4.N HYDROLOGY AND WATER QUALITY

This section describes the regulatory and environmental setting for hydrology and water quality. It also describes impacts on hydrology and water quality that would result from implementation of the Seawall Lot 337 and Pier 48 Mixed-Use Project (Mission Rock Project or proposed project) and mitigation measures that would reduce these impacts.

Issues identified in response to the notice of preparation (NOP) (Appendix 1) were considered in preparing this analysis. Applicable issues that were identified include potential impacts related to sea-level rise (SLR), flood inundation, and contaminated runoff.

ENVIRONMENTAL SETTING

CLIMATE AND PHYSIOGRAPHY

The project site has a Mediterranean climate, characterized by dry, cool summers and mild and moderately wet winters. The city receives, on average, approximately 21.14 inches of rainfall per year,[1] with most occurring from November through March and accounting for more than 80 percent of the total.[2] Within the project vicinity, there are minimal topographic features, and the grading is generally flat. The majority of the site is currently a large surface parking area, encompassing Pier 48, which is built on landfill along San Francisco Bay (Bay).[3] The project site has existing grades that vary in elevation from 8.3 to 11.8 feet NAVD88 Datum[4]; however, the majority of the proposed development footprint is at about 10.3 feet NAVD88, or about 4.7 feet above the mean high water (MHW) elevation of 5.61 feet (NAVD88). Prior to filling during the early part of the 20th century, the project site historically was open water, part of Mission Bay.[5]

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1 Western Regional Climate Center. n.d. *San Francisco, Mission Dolores, California Monthly Total Precipitation (inches) (047772).* Available: www.wrcc.dri.edu. Accessed: September 16, 2015.

2 Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements*. M&N Job No: 7530. November.

3 Museum of California. 2008. *San Francisco Historical Creek Map*. Last updated: 2008. Available: http://explore.museumca.org/creeks/SFTopoCreeks.html. Accessed: October 26, 2015.

4 BKF Engineers, Surveyors, Planners. 2011. *Sea Wall 337 Infrastructure Analysis*. September 14.

5 Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements.* M&N Job No: 7530. November.

SURFACE WATER HYDROLOGY

The project site is located within the Mission Creek subwatershed of the larger Lower San Francisco Bay watershed,[6] in an area known as China Basin. The project site is southeast of China Basin, in the area where Mission Creek meets San Francisco Bay. Although no natural surface waters go through the project site, it is bordered by major surface waters (i.e., Mission Creek to the north and San Francisco Bay to the east).

Upstream of where Interstate 280 crosses it, Mission Creek is culverted beneath urban development. Before urbanization, it was once a creek that was formed when several smaller creeks converged. It was also part of a large salt marsh and lagoon. Later, the area was filled and the creek was culverted.[7]

EXISTING DRAINAGE PATTERNS ON THE PROJECT SITE

Prior to industrialization, a large portion of stormwater flow in San Francisco percolated into the ground, while the remaining water ran off to local creeks and streams, eventually flowing to the ocean or the Bay. San Francisco's development altered the natural landscape of many of the city's drainage basins. Mission Bay and the surrounding wetlands were filled, and contributing creeks and streams were put into pipes and covered. Because of reduced percolation and the infill of wetlands and streams, stormwater in most of the city is now collected in the city's combined sewer system or in a separated stormwater system, depending on the location in the city, instead of draining overland to a creek or the Bay.

The project site is generally flat and paved. The existing storm drain infrastructure within the vicinity of the project site has a separated storm sewer system to the west, south, and east and two separate outfalls that drain to the Bay.[8] However, some stormwater from the site is collected by a combined storm drain system in the Mission Bay area, with the stormwater system on Third Street currently discharging into the combined system and with surface runoff generated at Pier 48 directly or indirectly discharging to the Bay.[9] The combined system is discussed further in Section 4.K, *Utilities and Service Systems.*

The west side of the project site is served by an existing storm drain system within Third Street. This system will be routed to future Mission Bay Stormwater Pump Station No. 3 for discharge to Mission Creek. Until Stormwater Pump Station No. 3 is constructed, runoff will discharge to

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[6] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Originally published January 18, 2007. Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

[7] Museum of California. 2008. *San Francisco Historical Creek Map.* Last updated: 2008. Available: http://explore.museumca.org/creeks/SFTopoCreeks.html. Accessed: October 26, 2015.

[8] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

[9] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock DEIR Hydrology Description Memorandum*. October 13.

an existing 11- by 11-foot combined sewer (Figure 4.N-1, page 4.N-4). The realigned Mission Rock Street has a new storm drain system that conveys stormwater to Mission Bay Stormwater Pump Station No. 6 to the south, which discharges to the Bay adjacent to the Radiance Development. Both China Basin Park and Terry A. Francois Boulevard have storm drain systems that discharge directly to the Bay through existing outfalls.[10]

The project site is located in the Bayside drainage basin. A San Francisco Public Utilities Commission (SFPUC) sewage and stormwater pumping station is present at the west end of Mission Creek.[11] A combination of Port of San Francisco (Port) and SFPUC sanitary, storm, and combined sanitary-storm sewers exist in the public rights-of-way adjacent to the project site. Portions of the project area are under Port jurisdiction, such as Seawall Lot 337; however, stormwater is conveyed to the Mission Bay separated system under SFPUC jurisdiction. Figure 4.N-1 shows the four drainage areas and the jurisdiction of their respective drains.

GROUNDWATER HYDROLOGY

San Francisco overlies all or part of seven unadjudicated groundwater basins. These groundwater basins include the Westside, Lobos, Marina, Downtown San Francisco, Islais Valley, South, and Visitation Valley basins. The Lobos, Marina, Downtown San Francisco, and South Basins are located wholly within city limits, while the remaining three extend south into San Mateo County.[12] The project site is situated above the Downtown San Francisco groundwater basin (ID 2-40).[13] The Downtown San Francisco groundwater basin is located in the northeastern portion of the San Francisco peninsula. It is one of five basins in the eastern part of the city, each separated from the other by bedrock ridges. The groundwater basin is made up of shallow, unconsolidated alluvium that is underlain by less permeable bedrock within the watershed located east and northeast of the Twin Peaks area, including Nob Hill and Telegraph Hill to the north and Potrero Point to the east as well as most of the downtown area. Bedrock outcrops along much of the ridge form the northeastern and southern basin boundaries. In general, groundwater flow is toward the northeast and the San Francisco Bay, following the downward slope of the topography.

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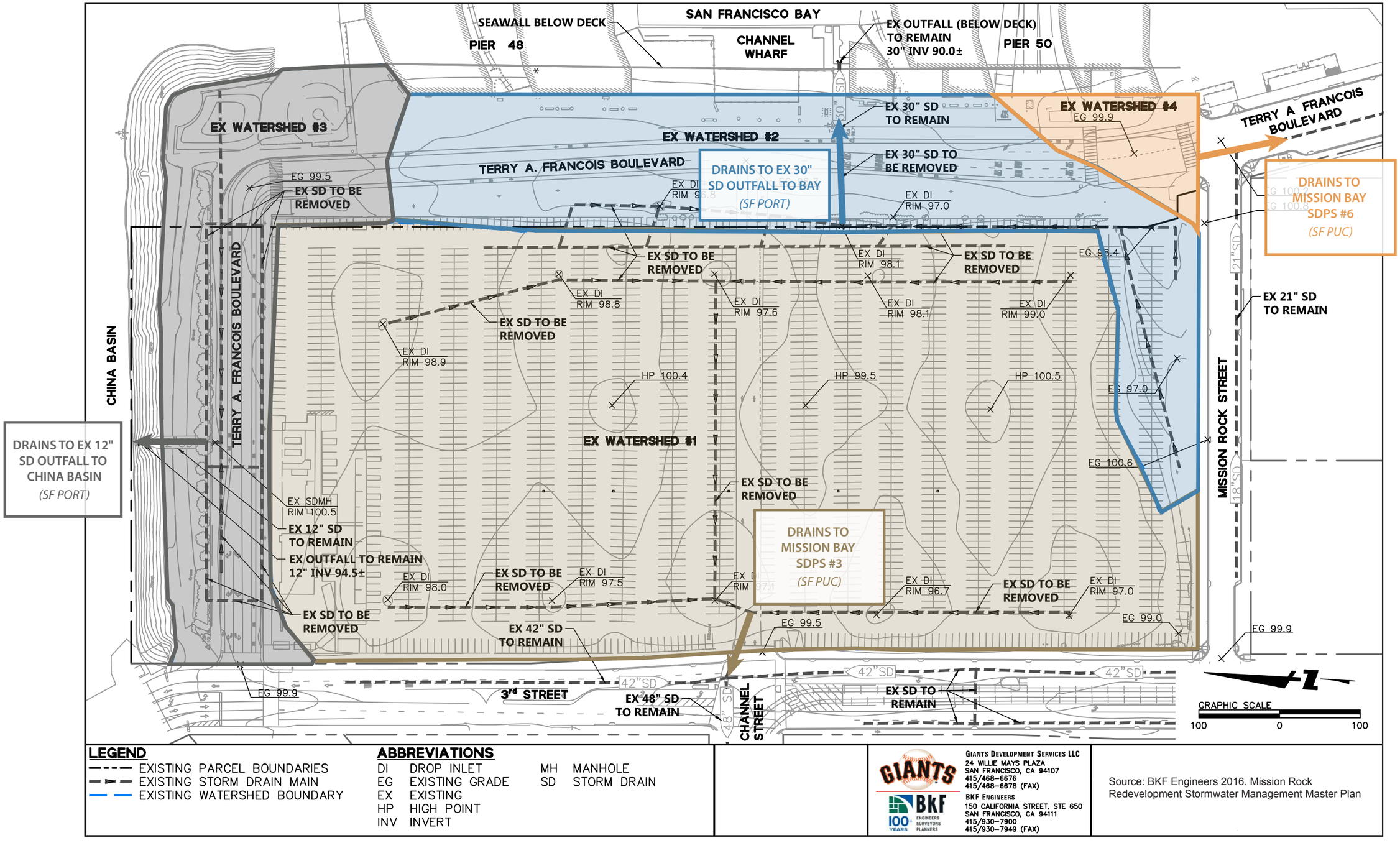
[10] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock DEIR Hydrology Description Memorandum*. October 13.

[11] Wijsman, P., J. LaClair. 2013. Adapting to Rising Tides: Mission Creek San Francisco, California. June, 25.

[12] San Francisco Public Utilities Commission. 2016. *2015 Urban Water Management Plan for the City and County of San Francisco.* June. Available: http://sfwater.org/modules/showdocument.aspx?documentid=9300. Accessed: September 27, 2016.

[13] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.



LEGEND

- EXISTING PARCEL BOUNDARIES
- EXISTING STORM DRAIN MAIN
- EXISTING WATERSHED BOUNDARY

ABBREVIATIONS

DI	DROP INLET	MH	MANHOLE
EG	EXISTING GRADE	SD	STORM DRAIN
EX	EXISTING		
HP	HIGH POINT		
INV	INVERT		

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

Source: BKF Engineers 2016. Mission Rock Redevelopment Stormwater Management Master Plan

Graphics ... 00336.13 (3-22-2017)

Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Figure 4.N-1
Existing Drainage Plan

Groundwater recharge to the groundwater basin occurs from infiltration of rainfall, landscape irrigation, and leakage of water and sewer pipes. Recharge to the Downtown San Francisco groundwater basin has been estimated to be 5,900 acre-feet per year.[14] Recharge due to leakage from municipal water and sewer pipes accounts for about half of the total recharge of groundwater in the San Francisco area.[15] Groundwater in the Downtown San Francisco groundwater basin is not currently used for water supply, nor do plans exist for this basin to be used for future water supply.

WATER AND SEDIMENT QUALITY

SAN FRANCISCO BAY AREA

As described under *Section 303 – Impaired Waters*, impaired water bodies are defined as those water bodies that do not meet water quality standards. The proposed project would be located along Mission Creek and Lower San Francisco Bay, which extends from approximately the Bay Bridge on the north to the Dumbarton Bridge on the south. The Regional Water Quality Control Board (Regional Water Board) has listed Mission Creek as an impaired water body for ammonia, chlordane (sediment), dieldrin (sediment), hydrogen sulfide, lead (sediment), polycyclic aromatic hydrocarbons (PAH) (sediment), polychlorinated biphenyls (PCBs), silver (sediment), and zinc (sediment). San Francisco Bay[16] is listed as an impaired water body for chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, dioxin compounds, furan compounds, invasive species, mercury, PCBs (including dioxin-like compounds), selenium, and trash.

SURFACE WATER

Water quality in a typical surface water body is influenced by processes and activities that take place within the watershed. The quality of the stormwater runoff from the project site and surrounding development is typical of urban watersheds where water quality is affected primarily by discharges from both point and nonpoint sources. Point-source discharges are discharges that one can point to as known sources of pollutants, while nonpoint source discharges generally result from diffuse sources, such as land runoff, precipitation, or seepage. Point and nonpoint sources include outfalls, winter storms, overland flow, exposed soil, roofs, parking lots, and streets. Water quality in the vicinity of the proposed project is directly affected

[14] California Department of Water Resources. 2004. California's Groundwater Bulletin 118, San Francisco Hydrologic Region, Downtown San Francisco Groundwater Basin. February 27.

[15] California Department of Water Resources. 2004. California's Groundwater Bulletin 118, San Francisco Hydrologic Region, Downtown San Francisco Groundwater Basin. February 27.

[16] This section of the Bay is known as Central San Francisco Bay, as defined by the State Water Resources Control Board for the 2012 Integrated Report (Clean Water Act Section 303(d) List/305(b) Report). Central San Francisco Bay extends from approximately Oakland International Airport and Hunters Point on the south to San Pablo Bay on the north.

by stormwater runoff from adjacent streets and properties that deliver fertilizers, pesticides, automobile and traffic pollutants (e.g., oil, grease, metals), sediment with associated pollutants from soil erosion, trash, and other pollutants.

The San Francisco Bay Basin Plan (Basin Plan)[17] specifies the beneficial uses that apply to the project area, as shown in Table 4.N-1, below. Beneficial uses form the cornerstone of water quality protection under the Basin Plan. Once beneficial uses are designated, appropriate water quality objectives can be established, and programs that maintain or enhance water quality can be implemented to ensure the protection of beneficial uses. The designated beneficial uses, together with water quality objectives, form water quality standards.

TABLE 4.N-1. BENEFICIAL USES OF SURFACE WATERS WITHIN THE PROJECT VICINITY

Water Body	Beneficial Uses
Lower San Francisco Bay	Industrial service water supply (IND), commercial and sport fishing (COMM), shell fish harvesting (SHELL), estuarine habitat (EST), fish migration (MIGR), preservation of rare and endangered species (RARE), fish spawning (SPWN), wildlife habitat (WILD), water contact recreation (REC-1), noncontact water recreation (REC-2), navigation (NAV)
Mission Creek	Commercial and sport fishing (COMM), estuarine habitat (EST), wildlife habitat (WILD), water contact recreation (REC-1), noncontact water recreation (REC-2), navigation (NAV)

Source: San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: April 18, 2016.

Constituents or pollutants in stormwater runoff vary with surrounding land uses, impervious surface area, and topography as well as with the intensity and frequency of rainfall or irrigation. Stormwater runoff generated at the onset of the wet season, or the "first-flush," typically contains the highest pollutant concentrations. The project site is located within a developed area of the city where the majority of the ground surface is covered by pavement (roads and parking lots) and structures (office, commercial, and residential). Street surfaces are the primary source of pollutants in stormwater runoff in urban areas. Common sources of stormwater pollution in the project vicinity include construction sites, parking lots, large landscaped areas, and household and industrial sites. Grading and earthmoving activities associated with new construction can accelerate soil erosion. Grease, oil, hydrocarbons, and metals deposited by vehicles and heavy equipment can accumulate on streets and paved parking lots. From there, they are carried into storm drains by runoff. PCBs are also listed as Clean Water Act Section

[17] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

303(d) impairments in the Lower San Francisco Bay. PCBs can be found in automobile engines and other sources that are common in urban areas. Pesticides, herbicides, fungicides, and fertilizers that are used for landscape maintenance can be washed into storm drains when irrigation exceeds the rate of soil infiltration and plant uptake or when the chemicals are applied in excess.

As shown in Table 4.N-2 on the following page, pesticides chlordane, dieldrin, and DDT, which is no longer permitted for use, are listed as 303(d) impairments in Mission Creek and San Francisco Bay. Paints, solvents, soap products, and other toxic materials may be inadvertently or deliberately deposited in storm drains in residential and industrial areas. Trash, as well as some metals, including lead, zinc, mercury, and silver, are also listed as 303(d) impairments. Trash can threaten aquatic life and recreational beneficial uses, as designated by the Basin Plan. Trash and litter can collect in storm drain inlets and ultimately be discharged into nearby waterways. The University of California, San Francisco (UCSF) Medical Center, which is committed to reducing the amount of medical waste, follows the guidelines of the UCSF Medical Waste Management Plan. Medical waste produced from research laboratory operations and clinical and patient care activities is subject to strict state requirements, including the California Medical Waste Management Act. Medical waste is treated onsite or steam sterilized and, therefore, would not be a threat to water quality.

SEDIMENT

Suspended sediments and turbidity, terms that are often used interchangeably, are key components of the estuarine system. The term "suspended sediments" refers to the actual sediment component in the water column. "Turbidity" refers to a number of different suspended particulates, including plankton and sediments. Most nearshore environments, particularly estuaries, tend to have higher levels of turbidity or suspended sediment loads than environments located farther off-shore because of discharges from rivers, drainages, and the relative shallow nature of the environment. Sediments in shallow regions of the estuary are highly susceptible to resuspension from wind, tides, and freshwater flows as well as subsequent advection to deeper channels of the Bay.[18]

Several groups, including the San Francisco Estuary Institute (SFEI) and the U.S. Geological Survey (USGS), have monitored suspended sediment loads throughout San Francisco Bay for many years and found that suspended sediment concentrations in the Bay tend to be highly variable and strongly correlated to season and water depth. Suspended sediment concentrations can range from well over 1,000 milligrams per liter (mg/l) near the bottom to as little as 10 mg/l

[18] Buchanan, P.A., and D.H. Schoellhamer. 1996. *Summary of Suspended-Solids Concentration Data, San Francisco Bay, California, Water Year 1995.* U.S. Geological Survey, Open File Report 96-591.

TABLE 4.N-2. 303(D) LISTED WATER BODIES IN THE PROJECT AREA

Water Body	Pollutant	Expected TMDL Completion Date
Mission Creek	Ammonia	2019
	Chlordane (sediment)	2013
	Dieldrin (sediment)	2013
	Hydrogen sulfide	2019
	Lead (sediment)	2019
	Mercury (sediment)	2019
	PAH (sediment)	2019
	PCBs (sediment)	2008
	Silver (sediment)	2019
	Zinc (sediment)	2019
Central San Francisco Bay	Chlordane	2013
	DDT	2013
	Dieldrin	2013
	Dioxin compounds (including 2,3,7,8-TCDD)	2019
	Furan compounds	2019
	Invasive species	2019
	Mercury[1]	
	PCBs	2008
	PCBs (dioxin-like compounds)	2008
	Selenium	2010
	Trash	2021

TMDL = total maximum daily load; EPA = U.S. Environmental Protection Agency

PAH = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls; DDT = dichlorodiphenyltrichloroethane

[1] The EPA approved the mercury TMDL on February 29, 2008. Potential Sources of mercury in Central San Francisco Bay are atmospheric deposition, industrial point sources, municipal point sources, natural sources, nonpoint sources, and resource extraction.

Source: State Water Resources Control Board *2012 Integrated Report* (Clean Water Act Section 303(d) List/305(b) Report). Last updated: 2015. Available: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml. Accessed: February 1, 2017.

in near-surface measurements.[19] Water depths along the San Francisco waterfront and piers are relatively shallow. Suspended sediment loads are strongly influenced by nearshore discharges and wind- and wave-generated sediment disruption, similar to the higher sediment concentrations found near the bottom of the Bay or in other shallow environments.

The only data available on the quality of the sediment within Piers 48 and 50 were collected by the Port of San Francisco in 1990 and 1998 to characterize sediment proposed for dredging. Results from these investigations exhibited metal concentrations in sediment samples that were generally comparable to Bay ambient conditions. In comparison to current regional criteria, only mercury concentrations exceeded the essential fish habitat bioaccumulation trigger of 0.33 milligram per kilogram (mg/kg) but were lower than the total maximum daily load (TMDL) of 0.47 mg/kg.[20] All organic analytes (e.g. PAHs, PCBs, and pesticides) were either not detected or lower than any regional criteria. Biological toxicity test results confirmed that chemicals were not at concentrations that would cause unacceptable adverse environmental impacts. This previous sediment characterization effort was for sediment that has since been dredged from the area and disposed of at an approved location. The sediments currently located in the vicinity of Pier 48 may contain higher or lower concentrations of contaminants. No data for existing sediment quality in the vicinity of Pier 48 are available.

GROUNDWATER

In general, groundwater quality throughout most of the region is suitable for most urban and agricultural uses, with only local impairments. The primary constituents of concern are high total dissolved solids, nitrate, boron, and organic compounds.[21] Although there is no published groundwater quality information available for the Downtown San Francisco basin, limited water quality data for the surrounding basins are available and show that the general character of groundwater for all basins beneath the entire San Francisco peninsula is similar. Groundwater beneath the San Francisco peninsula has high mineral content and is considered generally "hard." It also has high concentrations of iron and manganese [22] Elevated concentrations of nitrate and chloride are common, especially at shallower depths.[23]

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[19] Buchanan, P.A., and T.L. Morgan. 2014. *Summary of Suspended-Sediment Concentration Data, San Francisco Bay, California, Water Year 2010*. Data Series 808.

[20] Anchor Environmental CA, L.P. (Anchor). 2003. *Port of San Francisco Dredging Support Program – Programmatic Sampling and Analysis Plan.* San Francisco, CA.

[21] California Department of Water Resources. 2003. *California's Groundwater Bulletin 118, Update 2003, San Francisco Bay Hydrologic Region*. Available: http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater__bulletin_118_-_update_2003_/bulletin118_2-sf.pdf. Accessed: August 31, 2015.

[22] California Department of Water Resources. 2003. *California's Groundwater Bulletin 118, Update 2003, San Francisco Bay Hydrologic Region.* Available: http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater__bulletin_118_-_update_2003_/bulletin118_2-sf.pdf. Accessed: August 31, 2015.

[23] California Department of Water Resources. 2004. *California's Groundwater Bulletin 118, San Francisco Hydrologic Region, Downtown San Francisco Groundwater Basin*. February 27.

High concentrations of nitrates and elevated chloride, boron, and total dissolved solids concentrations are typically found in groundwater within the Downtown San Francisco basin. Groundwater recharge from sewer pipe leakage and possibly fertilizer introduced by irrigation return flows may account for high nitrate levels. Elevated chloride and total dissolved solids levels are most likely due to a combination of leaky sewer pipes, historic and current seawater intrusion, and geologically confined water.[24] In addition, improperly abandoned wells or leaking underground storage tanks (LUSTs) also have the potential to contaminate groundwater supplies. Groundwater contamination can also be the result of historical industrial activities. From around 1900 to the 1940s, the project site was an active rail yard[25]; thus, the potential exists for contamination to be present in the groundwater beneath the project site. Historical rail use and other activities are discussed further in Section 4.D, *Cultural Resources*.

The Site History Report found that residual contamination from historical uses or imported fill material is present on the project site.[26] Because there had been no change in land use at the project site since the 1999 subsurface investigation, the San Francisco Department of Public Health (SFDPH) determined that concentrations of residual contamination in soil and/or groundwater at the project site are limited to low levels of volatile organic compounds (VOCs), PAHS, and heavy metals and that no new subsurface investigations are required for the proposed project. However, SFDPH does require preparation and implementation of an approved Site Mitigation Report prior to commencement of construction and earthwork activities. The Site Mitigation Report must outline the soil and groundwater handling procedures to be followed in all areas that would be disturbed during construction on the land portion of the project site (i.e., not sediments submerged in the Bay beneath Pier 48).[27] See Section 4.O, *Hazards and Hazardous Materials*, for more information.

Prior operations at the project site resulted in potential groundwater contamination from hazardous substances, including diesel fuel and gasoline, at a number of onsite and nearby locations. Potential releases of total petroleum hydrocarbons as diesel and/or chlorinated solvents from warehouses west of the project site and a roundhouse, which is used for oil storage, south of the project site may have affected groundwater and migrated beneath the project site.[28]

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[24] California Department of Water Resources. 2004. California's Groundwater Bulletin 118, *San Francisco Hydrologic Region, Downtown San Francisco Groundwater Basin.* February 27.

[25] SPUR. 2016. *Mission Creek Sea-Level Rise Adaptation Study*. Waterfront Strategies for Long-Term Urban Resiliency. September. Available: http://www.spur.org/sites/default/files/publications_pdfs/Mission_Creek_Sea_Level_Rise_Adaptation_Study.pdf. Accessed: September 30, 2016.

[26] BASELINE Environmental Consulting. 2014. *Site History Report; Seawall Lot 337/Pier 48 Mixed-Use Project, San Francisco, California*. April 14.

[27] San Francisco Department of Public Health, Environmental Health Branch, Site Assessment and Mitigation. December 22, 2016—letter to Seawall Lot 337 Associates, LLC, regarding Mission Rock, Seawall Lot 337, and Pier 48, San Francisco, CA.

[28] BASELINE Environmental Consulting. 2014. *Site History Report Seawall Lot 337/Pier 48 Mixed-Use Project San Francisco, California.* April.

Two land use covenants between the City and County of San Francisco (City) and the California Department of Toxic Substances Control (DTSC) have been recorded to govern future land use within portions of the project site. All of the project site is subject to the San Francisco Maher Ordinance, but the land use covenants apply to only a portion of the project site. The land use covenants require excavated soils at subject portions of the project site to be evaluated and managed in accordance with the Maher Ordinance. Construction dewatering within areas that would be subject to the covenants would also be prohibited without prior approval from the DTSC. A review of the hazardous soils report suggests that there are "hot spots," or areas of affected soil or groundwater. Groundwater beneath the site was found 10 to 20 feet below ground surface,[29] and dissolved arsenic was found in groundwater at up to 180 micrograms per liter (µg/l). The California drinking water standard for arsenic is 50 µg/l.[30]

Beneficial uses, as designated by the Basin Plan, are identified for the Downtown San Francisco groundwater basin, as follows:[31]

- Municipal and domestic supply (MUN),[32]
- Industrial process supply (PROC),
- Industrial service supply (IND), and
- Agricultural supply (AGR).

Groundwater objectives consist primarily of narrative objectives, combined with a limited number of numerical objectives. The primary groundwater objective is the maintenance of existing high-quality groundwater. At a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances that produce taste and odor in excess of the objectives described in Table 4.N-3 on the following page, unless naturally occurring background concentrations are greater. Under existing law, the San Francisco Bay Regional

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[29] Section 4.M, *Geology and Soils,* section reports that groundwater was encountered between 6.5 and 9 feet below ground surface (Treadwell & Rollo. 2011. *Preliminary Geotechnical Investigation: Seawall Lot 337 – Mission Bay, San Francisco, California.* Prepared for Mission Rock Development. September 8 and Langan Treadwell Rollo. 2014. *Geotechnical Evaluation of Shoreline Conditions at Pier 48.* Mission Rock Development, Seawall Lot 337 and Pier 48, San Francisco, California. (Langan Project No. 750604203.) March 5.). This slight discrepancy does not affect the findings in this analysis.

[30] Department of Toxic Substances Control. 2002. *Hazardous Soils Report – Covenant to Restrict Use of Property Environmental Restriction, H&H Site located at China Basin Channel and Terry A. Francois Boulevard, City and County of San Francisco.*

[31] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Last updated: March 2015. Accessed: August 31, 2015.

[32] Although the downtown basin has MUN as a beneficial use, it is not currently used for MUN water supply because of low yield, contamination, or potential subsidence concerns.

TABLE 4.N-3. WATER QUALITY OBJECTIVES FOR GROUNDWATER IN THE PROJECT AREA

Constituent	Groundwater Quality Objective
Bacteria	Median of the most probable number of coliform organisms over any 7-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL).
Organic and Inorganic Chemical Constituents	All groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, shall not contain concentrations of constituents in excess of the maximum contaminant levels (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the provisions of Title 22.
Radioactivity	At a minimum, shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 4 (Radioactivity) of Section 64443 of Title 22.
Taste and Odor	Shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, shall not contain concentrations in excess of the SMCLs specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22.

Source: San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

Water Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater that is in continuity with surface water cannot cause violations of any applicable surface water standards.[33]

FLOODING

100-YEAR FLOOD EVENT

Because the City was not part of the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA) until 2008, there were no regulatory floodplain designations for the city prior to that time. Presently, FEMA is working on producing Flood Insurance Rate Maps (FIRMs) for the city. In the interim, the City has adopted the San Francisco Interim Floodplain Maps (Final Draft July 2008), which are based on preliminary information published by FEMA in 2007. The maps identify Special Flood Hazard

[33] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

Areas (SFHAs). SFHAs are areas that are subject to a 100-year flood, which means that, in any given year, the risk of flooding in the designated area is 1 percent. The 100-year flood event mapped by FEMA is typically referred to as the Base Flood Elevation (BFE) and based on current conditions without considering SLR, which is discussed in the next section. However, the elevation of the BFE was not determined as part of the Interim Floodplain Mapping.

Although the project site is close to low-lying areas along the San Francisco Bay shoreline, the Interim Floodplain Map (Figure 4.N-2 on the following page) indicates that the site is outside of a SFHA. Under current elevations of the project site, which varies from 8.3 to 11.8 feet (NAVD88), flooding may occur at the perimeter of the project site from a 100-year flood event.

San Francisco Bay experiences extreme high tides at various locations, coupled at times with storm surges and wind wave action, which makes it challenging to accurately estimate the 1 percent annual chance event. Although historical tide data have been collected for the area, they do not provide the information necessary for a prediction of extreme water levels, information that would be required to assess flood risk. The U.S. Army Corps of Engineers (USACE) estimates extreme high-tide levels on San Francisco Bay at Pier 22½ to be about 8.66 feet (NAVD88) for the 10-year tide event and 9.16 feet (NAVD88) for the 100-year tide event.[34] More recently, results from FEMA's region-wide mapping efforts in San Francisco Bay[35] indicate an elevation of 9.7 feet (NAVD88) for the noncoastal areas as the 1 percent annual chance event for this area.

FLOODING AS A RESULT OF SEA-LEVEL RISE

Flooding conditions at the project site and along San Francisco's Bay shoreline would be exacerbated with projected SLR due to climate change over the remainder of the century. This section discusses the factors that contribute to coastal flooding and the potential for increased flooding in the future as a result of SLR, assuming that no flood protection measures are implemented.

FACTORS CONTRIBUTING TO COASTAL FLOODING

Coastal areas can be vulnerable to periodic or episodic flooding due to extreme tides, storm surge, storm waves, and El Niño storm events. These conditions can result in many effects, including severe flooding of low-lying areas (e.g., roads, boardwalks, waterfront promenades), storm drain backup, wave damage to coastal structures, and erosion of natural shorelines. Rising sea levels due to climate change have the potential to increase the frequency, severity, and extent of flooding as a result of these conditions, each of which is described below.

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[34] Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements*. M&N Job No: 7530. November.

[35] AECOM. 2016. *San Francisco Bay Tidal Datums and Extreme Tides Study, Final Report*. February.

Note: As of this date, CCSF uses the 2008 interim flood maps to determine the existing 100-year flood zone.

Source: City and County of San Francisco. 2008. San Francisco Interim Floodplain Map: Northeast. July.

Special Flood Hazard Area

0 1,000 2,000

Feet

N

Graphics ... 00336.13 (3-22-2017)

Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Figure 4.N-2
San Francisco Interim 100-year Flood Plain Map

EXTREME TIDES

Diurnal (twice daily) high tides along San Francisco's Bay shoreline typically range from approximately 5 to 7 feet NAVD88; annual maximum tides may exceed 7 feet NAVD88.[36] The twice yearly extreme high and low tides are called "king tides." These occur each year during the winter and summer when the earth, moon, and sun are aligned; the winter event may be amplified by weather. A portion of The Embarcadero Promenade near Pier 14 and the Marina area in San Francisco experience inundation under current king tide conditions.[37] Development in the Mission Creek subwatershed is vulnerable to exposure to more extreme tides, storms, and annual flooding events (e.g., king tides). Third and Fourth Street Bridges are already vulnerable to inundation, including king tide events. However, daily high tides and king tides are not causing major inundation or disruptions in Mission Creek but, rather, more extreme but less frequent storm events could lead to flooding in the area. [38]

STORM SURGE

Storm surge occurs when persistent high winds and changes in air pressure elevate Bay water levels above normal tide levels, which can raise the water level near the shoreline by several feet and may persist for several days. Along the Bay shoreline, storm surge typically raises the surface water elevation from 0.5 to as much as 3 feet during major winter storms.[39] The degree of storm surge depends on the severity of the storm as well as tidal levels at the time of the storm. Storm surge is characterized using a return period that represents the expected frequency of a storm event occurring, based on historical information. One-year storm surge is expected to occur each year, while 100-year storm surge (which represents more extreme conditions) has a 1 percent chance of occurring in any year.

STORM WAVES

Waves and wave run-up affect primarily a narrow band along the shoreline where wave energy can damage structures and overtop both natural embankments and shoreline protection structures such as seawalls and levees. The influence of waves diminishes inland as wave energy dissipates. In addition, Pacific Ocean waves, which are generally larger than those originating in the Bay, are substantially dampened along the Bay shoreline because of transformation processes within the Bay. Along shoreline of the Bay, storm waves typically raise the surface water elevation by 1 to 4 feet during major winter storms several times a year.[40]

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[36] SFPUC. 2014a. *Climate Stressors and Impact: Bayside Sea-Level Rise Mapping, Final Technical Memorandum* (hereinafter *Bayside Sea-Level Rise Mapping Technical Memorandum*). June, p. 10.

[37] SFPUC, *Bayside Sea-Level Rise Mapping Technical Memorandum*, p. 7.

[38] SPUR. 2016. *Mission Creek Sea-Level Rise Adaptation Study.* Waterfront Strategies for Long-Term Urban Resiliency. September. Available: http://www.spur.org/sites/default/files/publications_pdfs/Mission_Creek_Sea_Level_Rise_Adaptation_Study.pdf. Accessed: September 30, 2016.

[39] SFPUC, *Bayside Sea-Level Rise Mapping Technical Memorandum*, p. 10.

[40] SFPUC, *Bayside Sea-Level Rise Mapping Technical Memorandum*, p. 10.

EL NIÑO WINTER STORMS

During El Niño events,[41] atmospheric and oceanographic conditions in the Pacific Ocean bring warmer, higher waters to the Bay Area and can produce severe winter conditions that bring intense rainfall to the Bay Area. Tides are often elevated 0.5 to 1.0 feet above normal along the coast and in the Bay for months at a time; additional storm surges and wind effects during storm events can elevate water levels even further. El Niño conditions prevailed in 1977–1978, 1982–1983, 1997–1998, 2009–2010,[42] and 2015–2016.[43]

SEA-LEVEL RISE

Sea levels are rising globally because of climate change, and they are expected to continue to rise at an accelerating rate for the foreseeable future. The sea level at the San Francisco tidal gage has risen approximately 8 inches over the past century.[44] The National Research Council's (NRC's) 2012 report, *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (NRC Report) provides a scientific review of SLR for the West Coast and the most recent regional SLR predictions for 2030, 2050, and 2100, relative to year 2000 sea level.[45] In this report, the NRC projects that sea levels in the San Francisco Bay Area will rise 11 inches by 2050 and 36 inches by 2100, as presented in Table 4.N-4 on the following page. As presented in the NRC Report, these SLR projections represent likely SLR values, based on the current understanding of global climate change, assuming a moderate level of greenhouse gas (GHG) emissions,[46] and extrapolation of continued accelerating land ice-melt patterns.

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41 El Niño Southern Oscillation (ENSO) is a natural oceanic-atmospheric cycle. El Niño conditions are defined by prolonged warming in Pacific Ocean sea-surface temperatures. Typically, this happens at irregular intervals of 2 to 7 years but can last anywhere from 9 months to 2 years.

42 SFPUC, *Bayside Sea-Level Rise Mapping Technical Memorandum*, p. 8.

43 NOAA. 2016. *El Niño and La Niña* (El Niño Southern Oscillation). Available: https://www.climate.gov/enso. Accessed: June 13, 2016.

44 NOAA. No date. *Mean Sea-Level Trend 9414290.* San Francisco, California. Available: https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9414290. Accessed: June 22, 2016.

45 National Research Council. 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. Washington, DC: The National Academies Press. Available: http://www.nap.edu/catalog.php?record_id=13389. Accessed: November 28, 2015.

46 Future emissions of greenhouse gases depend on a collection of human decisions at local, regional, national, and international levels as well as potential unknown technological developments. For this reason, future changes in greenhouse gas emissions cannot be accurately estimated, and a range of emissions levels is considered in the NRC Report. Estimates of SLR relative to thermal expansion of the oceans were formulated using the mid-level, or moderate level, of predicted changes in greenhouse gas emissions (from a combination of fossil and nonfossil fuels) as well as an assumption of high economic growth; this represents scenario "A1B," as described by the Intergovernmental Panel on Climate Change.

TABLE 4.N-4. SEA-LEVEL RISE ESTIMATES FOR SAN FRANCISCO BAY RELATIVE TO THE YEAR 2000

Year	Projection (inches)	Upper Range (inches)
2030	6	12
2050	11	24
2100	36	66

Source: National Research Council, 2012.[47]

The NRC Report also includes ranges of SLR that could occur, based on different estimates of GHG emissions and ice-melt patterns. The extreme upper limit of the ranges represents unlikely but possible levels of SLR that are based on very high GHG emissions scenarios and significant ice melt, which is not currently anticipated but could occur. Assuming the maximum level of GHG emissions and ice melt, the NRC anticipates that sea levels in the Bay Area could rise up to 24 inches by 2050 and 66 inches by 2100, as presented in Table 4.N-4, above.

These estimates represent the long-term increase in mean sea level and the associated average daily high tide conditions (represented by mean higher high water, or MHHW)[48] that could result from SLR; they do not take into account extreme tides, storm surge, storm waves, or El Niño storm events, all of which can result in water levels that are temporarily higher than MHHW, as discussed above.

In March 2013, the California Ocean Protection Council updated its 2010 statewide SLR guidance to adopt the NRC Report as the current best available science on SLR for California.[49] The California Coastal Commission supported the use of the NRC Report as the best science currently available in its *Sea-Level Rise Policy Guidance*, which it adopted in 2015. The California Coastal Commission guidance emphasizes the importance of regularly updating SLR projections as the science continues to advance.[50] The San Francisco Bay Conservation and Development Commission (BCDC) also considers the NRC Report to be the best available

[47] National Research Council. 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. Washington, DC: The National Academies Press. Available: http://www.nap.edu/catalog.php?record_id=13389. Accessed: November 28, 2015.

[48] Mean higher high water is the higher of each day's two high tides averaged over time.

[49] Ocean Protection Council. 2013. *State of California Sea-Level Rise Guidance Document.* Developed by the Coastal and Ocean Working Group of the California Climate Action Team, with science support provided by the Ocean Protection Council's Science Advisory Team and the California Ocean Science Trust. Updated: March 2013. (Hereinafter "*State of California Sea-Level Rise Guidance Document*"). Available: http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf. Accessed: November 28, 2015.

[50] California Coastal Commission. 2015. *Sea-Level Rise Policy Guidance, Interpretive Guidelines for Addressing Sea-Level Rise in Local Coastal Programs and Coastal Development Permits.* Unanimously adopted August 12, 2015. Available: http://documents.coastal.ca.gov/assets/slr/guidance/August2015/0_Full_Adopted_Sea_Level_Rise_Policy_Guidance.pdf. Accessed: November 28, 2015.

science-based prediction of SLR for the Bay. Accordingly, the San Francisco Planning Department (Planning Department) considers the NRC Report to be the best science currently available on SLR, affecting San Francisco for both CEQA and planning purposes.

Although the NRC Report provides the best available SLR projections for the Bay at this time, scientific uncertainty remains regarding the rate and magnitude of SLR. SLR projections beyond 2050 are highly dependent on assumptions regarding future global GHG emissions and changes in the rate of land ice melting. As a result of the uncertainties inherent in these assumptions, the range of SLR predictions becomes substantially broader beyond 2050. In recognition of this uncertainty, the State of California Sea-Level Rise Guidance recommends an adaptive management approach for development in areas that may be subject to SLR beyond 2050.[51] Adaptive management is an iterative process that involves monitoring conditions to evaluate whether an area could be inundated as a result of SLR and identifying actions to be implemented to ensure that the area and existing structures are resilient to future flooding conditions.

SEA-LEVEL RISE INUNDATION MAPPING

The SFPUC, as part of planning for its Sewer System Improvement Program, developed a series of maps, published in 2014, that identify areas of inundation along both the Bay and Pacific Ocean shorelines of San Francisco. These maps use a 1-meter horizontal grid resolution,[52] based on the 2010/2011 California Coastal Mapping Program LiDAR.[53] The inundation maps use data from FEMA's California Coastal Mapping and Analysis Project, which includes detailed coastal engineering analyses and mapping of the Bay shoreline.

The SFPUC inundation maps evaluate scenarios that represent NRC projections of SLR in combination with the effects of storm surge. They represent permanent inundation that could occur as a result of total water-level rise (over and above year 2000 MHHW), based on daily tidal fluctuations. Each scenario also addresses temporary inundation that could occur from extreme tides and 1-year, 2-year, 5-year, 25-year, 50-year, and 100-year storm surge. Flooding as a result of storm surge would occur on a temporary basis, during and immediately after a storm event or extreme tide.

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[51] *State of California Sea-Level Rise Guidance Document*; p. 3.

[52] The horizontal grid resolution of a digital elevation model (DEM) defines the scale of the features that are modeled; this is generally the minimum resolution necessary to depict levees, berms, and other topographic features important to diverting floodwaters.

[53] LIDAR, Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses combined with other data generate precise, three-dimensional information about the shape of the Earth and its surface characteristics.

The scenarios listed below are representative of Bay water elevations that could occur by 2050 and 2100, based on the NRC's projected levels of SLR and consideration of a 100-year storm surge:

- 12 inches above year 2000 MHHW (representative of NRC's projected SLR by 2050);
- 36 inches above year 2000 MHHW (representative of NRC's projected SLR by 2100);
- 52 inches above year 2000 MHHW (representative of NRC's projected SLR by the year 2050 in combination with a 100-year storm surge); and
- 77 inches above year 2000 MHHW (representative of NRC's projected SLR by the year 2100 in combination with a 100-year storm surge).

The following scenarios are representative of the maximum Bay water elevations that could occur by 2100, based on the NRC's upper range of SLR and consideration of a 100-year storm surge:

- 66 inches above year 2000 MHHW (representative of NRC's upper range of SLR by 2100); and
- 107 inches above year 2000 MHHW (representative of NRC's upper range of SLR by the year 2100 in combination with a 100-year storm surge).

The SFPUC cautions that its maps represent a "do nothing" scenario in which no site-specific measures are taken to prevent future flooding and no area-wide measures, such as waterfront protection structures, are implemented. In the event that the City undertakes area-wide measures to protect against inundation in the future, the mapping would need to be revised to reflect the modified inundation areas with implementation of these measures. In addition, because the SFPUC SLR maps are based on 2010/2011 topographic mapping, they do not account for planned increases in the base elevation of the project site, as would occur with implementation of the proposed project, to prevent future flooding due to SLR.

Pier 48, Pier 50, and the coastal perimeter along China Basin Park have a 100-year BFE of 11 feet NAVD88. The detailed Preliminary Flood Insurance Study indicates a 1 percent annual chance total water-level elevation (TWLE) of 11.4 feet NAVD88, which is the assumed 100-year BFE value for the pier structure for the purposes of this analysis. The TWLE is the maximum combined seawater elevation, wave setup, and wave run-up considered for coastal BFEs.[54] MHHW near the project site is at an elevation of 6.33 feet NAVD88.[55] Table 4.N-5 on the following page presents the water elevations near the project site associated with each of the SLR scenarios discussed above, based on the existing MHHW elevation.

[54] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

[55] Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements*. M&N Job No: 7530. November.

TABLE 4.N-5. WATER ELEVATIONS ASSOCIATED WITH SEA-LEVEL RISE PROJECTIONS

Sea-Level Rise Scenario	Water Level Above MHHW Inches	Elevation (feet, NAVD88)	Elevation (feet, Project Datum[1])
2000 MHHW with no SLR	0	6.33	95.03
2000 MHHW plus 12 inches of SLR	12	7.33	96.03
2000 MHHW plus 100-year storm surge	41	9.75	98.45
2000 MHHW plus 12 inches of SLR and 100-year storm surge	53	10.75	99.45
2000 MHHW plus 36 inches of SLR	36	9.33	98.03
2000 MHHW plus 36 inches of SLR and 100-year storm surge	77	12.75	101.45
2000 MHHW plus 66 inches of SLR (upper range)	66	11.83	100.53
2000 MHHW plus 66 inches of SLR and 100-year storm surge (upper range)	107	15.25	103.95

Notes:
MHHW – mean higher high water
[1] The project datum is equal to City and County San Francisco datum plus 100 feet. This is 88.7 feet higher than NAVD88.
Sources: SFPUC, *Bayside Sea-Level Rise Mapping Technical Memorandum*, 2014.

The SFPUC inundation maps indicate that, under existing conditions, only the immediate waterfront portions of the project site (along Mission Creek and Lower San Francisco Bay) would be inundated with 12 inches of SLR, which is expected by 2050 (Figure 4.N-3 on the following page).[56] Pier 48 sits at a higher surface elevation, and no part of the pier is within an anticipated future flood zone. However at the mid-century level of the SLR scenario, pier decks on Pier 48 may be affected where utility infrastructure is currently located beneath the pier decks. In addition, the structural integrity of the pier's substructure can be threatened, and wave action underneath the piers can create uplift.[57] However, when the effects of 100-year storm surge are considered in addition to 12 inches of SLR, the flood level would be approximately 10.75 feet NAVD88. Under this scenario, more than half of the project site could be temporarily flooded with the current site grade. Flooding would occur in the southern portion of the site and the waterfront portions of the project site (Figure 4.N-4, page 4.N-23). Similar to the 12 inches of SLR expected by 2050, only the immediate waterfront portions of the project site (along Mission Creek and Lower San Francisco Bay) would be inundated with projected end-of-century SLR (i.e., 36 inches by 2100) (Figure 4.N-5, page 4.N-24). However, when the effects of 100-year storm surge are considered in addition to 36 inches of SLR, the entire area west of Pier 48 could be subject to daily tidal inundation and flooding (Figure 4.N-6, page 4.N-25). The flood level would be approximately 12.75 feet NAVD88. Flooding would extend southward and westward, with the exception of a small area immediately south of the project site where flooding would not occur. Similarly, with the exception of Pier 48, the site would be inundated with 66 inches of SLR with a flood level of approximately 11.83 feet NAVD88. When the effects of 100-year storm surge are considered with 66 inches of SLR, the flood level would be approximately 15.25 feet NAVD88. The entire area west of Pier 48 could be temporarily flooded under this worst-case scenario.

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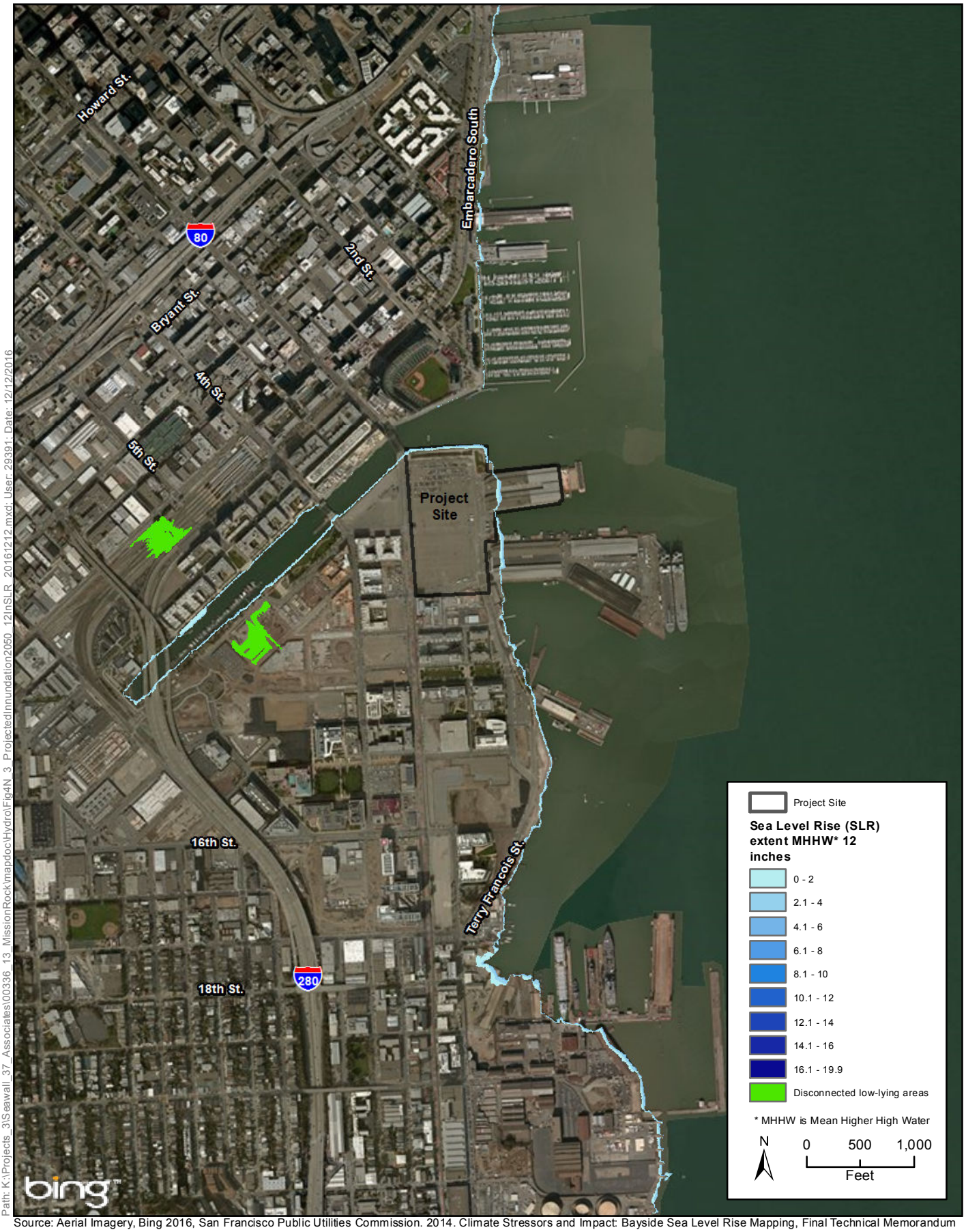
[56] SFPUC maps assume no improvements on the site. The inundation maps and the associated analyses are intended as planning-level tools to illustrate the potential for inundation and coastal flooding under a variety of future SLR and storm-surge scenarios. The maps depict possible future inundation that could occur if nothing is done to adapt or prepare for SLR over the next century. The maps do not represent the exact location or depth of flooding. The maps relied on a 1-meter digital elevation model created from LiDAR data collected in 2010 and 2011. Although care was taken to capture all relevant topographic features and coastal structures that may affect coastal inundation, it is possible that structures narrower than the 1-meter horizontal map scale may not be fully represented. The maps are based on model outputs and do not account for all of the complex and dynamic San Francisco Bay processes or future conditions such as erosion, subsidence, future construction or shoreline protection upgrades, or other changes to San Francisco Bay or the region that may occur in response to SLR. For more context about the maps and analyses, including a description of the data and methods used, please see the Climate Stressors and Impacts Report: Bayside Sea-Level Rise Inundation Mapping Technical Memorandum, March 2014.

[57] SPUR. 2016. *Mission Creek Sea-Level Rise Adaptation Study.* Waterfront Strategies for Long-Term Urban Resiliency. September. Available: http://www.spur.org/sites/default/files/publications_pdfs/Mission_Creek_Sea_Level_Rise_Adaptation_Study.pdf. Accessed: September 30, 2016.

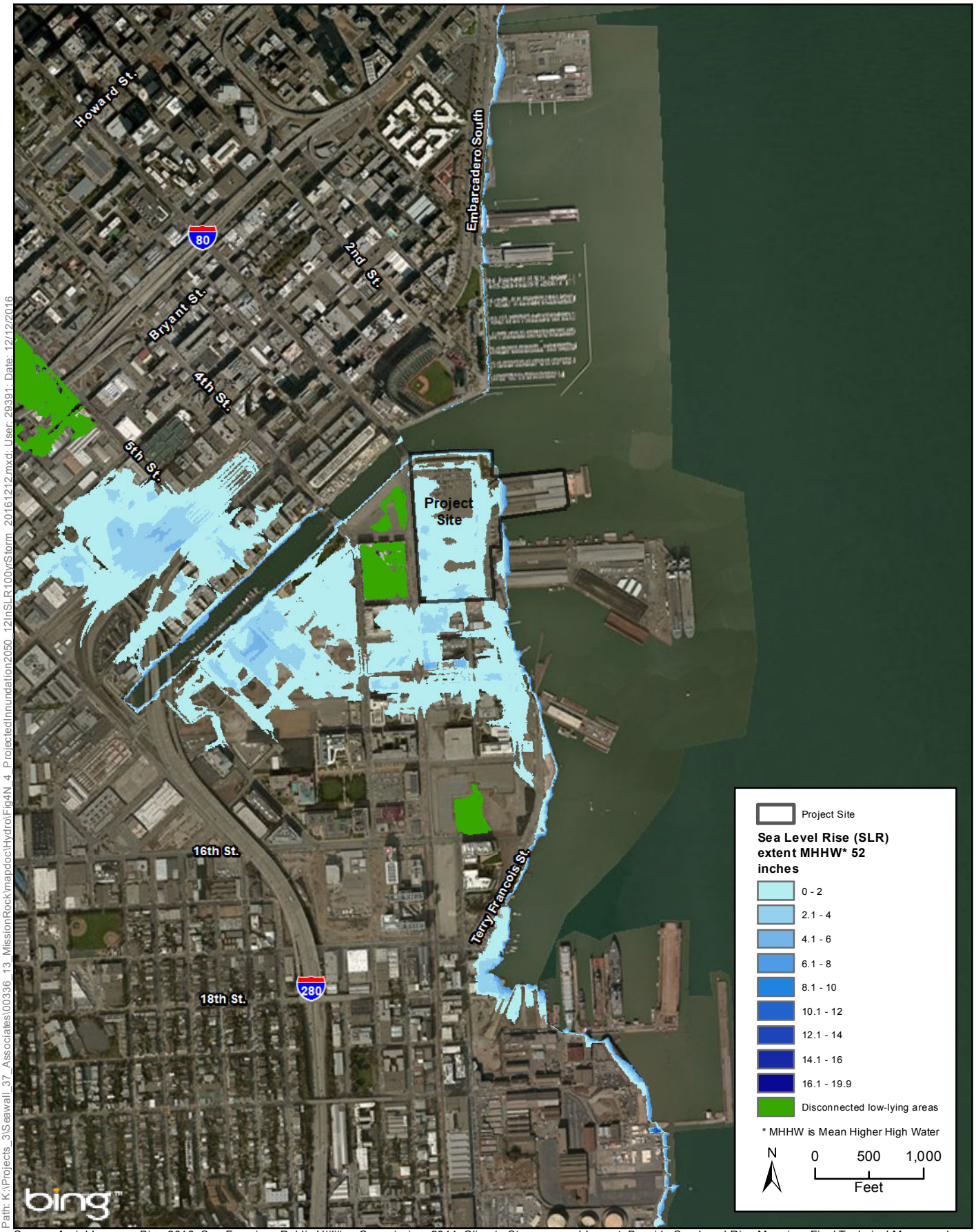


Path: K:\Projects_3\Seawall_37_Associates\00336_13_MissionRock\mapdoc\HydroFig4N_3_ProjectedInundation2050_12InSLR_20161212.mxd; User: 29391; Date: 12/12/2016

Source: Aerial Imagery, Bing 2016, San Francisco Public Utilities Commission. 2014. Climate Stressors and Impact: Bayside Sea Level Rise Mapping, Final Technical Memorandum

Seawall Lot 337/Pier 48 Mixed-Use Project,
Case No. 2013.0208E

Figure 4.N-3
Projected Inundation by 2050, with 12 Inches of Sea Level Rise

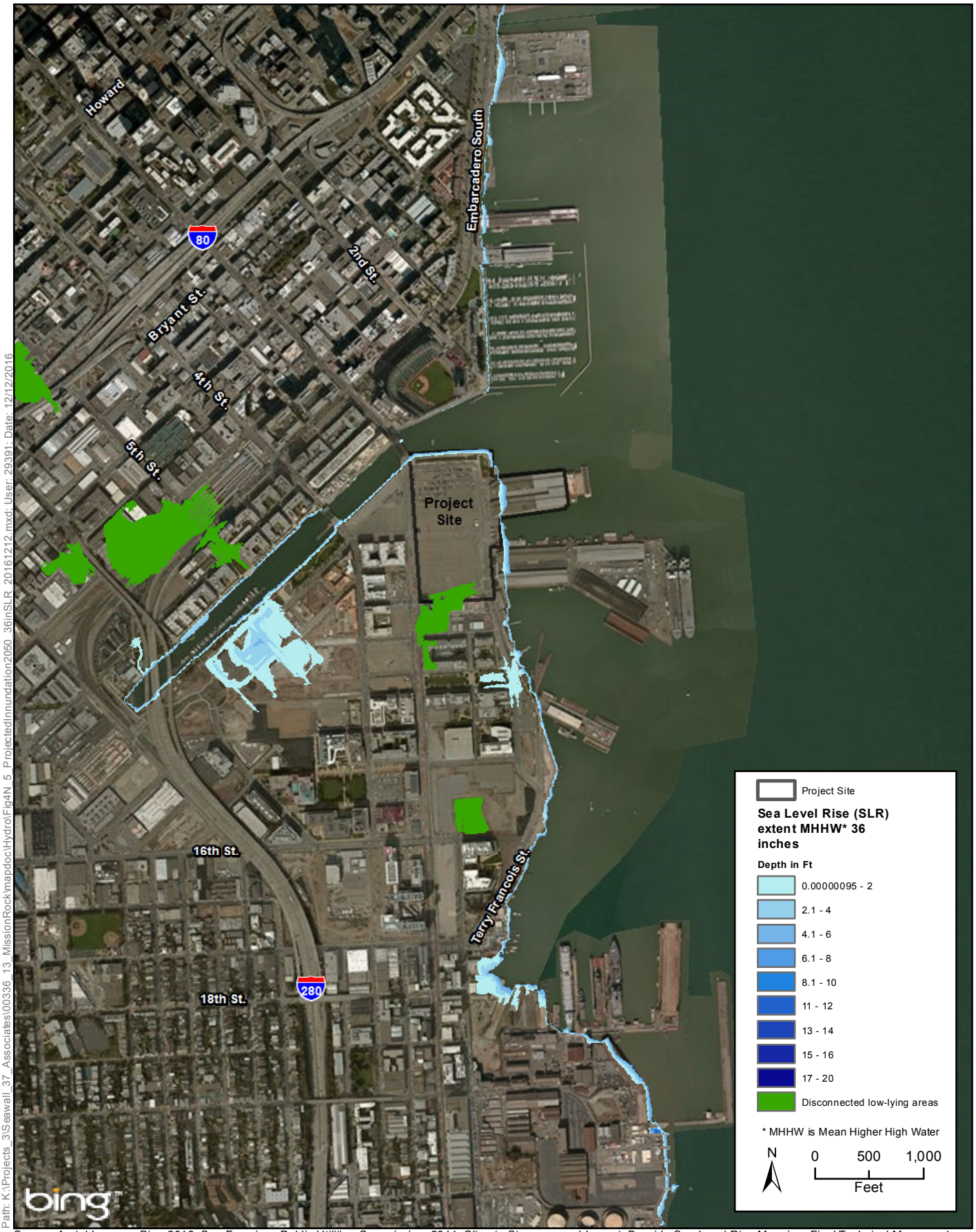


Path: K:\Projects_3\Seawall_37_Associates\00336_13_MissionRock\mapdoc\HydroFig4N_4_ProjectedInundation2050_12InSLR100yrStorm_20161212.mxd User: 29391 Date: 12/12/2016

Source: Aerial Imagery, Bing 2016, San Francisco Public Utilities Commission. 2014. Climate Stressors and Impact: Bayside Sea Level Rise Mapping, Final Technical Memorandum

Seawall Lot 337/Pier 48 Mixed-Use Project,
Case No. 2013.0208E

Figure 4.N-4
Projected Inundation by 2050, with 12 Inches of Sea Level Rise Plus 100-year Storm Surge

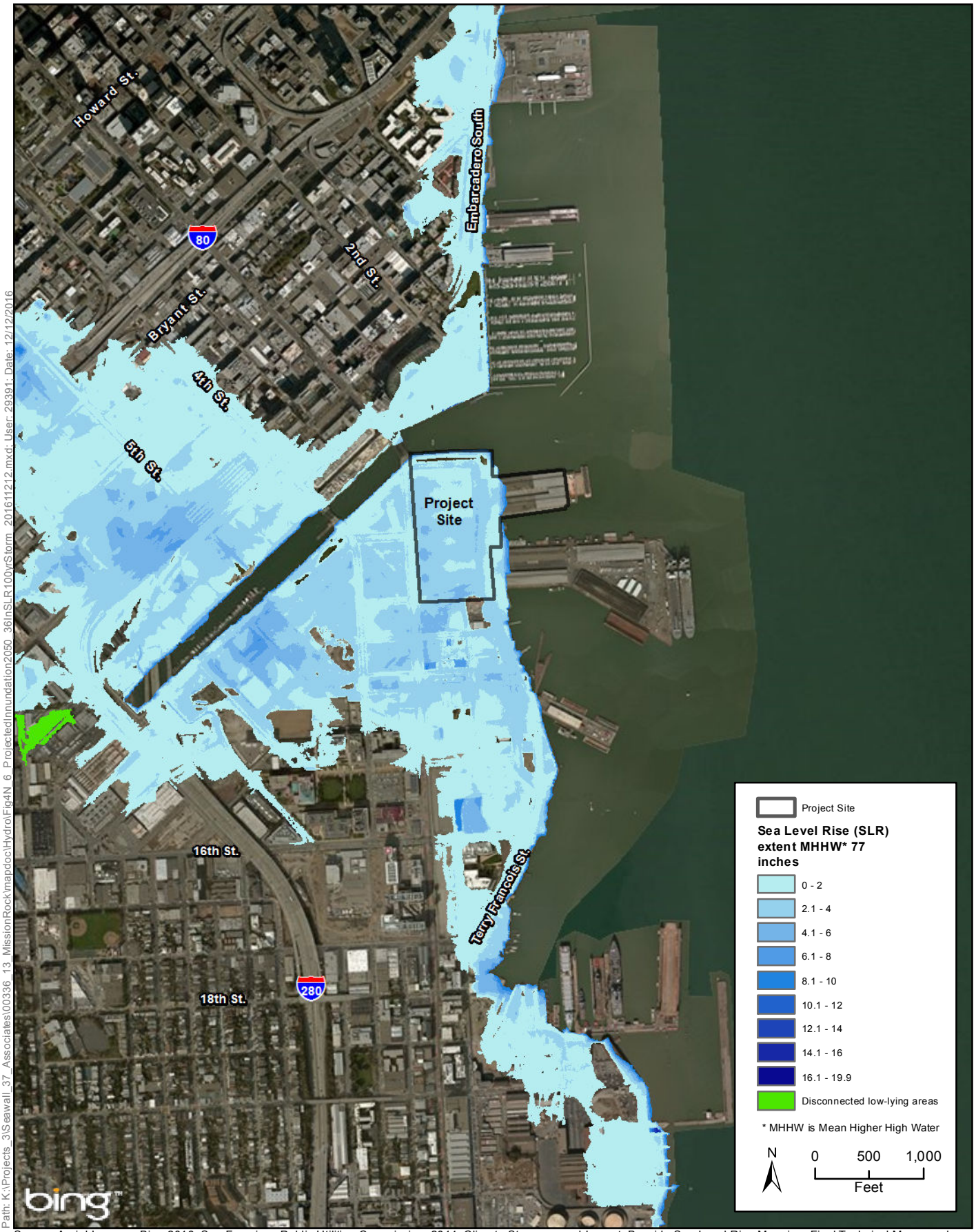


Path: K:\Projects_3\Seawall_37_Associates\00336_13_MissionRock\mapdoc\HydroFig4N_5_ProjectedInundation2050_36inSLR_20161212.mxd; User: 29391; Date: 12/12/2016

Source: Aerial Imagery, Bing 2016, San Francisco Public Utilities Commission. 2014. Climate Stressors and Impact: Bayside Sea Level Rise Mapping, Final Technical Memorandum

Seawall Lot 337/Pier 48 Mixed-Use Project,
Case No. 2013.0208E

Figure 4.N-5
Projected Inundation by 2100, with 36 Inches of Sea Level Rise



Path: K:\Projects_3\Seawall_37_Associates\00336_13_MissionRock\mapdoc\HydroFig4N_6_ProjectedInundation2050_36InSLR100yrStorm_20161212.mxd; User: 29391; Date: 12/12/2016

Source: Aerial Imagery, Bing 2016, San Francisco Public Utilities Commission. 2014. Climate Stressors and Impact: Bayside Sea Level Rise Mapping, Final Technical Memorandum

Seawall Lot 337/Pier 48 Mixed-Use Project,
Case No. 2013.0208E

Figure 4.N-6
Projected Inundation by 2100, with 36 Inches of Sea Level Rise Plus 100-year Storm Surge

PLANNING FOR SEA-LEVEL RISE IN SAN FRANCISCO

The City has convened an inter-agency Climate Adaptation Working Group to identify ways to make sure that it is prepared to adapt to the effects of SLR.[58] Participating agencies include the Department of the Environment, the SFPUC, Planning Department, City Administrator's Office, the Port, San Francisco International Airport (SFO), San Francisco Public Works (SFPW), the San Francisco Municipal Transportation Agency (SFMTA), Department of Public Health, and Department of Recreation and Parks. The working group is focusing its effort on the City's most imminent adaptation concerns, including SLR along Ocean Beach and the shores, flooding from storm surge and extreme rain events, an increased likelihood of extreme heat, and a decreased likelihood of fog that supports local ecosystems, such as redwoods. It is working on ways to improve the existing coastal flood protection infrastructure in time to prevent significant flooding impacts from SLR. The working group will establish requirements to address issues such as proper flood insurance for structures in low-lying areas, flood-resilient construction of new development within inundation areas, and a low-carbon footprint for new development. It is also assessing the use of natural solutions, such as wetlands, to protect the shoreline.

San Francisco Mayor Edwin M. Lee established two interdepartmental committees to manage the City's efforts to address SLR: the SLR Coordinating Committee and the SLR Technical Committee. The SLR Coordinating Committee, established in February 2015, is a director-level committee. It is co-chaired by the Port's Deputy Director of Planning and Development along with a senior planner from the Planning Department. SLR Coordinating Committee members also include the chief resiliency officer and senior staff from the mayor's office, City Administrator's Office, SFO, the Port, the SFPUC, SFMTA, the Department of Building Inspection (DBI), Office of Community Investment and Infrastructure, Office of Economic and Workforce Development, and the Capital Planning Committee. The responsibilities of the SLR Coordinating Committee are as follows:

1. Coordinate the efforts of City departments and advise the mayor's office on policies, strategies, initiatives, and resolutions to deal with and plan for the potential impact on San Francisco from SLR;

2. Coordinate local efforts and initiatives with the work of other governmental entities and various stakeholders at the regional, state, and national levels, such as the U.S. Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development, the Department of the Interior, the California Coastal Commission, the California Ocean Protection Council, and BCDC;

[58] San Francisco Department of the Environment. No date. *Adaptation*. Available: http://www.sfenvironment.org/article/climate-change/adaptation. Accessed: March 4, 2016.

3. Provide guidance and specific recommendations to City departments with regard to land use and strategies to protect assets and communities along the shoreline;
4. Oversee and guide the existing SLR Technical Committee and implementation of the Capital Planning Guidance to address related to vulnerability and risks as well as the adaptability of the City's physical infrastructure; and
5. Promote coordination and collaboration among City departments, private utility providers, and other stakeholders.

The SLR Coordinating Committee is first charged with assessing the city's risk to SLR. Once the data-analysis phase is complete, the SLR Coordinating Committee will coordinate the City's SLR vulnerability assessment and adaptation planning efforts with local, regional, and national governmental and nongovernmental organizations as well as community stakeholders, as needed. Key to this effort will be determining how to best involve the community.

The SLR Technical Committee, established in February 2015, comprises the same agencies that developed the Capital Planning Committee's Sea-Level Rise Guidance, including the SFPUC, the Port, SFPW, SFO, SFMTA, the Capital Planning Committee, and the Planning Department. This committee is charged with assisting all City agencies with consistent implementation of the guidance; revising the guidance, as needed; and assisting the SLR Coordinating Committee, as requested.

GUIDANCE FOR INCORPORATING SEA-LEVEL RISE INTO CAPITAL PLANNING

On September 22, 2014, the City's Capital Planning Committee adopted the Guidance for Incorporating Sea-Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation, which was prepared by the SLR Coordinating Committee.[59] The guidance document has been revised to simplify the analysis of specific SLR scenarios and clarify how to select the appropriate scenario for design and planning purposes. The revised document also provides a methodology for determining the design tide for use in project design and planning. It was adopted by the Capital Planning Committee on December 14, 2015.[60]

[59] City and County of San Francisco Sea-Level Rise Committee. 2014. *Guidance for Incorporating Sea-Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation*. September 14. Available: http://onesanfrancisco.org/wp-content/uploads/San%20Francisco%20SLR%20Guidance%20Adopted%209.22.14%2012182014.pdf. Accessed: March 15, 2016.

[60] City and County of San Francisco Sea-Level Rise Committee. 2015. *Guidance for Incorporating Sea-Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation.* December 14. Available: http://onesanfrancisco.org/wp-content/uploads/Guidance-for-Incorporating-Sea-Level-Rise-into-Capital-Planning1.pdf. Accessed: January 22, 2016.

SAN FRANCISCO SEA-LEVEL RISE ACTION PLAN

In March 2016, the SLR Coordinating Committee released the San Francisco Sea-Level Rise Action Plan, with lead City staffing from the Planning Department and SFPW, along with other City departments and a consultant team.[61] The plan is intended to guide City departments in their understanding of and adaptation to the impacts of SLR; it also identifies what long-term SLR means for San Francisco's residents, visitors, the economy, and the waterfront.

The action plan establishes an overarching vision, goals, and a set of guiding principles for SLR planning; summarizes current climate science, relevant policies and regulations, and vulnerability and risk assessments conducted to date; identifies data gaps and establishes a framework for further assessment, adaptation planning, and implementation; and provides the foundation and guidance to develop the Citywide Sea-Level Rise Adaptation Plan.

The action plan is the first step in the development of the Citywide Sea-Level Rise Adaptation Plan, expected to be complete in 2018, which will incorporate the adaptation strategies identified in the action plan and help prioritize investments to best improve climate resilience while protecting economic and environmental value. The adaptation plan will also identify potential funding sources, governance structures, and implementation timelines.

PLANNING FOR CLIMATE CHANGE UNDER THE SFPUC SEWER SYSTEM IMPROVEMENT PROGRAM

The SFPUC is addressing SLR as part of its Sewer System Improvement Program and conducting a detailed analysis of the potential for new and existing combined sewer infrastructure to be affected by SLR.[62] Accordingly, all new facilities will be built with use of a climate change criterion so that the combined sewer system will be better able to respond to rising sea levels. Rising sea levels and storm surge could inundate the combined sewer system and exacerbate existing flooding that results from backups of the sewer system in some areas of San Francisco. Rising sea levels and storm surge can also cause new flooding. To address these issues, the SFPUC is evaluating alternatives such as the installation of backflow preventers on the combined sewer discharge structures to restrict the intrusion of Bay water into the combined sewer system.

LEVEE OR DAM FAILURE

There are no levees or dams upstream of the project vicinity; therefore, the project site is not vulnerable to inundation by levee or dam failure.

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[61] City and County of San Francisco. 2016. *Sea-Level Rise Action Plan*. March. Available: http://default.sfplanning.org/plans-and-programs/planning-for-the-city/sea-level-rise/160309_SLRAP_Final_ED.pdf.

[62] SFPUC. 2014b. *Bayside Drainage Basin Urban Watershed Opportunities, Final Draft Technical Memorandum*. July.

SEICHE, TSUNAMI, AND MUDFLOWS

In June 2015 the California Emergency Management Agency (CalEMA) released statewide tsunami inundation maps for emergency planning purposes. The specific map for the project area (San Francisco North Quadrangle/San Francisco South Quadrangle) shows the project site within a tsunami run-up area, with potential flooding up to an elevation of about 12.7 feet (NAVD88). The maps point out that this elevation does not have a probability associated with it; the elevation was based on a worst-case scenario seismic event for emergency planning purposes rather than hazard mapping.[63,64] Other, more probabilistic studies, which evaluated the statistical likelihood of specific tsunami events, indicate a 100-year return period tsunami run-up elevation of 8.2 feet (NAVD88) and a 500-year return period tsunami run-up of 11.4 feet (NAVD88).[65]

A tsunami is a series of ocean waves caused by displacement of a large volume of water, typically as a result of an undersea earthquake or landslide. In the open ocean, tsunamis can travel more than 500 miles per hour. However, as tsunami waves reach shallow water, they slow in speed and grow in height. At the shoreline, tsunami waves may range in height from a few inches to more than 30 feet.[66] Seiche occurs in an enclosed or partially enclosed body of water, such as a lake or reservoir. San Francisco Bay is a large, open body of water with no immediate risk of seiche. Therefore, there would be minimal to no risk of damage from a seiche event in the project vicinity.

Large waves can affect people or damage structures along shoreline areas. Waves generated by winds within San Francisco Bay are typically minor but can cause shoreline erosion over time and affect boat launch areas. Larger waves generated in the Pacific Ocean undergo considerable refraction and diffraction upon passing through the Golden Gate, thereby greatly reducing their height by the time they reach the project site.

The project site is relatively flat and outside the potentially affected zones for earthquake-induced or rainfall-induced landslides;[67] therefore, no mudflows or debris slides are expected to occur within the project site.

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[63] California Emergency Management Agency, the University of Southern California, and the California Geological Survey. 2009. *Tsunamic Inundation Map for Emergency Planning*. State of California, City and County of San Francisco. San Francisco North Quadrangle/San Francisco South Quadrangle. June 15.

[64] Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements*. M&N Job No: 7530. November.

[65] Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements*. M&N Job No: 7530. November.

[66] City and County of San Francisco. 2016. *Emergency Response Plan, an Element of the CCSF Emergency Management Program, Tsunami Annex*. August. Available: http://sfdem.org/sites/default/files/Documents/CCSF%20Tsunami%20Annex%20Public%20Version%2020160907.pdf. Accessed: January 30, 2017.

[67] Association of Bay Area Governments. n.d. *Resilience Program Hazard Map.* Available: http://gis.abag.ca.gov/website/Hazards/?hlyr=femaZones. Accessed: September 22, 2015.

REGULATORY FRAMEWORK

The following federal, state, and local regulations are relevant to hydrology and water quality and apply to implementation of the proposed project unless otherwise specified.

The primary federal law for regulating water quality is the federal Clean Water Act (CWA). EPA has delegated enforcement of the CWA in California to the State Water Resources Control Board (State Water Board) and its nine Regional Water Boards. All proposed project activities need to be in compliance with, at a minimum, the CWA, the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act), and the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).

FEDERAL

Clean Water Act. Several sections of the CWA pertain to regulating impacts on waters of the United States. The CWA sections below pertain to the proposed project. The term *waters of the United States* refers to all surface waters, such as all navigable waters and their tributaries; all interstate waters and their tributaries; all wetlands adjacent to these waters; and all impoundments of these waters. EPA is the overarching authority for protecting the quality of waters of the United States. However, the State Water Board administers CWA Sections 303, 401 and 402; USACE has jurisdiction over waters of the United States under CWA Section 404.

Section 303 – Impaired Waters. The State of California adopts water quality standards to protect beneficial uses of waters of the state, as required by Section 303(d) of the CWA and the Porter-Cologne Act. Section 303(d) of the CWA established the TMDL process to guide the application of state water quality standards (refer to the discussion of state water quality standards below). To identify candidate water bodies for TMDL analysis, a list of water quality–limited segments was generated by the State Water Board. These stream or river segments are impaired by the presence of pollutants such as sediment and are more sensitive to disturbance because of this impairment.

In addition to the impaired water body list required by CWA Section 303(d), CWA Section 305(b) requires states to develop a report that assesses statewide surface water quality. Both CWA requirements are addressed through the development of a 303(d)/305(b) Integrated Report, which addresses both an update to the 303(d) list and a 305(b) assessment of statewide water quality. The State Water Board's statewide 2012 California Integrated Report was based on Integrated Reports from each of the nine Regional Water Boards. After approval of the 303(d) list portion of the California Integrated Report by the State Water Board, the 2012 California Integrated Report was approved by EPA on July 30, 2015.

Section 401 – Water Quality Certification. Section 401 of the CWA requires an applicant who pursues a federal permit for conducting an activity that may result in a discharge of a pollutant to obtain Water Quality Certification (or waiver). Water Quality Certification requires the evaluation of water quality considerations associated with dredging or the placement of fill

materials into waters of the United States. Water Quality Certifications are issued by one of the nine geographically separated Regional Water Boards in California. Under the CWA, the Regional Water Board must issue Section 401 Water Quality Certification for a project to be permitted under CWA Section 404.

The proposed project would be required to obtain Water Quality Certification from the San Francisco Bay Regional Water Board because of in-water work, such as pile driving, which is proposed for seismic upgrades at the Pier 48 structure.

Section 402 – National Pollutant Discharge Elimination System. The 1972 amendments to the federal Water Pollution Control Act established the National Pollutant Discharge Elimination System (NPDES) permit program to control discharges of pollutants from point sources. NPDES is the primary federal program that regulates point-source and nonpoint-source discharges to waters of the United States.

The 1987 amendments to the CWA created a new section that was devoted to stormwater permitting (Section 402). EPA has granted the State of California primacy in administering and enforcing the provisions of the CWA and NPDES within state boundaries. NPDES permits are issued by one of the nine Regional Water Boards.

The proposed project is required to comply with both construction and municipal NPDES stormwater requirements. More information is provided in the *State Regulations* section, below.

Section 404 – Dredge/Fill Permitting. The discharge of dredged or fill material into waters of the United States is subject to permitting specified under Title IV (Permits and Licenses) of the CWA and, specifically, Section 404 (Discharges of Dredged or Fill Material) of the CWA. Section 404 of the CWA regulates the placement of fill materials into the waters of the United States. Section 404 permits are administered by USACE.

River and Harbors Act. Section 10 of the Rivers and Harbors Act of 1899 (RHA) prohibits work that affects the course, location, conditions, or capacity of navigable waters of the United States without a permit from USACE. *Navigable waters* under the act are "subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (Title 33 Code of Federal Regulations Section 3294). Section 10 of the RHA requires permits for all structures (such as riprap) and activities (such as dredging or pile driving).

The proposed project would be required to obtain a CWA Section 404 permit and an RHA Section 10 permit from USACE (San Francisco District) because of in-water work, such as pile driving, which is proposed for seismic upgrades at the Pier 48 structure.

National Flood Insurance Program. In response to the increasing cost of disaster relief, Congress passed the National Flood Insurance Act (NFIP) of 1968 and the Flood Disaster Protection Act of 1973. FEMA administers the NFIP to provide subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains. A FIRM is an official FEMA-

prepared map of a community. It is used to delineate both the SFHAs and the flood-risk premium zones that are applicable to the community. As discussed above, the proposed project is not located within a SFHA; therefore, the NFIP does not apply.

STATE

Porter-Cologne Water Quality Control Act. The Porter-Cologne Act was established and implemented by the State Water Board and nine Regional Water Boards. The State Water Board is the primary state agency with responsibility for protecting the quality of the state's surface and groundwater, or *waters of the state*. Waters of the state are defined more broadly than *waters of the United States* (i.e., any surface water or groundwater, including saline waters, within the boundaries of the state). This includes waters in both natural and artificial channels. It also includes surface waters that are not waters of the United States or nonjurisdictional wetlands, which are essentially distinguished by whether they are navigable. If waters are not navigable, they are considered to be isolated and, therefore, fall under the jurisdiction of only the Porter-Cologne Act and not the CWA. The Regional Water Boards are responsible for implementing CWA Sections 303(d), 401, and 402, as mentioned above and described in detail below.

The Porter-Cologne Act authorizes the State Water Board to draft state policies regarding water quality. The act requires projects that are discharging, or proposing to discharge, wastes that could affect the quality of the state's water to file a Report of Waste Discharge (RWD) with the appropriate Regional Water Board. The act also requires the State Water Board or a Regional Water Board to adopt basin plans for the protection of water quality, as described below.

San Francisco Bay Water Quality Control Plan (Basin Plan). San Francisco Bay waters are under the jurisdiction of the San Francisco Bay Regional Water Board, which established regulatory standards and objectives for water quality in San Francisco Bay in its Water Quality Control Plan for the San Francisco Bay Basin, commonly referred to as the Basin Plan. The board is required to develop, adopt (after public hearing), and implement a basin plan for the region. Basin plans are updated and reviewed every 3 years. They provide the technical basis for determining waste discharge requirements (WDRs), taking enforcement actions, and evaluating clean water grant proposals. A basin plan must include (1) a statement of beneficial water uses that the Regional Water Board will protect, (2) the water quality objectives needed to protect the designated beneficial water uses, and (3) strategies to be implemented, with time schedules for achieving the water quality objectives.[68] The San Francisco Bay Basin Plan was last updated in 2015.[69]

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[68] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

[69] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

In basin plans, Regional Water Boards designate beneficial uses for all water body segments in their jurisdictions and then set the criteria necessary to protect these uses. Consequently, the water quality objectives developed for particular water segments are based on the designated use and vary, depending on such use. Each Regional Water Board has region-wide and water body–specific beneficial uses and sets numeric and narrative water quality objectives for several substances and parameters in numerous surface waters in its region. For water bodies that do not have specific beneficial uses or water quality objectives designated in the Basin Plan, the tributary rule[70] applies. Specific objectives for concentrations of chemical constituents are applied to bodies of water according to their designated beneficial uses.[71] In addition, the State Water Board identifies waters that fail to meet standards for specific pollutants, which are then state listed in accordance with CWA Section 303(d), described previously.

The proposed project lies within the jurisdiction of the San Francisco Bay Regional Water Board, which is responsible for protection of the beneficial uses of water resources in San Francisco Bay, from Tomales Bay south to Pescadero Creek, an area that encompasses Alameda, Contra Costa, San Francisco, Santa Clara (north of Morgan Hill), San Mateo, Marin, Sonoma, Napa, and Solano Counties. More information on beneficial uses, water quality objectives, and the 303(d) impairments that apply to the proposed project are provided in the surface water quality discussions in the *Environmental Setting* section.

NPDES General Construction Stormwater Permit. The General NPDES Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ) (Construction General Permit) regulates stormwater discharges related to construction activities. Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that, in total, disturbs 1 or more acres, are required to obtain coverage under the Construction General Permit. The Construction General Permit requires development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must list best management practices (BMPs) that the discharger will use to reduce or eliminate pollutants associated with construction activities in stormwater runoff and document the placement and maintenance of those BMPs. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "nonvisible" pollutants, to be implemented in case of a BMP failure; and a monitoring plan for turbidity and pH for projects

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[70] The "tributary rule" refers to any water body or stream not specifically listed in the Basin Plan that is deemed to have the same beneficial uses and water quality objectives of the listed stream, river, or lake to which they are a tributary.

[71] San Francisco Bay Regional Water Quality Control Board. 2015. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* Last updated: March 2015. Available: http://www.waterboards.ca.gov/rwqcb2/basin_planning.shtml. Accessed: August 31, 2015.

that meet defined risk criteria.[72] The requirements of the SWPPP are based on the construction design specifications detailed in the final design plans of a project and the hydrology and geology of the site expected to be encountered during construction. The local or lead agency requires proof of coverage under the Construction General Permit prior to building permit issuance. The SWPPP is submitted to the State Water Board, and a copy is kept at the jobsite where it is updated during different phases of construction. The SWPPP must be available for inspection and review upon request. The proposed project would involve more than 1 acre of land disturbance; therefore, a NPDES Construction General Permit would be required.

NPDES General Municipal Stormwater Permit. CWA Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4s). Phase I MS4 regulations cover municipalities with more than 100,000 residents, certain industrial processes, or construction activities that disturb an area of 5 acres or more. Phase II "small" MS4 regulations require stormwater management plans to be developed by municipalities with fewer than 100,000 residents and construction activities that disturb 1 or more acres of land. The State Water Board adopted a Statewide Phase II Small MS4 General Permit in 2013 to efficiently regulate discharges from numerous qualifying small MS4s under a single permit. Small MS4s were categorized as either "traditional" or "nontraditional." Traditional MS4s operate throughout a community. Nontraditional MS4s are similar to traditional MS4s but operate at a separate campus facility. Most nontraditional MS4s in California are not designated as having to comply with the Statewide Phase II Small MS4 General Permit, although the State Water Board reserved the right to allow the Regional Water Boards to designate through due process any single nontraditional MS4 if it deemed necessary.

MS4 permits require cities and counties to develop and implement programs and measures, including management practices, control techniques, system design and engineering methods, and other measures, as appropriate, to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible. As part of permit compliance, permit holders have created Stormwater Management Plans (SWMPs) for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. The requirements may include multiple measures to control pollutants in stormwater discharges. During implementation of specific projects under the program, project applicants are required to follow the guidance contained in the SWMPs, as defined by the permit holder in that location.

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[72] State Water Resources Control Board. 2013. *Construction General Permit Stormwater Program*. Last updated: 2013. Available: http://www.swrcb.ca.gov/water_issues/programs/stormwater/constpermits.shtml. Accessed: August 31, 2015.

The State Water Board is advancing low-impact development (LID) in California as a means of complying with municipal stormwater permits. LID incorporates site design, including, among other things, the use of vegetated swales and retention basins and minimizing impermeable surfaces, to manage stormwater and maintain a site's predevelopment runoff rates and volumes.

State Water Board Phase II MS4 Permit. Both the City and County of San Francisco and the Port of San Francisco are considered to be traditional small MS4 permittees under the State Water Board's WDRs for stormwater discharges from small MS4s (NPDES Order No. 2013-001-DWQ; General Permit No. CAS000004). Stormwater infrastructure connected to the Mission Bay separate stormwater system is under the jurisdiction of the SFPUC and covered under the City and County's MS4 Permit. The Port of San Francisco's MS4 Permit covers Port facilities that are not connected to the system operated by the SFPUC.

Traditional small MS4 permittees are required to comply with Section E of the Statewide Phase II MS4 Permit, which specifies requirements for site design measures, LID design standards, a post-construction stormwater management program, and operation and maintenance (O&M) of post-construction stormwater management measures as part of a Post-Construction Stormwater Management Program (Provision E.12).

LID design standards are required to be implemented for all development (or redevelopment) projects that create and/or replace 5,000 square feet (sf) or more of impervious surface. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of an exterior impervious surface area on a site where some past development has occurred. If a redevelopment project increases the impervious surface of an existing development by more than 50 percent, runoff from the entire project, including all existing, new, and/or replaced impervious surfaces, must be included to the extent feasible. If a redevelopment project increases the impervious surface of an existing development by less than 50 percent, only runoff from the new and/or replaced impervious surface of the project must be included.

The Statewide Phase II MS4 Permit specifies criteria for site design measures and stormwater treatment measures. Compliance with stormwater quality regulations would be addressed during the planning and construction phases on a block-by-block basis. The Port coordinates with all Port divisions to ensure that all new projects along the waterfront are reviewed with respect to the applicability of construction and post-construction stormwater controls. All new building permits and leases are reviewed with respect to the applicability of post-construction controls. The water quality analysis sections of all major CEQA documents for projects in Port jurisdiction now consider both construction and post-construction stormwater impacts.[73]

[73] Port of San Francisco. 2003. *Port of San Francisco Storm Water Management Plan 2003–2004.* December. Available: http://www.sfport.com/ftp/uploadedfiles/about_us/divisions/engineering/storm_water/SWMP2003-04.pdf. Accessed: October 27, 2015.

Waste Discharge Requirements for Dewatering and Other Low-threat Discharges to Surface Waters. CWA Section 402 also includes WDRs for dewatering activities. Although small amounts of construction-related dewatering are covered under the Construction General Permit, the San Francisco Bay Regional Water Board has regulations specific to dewatering activities that typically involve reporting and monitoring requirements. If dewatering to storm drains that lead to the San Francisco Bay occurs as part of the project, the contractor is required to comply with San Francisco Bay Regional Water Board dewatering requirements. Because there is potential for groundwater to be contaminated with fuel products during construction at the project site, the project sponsor would be required to comply with the San Francisco Bay Regional Water Board's Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds, Fuel Leaks, and Other Related Wastes (VOC and Fuel General Permit; Order No. R2-2012-0012). In addition, the land use covenants that are in effect over portions of the project site prohibit the use of groundwater as a drinking water source and require any activities that disturb the soil (e.g., excavation and grading) within areas that are subject to the land use covenants to be managed in accordance with applicable regulations. The SFDPH determination that the project complies with the Maher Ordinance is conditioned upon submittal of a Site Management Plan, including health and safety measures, to SFDPH prior to beginning any soil-disturbing activities at the project site.[74]

California Department of Pesticides Regulation. The California Department of Pesticides Regulation (DPR) is the lead agency for regulating the registration, sale, and use of pesticides in California. It is required by law to protect the environment, including surface waters, from adverse effects of pesticides by prohibiting, regulating, or controlling the uses of such pesticides. DPR has both a Surface Water and Groundwater Protection Program that address sources of pesticide residue in surface waters and preventive and response components that reduce the presence of pesticides in surface and groundwaters. The preventive component ranges from local outreach to the promotion of management practices to reduce pesticide runoff and prevent continued movement to groundwater in contaminated areas. To protect water from the adverse effects of pesticides, DPR and the State Water Board signed a Management Agency Agreement (MAA). The intent of the MAA and its companion document, California Pesticide Management Plan for Water Quality, is to coordinate interaction, facilitate communication, promote problem solving, and ultimately ensure the protection of water quality. The operation and maintenance of landscaped areas and lawns may require the use of pesticides; however, landscaping would be required to comply with DPR regulations. San Francisco has adopted local regulations that require use of Integrated Pest Management practices, as discussed below.

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[74] Department of Toxic Substances Control. 2002. *Hazardous Soils Report – Covenant to Restrict Use of Property Environmental Restriction, H&H Site located at China Basin Channel and Terry A. Francois Boulevard, City and County of San Francisco*.

Surface and Submerged Lands Lease Agreement. The California State Lands Commission (CSLC) has exclusive jurisdiction over all of California's tidelands and submerged lands as well as the beds of naturally navigable rivers and lakes, sovereign lands, swamp and overflow lands, and state school lands (proprietary lands). CSLC has statutory authority (Division 6 of the California Resources Code) to approve appropriate uses for public property rights within these sovereign lands, such as water-borne commerce, navigation, fisheries, open space, recreation, or other recognized public trust purposes.

CSLC management responsibilities include activities within submerged lands (from the mean high-tide line) as well as activities within an area 3 nautical miles offshore. These activities include oil and gas development, harbor development and management oversight, construction and operation of offshore pipelines or other facilities, dredging, reclamation, use of filled sovereign lands, topographical and geological studies, and other activities that occur on these lands. CSLC also surveys and maintains the title records of all state sovereign lands and settles issues regarding title and jurisdiction.

The proposed project would be replacing piles within CSLC jurisdiction for the purposes of changing some of the land uses and redeveloping and seismically upgrading Pier 48. Therefore, authorization from CSLC would be required for implementation of the pile-driving/removal component of the proposed project.

Inland Surface Waters, Enclosed Bays, and Estuaries Plan. On April 7, 2015, the State Water Board adopted an amendment to the Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Referred to as the "Trash Amendment," this amendment prohibits the presence of trash in inland surface waters, enclosed bays, estuaries, and along shorelines in amounts that adversely affect beneficial uses or cause nuisance. Compliance with this prohibition is achieved through compliance with NPDES permit limitations, WDRs, and waivers. Discharges that are not subject to these regulatory requirements are also required to comply.

MS4 permittees with authority over priority land uses that would be developed under the proposed project[75] are required to comply with the discharge prohibitions. Compliance may be achieved using a full capture system for all storm drains (Track 1) or a combination of full capture systems, multi-benefit projects, other treatment controls, and institutional controls (Track 2). These Track 2 measures must achieve a level of control equivalent to full capture under Track 1. The amendment requires that MS4 permits are modified or reissued to address this amendment within 18 months of adoption of the amendment.

[75] Under the Trash Amendment, priority land uses include high-density residential areas with at least 10 developed dwelling units per acre. Commercial uses and mixed urban developments with high-density residential and commercial land uses are also considered priority land uses.

The Trash Amendment also requires that trash is eliminated from all stormwater and nonstormwater discharges from construction activities regulated under the Construction General Stormwater Permit. If this is not economically feasible, dischargers must meet the requirements of Track 1 or Track 2, which are described above.

Existing NPDES permits must be modified or reissued to include the requirements of the Trash Amendment within 18 months of adoption of the amendment. Permittees must submit an implementation plan within 3 months of adoption of the implementing permit.

MS4 permittees must achieve full compliance with the requirements of the Trash Amendment within 10 years of the effective date of the first implementing permit and must achieve interim milestones during the first 10 years to show progress toward achieving full implementation.

REGIONAL AND LOCAL

Bay Conservation and Development Commission. The BCDC has permitting authority for most projects in San Francisco Bay and along the shoreline, which is defined in the McAteer-Petris Act to include Bay waters up to the mean high-water line and the area 100 feet landward of and parallel to the mean high-water line of San Francisco Bay. Under the McAteer-Petris Act, an agency or individual must secure a permit from BCDC if it proposes to place fill, dredged sediment, or dredged materials in San Francisco Bay or certain tributaries within BCDC jurisdiction. Most activities within the 100-foot shoreline band are also subject to a permit from the BCDC. The type of permit issued depends on the nature and scope of the proposed activities. Construction of those elements of the project within BCDC's jurisdiction would require a Major Permit under the McAteer-Petris Act.

San Francisco Waterfront Special Area Plan. BCDC completed and adopted the Bay Plan in 1968. The plan has been periodically amended since its adoption, most recently in 2011, to address climate change and shoreline protection. In 1975, after a collaborative planning process with the San Francisco Planning Department, BCDC adopted the San Francisco Waterfront Special Area Plan (Special Area Plan). The Special Area Plan was substantially amended in 2000. This plan, together with the McAteer-Petris Act and the Bay Plan, as well as subsequent amendments to all three documents, prescribes a set of rules for shoreline development along the San Francisco waterfront. Several policies of the Bay Plan are aimed at protecting San Francisco Bay's water quality, ensuring the safety of fills, and guiding dredging of the Bay's sediment.

San Francisco Public Utilities Commission and Port of San Francisco Stormwater Management Plans. San Francisco has obtained coverage under the updated Phase II General MS4 Permit for separate storm sewer systems under its jurisdiction, which includes the Port of San Francisco, Hunters Point Shipyard, Mission Bay, Treasure Island, Candlestick Point, and areas that discharge to inland receiving waters, such as Lake Merced. Ownership of the separate storm sewer system within San Francisco is divided between the

Port of San Francisco for areas along the city waterfront and SFPUC for all other areas within the city. Both the SFPUC and the Port are permittees that manage different portions of the San Francisco separate MS4 system and, therefore, have two different SWMPs. As a result, there are separate SWMPs for each jurisdiction (i.e., one SWMP that covers areas of the city that are under the jurisdiction of the Port[76] and another SWMP, produced by the SFPUC, that covers non-Port areas of San Francisco).[77] Portions of the project area, such as the existing 12-inch outfall at China Basin Park and the existing 30-inch outfall to the Bay in between Piers 48 and 50, are under Port jurisdiction; however, Seawall Lot 337 connects to Third Street and stormwater conveyed to the Mission Bay separated system is under SFPUC jurisdiction.

San Francisco Public Works Code Article 4.2 – Sewer System Management. In April 2010, San Francisco passed an ordinance (San Francisco Public Works Code, Article 4.2, Section 147–147.6) that requires stormwater controls to be implemented for development projects that discharge stormwater to either the combined sewer system or a separate stormwater system. If a large project creates and/or replaces 5,000 sf or more of impervious surface, it would be subject to San Francisco's stormwater management requirements, as outlined in the Stormwater Management Ordinance and the San Francisco Stormwater Management Requirements and Design Guidelines (SMR).[78]

Projects that trigger stormwater management requirements must prepare a Stormwater Control Plan, demonstrating project adherence to the performance measures outlined in the SMR, including a reduction in the total volume and peak flow rate of stormwater in areas with combined sewer systems or capture and treatment of the 90th percentile, 24-hour storm in areas with separate sewer systems. Responsibility for review and approval of the Stormwater Control Plan lies with the SFPUC, Wastewater Enterprise, Urban Watershed Management Program, as well as the Port, depending on the jurisdiction. Without SFPUC or Port approval of a Stormwater Control Plan, no site or building permits can be issued. The Stormwater Control Plan will be submitted to either SFPUC or the Port, or both, as required.

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[76] Port of San Francisco. 2003. *Port of San Francisco Stormwater Management Plan 2003–2004.* December. Available: http://www.sfport.com/ftp/uploadedfiles/about_us/divisions/engineering/storm_water/SWMP2003-04.pdf. Accessed: October 27, 2015.

[77] San Francisco Public Utilities Commission. 2004. *San Francisco Public Utilities Commission Stormwater Management Plan 2003–2004.* City and County of San Francisco. January. Available: http://www.waterboards.ca.gov/water_issues/programs/stormwater/swmp/sfpuc_swmp.pdf. Accessed: October 27, 2015.

[78] San Francisco Public Utilities Commission. 2016. *San Francisco Stormwater Management Requirements and Design Guidelines.* City and County of San Francisco. May. Available: http://sfwater.org/modules/showdocument.aspx?documentid=9025. Accessed: September 19, 2016.

The SFPUC and the Port developed the SMR[79] in accordance with the requirements of the NPDES Phase II General MS4 Permit and San Francisco's Stormwater Ordinance to govern post-construction stormwater runoff. The 2016 SMR updated the former Stormwater Design Guidelines to include new requirements, based on modifications to the Phase II General MS4 Permit. The SMR requires compliance with specified stormwater management requirements and provides tools to help project developers achieve compliance. The SMR also requires a signed maintenance agreement and Certification of Acceptable Construction to ensure construction and proper care of the necessary stormwater controls. A project's environmental evaluation should generally assess how and where the implementation of necessary stormwater controls would reduce the potential negative impacts of stormwater runoff.

The proposed project would involve creation and/or replacement of 5,000 sf or more of impervious surface and, therefore, would be subject to San Francisco's stormwater management requirements, as outlined in the Stormwater Management Ordinance and the corresponding SMR. BMPs must be implemented to improve the quality of stormwater before going into the separate stormwater system. For covered projects within SFPUC jurisdiction, the stormwater management approach must manage the 90th percentile, 24-hour storm. As a result, downstream water pollution would be reduced or eliminated by reducing impervious cover, eliminating sources of contaminants, and treating pollutants in stormwater runoff or increasing onsite infiltration. For areas that are within the Port's jurisdiction, the SMR would require projects to capture and treat the stormwater volume for the 85th percentile, 24-hour storm.

Green Building Standards – Stormwater Management. The Port of San Francisco Green Building Standards Code includes stormwater management requirements. The Port of San Francisco building codes became effective in January 2017 and are included as Chapter 1A of the Port of San Francisco Building Code (Section 106A.3.2.4). Sections 4.103.1.2 and 4.103.2.4 of the Port's Building Standards Code describes stormwater management requirements. The City also requires new projects, larger than 250,000 gross square feet, to use onsite "alternate sources" of graywater, rainwater, and foundation water to meet the project's nonpotable demands under Ordinance No. 109-15. Alternate water sources are discussed further in Section 4.K, *Utilities and Service Systems*.

San Francisco Construction Site Runoff Ordinance. To reduce the discharge of pollution to the local storm drain system, the City adopted the Construction Site Runoff Ordinance in 2013. SFPUC manages the Construction Site Runoff Control Program to ensure that all construction sites implement BMPs to control construction site runoff. To help construction professionals

[79] San Francisco Public Utilities Commission. 2016. *San Francisco Stormwater Management Requirements and Design Guidelines.* City and County of San Francisco. May. Available: http://sfwater.org/modules/showdocument.aspx?documentid=9025. Accessed: September 19, 2016.

comply with the requirements, SFPUC developed a construction BMPs handbook.[80] Construction activity within the city that disturbs 5,000 sf or more of ground surface must also submit an Erosion and Sediment Control Plan (ESCP) and an application for a Construction Site Runoff Control Permit prior to commencing construction-related activities. An ESCP is a site-specific plan that details the use, location, and emplacement of sediment and erosion control devices.

San Francisco Batch Wastewater Discharges Permit. Provisions of San Francisco Public Works Code, Article 4.1 (hereinafter referred to as the Sewer Use Ordinance, or SUO), specify pollutant limitations for the discharge of wastewater into the City's sewerage collection system on a temporary basis. Such temporary, or "batch," discharges may result from dewatering construction sites, drilling wells to investigate or mitigate a contaminated site, using water for cleaning or hydrostatic testing of pipes or tanks, or conducting any other activity that generates wastewater, other than routine commercial or industrial processes. If the dewatered water is discharged to the city's combined sewer system, a batch wastewater discharges permit will need to be obtained.

Soil Boring and Well Regulations. If wells are to be used for groundwater dewatering during construction, well use would need to be approved by the San Francisco Department of Public Health, SFPUC, and DTSC. The project would be required to comply with San Francisco's Soil Boring and Well Regulation Ordinance, adopted as Article 12B of the San Francisco Health Code. The use of a groundwater well may affect the beneficial uses of San Francisco's aquifers and, therefore, is required to be reviewed and approved by the San Francisco Department of Public Health and the SFPUC.

San Francisco Maher Ordinance. Properties with potential subsurface chemical contamination that require a grading or building permit may be regulated under the San Francisco Maher Ordinance, Article 22A of the San Francisco Health Code and Article 106A.3.4.2 of the San Francisco Building Code. The Maher Ordinance covers areas with current or historical industrial use or zoning; areas within 100 feet of current or historical underground tanks; former filled Bay, marsh, or creek areas; and areas within 150 feet of a current or former elevated highway.

According to the Expanded Maher Area Map (March 2015), the project site is located within a Maher Area. Compliance with the Maher Ordinance is discussed further in Section 4.O, *Hazards and Hazardous Materials*.

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[80] San Francisco Public Utilities Commission. 2013. *San Francisco Public Utilities Commission Construction Best Management Practices Handbook*. August. Available: http://sfwater.org/modules/showdocument.aspx?documentid=4282. Accessed: October 27, 2015.

San Francisco Integrated Pest Management (IPM) Ordinance. All property leased from the City, including Port land, is subject to the City's IPM Ordinance. The IPM Ordinance requires use of IPM practices, mandates that pesticides be used as a last report, and limits the types of pesticides and conditions under which they can be used.

San Francisco Floodplain Management Ordinance. In 2008, the City adopted the Floodplain Management Ordinance in order to meet the requirements of the NFIP. The ordinance was amended for the floodplain management program established by Chapter 2A, Article XX, Sections 2A.280–2A.285 of the San Francisco Administrative Code, providing requirements for designating floodplains and construction and development in floodplains. The Floodplain Management Ordinance requires new or substantially improved structures in designated flood hazard areas to be protected against flood damage and prohibits uses that would increase flood risks. In areas that have been delineated on the City's Interim Floodplain Map, the ordinance incorporates standards for construction, such as a requirement to elevate new structures above flood elevations, and requires the first floor of structures in flood zones to be constructed above the floodplain or flood-proofed, as set forth in the San Francisco Building Code. The code also requires that subdivision proposals in flood-prone areas be reviewed to ensure that all proposals are consistent with requirements 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; and adequate drainage is provided to reduce exposure to flood hazards. The floodplain management ordinance applies only to areas in the existing 100-year flood zone. The project site is not located within a 100-year floodplain, according to the City's Interim Floodplain Map, as illustrated in Figure 4.N-2, page 4.N-14.

San Francisco General Plan. The following objectives and policies within the Environmental Protection Element of the General Plan are relevant to the proposed project:

- 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 1.3: Restore and replenish the supply of natural resources.
- Policy 1.4: Assure that all new development meets strict environmental quality standards and recognizes human needs.
- Objective 3: Bay, Ocean, and Shorelines – Maintain and improve the quality of the bay, ocean, and shoreline areas.

The following policies and actions from the Recreation and Open Space Element of the General Plan pertain to the proposed project:

- Policy 2.4: Support the development of signature public open spaces along the shoreline.
- Policy 3.2: Establish and implement a network of green connections that increase access to parks, open spaces, and the waterfront.
- Policy 3.3: Develop and enhance the city's recreational trail system, linking to the regional hiking and biking trail system and considering restoring historic water courses to improve stormwater management.
- Policy 4.4: Include environmentally sustainable practices in construction, renovation, management, and maintenance of open space and recreation facilities.

The following policies and actions from the Community Safety Element of the General Plan pertain to the proposed project:

- Policy 1.9: Mitigate and assess the risk of flooding in San Francisco by incorporating the Flood Insurance Rate Map for San Francisco and related programs from this map to mitigate against flood risks.
- Policy 1.10: Examine the risk of flooding due to climate change–related effects, such as storm surges, changes in precipitation patterns, and SLR, as well as adaptation actions that will reduce population, built environment, and ecosystem vulnerability due to these threats.
- Policy 1.11: Continue to promote green stormwater management techniques.

ENVIRONMENTAL IMPACTS

This section describes the impact analysis related to hydrology and water quality for the proposed project. It describes the methods used to determine the impacts of the proposed project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany the discussion of each identified significant impact.

SIGNIFICANCE CRITERIA

The proposed project would be considered to have a significant effect if it would result in any of the conditions listed below.

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion of siltation onsite or offsite.
- 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 onsite or offsite.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality.
- Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other authoritative flood hazard delineation map.
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow.

METHODS FOR ANALYSIS

All project elements were analyzed by comparing baseline conditions, as described in the *Environmental Setting*, to conditions during construction and/or operation of the proposed project. The analysis focused on issues related to surface hydrology, flood hazards, groundwater supply, and surface and groundwater quality. The key construction-related impacts were identified and evaluated qualitatively, based on the physical characteristics of the project site and the magnitude, intensity, location, and duration of activities.

Surface Water Hydrology. The surface water hydrology impact analysis considered potential changes in the physical characteristics of water bodies, impervious surfaces, and drainage patterns throughout the project area as a result of project implementation.

Groundwater Hydrology. Impacts on groundwater supply and recharge were assessed by comparing existing groundwater use and recharge capabilities with project conditions. Recharge is determined by the ability of water to infiltrate into the soil.

Water Quality. Impacts of the proposed project on surface water and groundwater quality were analyzed by comparing existing water quality conditions and potential project water quality conditions. Potential project-related sources of water contaminants generated by industrial and project operational activities, such as vehicle use, building maintenance, pesticide use, trash generation, and the storage or inadvertent release of hazardous materials during project construction, are considered. The potential for water quality objectives to be exceeded and beneficial uses to be compromised is also considered.

Flooding. As discussed in the *Environmental Setting* section, above, the project site is not located within an existing 100-year flood hazard area. Under existing conditions, even 12 inches of SLR plus the 100-year storm surge would cause significant inundation over half of the site. However, after the proposed grading for the project, none of the structures would be in a flood zone, even in 2100 and the highest estimate of SLR of 66 inches.

Under the City's Initial Study Checklist, a project could have a significant impact if it would:

- Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows; or
- 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.

Based on these criteria, the Planning Department considers whether projects located in areas that are prone to flooding, under existing conditions or future conditions with projected SLR, would expose people or structures to significant risks due to flooding. However, in the *California Building Industry Association v. Bay Area Air Quality Management District* case that was decided in 2015, the California Supreme Court held that CEQA does not *generally* require lead agencies to consider how existing hazards or conditions might affect a project's users or residents, except where the project would exacerbate an existing environmental hazard.[81] Accordingly, hazards resulting from a project that places development in an existing or future flood hazard area are not considered impacts under CEQA unless the project would exacerbate the flood hazard. Thus, the analysis below evaluates whether the proposed project would exacerbate existing or future flood hazards in the project area, resulting in a substantial risk of loss injury or death. The impact would be considered significant if the proposed project were to exacerbate future flood hazards by increasing the frequency or severity of flooding or cause flooding to occur in an area that would not be subject to flooding without the project.

The proposed project could exacerbate the anticipated future flood hazards in the project area if it were to increase the frequency or severity of flooding or cause flooding to occur in an area that would not be subject to flooding without the project.

LAND USE ASSUMPTIONS

As described in Chapter 2, *Project Description*, this Draft EIR analyzes two land use assumptions: High Commercial and High Residential. These assumptions represent the full range of land uses and the building program floor area that could be developed on the

[81] *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369.

project site under the proposed flexible zoning for Blocks H, I, and J. Although the land use mix between High Commercial and High Residential would differ, the two assumptions would have similar total square footage, building configuration (with the exception of building height on Blocks H, I, and J), and construction characteristics. Building footprints and excavation depths and volumes would be the same under the two land use assumptions. Therefore, the differences between the two assumptions would not result in any meaningful difference in potential impacts on hydrology and water quality. As such, the following analysis applies to both the High Commercial and High Residential land use assumptions.

TOPICS NOT EVALUATED IN DETAIL

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. There are no major reservoirs or levees located upstream of the project site. Because there are no major reservoirs or levees upstream of the project site, there would be no exposure of people or structures to flood impacts as a result of dam or levee failure.

Remaining topics for which impact conclusions are reached because construction or operation of the project has the potential to exacerbate site conditions are addressed under Impacts HY-1, violate water quality standards or degrade water quality; HY-2, affect groundwater supplies or recharge; HY-3, alter existing drainage, resulting in erosion or siltation; HY-4, alter existing drainage, resulting in flooding; HY-5, create or contribute to runoff, HY-6 and HY-7, place housing or structures in 100-year flood hazard area or an area affected by flooding due to SLR; and HY-8, result in flooding from tsunami or seiche inundation.

IMPACTS AND MITIGATION MEASURES

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

CONSTRUCTION

LAND-BASED ACTIVITIES

Implementation of the proposed project would include construction activities, such as asphalt demolition, rough grading and excavation, new building construction, rehabilitation of existing facilities (Pier 48 and associated aprons), paving, and landscaping. Proposed seismic upgrades on the Pier 48 aprons could include demolition, removal of the current asphalt surface, new asphalt or concrete placed on rebuilt surfaces, wood decking, wood framing, and the replacement of deteriorated wood piles where needed. The replacement of existing piles would

be part of Pier 48 rehabilitation, which would involve removal of 675 existing and installation of approximately 106 new piles. Potential impacts related to this component of the proposed project are discussed further below.

Land-disturbing activities and the placement of stockpiles in proximity to storm drain inlets or nearby surface waters may result in a temporary increase in sediment loads in San Francisco Bay. Pollutants, such as nutrients, trace metals, and hydrocarbons attached to sediment, can be transported with sediment to downstream locations and degrade water quality. The delivery, handling, and storage of construction materials and wastes (e.g., concrete debris), as well as the use of heavy construction equipment, could also result in stormwater contamination, thereby affecting water quality. Construction activities may involve the use of chemicals and operation of heavy equipment, which could result in accidental spills of hazardous materials (e.g., fuel and oil) during construction activities. Such spills could enter the groundwater aquifer or nearby surface water bodies from runoff or storm drains. Constituents in fuel, oil, and grease can be acutely toxic to aquatic organisms and/or bioaccumulate in the environment.

All project construction activities would be subject to existing regulatory requirements. Because the area of land disturbance for the proposed project would be more than 1 acre, coverage under the Construction General Permit would be required. The Construction General Permit contains standards to ensure that water quality is not degraded.[82] As part of compliance with the Construction General Permit, standard erosion and sediment control measures and other housekeeping BMPs, such as vehicle and equipment maintenance, material delivery and storage, and solid waste management, would be identified in the SWPPP. These measures would be implemented during construction to reduce contamination and sedimentation in waterways. As a performance standard, BMPs included in the SWPPP would represent the best available technology that is economically achievable and the best conventional pollutant control technology to reduce pollutants. Commonly practiced BMPs consist of a wide variety of measures that can be implemented to reduce pollutants in stormwater and other nonpoint-source runoff. Permittees would also have to comply with the appropriate water quality objectives for the region.

Other measures in the SWPPP would include a range of stormwater control BMPs (e.g., installing silt fences, staked straw wattles, or geofabric to prevent silt runoff to storm drains or waterways). Topsoil and backfill would be stockpiled, protected, and replaced at the conclusion of construction activities. Disturbed soil would be revegetated as soon as possible with the appropriate selection and schedule for turf, plants, and other landscape vegetation.

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[82] State Water Resources Control Board. 2013. *Construction General Permit Stormwater Program*. Last updated: 2013. Available: http://www.swrcb.ca.gov/water_issues/programs/stormwater/constpermits.shtml. Accessed: August 31, 2015.

Construction Dewatering. Construction dewatering in areas of shallow groundwater may be required during excavation activities, which could result in the exposure of pollutants from spills or other activities and may contaminate groundwater. For water to be discharged to the Bay, the contractor would need to notify the San Francisco Bay Regional Water Board and comply with the board's requirements related to the quality of water and discharges. The Construction General Permit includes dewatering activities as authorized nonstormwater discharges, provided that dischargers prove the quality of water to be adequate and not likely to affect beneficial uses. However, there would be requirements in addition to those outlined in the Construction General Permit, including compliance with discharge sampling, monitoring, and reporting requirements, and compliance with the Monitoring and Reporting Program requirements of the VOC and Fuel General Permit (Order No. R2-2012-0012) as well as other approvals by DTSC if contaminated groundwater is encountered. Compliance with WDRs require confirmation that discharges would not require the construction or expansion of existing facilities and also include regulations specific to dewatering activities. If it is found that the groundwater does not meet water quality standards, it must either be treated as necessary prior to discharge so that all applicable water quality objectives (as designated in the Basin Plan) are met or hauled offsite for treatment and disposal at an appropriate waste treatment facility that is permitted to receive such water.

If wells are to be used for groundwater dewatering during construction, the project would be required to comply with San Francisco's Soil Boring and Well Regulation Ordinance, adopted as Article 12B of the San Francisco Health Code. Compliance with WDRs and other dewatering and groundwater regulations will ensure no violations of any water quality standards or WDRs.

Groundwater. Construction activities could result in short-term surface and groundwater quality impacts associated with the input of sediment loads that exceed water quality objectives or chemical spills into storm drains or groundwater aquifers if proper minimization measures are not implemented. However, the proposed project would be required to comply with the Construction General Permit as well as local stormwater and construction site runoff ordinances. These requirements involve development and implementation of a Construction General Permit SWPPP, an ESCP, and a Stormwater Control Plan specific to the project site to minimize water quality impacts related to spills or other activities that could contaminate groundwater. The plans would be developed according to the guidance provided in documents such as the SFPUC SMR and construction BMP handbook.[83] In addition, the proposed project would be required to comply with hazardous material requirements, such as the San Francisco Maher Ordinance for soil and groundwater contamination and

[83] California Stormwater Quality Association. 2015. *Construction BMP Handbook*. Available: https://www.casqa.org/resources/bmp-handbooks/construction. Accessed: April 17, 2017.

Spill Response and Countermeasure Plan (SPCC) requirements, as necessary. More information on hazardous material requirements is provided in Section 4.O, *Hazards and Hazardous Materials*. Compliance with WDRs and dewatering regulations will ensure that dewatering activities are monitored and treated as required and that no violations of any water quality standards or waste discharge requirements occur. Because the project would be required to comply with the regulatory controls described above, potential water quality impacts associated with construction activities and degradation of stormwater runoff would be ***less than significant***.

IN-WATER ACTIVITIES

In-water activities under the proposed project would include the removal of an existing deck and existing creosote-treated timber piles and the installation of both new precast concrete piles and steel-cased concrete-filled piles. Under the proposed project, demolition of the existing perimeter deck would include extracting approximately 675 24-inch rounded creosote-treated timber piles with a vibratory extractor. These piles would be replaced with the installation of 62 new precast concrete piles and 44 new cylindrical, steel-cased concrete-filled piles. The precast concrete piles would be installed using an impact hammer, and the steel-cased piles would be installed with a vibratory driver, located below the proposed reinforced concrete apron.

It is anticipated that the pier deck would be removed first by saw cutting the slab and breaking it up, then catching it in netting or on platforms below. Once the piles are exposed (with the deck portion removed or cut to access piles, if necessary), they would be pulled out of the Bay sediment with use of a barge-mounted crane that would support a vibratory extractor. Rigging straps would be secured to a pile, then the crane would apply a large and steady upward force to dislodge the pile. If the pile cannot be pulled out or breaks, it would be cut approximately 3 feet below the mudline.

The steel shells would be installed using a vibratory driver to provide the appropriate embedment into the dense sand-bearing stratum underlying the Bay Mud layer. The concrete piles would be installed with an impact hammer. Construction work schedules, noise attenuation measures, and other requirements to prevent project construction from affecting aquatic species or habitats are discussed in Section 4.L, *Biological Resources*.

Suspended sediments in the water column can lower levels of dissolved oxygen, increase salinity, increase concentrations of suspended solids, and possibly release chemicals present in sediments into the water. The degree of turbidity resulting from the suspended sediments would vary substantially with the quantity and duration of the construction activity. This would also depend on the methods used, the quality of equipment, and the care of the operator. In all cases, increased turbidity levels would be relatively short in duration and generally confined to within a few hundred yards of the activity. After initial resuspension of sediment,

dispersion would occur, and background levels would be restored within a short time frame. Normal circulation and tidal effects in the Bay would generally disperse and dilute the water that was temporarily affected by construction activities.

Historic pilings along the waterfront, including those that support Pier 48, are typically constructed of wood that has been treated with creosote. Creosote-treated wood is no longer permitted for use in structures on the Bay because of the toxicity to marine organisms. Temporary water quality effects could occur during removal because of resuspension of sediments that contain organic compounds and the debris that could be produced during removal. These in-water construction activities would result in short-term disturbance of localized Bay sediments and temporary impacts on water quality. Although the removal of creosote pilings may release some organic substances, the replacement pilings would be made of steel and concrete and would therefore be nontoxic, resulting in long-term improvement in water quality. Water quality may be temporarily affected by the disturbance of bottom sediments in the project area, but elevated levels of turbidity are expected to be minor, localized, and short-term.

Construction activities within the Bay would be subject to the requirements of a Section 10 permit from USACE, which would receive Water Quality Certification from the Regional Water Board and require a Major Permit from BCDC. As part of the Section 10 permitting, the Regional Water Board would conduct formal consultations with the National Marine Fisheries Service and California Department of Fish and Wildlife for the protection of biological resources (see Section 4.L, *Biological Resources*). The permits would specify BMPs and require preparation and implementation of plans for the protection of water quality (e.g., a Debris Management Plan; a Spill Resource and Countermeasure Plan; equipment fueling requirements to require proper fuel transfer procedures; equipment maintenance requirements to minimize fuel leaks and spills; a Materials Management Disposal Plan; barge mooring requirements to capture construction debris; measures to avoid cement, concrete, and saw water from entering the San Francisco Bay; and measures to ensure proper disposal of construction material).

The limited extent and temporary nature of construction activities in the Bay, as well as implementation of water quality control measures as part of compliance with permit requirements, would ensure that water quality standards would be achieved, including the water quality objectives that protect designated beneficial uses, as defined in the Basin Plan. Therefore, water quality impacts related to construction activities in the Bay would be ***less than significant***.

In summary, potential water quality impacts associated with construction activities (including both stormwater quality degradation and degradation of Bay water quality due to resuspension of sediment) would be ***less than significant***.

OPERATION AND MAINTENANCE

The project would involve operation and maintenance of residential, commercial, and active/retail uses, along with associated structured parking, open space and public parks, and landscaping. In addition, the existing Pier 48 would be rehabilitated for a range of uses, including industrial/manufacturing (specifically analyzed as a proposed brewery use), retail, restaurant, exhibition space/museum, and event-related uses. The proposed project would provide public access on the aprons and Channel Wharf, with the potential for expanded maritime uses for recreational/boat launch and other Port maritime tenants. These land uses and operational activities could increase existing or generate new levels of potential pollutants of concern within the project area, such as trash, sediments, pesticides, bacteria, nutrients, metals, oils, and other toxins. These pollutants could reach surface waters in the vicinity through storm drains or direct discharge into China Basin or Lower San Francisco Bay.

Operation and maintenance activities under the proposed project would generate pollutants of concern from landscape maintenance, building maintenance, the storage of materials and substances, maritime operations, and vehicle use. In addition, restaurant uses can result in additional pollutants, such as organic materials (food waste) and oil and grease. However, good housekeeping practices, such as regular trash collection and sweeping, would continue to be implemented onsite.

Runoff from impervious surfaces could contain nonpoint pollution sources that are typical of urban settings. These are normally associated with automobiles, trash, cleaning solutions, and landscaped areas. Stormwater would be drained by new pipes, drainage inlets, and other storm drain facilities, which would be connected to the existing storm drain system that serves the site (Figure 4.N-7, page 4.N-53). All flows from the project site would discharge to new and existing storm drainage facilities and then to the Bay.

For areas that drain directly to Lower San Francisco Bay, the proposed project would be required to comply with San Francisco's stormwater management requirements, as outlined in the Stormwater Management Ordinance and the corresponding SMR, because it would involve creation and/or replacement of 5,000 sf or more of impervious surface. The stormwater management measures at Seawall Lot 337 would utilize LID techniques, such as green roofs, pervious pavements, rain gardens or bio-retention areas, and flow-through planters, to reduce pollutant discharges. These LID features would treat stormwater runoff through biological uptake. Plant materials filter pollutants through their sandy loam substrate while aesthetically enhancing landscape designs. Stormwater management measures would be designed according to the SMR.

The project would comply with the City's SMR for collection and treatment of stormwater prior to discharging to storm drain infrastructure maintained by either the SFPUC or the Port. Both of these jurisdictions control portions of the project site. The project would comply with the SMR

sizing criteria applicable to the jurisdiction responsible for the specific drainage area within the site. Stormwater management performance requirements are based on the available sewer system as well as the jurisdiction of the sewer system. The SFPUC and Port requirements from the SMR are summarized below.

SFPUC Requirement. For project areas that would connect to the City's existing separated storm drain system in Third Street and/or Mission Rock Street, the SMR requires the project to implement a stormwater management plan that results in capture and treatment of all stormwater runoff from the 90th-percentile storm event prior to discharge to the separated storm sewer system.

Port Requirement. For project areas that would be served by the Port's separated storm drain system that outfalls directly to the Bay or China Basin, the SMR requires the project to implement a stormwater management plan that results in capture and treatment of all stormwater runoff from the 85th percentile storm event. [84]

Improvements would be considered parcel by parcel. Improvements to Pier 48 would be limited to proposed life-safety structural and internal building improvements and would not involve ground disturbance (or impervious surface creation/replacement) or alter the current stormwater management system at Pier 48.[85]

Stormwater treatment would be handled through self-contained treatment within specific streets (or "self-treating" streets) and within large-feature rain gardens in China Basin Park, along the Shared Public Way, and in Mission Rock Square, as shown in Figure 4.N-7 on the following page. Runoff would be conveyed by gravity or force main for treatment**.** Self-contained treatment would include pump stations for stormwater treatment flows and overflow from storm flows in excess of treatment flows, which would be applied at the north and south ends of the project site. Rain gardens would receive permanent irrigation from efficient drip irrigation systems.[86] In addition, the proposed project's sustainable stormwater quality control strategy would be designed to achieve compliance with both SFPUC and Port SMR performance requirements, as applicable.

Compliance with the Storm Water Management Ordinance and the corresponding SMR would allow the project to achieve its long-term sustainable approach to planning and design as well as comply with stormwater requirements established by the SFPUC and the Port's MS4 requirements.[87] Therefore, potential surface water quality impacts from project operation would be ***less than significant***.

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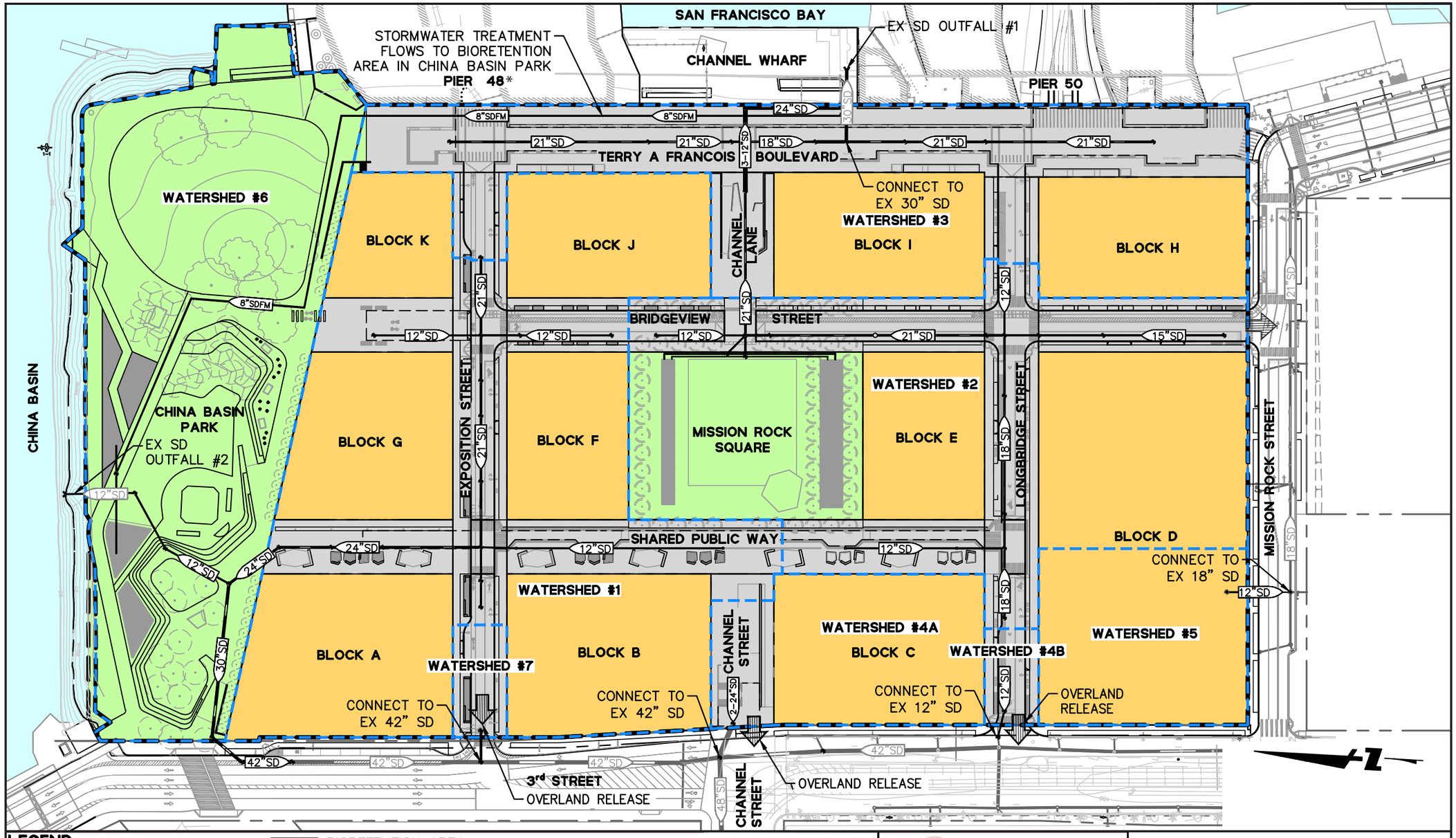
84 BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

85 BKF Engineers, Surveyors, Planners. 2011. *Sea Wall 337 Infrastructure Analysis*. September 14.

86 Mission Rock DCDG. 2014. *Sustainable Water Systems*. May 16.

87 BKF Engineers, Surveyors, Planners. 2011. *Sea Wall 337 Infrastructure Analysis*. September 14.



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Source: BKF Engineers, Surveyors, Planners 2016

* *No drainage changes are expected at Pier 48 with the proposed project.*

Figure 4.N-7
Conceptual Hydrology Plan

Impact HY-2. The proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level. (Less than Significant)

CONSTRUCTION

Groundwater beneath the site was found approximately 10 to 20 feet bgs.[88] The maximum excavation depth on land (i.e., for the Mission Rock Square Garage basement) would be approximately 33 feet, including the bottom of the lowest-level foundation slab. Basements within other new buildings constructed under the proposed project would have lesser depths. Although pile driving would be required, the piles would be impacted into the ground and would not require excavation. Construction dewatering in areas of shallow groundwater may be required during excavation activities, which could result in a temporary reduction in groundwater volumes. In the event that groundwater is encountered during construction, dewatering would be conducted on a one-time or temporary basis during the construction phase and would not result in a loss of water that would substantially deplete groundwater supplies. If wells are to be used for groundwater dewatering during construction, the project would be required to comply with San Francisco's Soil Boring and Well Regulation Ordinance. Approval from DTSC must be obtained prior to excavation or other soil-disturbing activities to reduce impacts on groundwater sources. In addition, groundwater within the Downtown San Francisco groundwater basin is not used for water supply. The water supply for construction activities (e.g., dust control, concrete mixing, material washing) would most likely come from nearby hydrants and existing surface supplies and/or would be trucked to the site. Therefore, impacts on groundwater supplies from construction activities would be ***less than significant***.

OPERATION

Natural groundwater recharge of the Downtown San Francisco groundwater basin occurs primarily from infiltration of rainfall, landscape irrigation, and leakage of water and sewer and pipes. New impervious areas can reduce infiltration capacities so that more precipitation runs off into storm sewers or nearby surface waters instead of infiltrating and recharging the underlying aquifer. However, the proposed project would not substantially interfere with groundwater recharge because it would not increase groundwater demand or decrease the size of groundwater recharge areas. The 27-acre project site would include approximately 5.4 acres of new open space, for a total of approximately 8.0 acres of open space on the site, compared to approximately 2.2 acres under the baseline conditions, allowing for an increase in groundwater recharge potential. Additionally, stormwater treatment areas, such as bio-retention areas/large-

[88] Department of Toxic Substances Control. 2002. *Hazardous Soils Report – Covenant to Restrict Use of Property Environmental Restriction, H&H Site located at China Basin Channel and Terry A. Francois Boulevard, City and County of San Francisco.*

feature rain gardens, "self-treating" streets, and other landscape features and open space areas, would allow for increased groundwater infiltration. Furthermore, new vegetation zones would slow water, allowing it to percolate into the ground, thereby providing increased benefits for groundwater recharge. Operation of the proposed project would not utilize groundwater supplies and therefore would not substantially deplete groundwater supplies. Therefore, the proposed project's impact on groundwater supplies and recharge would be ***less than significant***.

Impact HY-3. The proposed project would alter the existing drainage pattern of the site but would not result in substantial erosion or siltation onsite or offsite. (Less than Significant)

CONSTRUCTION

LAND-BASED ACTIVITIES

The proposed project would implement BMPs, described in the project SWPPP, to minimize the potential for erosion and sedimentation in nearby storm drains and temporary changes in drainage during construction. For example, exposed stockpiles of dirt or other loose, granular construction materials that could contribute sediment to waterways would be enclosed and covered. Efforts would be made by the contractor to conduct the majority of land-disturbing work outside of the typical wet season and minimize the potential for large rain events to mobilize loose sediment during construction.

Where possible, soil excavated onsite would be stockpiled on the site for reuse where fill is required. However, soil import and export would be necessary. Soil would be imported in all areas during the demolition and grading (first) phase (ranging from 15,791 to 33,570 cubic yards [cy]) and during the infrastructure (second) phase (ranging from 3,024 to 4,050 cy). Approximately 9,870 cy of soil would also be imported during the foundation and building (third) phase in Area 3. Soil would be exported from all areas during the demolition and grading (first) phase (ranging from 10,000 to 20,000 cy), the infrastructure (second) phase (ranging from 3,360 to 4,500 cy), and the foundation and building (third) phase (ranging from 7,650 to 103,200 cy). No soil would be imported during the paving and landscaping (fourth) phase. Approximately 23 total acres would be graded during project construction. The finished park and open space grades would be achieved with the placement of either lightweight soil or geofoam (styrofoam blocks), which would both replace and supplement existing fill to achieve no net increase in overall soil weight.

Because the project would disturb more than 5,000 sf, an ESCP must be submitted, further reducing the potential for substantial erosion or siltation onsite/offsite because the ESCP would comprise a site-specific plan that would detail the use, location, and placement of sediment and erosion control devices. The proposed project would be required to comply with existing NPDES Construction General Permit requirements, the City's Construction Site Runoff

Ordinance, and SFPUC Stormwater Management Requirements. The NPDES Construction General Permit requires stormwater discharges not to contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards, including designated beneficial uses of surface waters. The monitoring requirements for sampling and analysis procedures in the Construction General Permit would help determine whether the installed and maintained BMPs would prevent pollutants that may cause or contribute to an exceedance of water quality standards from being discharged from the construction site. Compliance with the Construction General Permit and other regulations would ensure that water quality standards, as defined by the Basin Plan, would be met; therefore, discharges would not violate any waste discharge requirements or otherwise substantially degrade water quality. There are no streams or rivers within the project site, and thus, the proposed project would not alter the course of an existing stream or river. For the above reasons, this impact would be ***less than significant***.

IN-WATER ACTIVITIES

The proposed project would include rehabilitation of existing facilities and seismic upgrades. However, no new structures would be placed on Pier 48; therefore, little to no alteration of the existing drainage pattern would occur on this portion of the project site. Surface runoff would continue to flow from Pier 48 by either directly or indirectly discharging into San Francisco Bay. During rehabilitation of Pier 48, in-water work could result in soil disturbance, with resulting turbidity spikes and siltation in Lower San Francisco Bay. As discussed under Impact HY-1, impacts would be minimized through implementation of BMPs and other measures specified in the Construction General Permit SWPPP, 401 Water Quality Certification, and the 404 Permit. Water quality monitoring for turbidity and other pollutants during construction may be required as part of permit compliance. Therefore, potential impacts to the alteration of existing drainage patterns that could result in substantial erosion or siltation onsite or offsite from construction activities would be ***less than significant***.

OPERATION

New storm drainage infrastructure would replace existing onsite storm drains and be connected to the existing storm drain system that serves the site and convey approximately 37 cubic feet per second of stormwater as shown in Figure 4.N-7, page 4.N-53, and summarized below.

- Watersheds #1 and #6 –Would drain to Third Street (through China Basin Park Promenade)
- Watersheds #2 and #3 – Would drain to existing outfall at Terry A. Francois Boulevard between Pier 48 and Pier 50
- Watershed #4A – Would drain to Third Street at Channel Street
- Watershed #4B – Would drain to Third Street at Longbridge Street

- Watershed #5 – Would drain to Mission Rock Street
- Watershed #7 – Would drain to Third Street at Exposition Street [89]

For the 5-year storm event, the onsite storm drain system would be designed to convey stormwater runoff from the development parcels and streets. For the 100-year storm event, the storm drain system, street section, and street grading would be designed to convey stormwater runoff from the development parcels and streets. In addition, storm drain lateral connections would be installed to serve the proposed development blocks, with sizes based on individual block demands. Although drainage patterns on the project site would be altered, as discussed in detail above, drainage would ultimately be improved because the project design would include new high-quality drainage infrastructure as well as bio-retention areas, rain gardens, and flow-through planter areas to minimize runoff, erosion, and siltation. The existing, largely impervious 27-acre project site would include approximately 5.4 acres of new open space, for a total of approximately 8.0 acres of open space on the site, allowing for a significant increase in pervious surfaces at the project site. Additionally, stormwater treatment areas, such as bio-retention areas/large-feature rain gardens, "self-treating" streets, and other landscape features and open space areas, would provide additional pervious surfaces. The proposed conceptual plan for project storm drain system improvements is shown in Figure 4.N-7, page 4.N-53.

New and renovated facilities would be drained by a combination of new and existing storm drains. As part of redevelopment, existing storm drainage infrastructure within the Seawall Lot 337 site, China Basin Park, and Terry A. Francois Boulevard would be removed. Storm drainage infrastructure within Pier 48 would remain intact. A series of inlets located at low points or overflow structures within stormwater management facilities located throughout the site would discharge storm drainage runoff to the proposed storm drain collection system.

Operation of the proposed project would require soil stabilization (e.g., vegetation or other protective cover, stabilized slopes and fills) in accordance with San Francisco stormwater requirements. With implementation of LID features, such as bio-retention areas, and additional open space, the potential for erosion and siltation at the project site would be reduced. Additionally, operation of the proposed project would not alter the course of an existing stream or river because these features do not exist onsite. Based on the above, impacts related to substantial erosion or siltation onsite or offsite from project alterations to existing drainage patterns would be ***less than significant***.

[89] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock DEIR Hydrology Description Memorandum*. October 13.

Impact HY-4. The proposed project would alter the existing drainage pattern of the site but would not result in a substantial increase in the rate or amount of surface runoff in a matter that would result in flooding onsite or offsite. (Less than Significant)

CONSTRUCTION

Project construction activities may alter existing drainage patterns and result in temporary increases in the rate or amount of local surface runoff (onsite) and temporary flooding. The existing onsite storm drain system would be replaced with a new storm drain system and be connected to the existing storm drain systems that serve the project site. The proposed conceptual drainage areas and outfalls for the project are shown in Figure 4.N-7, page 4.N-53, and summarized in Impact HY-3, above.[90] The proposed separated storm drain system would be designed in accordance with applicable regulations and the 2016 SMR Guidelines. The onsite storm drain system would be designed to convey stormwater runoff from development parcels and streets for the 5-year storm event. For the 100-year storm event and overland release, the storm drain system, street section, and street grading would convey stormwater runoff.

Although drainage patterns on the project site would be altered, drainage would ultimately be improved because project implementation would result in new drainage infrastructure and connections to the existing storm drain systems that serve the site, as discussed above. Preparation and implementation of the project SWPPP would reduce the potential for flooding onsite/offsite as a result of altering existing drainage patterns or substantially increasing the rate or amount of runoff. As part of the SWPPP, erosion and sediment control measures, such as silt fences and straw wattles, to prevent sediment from entering storm drains and surface waters, would be implemented during construction. The proposed project would be required to comply with existing NPDES Construction General Permit requirements, the City's Construction Site Runoff Ordinance, and SFPUC Stormwater Management Requirements. The NPDES Construction General Permit aims to match post-construction runoff to pre-construction runoff for the 85th-percentile storm event. In addition, the SWPPP is required to include a description of all post-construction BMPs. Preparation and implementation of the grading plan and the SWPPP would reduce the potential for a substantial increase in the rate or amount of runoff as well as the potential for flooding onsite or offsite. An effective stormwater management strategy must address the full suite of storm events, including consideration of water quality, overbank flood protection, and extreme flood protection. Through compliance with these regulations, this impact would be ***less than significant***.

[90] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

OPERATION

The project design would incorporate soil stabilization measures (e.g., vegetation and other protective cover, stabilized slopes and fills) as part of stormwater management measures, in accordance with San Francisco stormwater requirements. LID techniques within the project area, such as bio-retention areas, rain gardens, and flow-through planter areas, would allow for infiltration and minimize runoff volumes as well as the potential for ponding and onsite or offsite flooding during rain events. Because the proposed project would involve creation and/or replacement of 5,000 sf or more of impervious surface, the project would be subject to San Francisco's stormwater management requirements, as outlined in the Stormwater Management Ordinance and the San Francisco SMR.

The proposed project must prepare a Stormwater Control Plan(s), demonstrating project adherence to the performance measures outlined in the SMR, including stormwater treatment in areas with separate sewer systems. The MS4 requires a post-construction BMP condition assessment to inventory and assess the maintenance condition of structural post-construction BMPs. In addition, the NPDES Construction General Permit aims to match post-construction runoff to pre-construction runoff for the 85th-percentile storm event. Therefore, impacts related to altering existing drainage patterns or substantially increasing the rate or amount of runoff would be ***less than significant***.

Impact HY-5. The proposed project would not create or contribute runoff water that would exceed the capacity of the planned stormwater drainage system or provide additional sources of polluted runoff. (Less than Significant)

CONSTRUCTION

During construction, the proposed project would be required to meet several criteria (e.g., Stormwater Control Plan, ESCP, Construction Site Runoff Ordinance), including capture and treatment of the 90th percentile, 24-hour storm and implementation of BMPs to control construction site runoff, ensure proper stormwater control, reduce the discharge of pollution to the storm drain system, and ensure sufficient storm drain capacity for the proposed project. The proposed project would not create or contribute runoff water that would exceed the capacity of the existing stormwater drainage systems. The impact associated with project construction would be ***less than significant***.

OPERATION

New and renovated facilities would be drained by a combination of new and existing storm drains. To serve proposed development parcels, storm drain lateral connections would be installed, with sizes based on individual parcel demands, as shown in Figure 4.N-7, page 4.N-53.[91]

[91] BKF Engineers, Surveyors, Planners. 2011. *Sea Wall 337 Infrastructure Analysis*. September 14.

A 42-inch storm drain main between Channel Street and the proposed Exposition Street and a 30-inch main between Exposition Street and Lefty O'Doul Bridge are planned on Third Street. Construction and design of the 42- and 30-inch mains within Third Street would be the responsibility of the Mission Bay Development Group and initiated with the development of adjacent properties, which include Block 1. To ensure that the size of the infrastructure for Mission Bay development would be adequate with respect to serving the proposed project, the existing parking lot, which is part of Mission Bay Drainage Area D, was used to size Stormwater Pump Station No. 3, which discharges stormwater to China Basin Channel. Stormwater Pump Station No. 3 is located within the east corner of Mission Creek Park, at the west corner of Channel Street and Fourth Street. Stormwater Pump Station No. 3 was sized for the 5-year storm event to serve Giants Lot A, which includes drainage from the 30- and 42-inch storm drain within Third Street. In addition, the proposed project would reduce the amount of impervious area and overall stormwater runoff draining to the 30- and 42-inch storm drains within Third Street; therefore, the 30- and 42-inch mains would have capacity for the project. Drainage areas have been designed with more proposed flows being directed to the existing Port outfalls compared to the SFPUC system in Mission Bay. Analysis has shown that there is sufficient capacity for flows to the outfalls.[92] Within the new streets that would serve the proposed project, new 12- to 36-inch storm drainage pipe infrastructure would be installed. This would include the proposed realignment of Terry A. Francois Boulevard.[93]

The majority of the existing project site is paved, and therefore, the amount of new impervious surface would be minimal and would not increase stormwater runoff rates and volumes. In addition, the project design would include stormwater management measures, such as bio-retention areas, rain gardens, and flow-through planter areas, all of which would reduce the volume of runoff entering the storm sewer system. The Construction Site Runoff Ordinance includes implementation of BMPs to control construction site runoff and reduce the discharge of pollution to storm drain system. It also ensures that water quality standards and objectives, as designated by the Basin Plan, are achieved. The project would be designed to meet the SMR. Development parcels would be required to implement stormwater treatment measures either at the parcel or within centralized stormwater management areas within China Basin Park and Mission Rock Square to meet the guidelines prior to connecting to the storm drain system. In addition, through compliance with the Port's Green Building Standards Code requirements and implementation of San Francisco Stormwater Management Requirements, runoff water from the project site would not exceed the capacity of existing or planned stormwater drainage systems, and this impact would be ***less than significant***.

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[92] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock DEIR Hydrology Description Memorandum*. October 13.

[93] BKF Engineers, Surveyors, Planners. 2011. *Sea Wall 337 Infrastructure Analysis*. September 14.

Impact HY-6. The proposed project would not place housing within a 100-year flood hazard area. The proposed project may place housing in areas that could be inundated by flooding due to SLR but would not exacerbate the frequency or severity of flooding or cause flooding in areas that otherwise would not be subject to flooding without the project. (Less than Significant)

Factors that could exacerbate flooding issues along the waterfront portion of the project site include changes in the shape and configuration of the shoreline as well as construction of in-bay structures or enclosures such as jetties, breakwaters, or marinas that could change circulation patterns in San Francisco Bay in the vicinity of the project site. China Basin Park would maintain shoreline elevations close to the existing grade of approximately 11.3 feet NAVD88. When the sea level rises above 48 inches, the park would function as a space where future adaptations would provide flood protection for public access features, such as the promenades. Pier 48 and Pier 50 would also be maintained at existing elevations. [94] The final shape of the shoreline along the waterfront portion of the project site would be substantially the same as existing conditions. Further, the proposed project would not include the construction of any new in-water structures other than the removal and replacement of existing piles at Pier 48. For these reasons, the project would not substantially affect the patterns of flood flows at the project site or in the vicinity.

The proposed project would raise grades up to an elevation of 15.3 feet NAVD88 to finished floor elevations, which would provide 5.5 feet (66 inches) of freeboard[95] above present-day BFE for the development area, to accommodate for the projected 2100 SLR estimates. The Project would review adaptive management strategies in the future and determine the feasibility of solutions if and when the need for such strategies arises. Strategies have been developed for the project site, the shoreline, and the pier. Strategies include setting minimum grades and raising the Promenade and Bay Trail within China Basin Park to provide projection from inundation.[96] Although the proposed project would include construction of housing, any proposed housing or structures would be constructed more than 100 feet inland from the shoreline and would not be constructed within an identified 100-year flood zone. When the effects of SLR are considered with both the projected 2050 (12 inches of SLR) and 2100 (36 inches of SLR), only the perimeter of the site is vulnerable to flooding. But, when the effects of 100-year storm surge are considered, over half of the site east of Pier 48 would be vulnerable to flooding at the mid-century level of the SLR scenario, and the entire site west of Pier 48 would be vulnerable to flooding with projected end-of-century SLR.

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94 BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

95 Freeboard is a factor of safety, usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

96 BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

However, development of the proposed project would raise minimum elevation of the development footprint to the BFE plus an allowance of 66 inches (5.5 feet) for future SLR. Under daily flooding conditions, no flooding would be observed as the site is higher than flood elevations that would result from daily flooding, as well as future SLR conditions projected by 2050 (12 inches of SLR). With future SLR conditions projected by 2100 (36 inches of SLR), potential ponding at low spots is expected, primarily due to the inability of storm water to exit the site due to high tides in the Bay. When the 100-year storm surge is considered with present day conditions, no flooding within the development footprint is expected, as the proposed elevations are significantly higher than this elevation. However, there is potential for ponding on City streets at low spots. In addition, significant portions of the streets are lower than the flood elevation, and large-scale flooding of adjacent city streets would occur with mid-century level of the SLR scenario in addition to the 100-year storm surge, and large scale flooding would occur at all adjacent streets with end-of-century SLR in addition to a 100-year storm surge.[97] Therefore, the project would not exacerbate the frequency or severity of flooding or cause flooding in areas that otherwise would not be subject to flooding without the project because it would not change the shape or configuration of the shoreline or add in-water features that would alter circulation patterns or redirect flood flows. Further, the project site is predominantly impervious; project design would reduce the amount of impervious area, thereby reducing flood flows. Therefore, the project would not place housing within a 100-year flood zone or exacerbate the frequency or severity of flooding or cause flooding in areas with housing that otherwise would not be subject to flooding without the project and flooding impacts associated with housing would be ***less than significant***.

Impact HY-7: The proposed project would not place structures within a 100-year flood hazard area. The proposed project may place structures in areas that could be inundated by flooding due to SLR but would not exacerbate the frequency or severity of flooding or cause flooding in areas that otherwise would not be subject to flooding without the project. (Less than Significant)

The existing finished grades in Mission Bay adjacent to the project site range from elevations of 8.3 to 11.8 feet NAVD88. Grading and hydrology designs for Mission Bay were established prior to the more recent SLR investigations of the past 8 years and would not accommodate the 2100 high SLR estimates.[98] Under existing conditions, the project site (with the exception of Pier 48 and a small area along the north side of the site) could be temporarily flooded to a maximum depth of 2 feet as a result of 36 inches of SLR in combination with 100-year storm surge. This is the amount of SLR that the NRC projects will occur by 2100. The NRC Report

[97] Moffatt & Nichol. 2017. Coastal Flooding Limits for No-Project and Proposed Project Conditions Mission Rock Development Seawall Lot 337 M&N Job No: 7530-02. March 28.

[98] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

concludes that the worst-case amount of SLR would raise San Francisco Bay water levels by up to 66 inches by 2100. In combination with 100-year storm surge, this amount of SLR would flood the entire project site, with the exception of Pier 48, to a maximum depth of 6 feet with the current site grade. The flood levels associated with both scenarios are 12.8 feet NAVD88 and 15.3 feet NAVD88, respectively. Pier 48 is not within an anticipated future flood zone, even under the worst-case scenario of 66 inches of SLR in combination with a 100-year storm surge.[99]

As described above under Impact HY-6, proposed project would raise grades up to an elevation of 15.3 feet NAVD88 to finished floor elevations, which would provide a minimum of 5.5 feet (66 inches) of freeboard above present-day BFE for the development area. Further, the project would raise the center of site to approximate elevations of 14.8 to 15.8 feet NAVD88 to accommodate protection from the 2100 SLR projections.[100,101] No flooding would be observed under daily flooding conditions and mid-century SLR conditions, with the exception of potential ponding at low spots with end-of-century SLR scenarios. Although there is potential for ponding on streets at low spots when the 100-year storm surge is considered under current conditions, and large-scale flooding of adjacent city streets would occur with both the mid-century and end-of-century SLR scenarios when the 100-year storm surge is considered, no flooding within the development footprint is expected.[102] Therefore, the project would not exacerbate the frequency or severity of flooding. Raising the inland grade to this elevation would protect buildings and immovable facilities such as roadways from flooding from 66 inches of SLR in combination with a 100-year storm surge. China Basin Park would maintain shoreline elevations close to the existing grade of approximately 11.3 feet NAVD88. Grades across the park would transition between lower areas at existing grade and bio-retention areas, and raised or sloped landscape areas between the Bay Trail and the promenade. The Bay Trail would be elevated to approximately 13.3 feet NAVD88 through the center of the park to provide 6 feet of freeboard from the 2016 King Tide elevation of 7.3 feet NAVD88. The promenade, located on the south side of the park along the northernmost development blocks, would be elevated to an elevation of approximately 14.8-15.3 feet NAVD88 in relationship to the ground floors of adjacent buildings. These elevated areas in the park would preserve public access and help ensure that accessible paths of travel remain free of flood water except in extreme storm events, according to sea level rise projections for year 2100. Future adaptations would be implemented as required to maintain flood protection for existing public access features.

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99 BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

100 BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

101 Moffatt & Nichol. 2017. Coastal Flooding Limits for No-Project and Proposed Project Conditions Mission Rock Development Seawall Lot 337 M&N Job No: 7530-02. March 28.

102 Moffatt & Nichol. 2017. Coastal Flooding Limits for No-Project and Proposed Project Conditions Mission Rock Development Seawall Lot 337 M&N Job No: 7530-02. March 28.

As for existing flooding conditions, factors that could exacerbate flooding and increase the potential for coastal erosion along the waterfront portion of the project site include changes in the shape and configuration of the shoreline as well as construction of in-bay structures or enclosures such as jetties, breakwaters, or marinas that could change circulation patterns in San Francisco Bay at the project site and in the vicinity. Because the final slope and shape of the shoreline along the project waterfront portion of the project site would be substantially the same as existing conditions and the proposed project would not include the construction of any new in-water structures, the patterns of flood flows and the potential for coastal erosion at the project site and in the vicinity would not be substantially affected.

The proposed project would not include additional stormwater discharges or other discharges that would increase the frequency or severity of flooding. As discussed above in Impact HY-4, the proposed storm drain system would be designed in accordance with applicable regulations and the 2016 SMR Guidelines. All new development is required to handle stormwater that ensures that flooding will not increase and flood flows will not be redirected to other areas that are not currently prone to flooding. The overland release plan in the adjacent Mission Bay area avoids overland release around the project site. Overland release for the area is towards China Basin Channel or discharges into the Bay, along existing streets. Development within the project site will not impede flow. Rehabilitation of Pier 48 could include interior and exterior improvements and apron repair or replacement, but the overall structures and sizes would not change; therefore, there would be no changes with respect to the ability of the existing buildings to impede or redirect flood flows. The overland release plan for stormwater flow avoids overland release around the project site. The overland release for the areas west of Third Street is west, towards 4th Street and Channel Street, prior to discharge into the Bay. Development within the project site or raising the Mission Rock site will not impede stormwater flow. Further, the project site is predominantly impervious; project design would reduce the amount of impervious area, thereby reducing flood flows. The project would not exacerbate flooding due to SLR at the project site. The proposed project would not cause flooding to occur in areas that would not be subject to flooding without the proposed project for the reasons stated above. Therefore, impacts related to the placement of structures within a 100-year flood zone and the impedance or redirection of flood flows within an existing 100-year flood zone would be ***less than significant***.

Impact HY-8. The project area is subject to flooding from tsunami inundation, but the project would not exacerbate flooding or cause flooding in areas that otherwise would not be subject to flooding without the project. The project site is not subject to inundation by seiche or mudflows. (Less than Significant)

According to the State of California Tsunami Inundation Map for Emergency Planning (San Francisco North Quadrangle/San Francisco South Quadrangle), the majority of the project site is currently subject to flooding from tsunami inundation, with flooding up to an elevation of

about 12.7 feet NAVD88. However, the southwest portion of the site (Block C and the western half of Block D) is not located within a designated tsunami inundation area.[103] As explained above in Impact HY-6, the project would not exacerbate the frequency or severity of flooding or cause flooding in areas that otherwise would not be subject to flooding without the project because it would not change the shape or configuration of the shoreline or add in-water features that would alter circulation patterns or redirect flood flows. Further, the project would be designed to provide better protection for structures from flooding from tsunami inundation than current elevations provide by raising the site grade. While tsunami emergency preparedness planning focuses on the maximum credible event elevation, the design of the proposed project focuses on flood protection under most circumstances. The estimate for the 100-year tsunami event from the U.S. Army Waterways Experiment Station, which produces a minimum site grade of 8.2 feet NAVD88, without an allowance for SLR, is appropriate for purposes of establishing a minimum site grade, as it would provide for flood protection under more common extreme high tide events and most tsunami events under existing conditions.[104] In addition, the project site is predominantly impervious; project design would reduce the amount of impervious area, thereby reducing flood flows.

To protect people and structures from a significant risk of loss or injury due to tsunami hazards in the future with anticipated SLR, the project's grading elevations would consider SLR, and would exceed the minimum grade requirements. The project's minimum design criteria would provide a minimum finished floor elevation of 15.3 feet NAVD88, to accommodate for the projected 2100 SLR estimates.[105]

The project area is adjacent to Lower San Francisco Bay; therefore, the proposed project is not subject to inundation by a seiche. The project area is not within a designated landslide area. Therefore, the proposed project would not be subject to inundation by mudflows.

The project area is subject to flooding from tsunami inundation now; the project would not exacerbate flooding or cause flooding in areas that otherwise would not be subject to flooding without the project. It would raise the existing grade thereby reducing current risks that exist at the site associated with flooding from tsunami. The project site is not subject to inundation by seiche or mudflows. Therefore, impacts related to flooding from inundation by tsunami, seiche, or mudflow would be ***less than significant***.

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[103] California Emergency Management Agency (CalEMA), the University of Southern California (USC), and the California Geological Survey (CGS). 2009. *Tsunamic Inundation Map for Emergency Planning*. State of California, City and County of San Francisco. San Francisco North Quadrangle/San Francisco South Quadrangle. June 15.

[104] Moffat and Nichol. 2011. *Seawall Lot 337 Redevelopment – Waterside Improvements*. M&N Job No: 7530. November.

[105] BKF Engineers, Surveyors, Planners. 2016. *Mission Rock Infrastructure Plan*. September 20.

CUMULATIVE IMPACTS

The geographic context for the analysis of cumulative impacts associated with surface hydrology and water quality is the Mission Creek subwatershed. The context for groundwater hydrology is the Downtown San Francisco groundwater basin in the larger San Francisco Bay Hydrologic Region. The Mission Creek subwatershed is considered already built out. Consequently, potential growth would most likely occur as redevelopment and not extensive new development on vacant land or open space. The context for cumulative hydrology and water quality impacts is geographic and a function of whether impacts could affect surface water features/watersheds, the city's storm drainage system, or groundwater, each of which has its own physical boundary. This analysis accounts for anticipated cumulative growth within the potentially affected geographic area.

Impact C-HY-1. Cumulative Water Quality Impacts. The proposed project, in combination with other foreseeable development in the vicinity, would not contribute considerably to cumulative impacts on water quality. (Less than Significant)

Development of the proposed project, combined with other past and future development or redevelopment within the potentially affected geographic area (the Mission Creek subwatershed for surface water quality and the Downtown San Francisco groundwater basin for groundwater quality), could degrade stormwater quality through an increase in impervious surface area and an increase in contaminated runoff (see Table 4-1 in Chapter 4, *Environmental Setting and Impacts*, for projects in the area that could affect water quality). This could ultimately violate water quality standards, affect beneficial uses, and/or further impair 303(d)-listed waters within the Mission Creek subwatershed (of the larger Lower San Francisco Bay watershed) and the Downtown San Francisco groundwater basin. The quality of stormwater runoff varies with surrounding land uses, topography, and the amount of impervious cover as well as the intensity (energy) and frequency of irrigation or rainfall. During construction, runoff may contain sediments and other construction materials and wastes (e.g., concrete debris), resulting from activities such as site clearing and grubbing, demolition and the removal of existing structures and pavement, cut-and-fill activities, grading and excavation, paving, building construction, tree removal, and landscaping. During operation, runoff may contain oil, grease, and metals that accumulated in streets and driveways as well as pesticides, herbicides, particulate matter, nutrients, animal waste, and other oxygen-depriving substances from landscaped areas. The highest pollutant concentrations are generally in stormwater runoff generated at the beginning of the wet season and during the "first-flush," when approximately 80 percent of total accumulated pollutants are washed off surfaces with the first 0.5 inch of rainfall. Street surfaces are the primary source of pollutants in urban areas.

Other development could affect water quality if the land use changes, the intensity changes, and/or drainage conditions are altered to facilitate the introduction of pollutants to surface or

groundwater resources. Changes in land use would alter the associated type and amount of pollutants in stormwater runoff (e.g., higher fecal coliform concentrations in runoff from residential lands compared with commercial lands). An increased intensity in land use would increase potential pollutant loads. Alterations in drainage patterns could increase pollutant loads by increasing the amount of stormwater runoff and downstream flow, thereby transporting pollutants in stormwater runoff; cause or contribute to erosion if the rate of runoff is increased; or expose vulnerable areas to infiltration or runoff. Several blocks in the area are currently under development but would be completed by the time construction of the proposed project commences. Parcels adjacent to the project site are in various stages of completion. These adjacent parcels are vacant, serving temporarily as surface parking lots, under construction, or used for construction staging and therefore potential sources of stormwater contamination.

To prevent short-term (construction) impacts on water quality, construction of nearby projects would need to comply with the requirements of the NPDES Construction General Permit and the SFPUC's Construction Site Runoff Ordinance. If the dewatering of natural groundwater would require a discharge into surface waters or nearby storm drains, future projects would be required to comply with the dewatering requirements of the San Francisco Bay Regional Water Board or the City's batch wastewater discharges permit, depending on the location of discharge, to prevent potential water quality impacts on surface waters. In addition, future projects would be required to comply with hazardous material requirements, such as the San Francisco Maher Ordinance for soil and groundwater contamination as well as SPCC requirements, as necessary. Project operations would be subject to San Francisco stormwater and the Port's Green Building Standards Code requirements as well as other stormwater requirements established by CCSF and the Port's MS4 programs. The applicable regulations, which have been developed to protect water quality, as defined in the Basin Plan, require implementation of stormwater BMPs. Because the proposed project and other foreseeable projects in the vicinity would be required to comply with these regulations, cumulative impacts would be ***less than significant***.

Impact C-HY-2. Cumulative Groundwater Impacts. The proposed project, in combination with other foreseeable development in the vicinity, would not contribute considerably to cumulative impacts on groundwater recharge and supplies. (Less than Significant)

During construction of other reasonably foreseeable development projects within the Mission Creek subwatershed and Downtown San Francisco groundwater basin, potential dewatering could be conducted on a one-time or temporary basis during the construction phase but would not result in a loss of water that would deplete groundwater supplies. During operation, new impervious areas can reduce the potential for groundwater recharge. Groundwater recharge in the Downtown San Francisco groundwater basin, an area where other projects would be located, occurs through infiltration of precipitation, landscape irrigation, and leakage from water and sewer and pipes. Most other reasonably foreseeable projects in the basin would be redevelopment or infill projects in highly urbanized areas where recharge would not occur.

Development in highly urbanized areas would not be expected to increase the amount of impervious surfaces substantially because this development would be occurring mostly in areas with a substantial amount of existing impervious surfaces. Therefore, groundwater recharge from percolating rainfall would not be adversely affected, and an indirect lowering of the local groundwater table is not likely to occur. However, development outside of areas with prior impervious surfaces could affect groundwater recharge, and the effects may be cumulatively significant. Groundwater within the Downtown San Francisco groundwater basin is not used for water supply. Therefore, the water supply necessary for construction and operation of other development projects would not reduce the volume of groundwater within the Downtown San Francisco basin.

Because of the lack of groundwater use and the presence of existing impervious surfaces on the project site, the project site would contribute only minimally to cumulative impacts on groundwater recharge, and thus, impacts related to development of the proposed project would not be cumulatively considerable and would be ***less than significant*** with respect to any potential cumulative loss of groundwater recharge and supply.

Impact C-HY-3. Cumulative Storm Drain Impacts. The proposed project, in combination with other foreseeable development in the vicinity, would not contribute considerably to cumulative impacts on storm drain capacity. (Less than Significant)

Other reasonably foreseeable development projects in the vicinity could increase the rate and volume of stormwater runoff if there were an overall increase in impervious surfaces. The existing onsite storm drain system would be replaced on the project site with new storm drain systems and would connect to the existing offsite storm drain systems that serve the site. It is likely that other projects would also be connected to the existing system, through either existing or new storm drain systems. Increases in the rate or volume of stormwater runoff can cause localized flooding if storm drain capacity is exceeded or if flows exceed channel capacities and are conveyed to overbank areas where flood storage may not be available. Generally, other projects would occur in areas that are already highly developed with impervious surfaces; therefore, changes in flows that could increase localized flood risks would not be expected to be substantial. Also, a new drainage infrastructure is expected in the project area. All projects would be required to include design features to reduce flows to pre-project conditions, consistent with San Francisco stormwater requirements and the City's Floodplain Management Ordinance. Thus, cumulative impacts on storm drainage capacity would be ***less than significant***.

Impact C-HY-4. Cumulative Flooding Impacts. The proposed project, in combination with other foreseeable development in the vicinity, would not contribute considerably to cumulative impacts on flooding. (Less than Significant)

As described above, parts of the project area are subject to flooding. Most redevelopment, including the project, would be designed to reduce the amount of impervious area, thereby reducing flood flows. All new development is required to handle stormwater in a manner that ensures that flooding will not increase and flood flows will not be redirected to other areas that are not currently prone to flooding. The overland release plan in the adjacent Mission Bay area avoids overland release around the project site. Overland release for the area is towards China Basin Channel or discharges into the Bay, along existing streets. Development within the project site will not impede flow. Development that is not located in existing or future flood-prone areas would have no effect on contributing to cumulative impacts related to flooding. The potential for increased flooding due to coastal flooding as a result of wave action is limited because of the orientation of the area in China Basin, which serves as protection from southerly wind-induced waves. In addition, new development would be designed to not exacerbate the frequency or severity of flooding or cause flooding in areas that otherwise would not be subject to flooding without the project by maintaining the shape or configuration of the shoreline or not adding in-water features that would alter circulation patterns or redirect flood flows. Existing regulations and requirements, such as the San Francisco Floodplain Management Ordinance, in general, require site-specific actions for projects within the 100-year flood zone depicted on the 2008 interim flood maps to protect against increasing flood levels and placing people or structures at risk of flood flows. Compliance by other reasonably foreseeable development projects to relevant regulations would also reduce or avoid any significant cumulative impact.

The proposed project would be required to address 100-year flood events by designing an onsite drainage system that would avoid any increase in 100-year flood levels in Mission Creek, per existing regulations, and avoid any increase in flood flows. The proposed project would also address the risk of SLR by designing proposed buildings to minimize the risk of flooding, dependent on the approach to addressing risks from rising sea levels. Examples of design features which minimize flood hazard risks include anchoring and floodproofing; using materials and utility equipment that resist flood damage; requiring electrical, heating, ventilation, plumbing, and service facilities to be designed and/or located to prevent water from entering or accumulating within the components during flood conditions. Therefore, the proposed project (with grading options and LID measures, such as bio-retention areas) would not contribute to any potential cumulative impacts related to increased flood levels, and such cumulative impacts would be ***less than significant***.