatering activities, the incidental or accidental release of construction materials or products into the combined sewer system, separate storm sewer systems, or directly to receiving waters within or adjacent to the Project site, or the exposure of surface water or groundwater to contaminated soils could impair water quality.

Construction of the Project would include demolition of existing facilities, the clearing and grading of development areas (including excavation, trenching, movement of soil, and the importation of fill soils), and the subsequent construction of new facilities and associated infrastructure, including the Yosemite Slough bridge, the various shoreline improvements, and the marina and breakwaters. Construction activities would expose soils to rainfall and runoff, construction vehicle traffic, and wind, which could result in the erosion of soils and the mobilization and deposition of sediment from disturbed development areas, including those that may contain contamination. Construction activities could also result in the incidental release of construction materials or the accidental spill of substances commonly used in construction (e.g., paints, solvents, petroleum products, equipment leakage, and others). The incidental release or accidental spill of such substances could result in the introduction of those substances directly to the Lower Bay or into stormwater runoff that could discharge into the combined or separate sewer system.

Construction of the Project would require excavation of portions of the site for building foundations, basements, utilities, or mechanical equipment that may be installed below grade. Excavation and grading could encounter groundwater. The installation of below-grade building elements could, therefore, require temporary dewatering and the short-term discharge of groundwater to either the combined sewer system or separate storm sewer systems.

Erosion and Sediment Control

As previously discussed, portions of Candlestick Point drain to the combined sewer system, while other portions discharge directly to the Lower Bay (via sheet flow) or drain to separate storm sewer systems that then drain to the Lower Bay. HPS Phase II drains to the separate storm sewer system. The combined sewer system collects and treats stormwater flows prior to discharge to the Lower Bay; however, there is currently no treatment of stormwater runoff that drains to the Lower Bay via direct discharges or separate sewer systems.

Construction-related discharges to the combined system would need to comply with Article 4.1 of the *San Francisco Public Works Code* and meet the requirements of the City's Construction Site Runoff Pollution Prevention Program. The City's Construction Site Runoff Pollution Prevention procedures were established to ensure that all businesses comply with all appropriate stormwater laws and other City requirements, and includes inspection of construction sites to ensure compliance. Under this program, all construction sites must prepare a SWPPP, which includes an ESCP, as further required by mitigation measure MM HY-1a.1.

In areas served by a separate storm sewer system, or in areas that discharge runoff directly to the Bay (such as sheet flow from the CPSRA), the Project Applicant would be required to comply with the state's Construction General Permit, including development, implementation, and submittal of a SWPPP (which is required by mitigation measure MM HY-1a.2) that includes minimum BMP requirements, depending upon the Risk Level determination according to the Construction General Permit.

Groundwater Dewatering

For construction activities that discharge to the combined system, discharge of groundwater from temporary construction dewatering activities would be regulated under Article 4.1 of the *San Francisco Public Works Code*, which prohibits the discharge of hazardous waste and other pollutants that violate the City's federal and state NPDES permits. These NPDES Permits establish the waste discharge requirements for the combined sewer system.

Pursuant to Article 4.1 of the *San Francisco Public Works Code*, discharges of dewatering water to the combined sewer system would be regulated under a Batch Wastewater Discharge permit that would be obtained by the Applicant from the SFPUC. Specific permit terms and conditions are imposed by SFPUC to maintain SFPUC's compliance with its own Wastewater Discharge Permit issued by the SFRWQCB. Under the Batch Wastewater Discharge permit, the discharge must meet specific numeric effluent limitations for toxic and conventional pollutants and monitoring is required to ensure compliance.[578]

For construction activities that discharge to the separate storm sewer system, discharge of groundwater from temporary construction dewatering activities would be regulated by the SFRWQCB by one of several mechanisms, depending on the quality and quantity of groundwater and its potential to cause or contribute to violation of water quality standards. The permitting options are coverage under (1) the Construction General Permit (for uncontaminated groundwater); (2) one of the three General NPDES Permits regulating the discharge of extracted and treated groundwater to the storm drain system; or (3) an individual NPDES permit/WDR.[579] These permits include provisions for discharge limitations, peak flow and flow duration restrictions, other dewatering discharge requirements, and monitoring and reporting requirements.

Because permit conditions will depend upon the quality of the water discharged and the anticipated discharge rates, mitigation measure MM HY-1a.3 will require the preparation and implementation of a

[578] San Francisco Public Utilities Commission, 2008, Requirements for Batch Wastewater Discharges and associated Appendixes, July 10, 2008.
[579] An NPDES permit also serves as a WDR.

Groundwater Dewatering Plan to protect water quality; the Groundwater Dewatering Plan shall be incorporated into the SWPPP. Compliance with mitigation measure MM HY-1a.3 would protect water quality. Water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Shoreline Activities

As further discussed in Impact HY-1a, Impact HY-1b, and Impact HY-1c, development of the Project would include the repair and upgrade of existing shoreline protection features (e.g., riprap) and the construction of new shoreline protection features along the majority of the shoreline (as further described and illustrated in Chapter II).

Summary

With respect to erosion and sediment control, implementation of mitigation measures MM HY-1a.1 (SWPPP - Combined Sewer System), MM HY-1a.2 (SWPPP-Separate Storm Sewer System), MM HZ-1a (Article 22 Site Mitigation Plan), MM HZ-2a.1 (Unknown Contaminant Contingency Plan), MM HZ-9 (Navy-Approved Workplans for Construction and Remediation Activities on Navy-Owned Property), MM HZ-12 (Compliance with Administrative Order of Consent at Early Transferred Parcels), and MM HZ-15 (Asbestos Dust Mitigation and Control Plans)would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the combined or separate sewer system. Compliance with Article 4.1, including regulation under SFPUC's Batch Wastewater Discharge permit, would reduce the potential for pollutant discharges caused by groundwater dewatering to enter the combined sewer system. Implementation of mitigation measure MM HY-1a.3 would reduce the impacts of discharging dewatered groundwater into the separate sewer system. Water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

With respect to water quality impacts caused by the shoreline improvements at Candlestick Point, including pollutants transported through erosion and sedimentation or the incidental release of construction materials or the accidental spill of substances commonly used in construction directly to the Lower Bay, implementation of mitigation measures MM HY-1a.2 (SWPPP and ESCP—Combined Sewer System), MM HY-1a.2 (SWPPP—Separate Storm Sewer System), MM HZ-1a (Article 22 Site Mitigation Plan), MM HZ-2a.1 (Unknown Contaminant Contingency Plan), and MM HZ-10b (Regulatory Agency-Approved Workplans and Permits for Shoreline Improvements) would reduce the potential for contaminants, sediments, or pollutants in stormwater runoff to enter the Lower Bay. While mitigation measures MM HY-1a.1 and MM HY-1a.2, each of which require the preparation of a SWPPP, are intended to address runoff that enters either the combined or separate sewer systems, the BMPs could also address shoreline improvement activities.

Refer to Section III.N for a detailed discussion of the potential impacts to biological resources resulting from in-water construction, the permitting processes that would likely be required, and the mitigation measures that have been identified in this EIR to address biological impacts at HPS Phase II, including MM BI-4a.1 (Wetlands and Jurisdictional/Regulated Waters Mitigation for Temporary and/or Permanent Impacts), MM BI-4a.2 (Wetlands and Jurisdictional/Regulated Waters Impact Minimization for Construction-Related Impacts), MM BI-5b.4 (Eelgrass Water Quality BMPs), MM BI-12b.1

(Essential Fish Habitat Avoidance and Minimization Measures) and MM BI-12b.2 (Deconstruction/Construction Debris Recovery). Each of these mitigation measures provides specific mechanisms to protect biological resources and reduce potential effects on water quality during in-water construction activities.

All of the mitigation measures referenced in this discussion would ensure that water quality standards would not be exceeded nor would the Project cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Impact HY-2: Groundwater Supplies and Groundwater Recharge

Impact HY-2 **Construction activities associated with 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 local groundwater table level. (Less than Significant)** ***[Criterion M.b]***

Groundwater would not be used for any construction activities such as dust control or irrigation of vegetated erosion control features; no groundwater wells would be developed as part of the Project and no on-site groundwater wells would be used for water supplies. Short-term construction groundwater dewatering may be necessary at certain locations (e.g., for installation of building foundations or underground utilities), but dewatering would have only a minor temporary effect on the groundwater table elevation in the immediate vicinity of the activity, and would not measurably affect groundwater supplies. Further, the shallow groundwater underlying the Project site at Candlestick point or HPS Phase II is not used for water supply. Construction activities would generally occur within areas that are already developed, and much of the existing open space would remain undeveloped and continue to contribute to groundwater recharge. Construction of the Project would include installation and operation of groundwater remediation and monitoring wells, if required by Navy transfer documents and regulatory requirements (as discussed in Section III.K). Therefore construction at the Project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge, and this impact would be less than significant. No mitigation is required.

Impact HY-3: Erosion and Siltation Effects

Impact HY-3 **Construction activities associated with the Project would not 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. (Less than Significant)** ***[Criterion M.c]***

Construction activities associated with the Project would include site clearance, grading and excavation, and the construction of new buildings and infrastructure. The potential for on-site erosion of exposed soil surfaces during construction activity is fully addressed in Impact HY-1. No streams or rivers exist in the immediate vicinity of the Project site, and thus, no streams or rivers would be altered by construction activity. As discussed in the setting, stormwater at the Project site either drains to storm drains (which include both combined and separate systems), or drains directly to the Bay via surface runoff (generally

only along the shoreline). The existing drainage patterns would be generally preserved, although as noted in Chapter II, the ground elevation would be raised (via the importation of fill soils) to protect the area from a potential rise in sea level of up to three feet. This would locally modify drainage patterns within the affected area. Because most of the affected area is already drained by sewer systems (combined and separate), and would continue to drain to a newly constructed entirely separate storm sewer systems, this would not result in a substantial alteration of drainage patterns related to erosion potential. Potential effects of cut and fill activities on slope stability and erosion are addressed in Section III.L. Therefore, construction at the Project site would not substantially alter the existing drainage pattern of the site or area such that on- or off-site erosion is substantially increased and this impact would be less than significant. No mitigation is required.

Impact HY-4: Flooding Effects

Impact HY-4 **Construction activities associated with the Project would not substantially alter the existing drainage pattern of the site, 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. (Less than Significant with Mitigation)** ***[Criterion M.d]***

No streams or rivers exist within the Project site, and thus, no streams or rivers would be altered by construction activity. The amount of impervious area would not increase; impervious areas would be removed and/or replaced and the Project site would be graded flat (0.1 to 0.5 percent grade), resulting in no increase in stormwater runoff during construction. As discussed under Impact HY-3, construction activities at the Project site would not substantially alter existing drainage patterns causing or contributing to increased stormwater runoff. Construction would include clearance, grading, and excavation, and the subsequent construction of new buildings and infrastructure. With implementation of mitigation measures MM HY-1a.1 and MM HY-1a.2 (preparation of a SWPPP with BMPs to collect, retain as appropriate, and discharge stormwater runoff), and MM HY-1a.3 (Construction Dewatering Plan), construction of the Project would not substantially alter the existing drainage pattern of the site or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site, and this impact would remain at a less-than-significant level.

Impact HY-5: Storm Sewer System Capacity

Impact HY-5 **Construction activities associated with the Project would not create or contribute runoff water that would exceed the capacity of existing or planned storm sewer systems or provide substantial additional sources of polluted runoff. (Less than Significant with Mitigation)** ***[Criterion M.e]***

Management of runoff within portions of the Project site affected by construction activity discharging directly to the Bay or to a separate storm drain system would be governed by the conditions of a SWPPP developed per Construction General Permit requirements, as required by mitigation measure MM HY-1a.2, which would include measures to collect, retain, and discharge runoff in ways that do not overwhelm the capacity of existing downstream drainage facilities. Management of runoff from areas draining to the combined sewer system would be governed by conditions of a SWPPP with an ESCP, developed per SFPUC requirements.

As described in Impact HY-1, dewatering to the combined sewer system would require a Batch Wastewater Discharge Permit from the SFPUC. Permit conditions are specified by the SFPUC to prevent violation of the SFPUC's Wastewater Discharge Permit, including conveyance capacity constraints and effluent limits. Dewatering discharges to the separate sewer system would be governed by conditions of the Construction General Permits, other general permits, or an individual NPDES Permit/WDR, as specified by the SFRWQCB.

As discussed in Impacts HY-3 and HY-4, construction of the Project would not be expected to greatly alter Project site drainage such that stormwater runoff is increased. During construction, existing stormwater drainage facilities would be replaced by new, entirely separate sewer systems that would collect and treat Project site stormwater flows. This new storm drain system would be designed and sized in accordance with the City of San Francisco Subdivision Regulations and would also be sized to accommodate 5-year storm event flows from upstream contributing areas (HPS Phase I). In accordance with City design criteria, the newly piped storm drain system would be sized to convey the 5-year storm event when flowing full or surcharged (overloaded/flooded) and runoff from the 5-year storm event up to the 100-year storm event would be contained within the streets and drainage channels rights-of-way.

Impacts associated with additional sources of polluted runoff are addressed in Impact HY-1. As discussed under Impact HY-1, implementation of mitigation measures would reduce potential for construction activities to generate additional sources of polluted runoff to a less-than-significant level.

Operational Impacts

Impact HY-6: Water Quality Standards and Waste Discharge Requirements

Impact of Candlestick Point

This discussion addresses whether the Project could result in a violation of either water quality standards or waste discharge requirements. As previously mentioned, the CWA requires each state to adopt water quality standards which consist of designated beneficial uses and with water quality objectives. Discharges from the combined sewer system are regulated under two NPDES that identify specific WDRs. Stormwater runoff discharges from municipal separate stormwater systems (or MS4s) are regulated under the statewide *Phase II NPDES General Permit for Storm Water Discharges from Small MS4s* (Municipal Stormwater General Permit)(Order No. 2003-0005-DWQ), which requires the development of a Stormwater Management Plan (SWMP) with the goal of reducing the discharge of pollutants to the maximum extent possible (MEP). If recycled water was used for irrigation of landscaping, such use would be subject to the General Waste Discharge Requirements for Landscaping Irrigation Uses of Municipal Recycled Water (Recycled Water General Permit)(Order No. 2009-0006-DWQ). In addition, the State's Antidegradation Policy requires that actions which can adversely affect water quality must: (1) be consistent with maximum benefit to the people of the State; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies, (i.e., will not result in exceedances of water quality objectives).

Impact HY-6a **Implementation of the Project at Candlestick Point would not contribute to violations of water quality standards or waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

Stormwater Runoff

With development of Candlestick Point, stormwater runoff would be treated and conveyed through separate stormwater drainage systems. As such, the applicable WDR would be the Municipal Stormwater General Permit. Development of portions of Candlestick Point would result in the creation or replacement of impervious surfaces that would contribute to stormwater runoff and mobilize pollutants generated by the proposed land uses at Candlestick Point. The Project would remove existing structures, including Alice Griffith Housing, Candlestick Park stadium, and the parking lots surrounding the stadium; approximately 178.5 acres[580] of impervious surfaces. Development at Candlestick Point would include residential, commercial, office, and recreational uses, which could result in approximately 165.4 acres[581] of impervious surfaces. Development at Candlestick Point would, therefore, result in a 7.3 percent reduction in impervious surfaces. This reduction in impervious surface would reduce the volume of stormwater runoff from this area and reduce the surface area where pollutants could be deposited and subsequently transported in stormwater runoff.

Development at Candlestick Point would result in a change in land uses, from residential, a stadium and parking lots, to mixed land uses, including residential, commercial, office, and recreational uses. This change in land uses would affect the types and amounts of pollutants that could be present in stormwater runoff. As discussed above in the Analytic Method, typical stormwater pollutants from mixed land uses may include sediment, nutrients, heavy metals, pathogens, petroleum hydrocarbons, pesticides and other organic compounds, oxygen demanding substances, and trash and debris (refer to Table III.M-2). Stormwater runoff may be a potential source of mercury and PCBs, which are COCs because of the established and pending TMDLs for those substances. Redevelopment of Candlestick Point would remove most of the existing structures and infrastructure which could be historic sources of PCBs, thus reducing any potential discharges. However, the Project operation could be a source of mercury, which could originate from fluorescent light bulbs, mercury-containing instruments, and other sources. As discussed under Impact HY-1a, no known soil contamination is present at Candlestick Point and implementation of mitigation measures MM HZ-1a (Article 22 Site Mitigation Plan), and MM HZ-2a.1 (Unknown Contaminant Contingency Plan) would ensure remediation of contaminated soils during construction.

Effects of development on water quality were estimated by calculating existing and potential future mean annual pollutant loads. Mean annual pollutant loads are a function of the concentration of pollutants, which is affected by land use, and the volume of runoff from an area, which is affected by the extent of impervious surfaces.

Stormwater pollutant mean annual loads were estimated using the Simple Method, developed based on empirical relationships observed in data collected in the Washington, D.C. area for the Nationwide

[580] IBI Group, August 21, 2009.
[581] IBI Group, August 21, 2009.

Urban Runoff Program (NURP) studies published by US EPA in 1983.[582] As no monitoring data is available for runoff from Candlestick Point, pollutant concentrations[583] used in this analysis were derived from a combination of Los Angeles County Department of Public Works (LACDPW) monitoring data and Bay Area Stormwater Management Agencies Association (BASMAA) data; the best available data for the Project area and the proposed land uses. For each parameter, the same data set (either LACDPW or BASMAA) was used for all land use categories for that parameter. Therefore, although the estimated pollutant loads may not be reflective of actual site conditions (as no monitoring data is available), the relative differences resulting from changes in land use should conservatively reflect the change in stormwater quality associated with the proposed development. Refer to Appendix M1 for further description of the methodology and calculations.

The results of this analysis are provided in Table III.M-3 (Estimated Change in Annual Pollutant Loads from Candlestick Point Without BMPs[584]), which quantifies the change in annual pollutant loads[585] compared to existing conditions. Table III.M-3 also shows the change in the mean annual stormwater runoff volume associated with the Project (in acre-feet). To provide a conservative analysis, stormwater BMPs were not included in the analysis because specific details of the stormwater treatment BMPs that would be implemented with development have yet to be identified.

As shown in Table III.M-3, except for ammonia and total kjeldahl nitrogen (which show no change in loadings), development of Candlestick Point would result in a reduction in annual stormwater pollutant loads of between 8 and 67 percent, although these estimated loads do not account for the affect of any treatment measures, for either the existing condition (as some flows are currently discharged the combined system and treated at the SWPCP) or future conditions (as all flows up to the design storm would be treated via on-site BMPs). Table III.M-3 also shows that development of Candlestick Point would reduce stormwater runoff volumes by 37 percent, not accounting for volume reductions by BMPs.

The estimated increase in ammonia would result from the conversion of Candlestick Park stadium and associated parking lots to a mix of residential, commercial and open space. The concentration of ammonia (in the cited literature) from residential and open space land uses is approximately four times the concentration from commercial lands (which was conservatively used to estimate existing loads from the stadium and parking lots). Thus, although development at Candlestick Point would mostly decrease pollutant concentrations, it could increase the concentrations of ammonia in stormwater runoff.

Development at Candlestick Point would be required to comply with the provisions of Municipal Stormwater General Permit and the associated SWMP, the Draft San Francisco Stormwater Design

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582 Center for Watershed Protection. No Date. The Simple Method to Calculate Urban Stormwater Loads. http://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple.htm (accessed September 26, 2009).

583 The concentration of a pollutant is measured in terms of mass per volume (e.g., mg/L).

584 The data presented in Table III.M-3 is based on estimated site runoff, land use categories, and existing literature values, as described in Appendix M1, Stormwater Runoff Calculations. While literature values cannot be used to identify specific effects or concentrations, they are reasonable for identifying relative changes resulting from changes in land use and runoff.

585 Pollutant loads are the amount of pollutants entering a water body, generally expressed in terms of mass released over a given time frame (e.g., pounds/day).

Table III.M-3 Estimated Change in Annual Pollutant Loads from Candlestick Point Without BMPs

	Existing			*Project*		
					Difference (Existing – Project)[a]	
Pollutant	*Combined (lbs)*	*Separate (lbs)*	*Total (lbs)*	*Total (lbs)*	*(lbs)*	*(%)*
Total Suspended Solids	24,951	42,289	67,240	59,500	-7,740	-12%
Ammonia	49.5	51.1	101	124	23.5	23%
Nitrate+Nitrite as N	252	416	669	554	-114	-17%
Total Kjeldahl Nitrogen	343	448	791	790	-1.42	0%
Total Nitrogen	596	864	1,460	1,344	-116	-8%
Dissolved Phosphorous	77.1	143	220	110	-110	-50%
Total Phosphorous	107	201	309	163	-145	-47%
Total Cadmium	0.224	0.413	0.637	0.340	-0.298	-47%
Total Chromium	3.68	6.76	10.4	5.50	-4.94	-47%
Total Copper	7.38	16.50	23.9	7.82	-16.1	-67%
Total Lead	19.0	34.9	53.9	27.8	-26.1	-48%
Total Nickel	5.21	9.54	14.7	7.58	-7.17	-49%
Total Zinc	85.3	188	274	92.4	-181	-66%
Fecal Coliforms (billions of colonies)	1,272,951	2,322,614	3,595,565	1,849,326	-1,746,238	-49%
Stormwater Volume (acre-feet)	94.5	179.5	274	171	-102.5	-37%

SOURCE: PBS&J 2009

a. The 'Difference' columns denote the difference between Project and Existing annual pollutant loads; a negative difference indicates that pollutant loads are lower with development of the Project compared to existing conditions.

Guidelines, and San Francisco Green Building Ordinance. Consistent with these requirements, the Project Applicant would be required to submit a Stormwater Drainage Master Plan (SDMP) and Stormwater Control Plan (SCP) to the SFPUC, to identify the specific stormwater treatment BMPs that would be implemented.

When finalized, the Stormwater Design Guidelines[586] are anticipated to apply to all projects greater than 5,000 square feet, and projects in areas subject to San Francisco's Green Building Ordinance, including Candlestick Point. Per the guidelines, the performance standard requires the capture and treatment of runoff from either: 0.75 inch of precipitation (if volume-based BMPs are used) or a rainfall intensity of 0.2 inch per hour (if flow-based BMPs are used).

Preliminary stormwater infrastructure plans for Candlestick include a dual-pipe system to convey stormwater runoff; one system would treat runoff at the parcel level, and a second system would convey runoff from roads to centralized facilities for treatment. The Project Applicant has also developed a

[586] Draft Stormwater Design Guidelines were released in February 2009[586] and are expected to be adopted by the end of 2009.

stormwater LID Study,[587] which summarizes preliminary concepts for the integration of these two systems by distributing BMPs throughout the site, so that runoff is treated close to the source. Some of the types of BMPs that may be implemented at the Candlestick Point include:

- Dry Detention Ponds/Dry Ponds
- Infiltration Basins
- Wetland Basins
- Biofilter
- Vegetated Swales and Filter Strips
- Grassed Channels
- Bioretention
- Media Filters
- Hydrodynamic Separators
- Pervious Pavement

The following mitigation measure shall be implemented to reduce the presence of pollutants in stormwater runoff:

MM HY-6a.1 *Regulatory Stormwater Requirements. The Project Applicant shall comply with requirements of the Municipal Stormwater General Permit and associated City SWMP, appropriate performance standards established in the Green Building Ordinance, and performance standards established by the SFPUC in the San Francisco Stormwater Design Guidelines.*

The Draft San Francisco Stormwater Design Guidelines have been developed to satisfy the Municipal Stormwater General Permit requirements for new development and redevelopment projects in areas served by separate storm sewers, and are expected to be adopted by December 2009. The Project Applicant shall comply with requirements of the Draft San Francisco Stormwater Design Guidelines. Upon adoption of the Final Stormwater Design Guidelines, the Project shall comply with the Final San Francisco Stormwater Design Guidelines unless discretionary permits have been approved.

Per the Draft San Francisco Stormwater Design Guidelines, the Project Applicant shall submit a SCP to the SFPUC, as part of the development application submitted for approval. The SCP shall demonstrate how the following measures would be incorporated into the Project:

- *Low impact development site design principles (e.g., preserving natural drainage channels, treating stormwater runoff at its source rather than in downstream centralized controls)*
- *Source control BMPs in the form of design standards and structural features for the following areas, as applicable:*
  - *Commercial areas*
  - *Restaurants*
  - *Retail gasoline outlets*

[587] Arup North America, Ltd., Lennar Urban, Candlestick Point/Hunters Point Shipyard LID Stormwater Opportunities Study, June, 2009. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

> *Automotive repair shops*

> *Parking lots*

- *Source control BMPs for landscaped areas shall be documented in the form of a Landscape Management Plan that relies on Integrated Pest Management[588] and also includes pesticide and fertilizer application guidelines.*
- *Treatment control measures (e.g., bioretention, porous pavement, vegetated swales) targeting the Project-specific COCs: sediment, pathogens, metals, nutrients (nitrogen and phosphorus compounds), oxygen-demanding substances, organic compounds (e.g., PCBs, pesticides), oil and grease, and trash and debris. The SCP shall demonstrate that the Project has the land area available to support the proposed BMP facilities sized per the required water quality design storm. Volume-based BMPs shall be sized to treat runoff resulting from 0.75 inches of rainfall (LEED® SS6.2), and flow-based BMPs shall be sized to treat runoff resulting from a rainfall intensity of 0.2 inches per hour. Treatment trains shall be used where feasible.*

Additional requirements:

- *LEED® SS6.2: BMPs used to treat runoff shall be designed to remove 80 percent of the average annual post-development total suspended solids loads. BMPs are considered to meet these criteria if they are designed in accordance with SFPUC requirements.*
- *The SCP shall include an Operations and Maintenance Plan that demonstrates how the treatment control BMPs would be maintained in the long term, what entities would be responsible for BMP maintenance within the public and private rights-of-way, funding mechanisms, and what mechanisms would be used to formalize maintenance and access agreements.*
- *The Project Applicant shall also prepare a Stormwater Drainage Master Plan (SDMP) for approval by the SFPUC. The SDMP shall include plans for the storm drain infrastructure and plans for stormwater management controls (e.g., vegetated swales, dry wells). The storm drain infrastructure shall illustrate conveyance of the 5-year storm event in a separate storm drain piped system, and conveyance of the 100-year storm event in the street and drainage channel rights-of-way.*

Recycled Water

Development at Candlestick Point would have to comply with the Green Building Ordinance, including the provisions of LEED® WE 1.1, which requires reducing the use of potable water for landscaping by a minimum of 50 percent. This could be met by reducing total water use for landscaping, or alternatively by using recycled water for landscaping, if such supply is available from the SFPUC.

To produce and distribute recycled water, the SFPUC would have to treat the water to CCR Title 22 tertiary treatment standards and obtain coverage under the Recycled Water General Permit, which has been adopted to protect water quality standards.[589] To obtain coverage under the Recycled Water General

[588] IPM is a strategy that focuses on long-term prevention or suppression of pest problems (i.e., insects, diseases and weeds) through a combination of techniques including: using pest-resistant plants; biological controls; cultural practices; habitat modification; and the judicious use of pesticides according to treatment thresholds, when monitoring indicates pesticides are needed because pest populations exceed established thresholds.

[589] SWRCB, 2009, State Water Resources Control Board Water Quality Order No. 2009-0006-DWQ General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water, p. 9.

Permit, the SFPUC would be required to submit an NOI and an Operations and Maintenance Plan to the SWRCB for approval. The Operations and Maintenance Plan would identify inspection, monitoring, and reporting requirements, and specify prohibited uses, site suitability, application rates, and salinity management measures. Compliance with the Recycled Water General Permit would ensure that the use of recycled does not cause an exceedance of water quality standards or contribute to or cause a violation of applicable waste discharge requirements.

To demonstrate compliance with the Recycled Water General Permit and the SFPUC's Operations and Maintenance Plan, the following mitigation measure shall be implemented to require preparation of a Landscape Irrigation Plan, to minimize the potential for off-site transport of pollutants in the runoff of recycled water and reduce any potential water quality impacts associated with use of recycled water for landscape irrigation.

MM HY-6a.2 *Recycled Water Irrigation Requirements. Prior to application of recycled water at the Project site for landscape irrigation, the Project Applicant shall demonstrate compliance with all terms and conditions of the SFPUC's Operations and Maintenance Plan and the Recycled Water General Permit conditions for the use of recycled water. As required by the Recycled Water General Permit, the Project Applicant shall submit an Operations and Maintenance Plan and an Irrigation Management Plan to the SWRCB. The Project Applicant shall also submit the Operations and Maintenance Plan and the Irrigation Management Plan to the SFPUC. Prior to on-site application of recycled water, the Project Applicant shall obtain written confirmation from the SFPUC that the Project Operations and Maintenance Plan and the Irrigation Management Plan is in compliance with the SFPUC's Operations and Maintenance Plan, and other SFPUC requirements for the use of recycled water.*

All recycled water provided to Project Applicant, pursuant to the Recycled Water General Permit, shall be treated in and managed in conformance with all applicable provisions of the Recycled Water Policy and shall meet Title 22 Requirements for disinfected tertiary recycled water as described in CCR Title 22, sections 60301.230 and 60301.320.

In accordance with the Recycled Water General Permit, the Project Applicant's Operations and Maintenance Plan shall describe methods and procedures for complying with recycled water regulations, and the maintenance of equipment and emergency backup systems to maintain compliance with the General Permit conditions and California Department of Public Health (CDPH) requirements. The Project Applicant shall ensure that all users of recycled water comply with the Operations and Maintenance Plan by developing educational materials (e.g., pamphlet or brochure) that convey key operational elements (e.g., prevention of cross-connections) of the plan.

In accordance with the Recycled Water General Permit, the Project Applicant's Irrigation Management Plan shall include measures to ensure the use of recycled water occurs at an agronomic rate while employing practices to minimize application of salinity constituents. The Irrigation Management Plan shall account for soil characteristics, recycled water characteristics, plant species irrigation requirements, climatic conditions, supplemental nutrient additions to support plant growth, and management of impoundments used to store or collect recycled water. The Irrigation Management Plan shall describe any conditions of approval required by the City, CDPH or SWRCB.

The Project Applicant shall implement the following landscape irrigation BMPs in accordance with Recycled Water General Permit Requirements:

- *The Operations and Maintenance Plan shall include leak detection methods and correction within 72 hours of identifying a leak or prior to the release of 1,000 gallons.*

- *Recycled water shall not be applied during precipitation events.*
- *Impoundment areas shall be managed such that no discharge occurs from storms smaller than the 25-year, 24-hour event.*

The Project Applicant shall also implement BMPs for general operational controls, protection of workers and the public (e.g., education about not drinking recycled water), and efficient irrigation (e.g., dedicated landscape water meters for monitoring water usage and leak detection).

The Project Applicant shall conduct monthly monitoring to quantify the volume of recycled water applied, the locations and total area of application, and the mass of nitrogen and salinity constituents applied.

Dry Weather Flows

Dry weather flows can be generated by urban development from landscape irrigation runoff; driveway and sidewalk washing; vehicle washing; groundwater seepage; fire-fighting flows; potable water line operations and maintenance discharges; and other permitted and/or illegal non-storm water discharges.[590] Dry weather runoff is principally a water quality concern[591] as it may be a significant source of bacteria and other constituents. Dry weather flow quantities are typically estimated from monitoring data and cannot be predicted using normal hydrologic projections. The total flow volume from dry weather flow can be up to 10 to 30 percent of total runoff and dry weather flow is typically comprised of numerous small events while wet weather runoff is mainly comprised of several large events.[592,593] Drainage system capacity is typically not a concern for conveying dry weather flows. [594]

The concentrations and types of constituents in dry weather urban runoff may be different than for stormwater runoff. For example, irrigation runoff often has been shown to have higher pesticide concentrations than stormwater runoff.[595] However, long-term mean concentrations for most pollutants are likely to be lower in dry weather flows that stormwater flows.[596] Dry weather flows are typically low in sediment (TSS) because flow rates are relatively low and coarse suspended sediment tends to settle or be filtered by vegetation. Consequently, pollutants that tend to associate with suspended solids (e.g., phosphorous, some bacteria, trace metals, and pesticides) are typically found in very low concentrations in dry weather flows. Dry weather constituents are typically dissolved constituents (e.g., nitrate, trace metals, pesticides), or constituents that are small enough to be effectively transported (e.g., pathogens and oil and grease).

Stormwater quality treatment BMPs at Candlestick Point would be implemented under the SDMP and SCP prepared pursuant to mitigation measure MM HY-6a.1. These BMPs would be permanent features

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590 City of Huntington Beach, 2005, Citywide Urban Runoff Management Plan. p. 2-2.
591 City of Huntington Beach, 2005, Citywide Urban Runoff Management Plan. p. 2-2.
592 Southern California Coastal Water Research Project, 2008, Project: Dry Weather Water Quality in Ballona Creek, http://www.sccwrp.org/view.php?id=262, accessed October 12, 2009.
593 City of Huntington Beach, 2005, Citywide Urban Runoff Management Plan. P 3-2.
594 City of Huntington Beach, 2005, Citywide Urban Runoff Management Plan. P 2-2.
595 Schiff, K. and L. Tiefenthaler, 2003. Contributions of Organophosphorus Pesticides from Residential Land Uses during Dry and Wet Weather. Southern California Coastal Water Research Project, Technical Report 406. www.ocwatersheds.com/watersheds/pdfs/San_Diego_Organophorus_406_pesticides.pdf.
596 Duke, L.D., T.S. Lo, and M.W. Turner, 1999. "Chemical Constituents in Storm Flow vs. Dry Weather Discharges in California Storm Water Conveyances." J. of the American Water Resources Association, 35(4):821-836.

at Candlestick Point and would be available year-round to capture and treat both dry weather flows and stormwater runoff and would therefore reduce pollutants that may be present in dry weather runoff. In addition, mitigation measure MM HY-6a.2, to require an Irrigation Management Plan for recycled water use, would reduce the potential for irrigation of landscaping to contribute to dry weather flows. Implementation of mitigation measures MM HY-6a.1 and MM HY-6a.2 would reduce the impact of dry weather flows on water quality to a less-than-significant level.

Summary of Impact at Candlestick Point

Compliance with applicable regulatory requirements and implementation of the mitigation measures referenced in this discussion would ensure that water quality standards would not be exceeded nor would the development at Candlestick Point cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Impact of Hunters Point Shipyard Phase II

Impact HY-6b **Implementation of the Project at HPS Phase II would not contribute to violations of water quality standards or waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

Similar to the discussion above in Impact HY-6a, development at HPS Phase II could generate stormwater runoff, which could affect water quality and could involve the use of recycled water. In addition, maritime activities associated with the proposed marina could contribute contaminants to receiving waters, which could affect water quality.

Stormwater Runoff

Development of HPS Phase II would include installation of a separate stormwater system, which would be regulated under the Municipal Stormwater General Permit. Development at HPS Phase II would remove existing land uses, including industrial and former shipyard uses that contain approximately 326.8 acres[597] of impervious surface, and replace them with new mixed land uses, including residential, commercial, office, R&D, open space, and a new football stadium, with approximately 213.7 acres[598] of impervious surfaces. Thus, implementation of HPS Phase II would reduce the area of impervious cover by approximately 35 percent. The reduction of impervious surfaces would reduce the volume of stormwater runoff from this area and the extent of impervious area that could contribute pollutants in runoff. In addition, the change in land use would affect the types and amounts of pollutants that could be present in stormwater runoff.

Table III.M-4 (Potential Project Effect without BMPs on Annual Pollutant Load from HPS Phase II) identifies the estimated change in annual pollutant loads (without the implementation of BMPs) at HPS Phase II that would result from development. (The column for off-site residential loads represents the contributions to the on-site stormwater drainage system from HPS Phase I.) As a result of the conversion of primarily industrial lands to open space, residential, and commercial land, estimated pollutant loads would be substantially reduced by approximately 34 to 74 percent.

[597] IBI Group, August 21, 2009.
[598] IBI Group, August 21, 2009.

Table III.M-4 Estimated Change in Annual Pollutant Loads from HPS Phase II Without BMPs

Pollutant	*Existing (lbs)*	*Project (lbs)*	*Difference (%)*	*Off-site Residential (lbs)*
Total Suspended Solids	304,776	113,803	-63%	*24,822*
Ammonia	625	160	-74%	*85.4*
Nitrate+Nitrite as N	1,319	864	-34%	*268*
Total Kjeldahl Nitrogen	4,026	1,133	-72%	*494*
Total Nitrogen	5,345	1,997	-63%	*762*
Dissolved Phosphorous	386	142	-63%	*68.8*
Total Phosphorous	604	235	-61%	*92.5*
Total Cadmium	1.49	0.485	-67%	*0.202*
Total Chromium	26.9	7.91	-71%	*3.32*
Total Copper	43.0	13.8	-68%	*3.63*
Total Lead	105	36.6	-65%	*17.3*
Total Nickel	18.5	9.18	-50%	*4.75*
Total Zinc	496	159	-68%	*44.6*
Fecal Coliforms (billions of colonies)	4,262,577	2,182,629	-49%	1,173,810
Stormwater Volume (acre-feet)	465.8	229.8	-40%	78.7

SOURCE: PBS&J 2009

As discussed above, mean annual pollutant loads are a function of both the concentration of pollutants, and the total amount of runoff from an area. Development at HPS Phase II would decrease the extent of impervious surfaces and therefore decrease stormwater runoff volumes (by approximately 40 percent), while changes in land use would affect the concentration of pollutants in stormwater. The net effect of these changes would be a net decrease in the total pollutants loads, even without the implementation of stormwater treatment BMPs.

Development at HPS Phase II would be required to comply with the provisions of Municipal Stormwater General Permit and the associated SWMP, the Draft San Francisco Stormwater Design Guidelines, and San Francisco Green Building Ordinance. Consistent with these requirements, the Project Applicant would be required to submit a SDMP and SCP to the SFPUC, which would identify the specific stormwater treatment BMPs that would be implemented. To minimize the potential for stormwater pollutants to adversely affect water quality, mitigation measure MM HY-6-a.1 would be implemented.

As discussed above, although the specific BMPs that will be implemented have yet to be identified, the stormwater LID Study identified various stormwater treatment opportunities. However, the use of infiltration BMPs on the HPS Phase II site would be precluded by site constraints related to soil and physical characteristics and the presence of contaminants in soil associated with historic land uses. Further, the potential for stormwater BMPs to result in the mobilization of historic contaminants in soil would be reduced by the placement of fill soils in various locations to raise the land surface above the

base-flood elevation (as discussed in Section III.L), thus increasing the height of soil cover in those locations.

Prior to the transfer of the HPS Phase II site, all necessary remedial actions at HPS Phase II required by CERCLA, the FFA, or other applicable law, must be completed to the satisfaction of the relevant regulatory agencies, and those agencies must determine that the site is suitable for its intended use. The Navy would implement Institutional Controls (ICs) for cleanup at HPS Phase II. These IC's are legal and administrative mechanisms to implement land use restrictions to limit the exposure of future landowners and users to hazardous materials, and to ensure the integrity of remedial activities. The mitigation measures set forth in Section III.K require compliance with these requirements. Mitigation measure MM HZ-1b would require the San Francisco Department of Public Health to verify, before any development activity occurs at HPS Phase II, that remediation as been completed in compliance with all restrictions imposed for the site. Mitigation measure MM HZ-2a.1 (Unknown Contaminant Contingency Plan) would ensure that potential risks associated with unknown contamination sites are minimized. Mitigation measures MM HZ-5a (Foundation Support Piles Installation Plan), MM HZ-9 (Navy-Approved Workplans for Construction and Remediation Activities on Navy-Owned Property), MM HZ-10b (Regulatory Agency-Approved Workplans and Permits for Shoreline Improvements), and MM HZ-12 (Compliance with Administrative Order of Consent at Early Transferred Parcels), and MM HZ-15 (Asbestos Dust Mitigation and Control Plans) also include measures to protect water quality. With these mitigation measures, the potential for historic soil contamination to be mobilized by stormwater runoff would be minimized.

Although open spaces at HPS, Phase II would capture rainfall which could percolate into the soil, compliance with mitigation measures identified above would reduce the potential for mobilization of contaminants in soil from historic uses. The use of stormwater infiltration BMPs, which would enhance percolation of runoff, could increase the potential for mobilization of soil contaminants. To reduce this potential, mitigation measure MM HY-6b.1 would prohibit use of infiltration BMPs and require lined stormwater conveyance systems at HPS Phase II to protect groundwater quality.

MM HY-6b.1 *Limitations on Stormwater Infiltration: Infiltration BMPs on HPS Phase II shall be prohibited. Alternative BMPs for stormwater quality control, reuse, and treatment shall be used. For instance, biofiltration BMPs can be implemented with an impervious liner and subdrain system to treat stormwater runoff while preventing infiltration. Overland flow (greater than the five-year and up to the 100-year storm) shall be conveyed in lined channels or other conveyances that will not result in infiltration.*

Stormwater from Industrial Activities

HPS Phase II development would include R&D space within certain areas and some potential uses within this land use category could be considered industrial activities for the purposes of a stormwater permit. Any such industrial uses would be required to obtain coverage under the Industrial General Permit for stormwater discharges. Implementation of mitigation measure MM HY-6b.2 would ensure compliance with the Industrial General Permit, as necessary, which would require the development and implementation of an industrial SWPPP to reduce potential impacts.

MM HY-6b.2 *Industrial General Permit: The Facility Operator shall apply for an Industrial General Permit prior to operational activities for facilities requiring coverage under the Industrial General Permit, which is determined based on the facility's SIC. The Facility Operator shall comply with all provisions in the Industrial General Permit, including implementation of a SWPPP, to effectively control pollutants to the BAT/BCT during the normal course of operations. Primary components and pollution prevention measures that the SWPPP shall address are described below. The Facility Operator shall refer to the California Stormwater Quality Association Stormwater Best Management Practice Handbook – Industrial and Commercial or equivalent[599] for details on BMP implementation. The SFRWQCB is responsible for overseeing Industrial General Permit activities, including SWPPP compliance. The following BMPs shall be incorporated into the SWPPP.*

Non-Structural BMPs

- *Good Housekeeping: Good housekeeping generally consists of practical procedures to maintain a clean and orderly facility.*
- *Preventive Maintenance: Regular inspection and maintenance of structural stormwater controls (catch basins, oil/water separators, etc.) as well as other facility equipment and systems.*
- *Spill Response: Spill clean-up procedures and necessary clean-up equipment based upon the quantities and locations of significant materials that may spill or leak.*
- *Material Handling and Storage: Procedures to minimize the potential for spills and leaks and to minimize exposure of significant materials to stormwater and authorized non-stormwater discharges.*
- *Employee Training: Training of personnel who are responsible for (1) implementing activities identified in the SWPPP, (2) conducting inspections, sampling, and visual observations, and (3) managing stormwater. The SWPPP shall identify periodic dates for such training. Records shall be maintained of all training sessions held.*
- *Waste Handling/Recycling: Procedures or processes to handle, store, or dispose of waste materials or recyclable materials.*
- *Recordkeeping and Internal Reporting: Procedures to ensure that all records of inspections, spills, maintenance activities, corrective actions, visual observations, etc., are developed, retained, and provided, as necessary, to the appropriate facility personnel.*
- *Erosion Control and Site Stabilization: This may include the planting and maintenance of vegetation, diversion of run-on and runoff, placement of sandbags, silt screens, or other sediment control devices, etc.*
- *Inspections: This includes, in addition to the preventative maintenance inspections identified above, an inspection schedule of all potential pollutant sources. Tracking and follow-up procedures shall be described to ensure adequate corrective actions are taken and SWPPP revisions are made as needed.*
- *Quality Assurance: Procedures to ensure that all elements of the SWPPP and Monitoring Program are adequately conducted.*

[599] California Stormwater Quality Association, Stormwater Best Management Practice Handbook- Industrial and Commercial, January, 2003.

Structural BMPs to be Considered

- *Overhead Coverage: Structures that provide horizontal coverage of materials, chemicals, and pollutant sources from contact with stormwater and authorized non-stormwater discharges.*
- *Retention Ponds: Basins, ponds, surface impoundments, etc. that do not allow stormwater to discharge from the facility.*
- *Control Devices: Berms or other devices that channel or route run-on and runoff away from pollutant sources.*
- *Secondary Containment Structures: This generally includes containment structures around storage tanks and other areas for the purpose of collecting any leaks or spills.*
- *Treatment: This includes inlet controls, infiltration devices, oil/water separators, detention ponds, vegetative swales, etc. that reduce the pollutants in stormwater discharges and authorized non-stormwater discharges. However, because of extensive site constraints, use of infiltration BMPs shall be limited.*

Recycled Water

As discussed above, under Impact HY-6a, the HPS Phase II may use recycled water from the SFPUC for landscaping to reduce potable water demand. Compliance with the Recycled Water General Permit would ensure that the use of recycled does not cause an exceedance of water quality standards or contribute to or cause a violation of applicable waste discharge requirements. The Operations and Maintenance Plan would identify inspection, monitoring, and reporting requirements, and specify prohibited uses, site suitability, application rates, and salinity management measures. The Irrigation Management Plan would demonstrate how the water is used effectively and what practices would be used to minimize application of salinity constituents. Mitigation measure MM HY-6a.2 would be implemented to ensure compliance with the Recycled Water General Permit and the SFPUC's Operations and Maintenance Plan for recycled water.

Dry Weather Flows

As discussed above, dry weather flows can be generated by urban development and have the potential to affect receiving water quality. Consistent with regulatory requirements, stormwater treatment BMPs would be implemented under the SDMP and SCP for wet weather runoff (per mitigation measure MM HY-6a.1) and these measures would also capture and treat dry weather flows. Mitigation measure MM HY-6a.2 would be implemented to reduce the potential discharge of polluted runoff from landscape irrigation with recycled water. Compliance with these requirements would ensure that the dry weather flows do not cause an exceedance of water quality standards or contribute to or cause a violation of applicable waste discharge requirements.

Marina Operations

Dredging

Development of the marina would include creation of two basins (by means of constructing breakwater in the Bay to form one 11.3 basin and one 10.7 basin) that would not require initial dredging, but may require ongoing maintenance dredging in the future. Dredging activities could result in the re-suspension

of previously undisturbed in-Bay sediments, which could adversely affect water quality.[600] In-water disposal of dredge spoils has the potential to alter benthic and shoreline habitats and to increase water column turbidity.[601] The potential for maintenance dredging to result in impacts to Biological Resources is discussed in Section III.N; refer to mitigation measures MM BI-18b.1 (Maintenance Dredging and Turbidity Minimization Measure for the Operation of the Marina), MM BI-18b.2 (Implement BMPs to Reduce Impacts of Dredging to Water Quality), MM BI-19b.1 (Work Windows to Reduce Maintenance Dredging Impacts to Fish during Operation of the Marina), and MM BI-19b.2 (Implement BMPs to Reduce Impacts of Dredging to Water Quality). Compliance with applicable DMMO regulatory requirements would ensure that maintenance dredging operations do not cause an exceedance of water quality standards or contribute to or cause a violation of applicable waste discharge requirements. Implementation of these mitigation measures would reduce the water quality impacts from marina dredging and a less than significant impact would result.

Operational Discharges

The discharge of stormwater runoff from the marina would be regulated under the Municipal Stormwater General Permit, which would require the preparation of a SDMP and SCP, consistent with mitigation measure MM HY-6-a.1.

In addition, the marina operator would be required to obtain certification of by the Clean Marinas California Program to reduce potential water quality affects associated with marina operations. To ensure compliance with these requirements, mitigation measure MM HY-6b.3 would be implemented.

MM HY-6b.3 *Clean Marinas California Program: The marina operator shall obtain certification under the Clean Marinas California Program. The Clean Marinas California Program has developed marina BMPs and an inspection and certification process for marinas that meet the program standard for BMP implementation. The marina operator shall implement BMPs that address the following sources of pollution: petroleum containment, topside boat maintenance and cleaning, underwater boat hull cleaning, marina operations, marina debris, boat sewage discharge, solid waste, liquid waste, fish waste, hazardous materials, and stormwater runoff.*

No fueling facilities are proposed as part of marina operations. However, if maintenance activities such as rehabilitation, mechanical repairs, painting, and lubrication or equipment cleaning operations are conducted, stormwater runoff from the marina would also be regulated under the Industrial General Permit. Compliance with the requirements of the Industrial General Permit (for applicable portions of the marina, if any) would reduce potential water quality impacts. Implementation of mitigation measure MM HY-6b.2 (to obtain coverage under the Industrial General Permit) would ensure compliance with the requirements for any maintenance operations.

Summary of Impact at Hunters Point Shipyard, Phase II

Compliance with applicable regulatory requirements and implementation of all of the mitigation measures referenced in this discussion would ensure that water quality standards would not be exceeded

[600] San Francisco Estuary Institute (SFEI), Effects of Short-term Water Quality Impacts due to Dredging and Disposal on Sensitive Fish Species in San Francisco Bay, Prepared for Corps San Francisco District, 2008.
[601] California Regional Water Quality Control Board San Francisco Bay Region, 2007, op. cit.

nor would the development at HPS Phase II cause or contribute to a violation of the applicable WDRs. A less-than-significant impact would result.

Impact of Yosemite Slough Bridge

Impact HY-6c **Implementation of the Yosemite Slough bridge would not contribute to violations of water quality standards or waste discharge requirements. (Less than Significant)** ***[Criterion M.a]***

Stormwater runoff from the Yosemite Slough bridge and discharges of materials from bridge maintenance activities would not cause or contribute to an exceedance of water quality standards. Primary pollutants of concern in stormwater runoff from transportation-related land uses include fuels, PAHs, sediment, metals, and litter and debris. Bridge maintenance activities such as welding and grinding, sandblasting, and painting can also adversely affect water quality if materials generated from maintenance are allowed to discharge into the Bay. It is anticipated that bridge operation would be under the jurisdiction of the City, and thus stormwater runoff mitigation would be performed under the Municipal Stormwater General Permit, which requires development of a pollution prevention program for municipal operations. Impacts from bridge operation would be reduced via compliance with the existing stormwater runoff programs. Operation of the Yosemite Slough bridge would not cause an exceedance of water quality standards or contribute to or cause a violation of waste discharge requirements and a less than significant impact would result. No mitigation is required.

Combined Impact of Candlestick Point, Hunters Point Shipyard Phase II, and Yosemite Slough Bridge

Impact HY-6 **Implementation of the Project would not contribute to violations of water quality standards or waste discharge requirements. (Less than Significant with Mitigation)** ***[Criterion M.a]***

As discussed in Impact HY-6a through Impact HY-6c, compliance with the requirements of the Municipal Stormwater General Permit, the Recycled Water General Permit, and the Industrial General Permit would reduce potential water quality impacts associated with implementation of the Project. In addition, the project would be required to comply with the San Francisco SWMP, the Draft San Francisco Stormwater Design Guidelines, and the San Francisco Green Building Ordinance. Compliance with these requirements would be demonstrated in the SDMP or SCP for the project site, as required by mitigation measure MM HY-6a.1. Compliance with the Recycled Water General Permit would be required by implementation of mitigation measure MM HY-6a.2. To reduce the potential for stormwater infiltration to mobilize historic soil contaminants at HPS Phase II, the use of infiltration BMPs would be prohibited by mitigation measure MM HY-6b.1. To reduce stormwater runoff impacts associated with industrial activities at HPS Phase II, compliance with the Industrial General Permit would be required by implementation of mitigation measure MM HY-6b.2. To reduce stormwater impacts associated with maintenance dredging of the marina, compliance with the DMMO regulatory requirements would be required by implementation of mitigation measures MM BI-18b.1 (Maintenance Dredging and Turbidity Minimization Measure for the Operation of the Marina), MM BI-18b.2 (Implement BMPs to Reduce Impacts of Dredging to Water Quality), MM BI-19b.1 (Work Windows to Reduce Maintenance Dredging Impacts to Fish during Operation of the Marina), and MM BI-19b.2 (Implement BMPs to

Reduce Impacts of Dredging to Water Quality). Compliance with the Clean Marinas California Program would be required by implementation of mitigation measure MM HY-6b.3. Compliance with applicable regulatory requirements and implementation of the identified mitigation measures would ensure the Project would not cause an exceedance of water quality standards or contribute to or cause a violation of waste discharge requirements and a less than significant impact would result.

Impact HY-7: Other Water Quality Effects

Impact HY-7 Implementation of the Project would not otherwise degrade water quality. (Less than Significant with Mitigation) *[Criterion M.f]*

Stormwater and recycled water infiltration to groundwater could degrade groundwater quality. One of the Project's stormwater management strategies includes infiltration of stormwater runoff in Candlestick Point, where feasible, using permeable pavement, bioretention basins and other measures, to control peak flow rates, reduce total runoff volumes, and reduce the potential quantity of pollutants in residual surface runoff. Urban stormwater runoff contains a variety of pollutants that could potentially reach groundwater aquifer via infiltration. Research on groundwater effects resulting from stormwater infiltration indicate that the potential for groundwater contamination via infiltration depends on several pollutant- and site-specific environmental factors such as: (1) precipitation, irrigation, dry weather runoff, and temperature patterns; (2) soil properties such as texture; clay content, mineral content, organic matter and microbial content; and presence of structural voids; and (3) depth to the groundwater table.[602]

Chemical characteristics of the potential stormwater COCs and recycled water constituents that could infiltrate to groundwater aquifer include (1) mobility (measured by parameters such as solubility, sorption coefficients, and vapor pressure) and persistence (measured by the half-life) in soil; (2) use patterns; and (3) abundance in stormwater and dry weather runoff.

Some stormwater pollutants such as metals, certain pesticides and herbicides, and pathogens tend to be filtered out by soils and have a low probability of leaching into groundwater. More mobile chemicals such as nitrate and other dissolved constituents (e.g., chemicals that contribute to total dissolved solids [TDS] such as chloride), have a greater potential for leaching into groundwater. Groundwater in portions of the Project site has been impacted by releases of various inorganic and organic constituents associated with current and previous land uses, and a remediation program is ongoing. DWR also indicates that elevated nitrate concentrations are the most common water quality problem with wells in the San Francisco Peninsula. Data from the National Stormwater Quality Database[603] indicate that stormwater runoff from land uses similar to the Project (e.g., mixed residential, commercial and industrial) has a total dissolved solids (TDS) concentration of about 80 mg/L and a nitrate (as nitrogen) concentration of about 0.6 mg/L; these concentrations would not be expected to adversely affect groundwater quality. Use of recycled water could increase groundwater salinity because recycled water tends to concentrate

[602] Pitt, R., S. Clark, and K. Parmer, Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, US EPA 600-SR-94-051, May 1994. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

[603] A. Maestre, R. Pitt, and Center for Watershed Protection, *The National Stormwater Quality Database, Version 1.1, a Compilation and Analysis of NPDES Stormwater Monitoring Information*, prepared for U.S EPA, September 2005.

salts and have a higher salt content than potable water. However, the underlying groundwater basins are only designated as potential municipal or domestic water supplies. As such, there are no applicable water quality standards.

Implementation of mitigation measure MM HY-6a.1 would ensure compliance with the Municipal Stormwater General Permit, which would result in BMPs designed to treat stormwater runoff for nitrogen compounds and limit infiltration BMPs at Candlestick Point where site physical constraints (e.g., shallow depth to groundwater) are present. Limitations on infiltration BMPs would reduce the potential for nitrate and TDS leaching to groundwater. Mitigation measure MM HY-6b.1 would prohibit infiltration BMPs at HPS Phase II and further reduce the potential for nitrate and TDS degradation of groundwater quality underlying HPS Phase II. Implementation of mitigation measure MM HY-6a.2 would ensure compliance with the Recycled Water General Permit, resulting in application rates that do not exceed agronomic requirements. As such, the potential for recycled water, and associated nitrates and TDS, leaching to groundwater is minimized. Compliance with these mitigation measures would reduce the potential for nitrogen and salt migration to groundwater and Project degradation of groundwater quality would be less than significant.

Impact HY-8: Groundwater Supplies and Groundwater Recharge

Impact HY-8 **Implementation of 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 local groundwater table level. (No Impact)** ***[Criterion M.b]***

The Project would not use groundwater as a source of water supply, and would, therefore, not deplete groundwater supplies. The Project site is currently primarily impervious surfaces and would not, therefore, substantially contribute to groundwater recharge. The Project would remove existing structures, including Alice Griffith Housing, Candlestick Park stadium, and the parking lots surrounding the stadium which include approximately 178.5 acres[604] of impervious surfaces. The proposed development of new mixed land uses at Candlestick Point would include residential, commercial, office, and recreational uses, which could include approximately 165.4 acres[605] of impervious surfaces. Development at Candlestick Point would result in an approximate 7 percent decrease in impervious surfaces, which could increase infiltration. At HPS Phase II, the Project would remove existing improvements, including industrial and former shipyard uses that contain approximately 326.8 acres[606] of impervious surfaces. The proposed development at HPS Phase II consisting of new mixed land uses, including residential, commercial, office, R&D, open space, and a new football stadium, would result in approximately 213.7 acres[607] of impervious surfaces. Thus, implementation of HPS Phase II would decrease the impervious cover of the HPS Phase II area by approximately 35 percent, which could increase infiltration (via natural percolation of rainfall, as stormwater infiltration BMPs would be prohibited by mitigation measure HY-6b.1). Overall, development of the Project would result in a decrease in impervious surfaces of approximately 25 percent. By decreasing the extent of impervious

[604] IBI Group, August 21, 2009.
[605] Ibid.
[606] IBI Group, August 21, 2009.
[607] Ibid.

cover and by limiting stormwater infiltration BMPs to Candlestick Point, development at the Project would not interfere with groundwater recharge or substantially deplete groundwater supplies, and thus no impact would occur. No mitigation is required.

Impact HY-9: Erosion or Siltation Effects

Impact HY-9 **Implementation of the Project would not alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, and would not result in substantial erosion or siltation on site or off site. (Less than Significant with Mitigation)** ***[Criterion M.c]***

As discussed above in Constructions Impacts, Project grading would not substantially alter the drainage pattern of the site. Off-site erosion or siltation impacts from new development can occur in the form of stream channel hydromodification,[608] caused by increased impervious cover that increases stormwater peak flow rates, volumes, and durations into a water body susceptible to bed or bank erosion. The Project site would discharge to separate sewer systems or the Lower Bay, rather than surface water bodies susceptible to erosion and siltation. There are no streams or rivers at the Project site and the Project would not discharge directly or indirectly to a stream or river. Therefore, no impacts to streams or rivers would occur. Although some areas would continue to sheet flow to the Lower Bay, these areas would not receive additional flows from the developed portion of the Project site and the potential for increased erosion and sediment transport would be less than significant. In addition, implementation of mitigation measure MM HY-6a.1would require preparation of a SDMP and SCP to control post-construction erosion that incorporates erosion and sediment transport control BMPs. A less-than-significant impact would occur.

Impact HY-10: Flooding From Surface Runoff[609]

Impact HY-10 **Implementation of the Project would not alter the existing drainage pattern of the site, through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff, and would not result in flooding on site or off site. (Less than Significant with Mitigation)** ***[Criterion M.d]***

The Project would remove existing structures and uses at Candlestick Point, including Alice Griffith Housing, Candlestick Park stadium, and the parking lots surrounding the stadium which total approximately 178.5 acres[610] of impervious surface area. Proposed new land uses at Candlestick Point would include residential, commercial, office, and recreational uses, which would total approximately 165.4 acres[611] of impervious surface. Thus, development at Candlestick Point would reduce the area of

[608] Hydromodification refers to the change in the stream flow hydrograph (e.g., flow rate, timing of peak flows, flow duration, and flow volume). Stream channels are formed as a function of the water flow patterns (hydrograph). When patterns change (e.g., changes in runoff to the stream), the channel form (e.g., depth, width, curvature, substrate) and function (e.g., habitat quality, habitat area) can be altered as beds and banks erode (or build up) in response to the change in flow regime.

[609] As discussed in the Setting, the Project site is not currently subject to flooding from a stream or river. Tidal flooding is discussed under Impacts HY-12a, 12b, 12, 13a, 13b, 13, and 14.

[610] IBI Group, August 21, 2009.

[611] Ibid.

impervious surfaces. The Project would also remove existing structures and uses at HPS Phase II, including industrial and former shipyard features that total approximately 326.8 acres[612] of impervious surface area. Proposed uses at HPS Phase II, including residential, commercial, office, R&D, open space, and a new football stadium, would total approximately 213.7 acres[613] of impervious surface area. Thus, implementation of HPS Phase II would also reduce the amount of impervious cover at HPS Phase II. Because of the increase in permeable surface area, infiltration would be expected to increase, resulting in a corresponding decrease in runoff volumes. Grading would reduce slopes at both sites, slowing runoff rates.

Table III.M-5 (Estimated Existing and Project Stormwater Peak Flow Rates and Runoff Volumes) lists the estimated Project site stormwater runoff flow rates for existing and Project conditions, calculated using the Rational Method.[614] Details on flow rate calculations are provided in Appendix M1. For HPS Phase II, flow rates reported in Table III.M-5 do not include off-site flow from HPS Phase I. The City has required the HPS Phase II development to convey the 5-year storm event from HPS Phase I in the Project storm drain system (108 cfs of flow for the 5-year storm event) in addition to Project flows. However, HPS Phase I flows are existing flows, currently draining to the separate storm system. Therefore, although these flows must be accounted for in the sizing of Project storm drain infrastructure, they are not included in Table III.M-5 because they are not Project site flows and are not affected by development of the Project.

Table III.M-5 Estimated Existing and Project Stormwater Peak Flow Rates and Runoff Volumes

			Project Increase[a]	
Storm Event	*Existing (cfs)[b]*	*Project (cfs)[c]*	*(cfs)*	*(%)*
Candlestick Point				
5-Year	477 (130)[d]	249 (0)[d]	-228	-48%
10-Year	545	284	-261	-48%
100-Year	783	408	-375	-48%
Hunters Point Shipyard[e]				
5-Year	644	448	-196	-30%
10-Year	730	509	-221	-30%
100-Year	1052	733	-319	-30%
2-year 24-hour (acre-feet)				
Candlestick Point	36	20	-16	-44%
HPS Phase II	64	39	-24	-38%

SOURCE: PBS&J 2009

a. A negative number denotes a reduction in Project flow rates compared to existing conditions.
b. Existing flows are based on 72 percent impervious surfaces (505.3 acres).
c. Project flows are based on 54 percent impervious surfaces 9379.1 acres).
d. Values in parenthesis denote the amount of total Candlestick Point site runoff flowing to the combined sewer system.
e. Off-site flow from HPS Phase I is not included in these runoff calculations. Required HPS Phase I diversions into the HPS Phase II separate stormwater sewer system would be 108 cfs.

612 IBI Group, August 21, 2009.
613 Ibid.
614 City and County of San Francisco, Bureau of Engineering, Department of Public Works, Subdivision Regulations, for the Information and Guidance of all Subdividers, Engineers and Surveyors with reference to the Subdivision of Land within the City and County of San Francisco and to Supplement the Subdivision Code, January 6, 1982.

As demonstrated in Table III.M-5, the runoff peak flow rates from the Project site would be reduced by an average of 39 percent. Although these calculations are based on estimated site characteristics, it is not likely that more detailed data would indicate a substantially lower peak flow rates. Table III.M-5 also shows that runoff volumes from the 2-year 24-hour storm (i.e., frequently occurring storms) would be reduced by implementation of the Project, which would also reduce flooding impacts.

Grading and fill placement would be required to bring surface elevations to a level appropriate for development (i.e., a level that would not be subject to flooding and that would support Project structures). Material removed from Candlestick Point would be used for embankments at HPS Phase II. The overall drainage pattern (runoff into a piped system for the majority of the Project site and sheet flow into the Lower Bay for remaining portions) would be preserved following development,[615] and no rivers or streams exist on site that would be altered by development. Most of the Project site would be graded with a 0.1 percent slope to facilitate overland flow, and the streets would have a waffling grade[616] of 0.5 percent to reduce localized stormwater ponding.[617] According to the City, new developments must ensure that stormwater runoff volumes, up to the volumes anticipated for a five-year storm event, would be adequately conveyed in pipes.[618] Storms larger than the five-year storm and up to the 100-year storm event should be conveyed adequately via overland flow, i.e., through street gutters and swales. The design objective for overland flow is to allow streets and sidewalks to fully contain the 100-year event without surcharging[619] (flooding) the adjacent development blocks.[620] Downstream flooding would not occur because the Project is directly upstream of the Bay.

As discussed in Impact HY-6a, p. III.M-114, the Project Applicant has developed a LID Study,[621] which identifies concepts for how the development could integrate stormwater volume reduction and treatment control measures. Mitigation measure MM HY-6a.1 would require preparation, and SFPUC approval, of a SDMP and SCP for the Project that would ensure that this impact is less than significant.

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615 MACTEC Engineering and Consulting, Inc., *Proposed Infrastructure Plans and Implementation Schedule, Hunters Point/Candlestick Point Redevelopment Project,* Draft, July 7, 2008. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

616 A surface texture marked by ridges and valleys that would help to channel flow.

617 Ibid.

618 City and County of San Francisco, Bureau of Engineering, Department of Public Works, Subdivision Regulations, for the Information and Guidance of all Subdividers, Engineers and Surveyors with reference to the Subdivision of Land within the City and County of San Francisco and to Supplement the Subdivision Code, January 6, 1982.

619 Surcharging refers to overloading and flooding of the drainage system.

620 Ibid.

621 Arup North America, Ltd., Lennar Urban, Candlestick Point/Hunters Point Shipyard LID Stormwater Opportunities Study, June 2009. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

Impact HY-11: Storm Sewer System Capacity

Impact HY-11 **Implementation of the Project would not create or contribute runoff water that would exceed the capacity of existing or planned storm sewer systems or provide substantial additional sources of polluted runoff. (Less than Significant with Mitigation)** ***[Criterion M.e]***

A new separate storm sewer system would be constructed at the Project site in accordance with the design standards and criteria issued by the SFPUC and criteria in the San Francisco Subdivision Regulations.[622] The capacity design basis in those regulations specify that storm sewers should have sufficient capacity, when flowing full or surcharged (flow in manholes is above top of pipe), to carry the estimated stormwater runoff from the 5-year storm event, based on the ultimate development of the area, including natural drainage from upstream areas. Flows up to the five-year storm event would be carried in pipes, and larger flows, up to the 100-year storm, would be conveyed via overland flow, street rights-of-way, drainage channels, and pipes. As discussed in Impact HY-10, above, overall Project site development would result in an average of approximately 39 percent reduction in peak storm flows and would also reduce runoff volumes from frequently occurring storms. Implementation of mitigation measure MM HY-6a.1 and compliance with stormwater drainage capacity design criteria would ensure that impacts related to exceeding the capacity of the storm sewer system would be less than significant.

Impact HY-12: Housing within a 100-Year Flood Hazard Area

Impact of Candlestick Point

Impact HY-12a **Implementation of the Project at Candlestick Point would not place housing in 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. (Less than Significant with Mitigation)** ***[Criterion M.g]***

SFHAs shown on the preliminary FIRM for San Francisco and the Interim Floodplain Map are indicated in Figure III.M-4. Residential development at Candlestick Point could be placed within the area currently designated as Zone A.

The preliminary grading plan for Candlestick Point598 shows that the site would be graded such that the finished grade would be 3 feet higher than the Base Flood Elevation, and building finish floors would be 6 inches above that (total of 42 inches above Base Flood Elevation) per MM HY-12a.1 (Figure III.M-7 Existing Flood Zones and Sea Level Rise [with Project Land Use Overlay and with Project Shoreline and Grading Improvements]). The Project grading plans indicate bayside elevations of +2.0 feet SFCD. The 100-year flood elevation with a 36-inch sea level rise would be +1.2 feet SFCD. Therefore, according to the current grading plan, development of Candlestick Point would be above the 100-year flood elevation with a safety factor of 36 inches to allow for future sea level rise.

Mitigation measure MM HY-12a.1 requires the Project Applicant to ensure that all finished grade elevations would be above the Base Flood Elevation and to request revision of the San Francisco Interim Floodplain Maps (or FIRMs, if adopted prior to Project implementation) to reflect new fill.

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[622] City and County of San Francisco, Bureau of Engineering, Department of Public Works, January 6, 1982, op. cit.

SOURCE: RHAA, 2009.

PBS&J 11.2.09 08068 | JCS | 09

FIGURE III.M-7

Candlestick Point — Hunters Point Shipyard Phase II EIR

EXISTING FLOOD ZONES AND SEA LEVEL RISE (WITH PROJECT LAND USE OVERLAY AND WITH PROJECT SHORELINE AND GRADING IMPROVEMENTS)

Implementation of mitigation measure MM HY-12a.1 would ensure that impacts associated with construction of housing within a 100-year flood hazard area, as designated on a flood hazard delineation map, would be less than significant.

MM HY-12a.1 *Finished Grade Elevations Above Base Flood Elevation. The Project site shall be graded such that finished floor elevations are 6.5 feet above the Base Flood Elevation (BFE), and streets and pads are 3 feet above BFE to allow for future sea level rise, thereby elevating all housing and structures above the existing and potential future flood hazard area. If the FIRM for San Francisco is not finalized prior to implementation of the Project, the Project Applicant shall work with the City Surveyor to revise the City's Interim Floodplain Map. If the FIRM for San Francisco is finalized prior to implementation of the Project, the Project Applicant shall request that the Office of the City Administrator (Floodplain Manager) request a Letter of Map Revision based on Fill (LOMR-F) from FEMA that places the Project outside a SFHA and requires that the FIRM is updated by FEMA to reflect revised regulatory floodplain designations.*

Rising sea levels is an ongoing phenomenon, which needs to be accounted for in the planning process to prevent future flooding or loss of infrastructure due to shoreline erosion. Planning for sea level rise includes three separate components (1) designing the perimeter to be flexible enough that crest elevations could be increased to prevent overtopping, (2) designing the development areas to be high enough that flooding would not occur around dwellings should the perimeter not function adequately, (3) designing the storm drainage system to be flexible enough that higher water levels would not result in overland flooding. It is obvious that while the perimeter and storm drain system could be upgraded over time, habitable structures cannot be raised.

There is no current guidance or policy establishing numeric values for development projects along the Bay edge. The Federal Emergency Management Agency (FEMA) maps flood zones based on present day rainfall and tidal conditions, but regional and local agencies have taken a more proactive approach in reviewing development proposals because of the public infrastructure element for which they would be responsible.

A project specific sea level rise study was undertaken[623] to develop planning and design guidance through the various phases of the project. The study was based on an exhaustive review of the literature, recent guidance from regional agencies, and knowledge of coastal processes of San Francisco Bay. The literature on sea level rise estimates varies widely, from an observed value of 8 inches per century (historical measurements) to 33 inches per century (Intergovernmental Panel on Climate Change [IPCC] maximum estimate). News articles and semi-empirical studies (Rahmstorf 2007) based in part on recent measurements of ice cap melt, have stated that the increase in sea level rise over the next 100 years could be much higher than those estimated by the Intergovernmental Panel on Climate Change. Even among projections considered plausible, albeit high, by the CALFED Independent Science Board, a sea level rise of 36-inches would not occur until about 2075 to 2080 and by about 2100 the sea level rise could reach 55 inches. However, sea level observations since the publication date of the ice cap melt studies, although

[623] Moffatt & Nichol, Hunters Point Shoreline Structures Assessment, October 2009.

not conclusive to establish a new trend in sea level rise, do not show the accelerated sea level rise trajectory predicted by some of the reports.[624]

Project design for sea level rise meets both near term (2050) and long-range (2080) objectives; and in addition, incorporates an adaptive management strategy to address sea level rise for the most conservative estimates at 2100 and beyond. Since building structures are generally "immovable", whereas a perimeter and/or storm drain system can be adapted to keep up with changing sea levels, each was designed to a specific planning horizon as described below.

Development Design

For building structures, a 36-inch sea level rise allowance plus a freeboard of 6 inches was selected as the design criteria to use for design and construction. Per the most conservative rate of sea level rise (Rahmstorf 2007, which includes ice-cap melt estimate), a sea level rise of 36 inches would not occur until about 2080,[625] which would be approximately 50 years beyond the last phase of construction for the project. Ongoing measurements of sea level rise from the scientific community would be incorporated into Monitoring and Adaptive Management Plans, administered by a Geologic Hazard Abatement District (GHAD) or other entity with similar funding responsibility.[626] This entity would guide the decision-making process for implementation of future improvements, such as raising the perimeter. The proposed Monitoring and Adaptive Management Plan for the project would have the appropriate language that specifies management actions that would need to occur should sea level rise exceed 36 inches. Should sea level rise exceed 36 inches, the proposed project-specific funding mechanism (GHAD or similar) would pay for improvements.

Perimeter and Storm System Design

For the perimeter system, it is not practical to build a high wall around the project for a design condition that may not happen for several decades. At the same time, it is not prudent to build to present sea level conditions and keep raising it as sea levels rise. Therefore, an interim sea level rise estimate for the year 2050, as put forth by BCDC and the State Coastal Conservancy,[627] was selected as the design criteria to use for design and construction. That sea level is 16 inches higher than the present, which will ensure that adaptive management construction activities are not triggered until at least the year 2050. In addition, the shoreline and public access improvements have been designed with a development setback to allow any future increases in elevation to accommodate higher sea level rise values, should they occur.

For the storm drain system, the same approach as the perimeter system described above was adopted. This will avoid installing pumps and other appurtenances at the present time, when they are not needed, while still ensuring that an adaptation strategy and a funding mechanism exists for future management actions.

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624 Rahmstorf, S., A. Cazenave, J.A. Church, J.E. Hansen, R.F. Keeling, D.E. Parker, and R.C.J. Somerville, 2007. *Recent Climate Observations Compared to Projections*. Science 316, p. 709.

625 Moffatt & Nichol, *Candlestick Point/Hunters Point Development Project Initial Shoreline Assessment*, prepared for Lennar Urban, February, 2009, op. cit.

626 Moffatt & Nichol, *Hunters Point Shoreline Structures Assessment*, October 2009.

627 California State Coastal Conservancy. 2009. *Policy Statement on Climate Change*. Adopted at the June 4, 2009 Board Meeting. http://www.scc.ca.gov/index.php?p=75&more=1.

Mitigation measure MM HY-12a.2 would require open space setbacks along the shoreline to allow for additional fill if the rate of future sea level rise is more rapid than currently anticipated. Implementation of mitigation measure MM HY-12a.2 would ensure flooding impacts associated with more rapid sea level rise would remain at a less-than-significant level.

MM HY-12a.2 *Shoreline Improvements for Future Sea-Level Rise. Shoreline and public access improvements shall be designed to allow future increases in elevation to keep up with higher sea level rise values, should they occur. Design elements shall include providing adequate setbacks to allow for future elevation increases of at least 3 feet along the shoreline.*

To guide the storm drain system design and establish the perimeter crest elevation, recent guidance from the Climate Change Center[628] and the policies adopted by the California State Coastal Conservancy[629] of using a 16-inch sea level rise by the year 2050 for a planning horizon were used. The storm drain system will, thus, function as a gravity-drained system up to the year 2050 and not require any management action until that point in time. Beyond the 16-inch sea level rise timeframe, the Adaptation Strategy described in mitigation measure HY-12a.2 shall be implemented, which will may consist of installing storm drain pumps that will be funded by the project funding mechanism established during the initial development phase.

Impact of Hunters Point Shipyard Phase II

Impact HY-12b **Implementation of the Project at HPS Phase II would not place housing in 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. (Less than Significant with Mitigation)** ***[Criterion M.g]***

According to proposed site plans, the portions of HPS Phase II that fall within a SFHA are proposed to be used for stadium parking. However, housing could be located in an area subject to flooding if the rate of sea level rise were to exceed the 36 inches that serves as the basis for Project grading plans and fill elevations.

Mitigation measure MM HY-12.a.1 requires Project finished grade elevations to be above the BFE accounting for future sea level rise. Mitigation measure MM HY-12a.2 requires that shoreline and public access improvements be designed to incorporate setbacks in the event that sea level rise exceeds 36 inches. With implementation of this mitigation measure impacts pertaining to the placement of flooding within a mapped flood hazard area would remain at less-than-significant levels.

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[628] Cayan, D., P. Bromirksi, K. Hayhoe, M. Tyree, M. Dettinger, and R. Flick, 2006. *Projecting Future Sea Level.* California Climate Change Center report number CEC-500-2005-202-SF, dated March 2006.
[629] California State Coastal Conservancy. 2009. *Policy Statement on Climate Change*. Adopted at the June 4, 2009 Board Meeting. http://www.scc.ca.gov/index.php?p=75&more=1.

Combined Impact of Candlestick Point and Hunters Point Shipyard Phase II

Impact HY–12 **Implementation of the Project would not place housing in 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. (Less than Significant with Mitigation)** ***[Criterion M.g]***

The Project would place housing within a SFHA according to the preliminary FIRM for San Francisco and the City's Interim Floodplain Map (refer to Figure III.M-4). However, the preliminary grading plan for the Project site[630] shows that the site would be graded such that finished grade would comply with recommendations by Moffatt and Nichol,[631] which require land elevations to be graded above the Base Flood Elevation with a safety factor of +3.5 feet to allow for future sea level rise. However, future sea levels may rise at a more rapid rate than estimated. Implementation of mitigation measures MM HY-12a.1 and MM HY-12a.2 would require that all housing be elevated out of the floodplain by grading and fill, that the City's Interim Floodplain Maps (or the FEMA maps, if adopted prior to Project implementation) be updated to reflect finished grade elevations, and that open space setbacks be put in place to allow protection against future sea level rise. These mitigation measures would ensure impacts pertaining to the placement of housing within a mapped flood hazard area remain at a less-than-significant level.

Impact HY-13: Structures within a 100-Year Flood Hazard Area

Impact of Candlestick Point

Impact HY-13a **Implementation of the Project at Candlestick Point would not place structures within a 100-year flood hazard area that could impede or redirect flood flows. (Less than Significant)** ***[Criterion M.h]***

Development at Candlestick Point could place structures within a SFHA (Zone A) according to the City's Interim Floodplain Map and the preliminary FIRM for the San Francisco (refer to Figure III.M-4). Placement of structures in a SFHA is primarily a concern within riverine floodways[632] because structures placed in the floodway could redirect flows away from a flooded channel into developed areas. If a development were proposed in a designated floodway, it would require a hydraulic/hydrologic analysis to show that it would not increase the Base Flood Elevation. This issue is not of significant concern at the Project site because the Interim Floodplain Map and the preliminary FIRMs do not designate any areas that would contain structures as regulatory floodways. Therefore, the impacts of development at Candlestick Point on impeding or redirecting flood flows would be less than significant. No mitigation is required.

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[630] Winzler & Kelly, Infrastructure Plan, Candlestick Point High Grading with Sea Level Rise, June 23, 2009. Copies of these documents are on file for public review at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor as part of File No. ER06.05.07, or at the Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103 as part of File No. 2007.0946E.

[631] Moffatt & Nichol, 2009, op. cit.

[632] The floodway is the stream channel and portion of the adjacent floodplain that must remain open to permit passage of the base flood.

Impact of Hunters Point Shipyard Phase II

Impact HY-13b **Implementation of the Project at HPS Phase II would not place structures within a 100-year flood hazard area or impede or redirect flood flows. (Less than Significant with Mitigation)** ***[Criterion M.h]***

Development at HPS Phase II could place structures within a SFHA (Zone A) according to the Preliminary FIRM for the San Francisco (refer to Figure III.M-4). However, structures within Zone A that do not fall within a designated floodway would not be expected to impede or redirect flood flows.

Development at HPS Phase II would also place structures, including the marina, the shoreline improvements, and a portion of the Yosemite Slough bridge, within a Zone V SFHA, according to the preliminary FIRM for San Francisco.[633] Structures in Zone V could be subject to high-velocity wave forces that could cause damage to the structures or redirection of flood flows onto other parts of the site. Mitigation measure MM HY-13b would require and the Project Applicant to obtain a Floodplain Development Permit from the City Administrator and to provide a V-Zone Certification for development within any such designated areas.

MM HY-13b *Floodplain Development Permit. To reduce the impacts of placing structures in a 100-year flood hazard area that could impede or redirect flows, the Project Applicant shall implement that following measures:*

- *The Project Applicant shall obtain a Floodplain Development Permit from the Office of the City Administrator in accordance with the City's floodplain management ordinance that includes a hydraulic evaluation to determine whether structures or structural elements would impede or redirect flood flows and mandates minimum design and construction standards. Design and construction methods shall comply with NFIP requirements for placing structures in Zone V.*
- *The Floodplain Development Permit shall include a "V-Zone Certification" in accordance with the NFIP. As part of the certification, a professional engineer or architect shall consider the NFIP "Free-of-Obstruction" requirement, to ensure that floodwaters or waves would not be deflected into a building or adjacent structure.*

Placement of structures in a Zone A SFHA or Zone V SFHA would result in a less-than-significant impact with implementation of mitigation measure MM HY-13b.

Impact of Yosemite Slough Bridge

Impact HY-13c **The Yosemite Slough bridge would not place structures within a 100-year flood hazard area or impede or redirect flood flows. (Less than Significant)** ***[Criterion M.h]***

The bridge across Yosemite Slough would not place structures within a SFHA that could generate high-velocity flood forces that could cause damage to the structure itself or adjacent structures. The bridge

[633] Although the City Administrator has requested revision of the preliminary FIRM to remove the Zone V designation at the Project site, it is conservatively assumed for the purposes of this analysis that (1) the FIRM will not be modified prior to approval, and (2) the FIRM could be adopted prior to implementation of the Project.

was designed to avoid potential impedance of flood flows; therefore, impacts would be less than significant. No mitigation is required.

Combined Impact of Candlestick Point, Hunters Point Shipyard Phase II, and Yosemite Slough Bridge

Impact HY-13 **Implementation of the Project would not place structures within a 100-year flood hazard area or impede or redirect flood flows. (Less than Significant with Mitigation)** ***[Criterion M.h]***

As discussed in Impact HY-13a and Impact HY-13b, the preliminary FIRM for San Francisco indicates that development in portions of the Project site would occur in locations that are designated as Zone A. However, there are no designated floodways within this SFHA. Therefore, the impacts of impeding or redirecting flood flows in Zone A would be less than significant.

As discussed in Impact HY-13b, the Project would place structures within locations designated as Zone V on the preliminary FIRMs. Structures in Zone V could be subject to high-velocity flood forces that could cause damage to the structure itself or redirect flood flows into adjacent areas. Mitigation measure MM HY-13b would require the Project Applicant to obtain a Floodplain Development Permit from the City Administrator and provide a Zone V Certification prior to development.

Impact HY-14: Other Flood Risk

Impact HY-14 **Implementation of 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 with Mitigation)** ***[Criterion M.i]***

According to ABAG,[634] the Project site is adjacent to, but not within, the dam failure inundation zones from failure of the University Mound South Basin and/or North Basin reservoirs (refer to Figure III.M-3).

The Project shoreline includes various features, such as concrete debris, unprotected embankments, pile-supported wharves, seawalls, and bulkheads that serve to protect the Project from flooding. Several of these features lack structural integrity and could fail suddenly, as the result of a large storm event or an earthquake, or gradually, through continued deterioration. Failure of these features could expose people or structures to flood hazards.

Mitigation measure MM HY-14 would require implementation of improvements recommended in Moffatt and Nichol's shoreline evaluation. In accordance with these recommendations, areas along the shoreline would be developed as open space, which would allow for implementation of additional flood control improvements, if necessary, in the case of a higher-than-planned sea level rise. The shoreline improvements would also reinforce the structural integrity of the existing shoreline, reducing the risk of sudden structural failure of deteriorated shoreline features. Such improvements would provide added protection against Project site flooding.

[634] Association of Bay Area Governments (ABAG). *Interactive ABAG (GIS) Maps Showing Dam Failure Inundation,* Website: http://www.abag.ca.gov/bayarea/eqmaps/damfailure/damfail.html, accessed on September 8, 2008.

MM HY-14 *Shoreline Improvements to Reduce Flood Risk. To reduce the flood impacts of failure of existing shoreline protection, the Project Applicant shall implement shoreline improvements for flood control protection, as identified in the Candlestick Point/Hunters Point Development Project Proposed Shoreline Improvements report.*[635]

Therefore, the risk of harm associated with dam failure would be less than significant.

Impact HY-15: Seiche, Tsunami, and Mudflows

Impact HY-15 **Implementation of the Project would not expose people or structures to inundation by seiche, tsunami, or mudflow. (Less than Significant)** ***[Criterion M.j]***

Tsunamis are large sea waves generated by submarine earthquakes, or similar large-scale, short-duration phenomena, such as volcanic eruptions, that can cause considerable damage to low-lying coastal areas. A substantial tsunami wave could affect areas of Project site adjacent to the coastline. Seiches are waves, also caused by large-scale, short-duration phenomena, which result from the oscillation of confined bodies of water (such as reservoirs, lakes, and bays) that also may damage low-lying adjacent areas, although not as severely as tsunamis. Mudflow hazards typically occur where unstable hillslopes are located above gradient, where site soils are unstable and subject to liquefaction, and when substantial rainfall saturates soils causing failure.

Inundation caused by a seiche would be triggered by seismic activity, tsunamis, or tides. Tidal records for the San Francisco Bay have been maintained for over 100 years, and during that time, a damaging seiche has not occurred. A seiche of approximately 4 inches occurred during the M8.3 1906 earthquake. It is probable an earthquake similar to the 1906 event would be the largest experienced in the Bay Area;[636] consequently a seiche larger than 4 inches is considered unlikely to occur. Finished grade elevations for the Project would protect the Project site from a seiche; therefore the impacts would be less than significant.

The expected 100-year wave run-up height from a tsunami at the South Basin is -3.8 feet SFCD.[637] Accounting for a planned sea level rise of 3 feet, the 100-year wave run-up at South Basin would increase to -0.7 SFCD. The expected 100-year tsunami wave run-up at India Basin is -2.2 SFCD.[638] Accounting for sea level rise, 100-year wave run-up at India Basin would increase to +0.8 feet SFCD. Development finished grades, which account for sea level rise and 100-year flood elevations, would be over 1 foot above this potential tsunami wave run-up elevation. Therefore, the impacts from tsunami and seiche inundation would be less than significant. No mitigation is required.

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635 Moffatt & Nichols, 2009, Candlestick Point / Hunters Point Redevelopment Project Proposed Shoreline Improvements, prepared for Lennar Urban, September, 2009.
636 Working Group On California Earthquake Probabilities, *Earthquake Probabilities in the San Francisco Bay Region: 2002–2031*, United States Geological Survey Open-File Report 03-214, Appendix D. "Magnitude and Area Data for Strike Slip Earthquakes," Dr. William L. Ellsworth, Research Seismologist, USGS, 2003.
637 Garcia, A.W. and Houston, J.R., 1975. *Type 16 Flood Insurance Study: Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound*, United States Army Corps of Engineers Technical Report H-75-17, Figure 58, converted to SFCD.
638 Garcia, A.W. and Houston, J.R., 1975. *Type 16 Flood Insurance Study: Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound*, United States Army Corps of Engineers Technical Report H-75-17, Figure 58., converted to SFCD.

Refer to the Section III.L for a discussion of the impacts related to mudflows and other types of landslides.

Cumulative Impacts

The geographic context for the analysis of hydrology and water quality cumulative impacts is often site-specific because each project site has a different set of physical considerations limiting development and construction. The following impacts identified for the Project are site-specific and would not contribute to impacts from other development projects: placement of housing in a 100-year flood hazard area, flooding in areas adjacent to the Bay, and exposure of people or structures to inundation by seiche, tsunami, mudflow, or dam failure. Some effects, however, particularly those pertaining to water quality, do have potential to contribute to impacts from other developments. Even when the pollutants and sediments generated by each individual project are minor, the additive effect of cumulative development in a watershed could have an adverse effect on the receiving waterbody. Because the extent of hydrology impacts can vary, the geographic context for each impact criterion is called out within the impact discussion.

With respect to cumulative effects on water quality associated with construction, all future development within the Islais Creek and Yosemite Basins would be required to conform to applicable WDRs, for example, the Construction General Permit, Wastewater Discharge Permit Order No. R2-2008-0007, and potentially General Permits Orders No. R2-2004-0055, R2-2006-0075, R2-2007-0033 (for certain types of construction dewatering). To obtain coverage under these permits, cumulative development projects would be required to implement construction BMPs similar to those recommended for the Project. Construction impacts on water quality would therefore be less than significant.

Construction and operation of cumulative development would not deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. The groundwater basin underlying the Project site are not used for water supply; thus, the groundwater level has remained relatively constant over time. Although multiple dewatering projects within the groundwater basin could reduce the water table temporarily, this effect would be offset by infiltration. Thus, cumulative development would have a less-than-significant impact on groundwater recharge.

Construction activities would alter the drainage pattern of the various development sites within the Islais Creek and Yosemite Basins, as at the Project site. Over time, construction has substantially changed the hydrology of San Francisco, resulting in localized changes, and in some cases, adverse effects such as flooding. The cumulative alteration of the drainage patterns of the watersheds would therefore be considered significant and adverse. However, the Project's contribution to this cumulative impact would not be considerable, because overall, the Project would not substantially change the existing drainage patterns at the Project site.

Both the construction and operation of cumulative development would have the potential to exceed the capacity of existing and planned storm sewers. As foreseeable development is constructed, the demand for conveyance capacity will increase. The SFPUC's Stormwater Sewer Master Plan is under development and is expected to address the need for additional sewer system capacity for planned future development

through capital improvements. Individual projects may also be required to provide on-site treatment and retention capacity. Finally, the City's Green Building Ordinance requires treatment of 0.75 inch of stormwater runoff and a 25 percent reduction in runoff from the 2-year 24-hour storm event (the latter standard applies only to discharges to the combined sewer) compared to existing conditions (based on the LEED® standards). As a result of these planning efforts and policies, the cumulative impact on the capacity of existing and planned storm sewers would be less than significant.

Cumulative development in the watershed, including development at Executive Park, HPS Phase I, India Basin Shoreline, Jamestown, Brisbane Baylands, and Visitacion Valley, could contribute to violations of water quality standards or WDRs. The Lower Bay, the receiving waterbody, has noted impairments for chlordane, dichlro-diphenyl-trichloroethane (DDT), dieldrin, dioxin compounds, exotic species, furan compounds, mercury, and polychlorinated biphenyls (PCBs).[639] Additional development could exacerbate existing pollutant concentrations. However, future development in the watershed would likely use the combined sewer system infrastructure, provided it is in good condition. Therefore, these projects would need to follow SFPUC requirements for combined sewer areas once these requirements are developed. In addition, foreseeable development projects would be required to implement operational BMPs to control release of pollutants, similar to the Project. Therefore, the overall effect on water quality would be less than significant.

Structures placed within an area subject to flooding can redirect flood flows, resulting in impacts on surrounding properties. Cumulative development surrounding the Project site could contribute to such an effect by erecting buildings and other structures within an area subject to inundation. However, it is anticipated that cumulative development in the floodplain would be subject to mitigation similar to that proposed for the Project and would be required to obtain Floodplain Development Permits from the City Administrator prior to buildout. To acquire such a permit, the project applicants for individual development projects must demonstrate that the proposed buildings or structures would not redirect flood flows such that an adverse physical effect would occur. Thus, cumulative impacts for this criterion would be less than significant.

[639] US EPA, 2007. 2006 CWA Section 303(d) List of Water Quality Limited Segments, June 28, 2007.