IV.I Hydrology (Sea Level Rise and Combined Sewer System)

IV.I.1 Introduction

This section describes the potential effects of the Central SoMa Plan (the Plan) on the existing hydrology and water quality in the Plan Area, with a focus on the potential for flooding impacts as a result of sea level rise and changes in stormwater and wastewater flows.

The impact evaluation in the Hydrology and Water Quality Section of the Initial Study (see Appendix B) explains why the proposed project would not result in significant impacts on hydrology and water quality with respect to construction-related discharges of stormwater; discharges of groundwater during dewatering; depletion of groundwater and interference with groundwater recharge; alteration of drainage patterns; exceedance of the capacity of the stormwater drainage system and providing an additional source of stormwater pollutants; placement of housing within an existing 100-year flood zone; placement of structures within an existing 100-year flood zone; flooding as a result of failure of a levee or dam; and inundation by seiche, tsunami, or mudflow.

Project effects on the capacity of the wastewater and stormwater system are addressed in Section D.11, Utilities and Service Systems, of the Initial Study (Appendix B).

IV.I.2 Environmental Setting

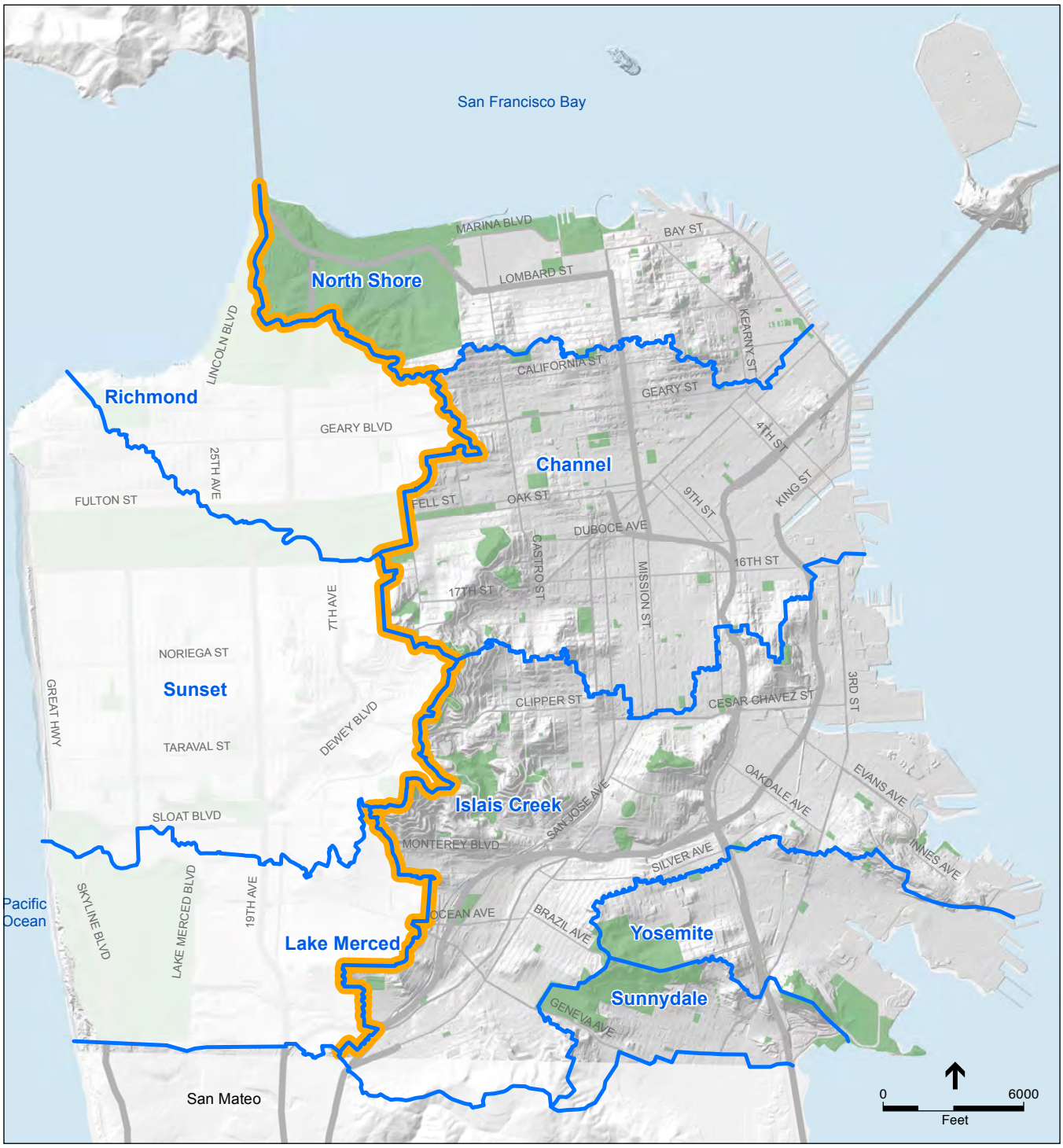
Combined Sewer System

Drainage Basins

San Francisco comprises two drainage basins: the Westside Drainage Basin that drains to the Pacific Ocean, and the Bayside Drainage Basin that includes the Plan Area and drains to the Bay. Freshwater flow to San Francisco Bay from the city, including all of the Plan Area, has been almost entirely diverted to the City's combined sewer system, which collects and transports both sanitary sewage and stormwater runoff in the same set of pipes. This combined sewer system is operated by the San Francisco Public Utilities Commission (SFPUC).

The Bayside Drainage Basin is divided into five distinct urban watersheds:[349] North Shore, Channel, Islais Creek, Yosemite, and Sunnydale as shown on **Figure IV.I-1, Watersheds of the Bayside Drainage Basin.**[350] The entire Plan Area and street network changes are located within the Channel urban watershed. With an area of

[349] A watershed is defined as the area of land that drains to a "receiving water body" such as a river, lake or ocean. In San Francisco's urban watersheds, rain runs off hardscapes (such as streets, rooftops, sidewalks, and parking areas), flowing through catch basins, sewers, and treatment plants before being discharged to the bay or ocean.
[350] San Francisco Public Utilities Commission (SFPUC), "Bayside Drainage Basin Urban Watershed Characterization," Final Draft Technical Memorandum, July 2013. Available at http://sfwater.org/modules/showdocument.aspx?documentid=4147, accessed 7/11/15.



SOURCE: Bayside Basin-San Francisco Public Utilities Commission, 2013

Case No. 2011.1356E: Central SoMa Plan

Figure IV.I-1

Watersheds of the Bayside Drainage Basin

5,665 acres, Channel is the largest urban watershed in the Bayside Drainage Basin.[351] Historically, the main drainage ways in Channel were Hayes, Mission and Arroyo Dolores Creeks, which all flowed to Mission Bay. Today, impervious surfaces comprise approximately 83 percent of the land cover in this watershed and the main sewer trunk lines follow the historical paths of the creeks. The combined sewer system collects about 95 percent of the stormwater drainage from the Channel urban watershed and stormwater from the remaining five percent of the area (Mission Bay and Port property) is served by separate stormwater systems that drain stormwater directly into the Bay.

Wastewater and Stormwater Flows

Wastewater flows in the Bayside Drainage Basin are transported to the Southeast Water Pollution Control Plant, or the "Southeast Treatment Plant" (SEP), located in the Bayview District. The SEP has the capacity to treat up to 150 million gallons per day (mgd) of wastewater to a secondary level.[352] During dry weather, wastewater flows consist mainly of municipal and industrial sanitary sewage and wastewater, and the annual average wastewater flow during dry weather is approximately 60 mgd.[353] The average dry weather design flow capacity of the SEP is 84.5 mgd; therefore the existing flows are about 70 percent of the treatment capacity and all dry weather wastewater flow is treated to a secondary level. The treated wastewater is then discharged to the bay through the deep water outfall at Pier 80, located immediately to the north of the Islais Creek Channel.[354]

During wet weather (generally October through April), the combined sewer collects and treats large volumes of stormwater runoff in addition to the wastewater consisting of municipal and industrial sewage. Depending on the amount of rainfall, these wet weather flows are treated to varying levels before discharge to the bay. Up to 150 mgd of wet weather flows receive secondary treatment at the SEP. The SEP can also treat up to an additional 100 mgd to a primary treatment standard plus disinfection. Treated wet weather discharges of up to 250 mgd from the SEP occur through the Pier 80 outfall to the bay or through the Quint Street outfall to Islais Creek Channel on the south bank of Islais Creek. Only wastewater treated to a secondary level is discharged at the Quint Street outfall.

Up to an additional 150 mgd of wet weather flows receive primary treatment plus disinfection at the North Point Wet Weather Facility, which is located in the northeast portion of the city and operates only during wet weather. Treatment at the North Point Wet Weather Facility consists of using bar screens to remove large

[351] SFPUC, "Bayside Drainage Basin Urban Watershed Characterization," July 2013.
[352] Secondary treatment is the treatment of wastewater or sewage involving removal of organic matter using biological and chemical processes. This is a higher level of treatment than primary treatment, which is removal of floating and settleable solids using physical operations such as screening and sedimentation. Secondary treatment is less intensive than tertiary treatment, in which additional chemical and biological treatment processes are used to remove additional compounds that may be required for discharge or reuse purposes.
[353] San Francisco Public Utilities Commission, *San Francisco's Wastewater Treatment Facilities*, June 2014. Available at http://sfwater.org/modules/showdocument.aspx?documentid=5801, accessed 7/11/15. Daily wastewater flows have declined by about 10 percent over the last decade due to declining water use, from an average of about 63 mgd during the mid-2000s to about 57 mgd in 2015 (SFPUC website, http://sfwater.org/index.aspx?page=616, and SFPUC, Sewer System Master Plan Summary Rpt. Final Draft, Ch. 2, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=0CDYQFjAE&url=http%3A%2F%2Fsfwater.org%2Fmodules%2Fshowdocument.aspx%3Fdocumentid%3D613&ei=J4ShVef5KtKwogS8g4X4BQ&usg=AFQjCNEmntwMlk6yo_wNrdEG_HQYAtBHnA).
[354] SFPUC, "Bayside Drainage Basin Urban Watershed Characterization," July 2013.

objects such as garbage; sedimentation to allow solids to settle out; skimming to remove floatables; disinfection with sodium hypochlorite; and dechlorination using sodium bisulfite to remove any chlorine residual before discharge. Treated effluent from this facility is discharged through four deep water outfalls, approximately 800 feet from the Bayshore and 18 feet below mean lower low water. Two of the deep water outfalls terminate at the end of Pier 33, and two terminate at the end of Pier 35 on the northeastern bayshore.

The combined sewer system includes underground concrete storage and transport boxes which, during wet weather, temporarily retain the stormwater and sewage flows that exceed the combined 400 mgd capacity of the SEP and North Point Wet Weather Facility for later treatment. When rainfall intensity results in flows that exceed the total capacity of the SEP, the North Point Wet Weather Facility, and the 126-million-gallon capacity of the storage and transport boxes, the excess flows are discharged through 29 combined sewer discharge (CSD) structures located along the city's bayside waterfront from the Marina Green to Candlestick Point. Discharges from these structures to San Francisco Bay (known as "combined sewer discharge events" or "CSD events") receive "flow-through treatment" to remove settleable solids and floatable materials, which is similar to primary treatment.

In a typical year, approximately 1.3 billion gallons of combined wastewater and stormwater are discharged to the Bay via the CSD structures.[355] Overall, 100 percent of all wet weather flows receive the equivalent of primary treatment and in a typical year, 95 percent of the annual wet-weather flows are disinfected prior to discharge. Wet weather flows are intermittent throughout the rainy season, and combined sewer discharge events vary in nature and duration, depending largely on the intensity of individual rainstorms. All discharges from the combined sewer system to the Bay, through either the outfalls or the CSD structures, are operated in compliance with the federal Clean Water Act and the state Porter-Cologne Water Quality Control Act through the National Pollutant Discharge Elimination System (NPDES) permit for discharges from the SEP, the North Point Wet Weather Facility, and all of the Bayside wet-weather facilities, including CSDs to the Bay (referred to as the Bayside NPDES Permit, and described below under the State Regulatory Framework).

On an annual basis, sanitary flows make up 49 percent of the total flow to the Bayside Drainage Basin while stormwater runoff makes about 25 percent of the flows, and base flows (infiltration of groundwater to the sewer system) make up the remaining 26 percent.[356] Wet weather flows within the Channel urban watershed are approximately 8,502 million gallons per year, and approximately 516 million gallons of this flow is discharged to the Bay via nine CSD structures: two that drain directly into the Bay and seven that drain into Mission Creek. These structures have been constructed with a regulatory design criterion of a long-term average of 10 discharges per year. Over the last 14 years, the long-term average number of CSD events from the Central Basin of the combined sewer system, which includes the Channel watershed, is 11, This indicates the need to implement improvements to maintain the long-term design criterion of 10 CSD events per year.[357]

[355] San Francisco Public Utilities Commission, "Special Study: Overflow Impacts and Efficacy of Combined Sewer Overflow Controls for the San Francisco Bayside System, Southeast Water Pollution Control Plant, North Point Wet Weather Facility and Bayside Wet Weather Facilities, NPDES No. CA0037664." June 29, 2012.
[356] SFPUC, "Bayside Drainage Basin Urban Watershed Characterization," July 2013. In periods of wet-weather flow when discharges to the Bay occur, the flows are more than 90 percent stormwater (SFPUC, Wastewater Collection System webpage: http://sfwater.org/index.aspx?page=399).
[357] SFPUC, "Bayside Drainage Basin Urban Watershed Characterization," July 2013.

Under peak high tide conditions, some of the City's CSD outfalls are subject to tidal inflow, and more CSD structures could be affected in the future due to projected sea level rise.[358] The inflow both uses up storage volumes in the transport and storage boxes, and increases the amount of water requiring treatment at the SEP and the North Point Wet Weather Facility. The SFPUC is evaluating measures to prevent backflow of Bay water into the sewer system such as the installation of gates and valves.

Combined Sewer System Planning Efforts by the SFPUC

The SFPUC is currently implementing a $7 billion, 20-year capital program called the Sewer System Improvement Program (SSIP) to address system-wide needs and update the aging combined sewer system. The SSIP is the result of an eight-year public planning process incorporating valuable feedback from the community. Improvements constructed under the SSIP will upgrade the wastewater collection, treatment, and discharge facilities to ensure regulatory compliance, reliability, and long-term sustainability.

The SFPUC's endorsed goals for the SSIP are to:

- Provide a compliant, reliable, resilient, and flexible system that can respond to catastrophic events;
- Integrate green and gray infrastructure to manage stormwater and minimize flooding;
- Provide benefits to impacted communities;
- Modify the system to adapt to climate change; and
- Achieve economic and environmental sustainability.

In 2012, the SFPUC Commission authorized staff to proceed with the planning and development of projects totaling $2.7 billion for Phase 1 of the SSIP, with final approval subject to completion of environmental review.[359] Phase 1 SSIP projects include, for example, upgrading of the biosolids treatment facilities at the SEP as well as the odor control and energy recovery facilities; replacement of the SEP Headworks project to provide better screening and grit removal for the wastewater and stormwater influent to the SEP; adding redundancy to wastewater conveyance capacity via the Central Bayside System Improvement Project (funded through design phase only); upgrades to the Oceanside Water Pollution Control Plant and North Point Wet Weather Facility; and installation of green infrastructure (such as stormwater infiltration areas along streets and creek daylighting) in eight locations around San Francisco. Additional projects include improved odor control associated with the liquid treatment processes at SEP (i.e., SEP Existing Digester Gas Handling Improvements Project and Primary and Secondary Clarifier Upgrades Project).[360] The SFPUC Commission has not yet authorized planning and development of projects included in Phase 2 or 3 of the SSIP; examples of SSIP Phase 2 and 3 projects that may be authorized for funding in the future include construction of the Central Bayside System Improvement Project, SEP Southside Renovation (demolition of the existing digesters and subsequent redevelopment of SEP South), expansion of the West Side Pump Station, and additional citywide green infrastructure.

[358] SFPUC, "Bayside Drainage Basin Urban Watershed Characterization," July 2013.
[359] SFPUC Resolution No. 12-0156 applicable to the SSIP "directs staff to return to the Commission after key project milestones have been met, and ultimately for project review and approval, following environmental review of proposed projects …"
[360] SFPUC, SSIP Phase 1 Program Executive Summary, April–June 2015.

The Urban Watershed Assessment being conducted by the SFPUC is a process by which SSIP collection system improvement projects will be developed and evaluated to achieve the endorsed goals of the SSIP. This planning process provides an integrated, urban watershed-wide approach to define the most effective capital improvement projects and policy initiatives for each of the city's eight urban watersheds (five in the Bayside Drainage Basin and three in the Westside Drainage Basin) and to address surface drainage and collection system challenges. The assessment includes several steps:

- Characterizing each watershed;
- Developing and screening watershed alternatives to meet the collection-system related SSIP goals;
- Evaluating the screened watershed alternatives to optimize financial, social, and environmental benefits; and
- Recommending an implementation strategy for all of the preferred watershed alternatives (the goal is to determine a recommended plan of collection system projects for all of the watersheds).

The Urban Watershed Assessment identified several needs related to the Bayside Drainage Basin, including management of excess stormwater and related CSDs and the fact that existing infrastructure is aging, inadequate, or in need of redundancy. Compliance with the City's Stormwater Management Ordinance and associated Stormwater Management Requirements and Design Guidelines, discussed below under Regulatory Setting, will require development on non-SFPUC properties (approximately 70 percent of the impervious surface of the drainage basin) to reduce stormwater flows to the combined sewer system, which will help manage excess stormwater flows and result in less stormwater discharged to the Bay as CSDs. Implementation of the SFPUC's Non-Potable Water Program, which is also discussed below under Regulatory Setting, is expected to increase the number of rainwater harvesting projects in the Bayside Drainage Basin, which would also reduce the amount of stormwater conveyed to the combined sewer system. Graywater[361] reuse under the Non-Potable Water Program is expected to reduce wastewater discharges to the combined sewer system, also ultimately helping reduce CSDs.

The SFPUC is also considering several incentive programs to reduce stormwater flows to the combined sewer system.[362] The Sustainable Roofs Program would encourage properties with large roofs (approximately 40 percent of the impervious surface of the drainage basin) to install green roofs (constructed with vegetation to utilize stormwater falling on the roof) or blue roofs (constructed with facilities to store stormwater flows until the peak has subsided). The Watershed Improvement Grant Program would target properties with greater than half an acre of impervious surfaces (approximately 40 percent of the impervious surface of the drainage basin) and encourage stormwater management projects on properties in areas where the system needs are greatest. The Residential Stormwater Program would target single family and two to four unit buildings (approximately 35 percent of the impervious surfaces in the drainage basin) and provide incentives for implementing a variety of stormwater runoff management technologies, including downspout disconnection, pavement removal, and rain gardens. The Urban Watershed Opportunities Report[363] evaluated

[361] Graywater is water from washing machines, showers, bathtubs, and bathroom sinks that can be used for irrigation.
[362] San Francisco Public Utilities Commission, Sewer System Improvement Program, Bayside Drainage Basin Urban Watershed Opportunities, Final Draft Technical Memorandum, July 2014.
[363] San Francisco Public Utilities Commission, Sewer System Improvement Program, Bayside Drainage Basin Urban Watershed Opportunities, Final Draft Technical Memorandum, July 2014.

opportunities for improving the collection system of the combined sewer and reducing stormwater flows to the sewer. The report identified 34 possible streetscape improvements within the Channel watershed. These streetscape projects would increase stormwater infiltration within the streets, which comprise 30 percent of the impervious surfaces within the Bayside Drainage Basin. One of the potential streetscape projects is along Townsend Street and another is along Sixth Street. None of the other potential locations are within or adjacent to the Plan Area. The report also recommended stormwater infiltration projects on publicly owned parcels within the basin to increase the infiltration of stormwater as well as daylighting of several creeks within the Bayside basin, which would accept some stormwater flows and help alleviate excess stormwater flows and associated CSDs.

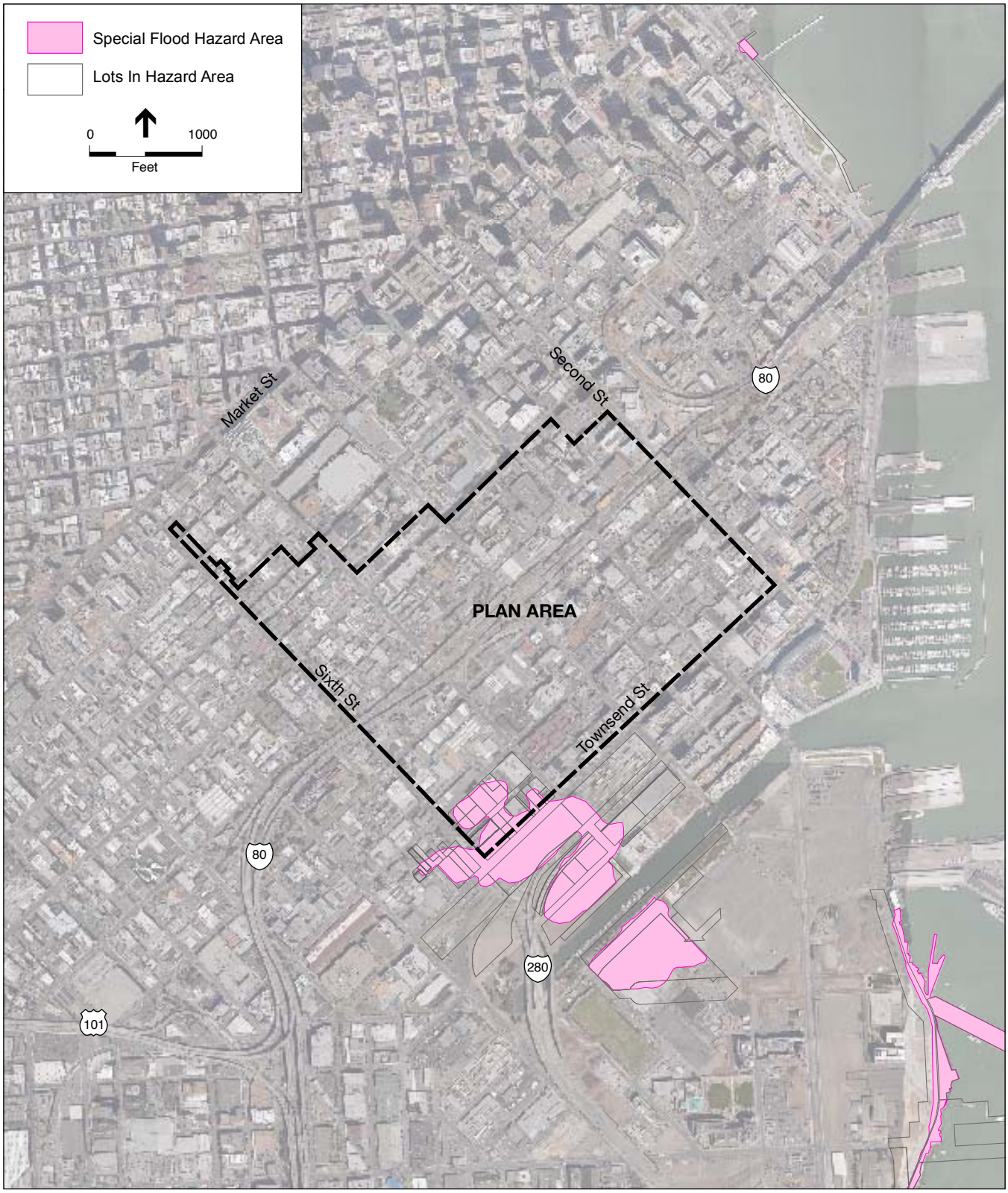
Specific needs identified for the Channel urban watershed related to combined sewer discharges and existing infrastructure include maintaining a long-term average of 10 CSD events per year from the Central Basin; providing redundancy for the Channel force main; constructing pump station reliability improvements; and renewing or replacing aging infrastructure such as the Channel treatment and storage box, Brannan Street Tunnel, North Point Main, 25.3 miles of brick sewers, 1.9 miles of high-risk sewers, and 1.4 miles of force mains.[364] Renewing or replacing infrastructure would include providing detention vaults to temporarily store peak stormwater flows, upsizing the pipes to increase conveyance capacity, and constructing CSD outfall capacity improvements that would help balance flows within the system without increasing the volume of CSDs. To reduce CSD volumes and improve the quality of CSDs, operational improvements could be made to reroute dry-weather flows, existing valves could be replaced with ones that would better restrict the discharge of sediments, discharge locations could be reconfigured, or some combination of these approaches could be used.

Bayside projects currently planned under the SSIP include the Central Bayside System Improvement Project, which will include improvements to provide redundancy to the Channel force main that transports flows from the Channel Pump Station to the SEP, along with construction of green and grey infrastructure to reduce stormwater flows to the combined sewer system; operational and seismic improvements to the SEP; operational improvements to the North Point Wet Weather Facility; and green infrastructure projects to manage stormwater before it enters the combined sewer system.

Flooding

Some low lying areas along San Francisco's Bay shoreline are subject to flooding during periods of extreme high tides, storm surge and waves, although these occurrences are relatively rare in San Francisco compared to areas prone to hurricanes or other major coastal storms or with developed areas near or below sea level. In 2008, the City adopted interim flood maps depicting the 100-year flood zone along the city's Bay shoreline. The identified flood zones in the vicinity of the Plan Area are shown on **Figure IV.I-2, San Francisco Interim Floodplain Map**. The 100-year flood zone represents areas that have a one percent chance of flooding in any single year.

[364] San Francisco Public Utilities Commission, Sewer System Improvement Program, Bayside Drainage Basin Urban Watershed Opportunities, Final Draft Technical Memorandum, July 2014.



SOURCE: San Francisco Floodplain Managment Program, 2008

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Figure IV.I-2

San Francisco Interim Floodplain Map

As shown on Figure IV.I-2, and discussed in Impact HY-5 of the Initial Study, a small portion of the Plan Area bounded by Townsend, Sixth, Brannan, and Fifth Streets is located within a Special Flood Hazard Area identified on San Francisco's Interim Floodplain Map of 2008.[365] As part of the building permit review process, project applicants for buildings located in this flood hazard area would have to comply with the standards of construction specified in the City's Floodplain Ordinance passed in 2008 and amended in 2010.[366] Accordingly, the first floor of new or substantially improved structures would be required to be elevated above the base flood elevation or otherwise flood-proofed. The remainder of this impact analysis discusses the factors contributing to coastal flooding and the potential for increased flooding in the future as a result of sea level rise.

Factors Contributing to Coastal Flooding

Coastal areas are vulnerable to periodic flooding due to storm surge, extreme tides, and waves. Rising sea level due to climate change has the potential to increase the frequency, severity, and extent of flooding in coastal areas. These factors are defined and described below.

Tides. Diurnal (twice daily) high tides along the San Francisco Bay shoreline typically range from approximately 5 to 7 feet, North American Vertical Datum of 1988 (NAVD88; approximately -4 to -6 feet San Francisco City Datum [SFD]), though annual maximum tides may exceed 7 feet NAVD88.[367] 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, and may be amplified by winter weather. King tides and other high tides can result in temporary inundation of low-lying roads, boardwalks, and waterfront promenades. A portion of The Embarcadero Promenade near Pier 14 and the Marina area in San Francisco experience inundation under current king tide conditions.[368]

Storm Surge. Storm surge occurs when persistent high winds and changes in air pressure push water towards the shore, which can raise the water level near the shoreline by several feet and may persist for several days. Along San Francisco's bay shoreline, storm surge typically raises the surface water elevation 0.5 to 3 feet during major winter storms several times a year.[369] Extreme high tides in combination with storm surge can cause inundation of low-lying roads, boardwalks, and promenades; can exacerbate coastal flooding; and can interfere with stormwater and sewer outfalls.

[365] City and County of San Francisco, San Francisco Interim Floodplain Map, Northeast, Final Draft, July 2008.
[366] Office of the City Administrator, San Francisco Floodplain Management Program Fact Sheet, revised March 1, 2016.
[367] San Francisco City Datum (SFD) establishes the City's zero point for surveying purposes at approximately 11.3 feet above the current 1988 North American Vertical Datum. Street elevations on Department of Public Works maps are given in SFD, and this datum is commonly used in mapping and technical reports in the City.
[368] San Francisco Public Utilities Commission (SFPUC), *Climate Stressors and Impact: Bayside Sea Level Rise Mapping*, Final Technical Memorandum (hereinafter "SFPUC, *Bayside Sea Level Rise Mapping*"). Prepared for San Francisco Public Utilities Commission by the Sewer System Improvement Program, Prepared by Program Management Consultant AECOM Contract CS-165, June 2014.
[369] SFPUC, *Bayside Sea Level Rise Mapping*.

The degree of storm surge depends on the severity of the storm as well as tidal levels at the time of the storm and is characterized using a return period, which 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 one percent chance of occurring in any year.

Storm Waves. Waves and wave run-up primarily affect 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, the Pacific Ocean waves which are generally larger than those originating in the Bay are substantially dampened along the Bay shoreline due to transformation processes within San Francisco Bay. Along San Francisco's bay shoreline, storm waves typically raise the surface water elevation 1 to 4 feet during major winter storms several times a year.[370]

El Niño winter storms. During El Niño,[371] atmospheric and oceanographic conditions in the Pacific Ocean bring warm, higher waters to the Bay Area and may produce severe winter conditions that bring intense rainfall and storm conditions to the Bay Area. Tides are often elevated 0.5 to 3.0 feet above normal along the coast for months at a time, and additional storm surge and wave setup during storm events can elevate water levels even further. El Niño conditions prevailed in 1977–1978, 1982–1983, 1997–1998, and 2009–2010. Typical impacts include severe flooding of low-lying roads, boardwalks and waterfront promenades; storm drain backup; wave damage to coastal structures and erosion of natural shorelines.

Sea Level Rise. Seas are rising globally due to climate change, and are expected to continue to rise at an accelerating rate for the foreseeable future. The sea level at the San Francisco tidal gauge has risen 8 inches over the past century. The National Research Council's (NRC's) 2012 report, *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*, provides a scientific review of sea level rise for the West Coast and provides the most recent regional sea level rise predictions for 2030, 2050, and 2100, relative to year 2000 sea level.[372] 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 (see **Table IV.I-1, Sea Level Rise Estimates for San Francisco Relative to the Year 2000**). As presented in the NRC Report, these sea level rise projections represent likely sea level rise values based on the current understanding of global climate change and assuming a moderate level of greenhouse gas (GHG) emissions[373] and extrapolation of continued accelerating land ice melt patterns.

[370] SFPUC, *Bayside Sea Level Rise Mapping*.
[371] El Niño–Southern Oscillation (ENSO) is a natural oceanic-atmospheric cycle. El Niño conditions are defined by prolonged warming in the Pacific Ocean sea surface temperatures. Typically, this happens at irregular intervals of two to seven years, and can last anywhere from nine months to two years.
[372] National Research Council, *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*, Washington, DC: The National Academies Press, 2012. Available at http://www.nap.edu/catalog.php?record_id=13389, accessed October 1, 2014.
[373] 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 sea level rise 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 non-fossil fuels), as well as an assumption of high economic growth; this represents scenario "A1B" as described by the Intergovernmental Panel on Climate Change (IPCC).

TABLE IV.I-1 SEA LEVEL RISE ESTIMATES FOR SAN FRANCISCO RELATIVE TO THE YEAR 2000

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

SOURCE: National Research Council, 2012.

The NRC report also includes ranges of sea level rise 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 sea level rise that are based on very high GHG emissions scenarios and significant ice melt that is not currently anticipated, but could occur. Assuming the maximum level of greenhouse gas emissions and ice melt, the NRC anticipates that sea levels in the San Francisco Bay area could rise up to 24 inches by 2050 and 66 inches by 2100 as presented in Table IV.I-1.

The estimates represent the permanent increase in Mean Sea Level and the associated average daily high tide conditions (represented by Mean Higher High Water, or MHHW),[374] that could result from sea level rise; they do not take into account storm surge, extreme tides, or waves 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 sea level rise guidance to adopt the NRC Report as the current best available science on sea level rise for California.[375] The California Coastal Commission supports the use of the NRC Report as the best science currently available in its *Sea Level Rise Policy Guidance*, adopted in 2015.[376] The San Francisco Bay Conservation and Development Commission (BCDC) also considers the NRC Report to be the best available science-based prediction of sea level rise for San Francisco Bay. Accordingly, this EIR considers the NRC Report to be the best science currently available on sea level rise affecting San Francisco for both CEQA and planning purposes.

Although the NRC Report provides the best available sea level rise projections for San Francisco Bay at this time, scientific uncertainty remains regarding the rate and magnitude of sea level rise. Sea level rise projections beyond 2050 are highly dependent on assumptions regarding future GHG emissions and future changes in the rate of land ice melting. In recognition of this uncertainty, State of California Sea-Level Rise Guidance recommends an adaptive management approach, incorporating risk assessment, for development in areas that may be subject to sea level rise beyond 2050.[377]

[374] Mean higher high water is the higher of each day's two high tides averaged over time.
[375] State of California, *State of California Sea-Level Rise Guidance Document*, Developed by the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), with science support provided by the Ocean Protection Council's Science Advisory Team and the California Ocean Science Trust, March 2013 Update. Available at http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf/.
[376] California Coastal Commission, 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 at http://documents.coastal.ca.gov/assets/slr/guidance/August2015/0_Full_Adopted_Sea_Level_Rise_Policy_Guidance.pdf, accessed November 28, 2015.
[377] State of California, *State of California Sea-Level Rise Guidance Document*.

Sea Level Rise Inundation Mapping

The SFPUC, as part of the planning for its SSIP, has developed a series of maps published in 2014 that represent areas of inundation along both the Bay and Ocean shorelines of San Francisco. These maps use a one-meter horizontal grid resolution[378] based on the 2010/2011 California Coastal Mapping Program LiDAR.[379] The inundation maps leverage data from FEMA's California Coastal Analysis and Mapping Project, which includes detailed coastal engineering analyses and mapping of the San Francisco Bay shoreline.

The SFPUC inundation maps evaluate scenarios that represent the NRC projections of sea level rise in combination with the effects of storm surge. They represent permanent inundation that could occur as a result of total water level rises (over and above year 2000 MHHW) based on daily tidal fluctuations. Each scenario also addresses temporary inundation that could occur from extreme tides and one-year, two-year, five-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.

The scenarios listed below represent Bay water elevations that could occur by the year 2050 and the year 2100 based on the NRC's projected level of sea level rise and considering 100-year storm surge:

- MHHW plus 12 inches of sea level rise (representative of NRC's projected sea level rise by 2050);
- MHHW plus 36 inches of sea level rise (representative of NRC's projected sea level rise by 2100);
- MHHW plus 52 inches of sea level rise (representative of NRC's projected sea level rise by the year 2050 in combination with 100-year storm surge); and
- MHHW plus 77 inches of sea level rise (representative of NRC's projected sea level rise by the year 2100 in combination with 100-year storm surge).

The following scenarios represent the maximum Bay water elevations that could occur by the year 2100, based on the NRC's upper range of sea level rise and considering 100-year storm surge:

- MHHW plus 66 inches of sea level rise (representative of NRC's upper range of sea level rise by 2100); and
- MHHW plus 107 inches of sea level rise (representative of NRC's upper range of sea level rise 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 constructed. 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 construction of these measures. In addition, because the SFPUC sea level rise maps are based on 2010/2011 topographic

[378] 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.

[379] LiDAR (Light Detection and Ranging) is a remote sensing technology that measures distance by illuminating a target with a laser and analyzing the reflected light. LiDAR is commonly used to create high-resolution terrain models, topography data sets, and topographic maps.

mapping, they do not account for placement of fill that could be conducted at individual development sites to prevent future flooding due to sea level rise.

The SFPUC inundation maps indicate that the Plan Area would not be permanently inundated with a sea level rise of 12 inches that is expected by 2050 or a sea level rise of 36 inches which is expected by 2100.[380] Water levels could temporarily rise to 11 feet NAVD88 (-0.7 feet SFD) with 12 inches of sea level rise and 100-year storm surge. As shown on **Figure IV.I-3, Inundation with 12 Inches of Sea Level Rise plus 100-Year Storm Surge**, a very small area in the southwest portion of the Plan Area would be temporarily flooded to a depth of approximately two feet, with local inundation as deep as six feet under this scenario.[381] Similar to flooding under current conditions, the potential flooding zone is roughly bounded by Townsend, Sixth, Brannan, and Fifth Streets.

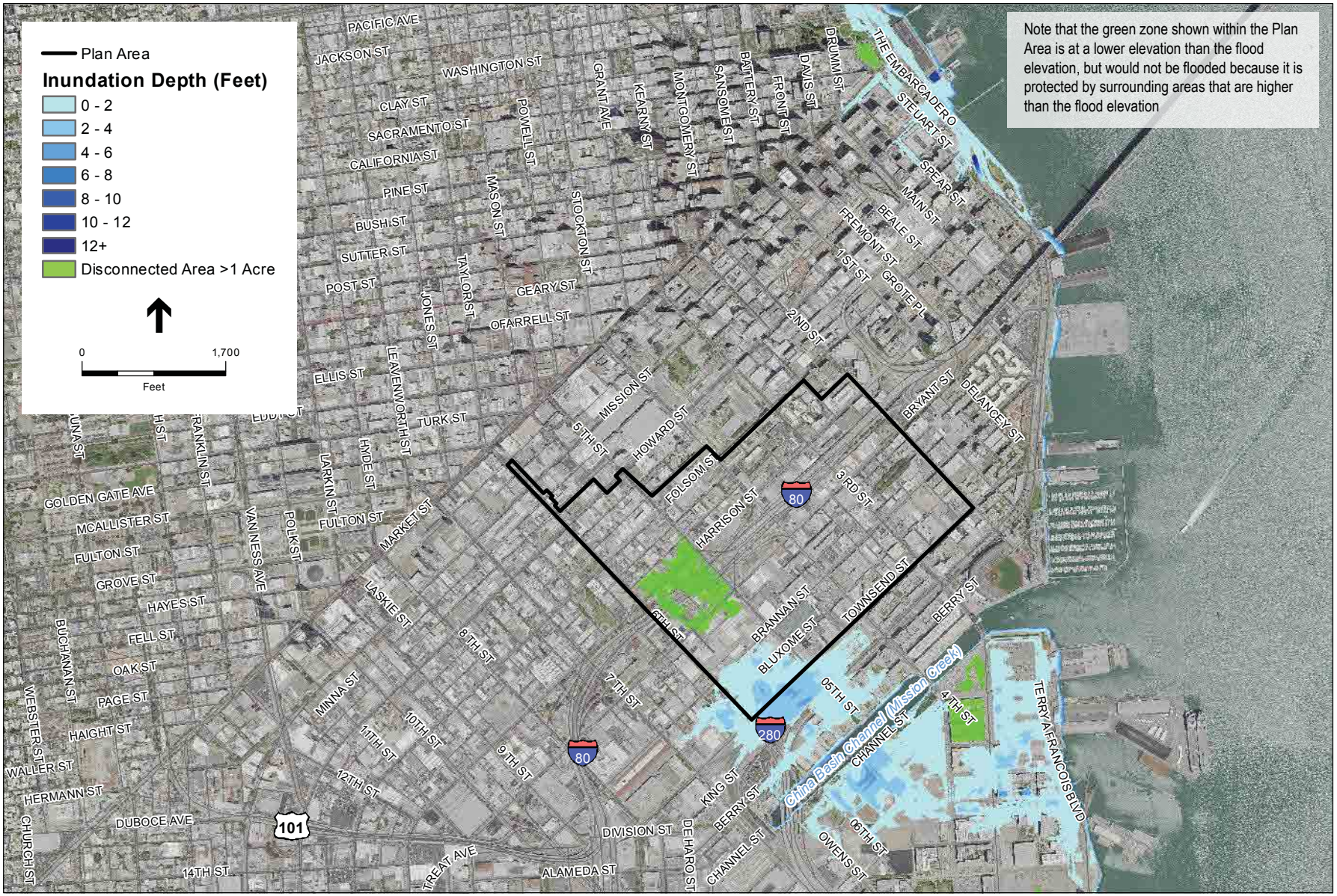
With 36 inches of sea level rise that is expected by 2100 and 100-year storm surge, water levels could temporarily reach 13 feet NAVD88 (1.4 feet SFD) and a larger area within the southwest portion of the Plan Area would be temporarily flooded. As shown on **Figure IV.I-4, Inundation with 36 Inches of Sea Level Rise plus 100-Year Storm Surge**, most of the area bounded by Sixth Street, Folsom Street, Fourth Street, and Townsend Street would be flooded to depths of at least two feet with localized areas being inundated to depths of approximately eight feet.

Planning for Sea Level Rise in San Francisco

Mayor Edwin M. Lee also established two interdepartmental committees to manage the City's efforts on addressing sea level rise: the Sea Level Rise (SLR) Coordinating and SLR Technical Committees. The SLR Coordinating Committee was established in February of 2005 and is a director-level committee co-chaired by the Director of Citywide Planning at the Planning Department and the City Engineer and Deputy Director at the SFPW. SLR Coordinating Committee members also include the Chief Resiliency Officer, and senior staff from the Mayor's Office, the City Administrator's Office, the San Francisco Airport (SFO), the Port, the SFPUC, MTA, Department of Building Inspection (DBI), Office of Community Investment and Infrastructure (OCII), Office of Economic and Workforce Development (OEWD), and the Capital Planning Committee. The responsibilities of the SLR Coordinating Committee are as follows:

- 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 sea level rise;
- Coordinate local efforts and initiatives with the work of other governmental entities and various stakeholders at the regional, state, and national levels such as U.S. Environmental Protection Agency (U.S. EPA), U.S. Department of Housing and Urban Development (HUD), Department of the Interior, California Coastal Commission, California Ocean Protection Council, BCDC, etc.;
- Provide guidance and specific recommendations to City departments with regard to land use and strategies to protect assets and communities along the shoreline;

[380] SFPUC, *Bayside Sea Level Rise Mapping*.
[381] Note that the green zone shown within the Plan Area on Figure IV.I-3 is at a lower elevation than the flood elevation, but would not be flooded because it is protected by surrounding areas that are higher than the flood elevation.

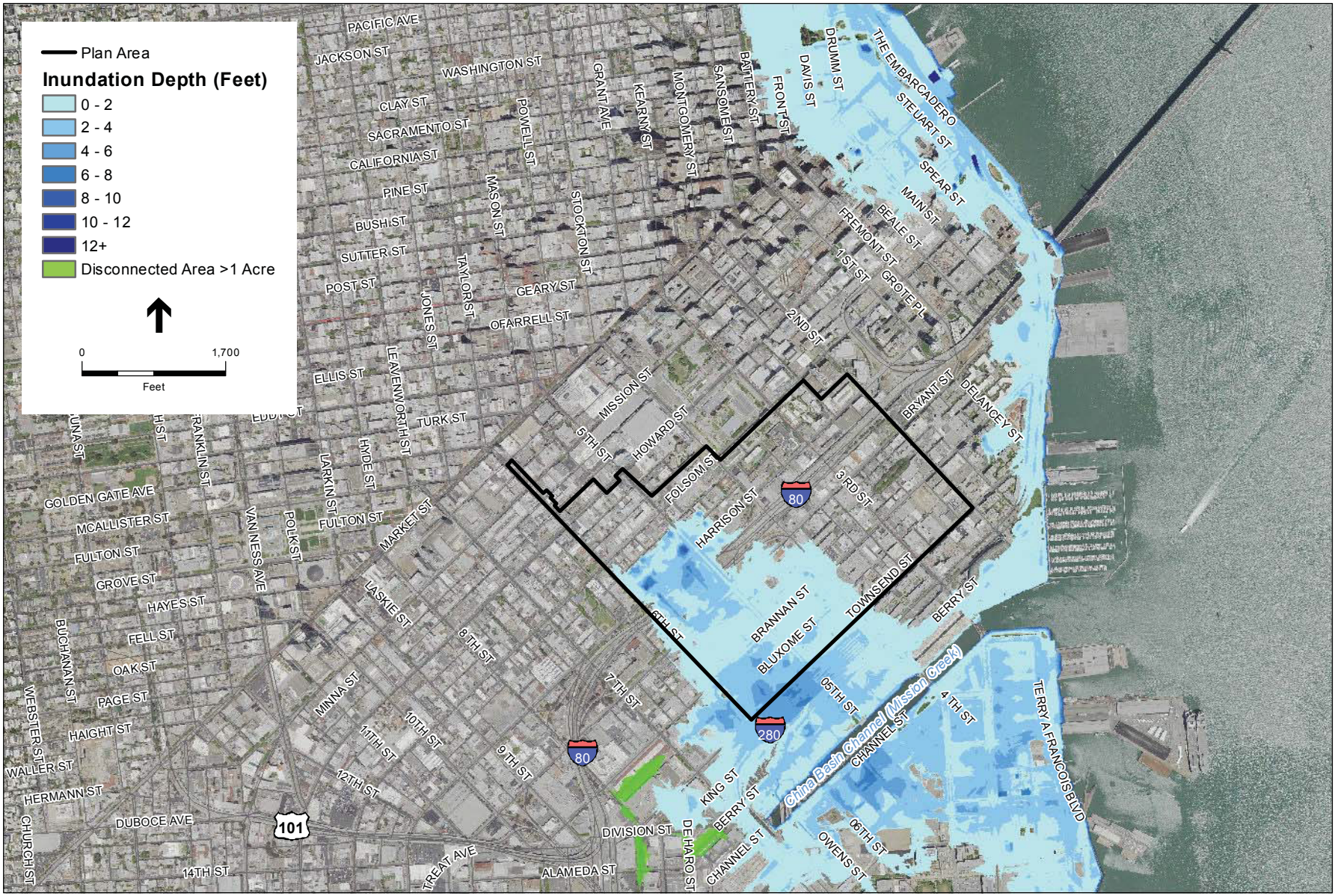


SOURCE: USDA, 2014; San Francisco Public Utilities Commission, 2014; AECOM, 2014; ESA, 2015

Case No. 2011.1356E: Central SoMa Plan

Figure IV.I-3

Inundation with 12 Inches of Sea Level Rise plus 100-year Storm Surge



SOURCE: USDA, 2014; San Francisco Public Utilities Commission, 2014; AECOM, 2014; ESA, 2015

Case No. 2011.1356E: Central SoMa Plan

Figure IV.I-4

Inundation with 36 Inches of Sea Level Rise plus 100-year Storm Surge

- Oversee and guide the existing SLR Technical Committee and implementation of the Capital Planning Guidance to address vulnerability and risks, and adaptability of the City's physical infrastructure; and
- 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 sea-level rise. 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 non-governmental organizations and with community stakeholders, as needed. Key to this effort will be determining how to best involve the community.

The SLR Technical Committee was established in February of 2015 and is comprised of the same membership that developed the Capital Planning Committee's Sea Level Rise Guidance, including the SFPUC, Port, SFPW, SFO, SFMTA, SFMTA, Capital Planning, 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 14, 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.[382] The guidance document has been revised to simplify the analysis of specific sea level rise 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, and was adopted by the Capital Planning Committee on December 14, 2015.[383]

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 by the Planning Department and Public Works, along with other City departments and a consultant team.[384] The Action Plan is intended to guide City departments in their understanding of and adaptation to the impacts of sea level rise, and it also identifies what long-term sea level rise means for San Francisco's residents, visitors, economy and waterfront.

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.

[382] City and County of San Francisco Sea Level Rise Committee, *Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation*, September 14, 2015. Available at http://onesanfrancisco.org/wp-content/uploads/San%20Francisco%20SLR%20Guidance%20Adopted%209.22.14%2012182014.pdf, accessed March 15, 2016.
[383] City and County of San Francisco Sea Level Rise Committee, *Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation*, December 14, 2015. Available at http://onesanfrancisco.org/wp-content/uploads/Guidance-for-Incorporating-Sea-Level-Rise-into-Capital-Planning1.pdf, accessed January 22, 2016.
[384] City and County of San Francisco, *Sea Level Rise Action Plan*, March 2016. Available at http://default.sfplanning.org/plans-and-programs/planning-for-the-city/sea-level-rise/160309_SLRAP_Final_ED.pdf.

The Adaptation Plan will also identify potential funding sources, governance structures, and implementation timelines.

The Action Plan establishes an overarching vision, goals, and a set of guiding principles for sea level rise 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 a citywide Sea Level Rise Adaptation Plan.

Mission Creek Sea Level Rise Adaptation Study

The San Francisco Bay Area Planning and Urban Research Association (SPUR) released the Mission Creek Sea Level Rise Adaptation Study in September 2016.[385] This study was prepared on the behalf of a several City and regional agencies and groups including the Port, BCDC, Delta Alliance, SFPUC, SFPW, San Francisco City Administrator, and San Francisco Planning Department. The study concluded that future flooding in the South of Market area due to sea level rise could occur due to low points along the northern Mission Creek shoreline that will provide paths for inundation. Flooding that could occur by 2050 could be prevented by raising a few low spots along the creek shoreline to cutoff pathways of inundation. The entire shoreline would need to be raised to prevent flooding that could occur by 2100.

The study evaluated seven adaptation concepts to control flooding as a result of sea level rise. These include three that focus on adaptations to Mission Creek and four that focus on adaptations to the Bay shoreline. All three of the Mission Creek concepts would reduce future flooding hazards in the Plan Area. The first concept includes constructing perimeter shoreline protection features to address vulnerable low spots. The measures implemented under this concept could include a mix of levees and seawalls. The second concept includes constructing a tidal barrier at the mouth of Mission Creek that can be closed during high tides and storm surge. The third concept includes completely closing off Mission Creek from the Bay with a levee or dam. All of the concepts focusing on the Bay shoreline include improvements that would be constructed to the south of Mission Creek. These measures would not address flooding issues in the Plan Area. To select the best option to control flooding due to future sea level rise, the study recommends completing a citywide adaptation plan.

Planning for Climate Change under the SFPUC Sewer Improvement Program

The SFPUC is also addressing sea level rise as part of its Sewer System Improvement Program, and is conducting a detailed analysis of the potential for new and existing combined sewer infrastructure to be affected by sea level rise.[386] Accordingly, all new facilities will be built using a climate change criterion so the combined sewer system will be better able to respond to rising sea levels. Because rising sea levels and storm surge could potentially inundate the combined sewer system and exacerbate existing flooding from the sewer system, or cause new flooding, the SFPUC is also evaluating alternatives such as the installation of backflow preventers on the CSD structures to restrict the intrusion of Bay water into the combined sewer system.

[385] San Francisco Bay Area Planning and Urban Research Association (SPUR), Mission Creek Sea Level Rise Adaptation Study, September 2016. Available at http://www.spur.org/sites/default/files/publications_pdfs/Mission_Creek_Sea_Level_Rise_Adaptation_Study.pdf, accessed October 18, 2016.

[386] San Francisco Public Utilities Commission, *Bayside Drainage Basin Urban Watershed Opportunities*, Final Draft Technical Memorandum, July 2014.

IV.I.3 Regulatory Framework

Federal Regulations

Clean Water Act – Water Quality

In 1972, the Clean Water Act (CWA) established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gave the U.S. Environmental Protection Agency (U.S. EPA) the authority to implement pollution control programs. The CWA sets water quality standards for contaminants in surface waters. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, to finance municipal wastewater treatment facilities, and to manage polluted runoff. The U.S. EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and programs in California to the State Water Resources Control Board (SWRCB) and the nine RWQCBs. Water quality standards applicable to the project are listed in the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), discussed further below under State Regulations.

Section 303(d) and Total Maximum Daily Loads

In accordance with Section 303(d) of the CWA, states must present the U.S. EPA with a list of "impaired water bodies," defined as those water bodies that do not meet water quality standards. The CWA requires the development of total maximum daily loads (TMDLs) to improve water quality of impaired water bodies. Implementation of this program in the project area is conducted by the RWQCB and is discussed below under the heading State Regulations.

Section 402

Section 402 of the CWA authorizes the U.S. EPA to establish a nationwide surface water discharge permit program for municipal and industrial point sources known as the National Pollutant Discharge Elimination System (NPDES) program. Under Section 402, the San Francisco Bay RWQCB has set standard conditions for each permittee in the Bay Area, including effluent limitation and monitoring programs. The stormwater and wastewater discharges under a subsequent development project would be subject to the City's NPDES permit requirements for the Bayside facilities described below under the heading State Regulations.

Federal Combined Sewer Overflow Control Policy

In 1994, the U.S. EPA adopted the Combined Sewer Overflow Control Policy (CSO Control Policy), which became part of the CWA in December 2000. This policy establishes a consistent national approach for controlling discharges from combined sewers to the nation's waters. Using the NPDES permit program, the permittee (e.g., the City, for its waste water control and treatment facilities) is required to implement the following nine minimum controls that constitute the technology-based requirements of the CWA and can reduce the frequency of CSDs and their effects on receiving water quality:

- Conduct proper operation and regular maintenance programs for the combined sewer system and CSD outfalls;

- Maximize the use of the collection system for storage;
- Review and modify pretreatment programs to minimize the effect of non-domestic discharges to the collection system;
- Maximize flow to the SEP and North Point Wet Weather Facility for treatment;
- Prohibit CSDs during dry weather;
- Control solids and floatable materials in CSDs;
- Develop and implement a pollution prevention program focused on reducing the effect of CSDs on receiving waters;
- Notify the public of CSDs; and
- Monitor to effectively characterize CSD effects and the efficacy of CSD controls.

The City is currently implementing these controls as required by the CSO Control Policy and has also developed a long-term control plan to optimize operations of the wastewater collection and treatment system and maximize pollutant removal during wet weather.

Consistent with the CSO Control Policy and the Long-Term Control Plan, the City captures and treats 100 percent of the combined sewage flow collected in the combined sewer system during precipitation events. Captured flows are directed first to the SEP and North Point Wet Weather Facility for primary or secondary treatment. Flows in excess of the capacity of these facilities are diverted to storage and transport boxes constructed around much of the city, and receive the equivalent to primary treatment prior to discharge to San Francisco Bay. The Long-Term Control Plan specifies operational parameters that must be met in each drainage basin before a CSD can occur, and includes the long-term average annual design goals for CSDs.

State Regulations

California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Division 7 of the *California Water Code*) provides for protection of the quality of waters of the State of California for use and enjoyment by the people of California. The act also establishes provisions for a statewide program for the control of water quality, recognizing that waters of the state are increasingly influenced by inter-basin water development projects and other statewide considerations, and that factors such as precipitation, topography, population, recreation, agriculture, industry, and economic development vary regionally within the state. The statewide program for water quality control is therefore administered most effectively on a local level with statewide oversight. Within this framework, the act authorizes the SWRCB and RWQCBs to oversee the coordination and control of water quality within California.

San Francisco Bay Water Quality Control Plan (Basin Plan)

San Francisco Bay waters are under the jurisdiction of the San Francisco Bay RWQCB, which has established regulatory standards and objectives for water quality in the Bay in the *Water Quality Control Plan for the San Francisco Bay Basin*, commonly referred to as the Basin Plan.[387] The Basin Plan identifies existing and potential beneficial uses for surface waters and provides numerical and narrative water quality objectives designed to protect those uses. The preparation and adoption of water quality control plans is required by the *California Water Code* (Section 13240) and supported by the federal CWA. Because beneficial uses, together with their corresponding water quality objectives, can be defined per federal regulations as water quality standards, the Basin Plan is a regulatory reference for meeting the state and federal requirements for water quality control. Adoption or revision of surface water standards is subject to the approval of the U.S. EPA.

The Plan Area is located adjacent to Lower San Francisco Bay, which extends from approximately the Bay Bridge on the north to the Dumbarton Bridge on the south. During wet weather, the Channel urban watershed discharges excess flows via nine CSD outfalls: two that drain directly into Central or Lower San Francisco Bay and seven that drain into Mission Creek, which ultimately drains to Lower San Francisco Bay.[388] Identified beneficial uses for Mission Creek include commercial and sport fishing, estuarine habitat, wildlife habitat, water contact recreation, noncontact water recreation, and navigation. Identified beneficial uses for Central and Lower San Francisco Bay include industrial service supply, commercial and sport fishing, shellfish harvesting, estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, noncontact water recreation, and navigation. Central San Francisco Bay also has a beneficial use of industrial process supply.

Impaired Water Bodies and Total Maximum Daily Loads

As described above under Section 303(d) of the CWA, states must present the U.S. EPA with a list of "impaired water bodies," defined as those water bodies that do not meet water quality standards. The proposed project is located inland from Lower San Francisco Bay. The RWQCB has listed Central and Lower San Francisco Bay and Mission Creek as impaired water bodies for a number of pollutants, including industrial and other chemicals, pesticides, metals, invasive species, and trash.[389]

As required by the CWA, the U.S. EPA requires the development of TMDLs to improve water quality of impaired water bodies. The first step of the TMDL process is development of a TMDL report describing the water quality problem, detailing the pollutant sources, and outlining the solutions. An implementation plan, included in the TMDL report, describes how and when pollution prevention, control, or restoration activities will be accomplished and who will be responsible for these actions. The final step of the TMDL process is adopting and amending the Basin Plan to legally establish the TMDL and to specify regulatory requirements

[387] San Francisco Bay Regional Water Quality Control Board (RWQCB), *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), June 29, 2013. Available at http://www.swrcb.ca.gov/rwqcb2/water_issues/programs/planningtmdls/basinplan/web/docs/BP_all_chapters.pdf, accessed March 4, 2015.
[388] The Bay Bridge divides the Central and Lower basins of San Francisco Bay, according to the Basin Plan.
[389] State Water Resources Control Board, *2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) — Statewide*. Available at http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml, accessed October 2, 2014.

for compliance. As part of a Basin Plan amendment, waste load allocations are specified for entities that have permitted discharges.

TMDLs for polychlorinated biphenyls (PCBs) and mercury in San Francisco Bay have been approved by the U.S. EPA and officially incorporated into the Basin Plan. The RWQCB also adopted the San Francisco Bay Watershed Permit (Order No. R2-2012-0096) which addresses mercury and PCBs in municipal and industrial wastewater discharges.[390]

NPDES Waste Discharge Regulations

As discussed above under the heading Federal Regulations, Section 402 of the federal CWA established the NPDES program to protect water quality of receiving waters. The NPDES program requires all facilities that discharge pollutants into waters of the United States to obtain a permit. The permit provides two levels of control—technology-based limits and water-quality-based limits—to control discharge of pollutants for the protection of water quality. Technology-based limits are based on the ability of dischargers in the same category to treat wastewater, while water quality-based limits are required if technology-based limits are not sufficient to protect the water body. Water quality-based effluent limitations required to meet water quality criteria in the receiving water are based on federal and state regulations, including the Basin Plan. In California, the SWRCB and the RWQCBs implement and enforce the NPDES program.

Southeast Plant, North Point, and Bayside Facilities NPDES Permit

The City currently holds an NPDES permit, adopted by the RWQCB in August 2013, that covers the SEP, the North Point Wet Weather Facility, and all of the bayside wet-weather facilities, including CSDs to the Bay.[391] The permit specifies discharge prohibitions, dry-weather effluent limitations, wet-weather effluent performance criteria, receiving water limitations, sludge management practices, and monitoring and reporting requirements. The permit prohibits overflows from the combined sewer discharge structures during dry weather, and requires wet-weather overflows to comply with the nine minimum controls specified in the federal CSO Control Policy, described above, and the City's Long-Term Control Plan. Areas that drain to the city's combined sewer system—the vast majority of the city, including the Plan Area—are subject to this permit.

As also discussed above in regard to the federal CSO Control Policy, the NPDES permit does not explicitly regulate the number, volume, duration, or frequency of CSDs from the combined sewer system, but instead requires that the system meet the long-term average annual design goals for CSDs. Under the Long-Term Control Plan, the City must optimize operations of the combined sewer system to minimize CSD frequency, magnitude, and duration and maximize pollutant removal during wet weather and must also provide treatment of all discharges from the combined sewer system, including CSDs. The NPDES permit also requires

[390] San Francisco Bay Regional Water Quality Control Board, *Waste Discharge Requirements for Mercury and PCBs from Municipal and Industrial Wastewater Discharges to San Francisco Bay, Order No. R2-2012-0096, NPDES No. CA0038849*, adopted December 12, 2012. Available at http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2012/R2-2012-0096.pdf pdf, accessed October 2, 2014.

[391] Regional Water Quality Control Board, San Francisco Bay Region, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0037664, Order No. R2-2013-0029, for City and County of San Francisco Southeast Water Pollution Control Plant, North Point Wet Weather Facility, Bayside Wet Weather Facilities and Wastewater Collection System, adopted January 31, 2008.

the City to monitor the water quality of all CSDs and the efficacy of wet weather discharge controls. If the CSDs cause a violation of water quality standards in the receiving water, the City must evaluate its Long-Term Control Plan and combined sewer system operation to ensure compliance with water quality standards.

Local and Regional Regulations and Plans

Stormwater and Wastewater Management

Stormwater Management Ordinance and Stormwater Management Requirements and Design Guidelines

Development projects that discharge stormwater to the combined sewer system or a separate stormwater system must comply with the City's Stormwater Management Ordinance contained in Article 4.2 of the *Public Works Code*, Section 147, which was last updated on April 27, 2016. The SFPUC and the Port of San Francisco have developed San Francisco Stormwater Management Requirements and Design Guidelines in accordance with the requirements of Article 4.2.

The Stormwater Management Requirements and Design Guidelines describe the regulatory context for a post-construction stormwater control program and provide four tools to help project developers achieve compliance with stormwater management requirements, including but not limited to:

- A set of stormwater BMP fact sheets;
- A vegetation palette to assist in bioretention BMP-appropriate plant selection;
- Sizing calculators to determine the required size of each BMP; and
- Illustrative examples of green infrastructure.

In accordance with the Stormwater Management Requirements and Design Guidelines, developers of projects that create and/or replace 5,000 square feet or more of impervious surfaces and discharge to the combined sewer system must implement BMPs to manage the flow rate and volume of stormwater going into the sewer system by achieving the equivalence of Leadership in Energy and Environmental Design (LEED)® for New Construction Version 2.2 Sustainable Sites Credit 6.1 (Stormwater Design—Quantity Control).[392] For covered projects with less than 50 percent existing impervious surfaces, the stormwater management approach must prevent the runoff flow rate and volume from exceeding existing conditions for the one- and two-year 24-hour design storm. For covered projects that include more than 50 percent impervious surfaces—which is the case for the vast majority of the Plan Area—the stormwater management approach must reduce the existing runoff flow rate and volume by 25 percent for a two-year 24-hour design storm.

[392] LEED® is a green building certification system administered by the United States Green Building Council. The certification protocols are periodically updated (as of 2015, Version 4 is the newest version). However, LEED standards are not prescriptive in the way that, for example, the *Building Code* must be complied with, and the reference in the Stormwater Guidelines to a particular LEED credit is for information only.

The Stormwater Management Requirements and Design Guidelines also require developers to use certain preferred BMPs to the maximum extent feasible before considering use of remaining BMPs. The preferred BMP hierarchy prioritizes infiltration-based BMPs, rainwater harvesting, and vegetated roofs followed by lined bioretention (e.g., lined bioretention materials with an underdrain, commonly known as a "flow-through planter"). If none of these BMPs are feasible on site, projects may be able to incorporate high-rate filtration BMPs (e.g., tree-box filters and media filters) into their site design pending approval by the SFPUC.

The SFPUC inspects stormwater BMPs once they are constructed, and any issues noted by the inspection must be corrected. The owner is responsible for completing an annual self-certification inspection, and must submit completed checklists and maintenance logs for the year to the SFPUC. In addition, the SFPUC inspects all stormwater BMPs every third year. Any issues identified by either inspection must be resolved. Projects that are required to implement the San Francisco Stormwater Management Requirements and Design Guidelines are also subject to review by the Department of Building Inspection, and are subject to building code provisions that include provisions for managing drainage for new construction.

Modified Compliance Program

The City has developed the Modified Compliance Program to allow development projects with proven site challenges and limitations to modify the standard stormwater performance requirements set by the Stormwater Management Requirements and Design Guidelines. The Modified Compliance Program applies only to projects served by the combined sewer system.

In order to qualify for modified compliance, a site owner must submit a modified compliance application to the SFPUC that documents existing and proposed site features that limit infiltration such as high groundwater, shallow depth to bedrock, poorly infiltrating soils, steep slopes, contamination, or limited space for infiltration. The application also requires the applicant to estimate the non-potable demand for the project if the project is subject to the City's Recycled Water Ordinance. Based on this information, the SFPUC can decrease the amount of stormwater runoff volume the applicant must reduce; and would increase the required flow rate reduction by the same percentage.

Construction-Related Stormwater Discharges to the Combined Sewer System

Discharges of construction-related stormwater runoff to the combined sewer system are subject to the construction site runoff requirements of Article 4.2 of the *Public Works Code*, Section 146. In accordance with these requirements, any site that disturbs more than 5,000 square feet of land must obtain a Construction Site Runoff Control Permit. Covered land disturbing activities include building demolition, clearing, grading, grubbing, filling, stockpiling, excavating, and transporting soil. The permit specifically requires easements for drainage facilities; provision of adequate dust controls in conformance with applicable air pollution laws and regulations; and improvement of any existing grading, ground surface, or site drainage to meet the requirements of Article 4.2. The application for the permit must also include an Erosion and Sediment Control Plan. For private projects, a building permit cannot be issued until a Construction Site Runoff Control Permit has been issued.

Under the Construction Site Runoff Control Permit, the site operator would be required to conduct daily inspections and maintenance of all erosion and sediment controls and must provide inspection and maintenance information to the SFPUC. The SFPUC would also conduct periodic inspections of the project site

to ensure compliance with the plan. The project sponsor would be required to notify the SFPUC at least two days prior to the start of construction, completed installation of erosion and sediment control measures, completion of final grading, and project completion. At the SFPUC's discretion, sampling, metering, and monitoring may also be required.

Wastewater Discharges to the Combined Sewer System

Discharges of non-sewage wastewater to the combined sewer system, such as groundwater produced during dewatering, are subject to the permit requirements specified in Article 4.1 of the *Public Works Code* and supplemented by Department of Public Works Order No. 158170. The permit requires development and implementation of a pollution prevention program and specifies discharge limitations for specific chemical constituents as well as general conditions for the discharge. In addition, the discharge must meet the pretreatment standards specified in Article 4.1 and the discharger must monitor the discharge quality for compliance with permit limitations. The discharger must also submit periodic reports to the SFPUC which also conducts periodic inspections to ensure compliance.

San Francisco Non-Potable Water Program

In 2012, the City amended the *Health Code* to add Article 12C, Alternate Water Sources for Non-Potable Applications (commonly referred to as the Non-potable Water Ordinance), to allow for the collection, treatment, and use of alternate water sources for non-potable applications. The ordinance was amended in 2013 to allow implementation of shared non-potable water systems for multiple buildings, referred to as district-scale water systems. In 2015, the ordinance was again amended: effective November 1, 2015, all new buildings of 250,000 square feet or greater that are within the City's designated recycled water use area,[393] such as those within the Plan Area, must be constructed, operated, and maintained using available alternate water sources for toilet and urinal flushing and irrigation. As of one year later—November 1, 2016, this requirement will apply citywide to all new buildings 250,000 square feet in floor area or larger. Article 12C also requires that all new buildings of 40,000 square feet or larger prepare water budget calculations for review and approval by the SFPUC. In practice, Article 12C requires such new large buildings to employ non-potable water for toilet and urinal flushing, through the on-site collection, storage, treatment, and reuse of rain water, graywater (e.g., wastewater from bathtubs, showers, bathroom sinks, lavatories, clothes washing machines, and laundry tubs), water pumped from below grade for foundation drainage, and, if necessary, stormwater (surface runoff) and blackwater (e.g., wastewater from toilets, dishwashers, kitchen sinks, and utility sinks).

San Francisco Reclaimed Water Use Ordinance

The Recycled Water Ordinance, which added Article 22 of the *Public Works Code*, requires property owners to install recycled water systems in certain new construction, modified, or remodel projects. The goal of the ordinance is to maximize the use of recycled water. Buildings and facilities that are located within the designated recycled water use areas, such as those within the Plan Area, are required to use recycled water for

[393] The recycled water use area covers downtown from Sansome Street east, South of Market from Seventh Street east and, west of Second Street, from Mission Street south, much of the Third Street corridor south to Newcomb Avenue, Hunters Point, Treasure Island and Yerba Buena Island, the Presidio, Golden Gate Park, Lincoln Park, the area around Lake Merced, and the Great Highway. The entire Central SoMa Plan Area is within the recycled water use area.

all uses authorized by the State of California. Some of the common uses include irrigation, cooling, and/or toilet and urinal flushing. These systems must meet San Francisco's *Plumbing Code* and *Health Code*, which include specifications for pipe type, pipe separation, backflow prevention assemblies, water meters, and signage.

The requirements of the Recycled Water Ordinance apply to properties located within the designated recycled water use areas under the following circumstances:

- New construction or major alterations to a building totaling 40,000 square feet or more;
- All subdivisions; and
- New and existing irrigated areas of 10,000 square feet or more.

While the City does not currently have a source of recycled water for use under this ordinance, new construction must be plumbed to use recycled water for non-potable purposes when and if recycled water becomes available.

San Francisco Sea Level Rise Guidance

The City has developed guidance for incorporating sea level rise into the planning of capital projects in San Francisco.[394] The guidance presents a framework for considering the effects of sea level rise on capital projects implemented by the City and selecting appropriate adaptation measures based on site-specific information. The planning process described in the guidance includes six primary steps:

- Review sea level rise science;
- Assess vulnerability;
- Assess risk;
- Plan for adaptation;
- Implement adaptation measures; and
- Monitor.

As noted, this EIR considers the 2012 NRC report as the best available science on sea level rise in California. However, the guidance acknowledges that the science of sea level rise is continually advancing and projections of sea level rise may need to be updated at some point to reflect the most updated science. Sea level rise inundation maps prepared by the SFPUC, described above under the heading Sea Level Rise Inundation Mapping, are considered the most up-to-date maps and take into account both water level rises and the temporary effects of storm surge along the shoreline based on existing topography and conditions. The guidance states that the review of available sea level science should determine whether the project site could be subject to flooding during the lifespan of the project.

[394] City and County of San Francisco Sea Level Rise Committee, *Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco*.

For those projects that cost $5 million or more that could be inundated during their lifespan, the guidance requires a vulnerability assessment based on the degree of inundation that could occur, the sensitivity of the project to sea level rise, and the adaptive capacity of the project site and design (the ability to adjust to sea level rise impacts without the need for substantial intervention or modification). The risk assessment takes into consideration the likelihood that the project could be adversely affected by sea level rise and the related consequences of flooding. An adaptation plan is required for projects that are found to be vulnerable to sea level rise and have a potential for substantial consequences. The plan should focus on those aspects of the project that have the greatest consequences if flooded. It should include clear accountability and trigger points for bringing adaptation strategies online and a well-defined process to ensure that milestones are being met and the latest science is being considered.

The City's sea level rise guidance document also acknowledges that there is some flexibility in how to plan for adaptations, and it may not always be feasible or cost effective to design and build for long-term potential sea level rise scenarios that are of a highly uncertain nature, such as the upper end of the NRC report range for the year 2100 (66 inches of sea level rise). In this case, a capital project constructed by the City could be designed and constructed to be resilient to the likely mid-century sea level rise (11 inches by 2050). Under this guidance, an alternative approach would be to build the project to be resilient to the *likely* sea level rise by 2100 (36 inches), while including adaptive capacity to be resilient to the *upper range* of sea level rise estimates for 2100 (66 inches).

San Francisco Floodplain Management

San Francisco's Floodplain Management requirements are specified in the *Administrative Code*. For buildings located within a flood-prone area, this code requires the following:

- The building must be adequately anchored to prevent flotation, collapse, or lateral movement.
- The building must be constructed with materials and utility equipment that is resistant to flood damage, and with methods and practices that minimize flood damage.
- Electrical, heating, ventilation, plumbing, and air conditioning equipment must be designed or located to prevent water from entering or accumulating within the components during flooding.
- All water supply and sanitary sewage systems must be designed to minimize or eliminate infiltration of flood waters into the system as well as discharges from the systems into floodwaters.

For projects located in areas that could be prone to flooding from the combined sewer system during wet weather, the SFPUC may require additional actions such as provision of a pump station for sewage flows, raised elevation of entryways, special sidewalk construction, and deep gutters.[395]

[395] San Francisco Planning Department, Planning Director Bulletin No. 4, Review of Project Identified in Areas Prone to Flooding.

IV.I.4 Impacts and Mitigation Measures

Significance Thresholds

For purposes of this EIR, the project would have a significant impact related to hydrology and water quality if it were to:

- Violate any water quality standards or waste discharge requirements;
- 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; 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.

The analysis of violation of water quality standards or waste discharge requirements provided in Impact HY-1 also addresses significance criterion (a) from Section D.11, Utilities and Service Systems of the Initial Study (Appendix B):

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

This criterion is evaluated here because, as described above, the City's NPDES permit for discharges from its wastewater treatment facilities is issued by the RWQCB, and the analysis herein evaluates whether development pursuant to the Plan could result in a substantial increase in CSDs.

The complete list of CEQA significance criteria used in the hydrology and water quality analysis is included in Section D.15 of the Initial Study (see Appendix B), which also explains why the implementation of the Plan would not result in significant impacts on hydrology and water quality with respect to degradation of water quality during construction (Impact HY-1); depletion of groundwater and interference with groundwater recharge (Impact HY-2); alteration of drainage patterns (Impact HY-3); exceedance of the capacity of a stormwater system or providing an additional source of stormwater pollutants (Impact HY-4); flooding under existing conditions (Impact HY-5); and inundation by seiche, tsunami, or mudflow (Impact HY-7). Therefore, as discussed in Section IV, Overview, and in the Initial Study included in Appendix B, no further analyses of these topics are presented in this section. The Hydrology and Water Quality Section of the Initial Study determined that all construction-related hydrology and water quality impacts of the proposed project would be less than significant.

Approach to Analysis

This section addresses two impacts associated with long-term implementation of the Central SoMa Plan. The first impact analyzes the potential for projects in the Plan Area to exacerbate future flooding hazards, taking into account future sea level rise. The second impact analyzes the potential for changes in wastewater and stormwater flows to exceed the wastewater treatment requirements of the Bayside facilities of the City's combined sewer system or increase the frequency of CSDs from the Bayside Drainage Basin. The approach to analyzing these impacts is discussed below relative to the applicable significance criteria:

- **Exacerbate flooding conditions such that people or structures would be exposed to a significant risk from future flooding:** In the *California Building Industry Association v. Bay Area Air Quality Management District* case decided in 2015,[396] the California Supreme Court held that CEQA does not *generally* require lead agencies to consider how existing hazards or conditions might impact a project's users or residents, except where the project would significantly exacerbate an existing environmental hazard. 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 significantly exacerbate the flood hazard. Thus, the analysis below evaluates whether the proposed project would exacerbate future flood hazards in the Plan Area and result in a substantial risk of loss, injury, or death. The impact is considered significant if implementation of individual development projects pursuant to the Plan, or overall development under the Plan, would exacerbate future flood hazards by increasing the frequency or severity of flooding or causing flooding to occur in an area that would not be subject to flooding without the project.
- **Exceed wastewater treatment requirements, violate water quality standards or waste discharge requirements, exceed the capacity of a storm drainage system, provide a substantial source of stormwater pollutants, or otherwise substantially degrade water quality:** Because stormwater and wastewater are conveyed in the same set of pipes within the Bayside Drainage Basin of the City's combined sewer system (and, indeed, in most of San Francisco), as described above in the Setting, the hydrology and water quality impacts related to changes in stormwater and wastewater flows are combined under one impact statement. This discussion is related to the analysis presented in Section D.11, Utilities and Service Systems of the Initial Study (Appendix B), which evaluates impacts related to the *capacity* of wastewater or stormwater facilities; however, this analysis focuses primarily on the potential to affect *water quality*.

  In order to meaningfully determine the long-term impacts of Plan implementation on wastewater treatment requirements and contributions to CSDs from the combined sewer system, the impact analysis must account for the cumulative effects of wastewater and stormwater flows resulting from development pursuant to Plan implementation in combination with flows from other developments within the Bayside Drainage Basin because all flows are collected together and transferred to the SEP at the same time. Therefore, the Plan's direct impacts are analyzed together with cumulative impacts, and a separate cumulative impact analysis is not necessary.

The impact analysis is broken down as described below.

Dry weather flows to combined sewer system: The analysis considers whether implementation of the plan in combination with other developments would contribute additional wastewater to the City's combined sewer system to the extent that the contribution would cause the system to exceed the treatment requirements (with respect to volume and treatment level) or other permit requirements of the RWQCB-issued NPDES permit for the SFPUC's Bayside wastewater facilities. The impact is considered less than significant if the increase in dry weather flows remains within the treatment capacity of the SEP.

Wet weather flows to combined sewer system: The impact analysis examines whether changes in wastewater and stormwater flows from the Plan Area in combination with flows from other developments would contribute to an increase in combined sewer discharges to the Bay during wet weather. The impact is

[396] *California Building Industry Association v. Bay Area Air Quality Management District,* 62 Cal.4th 369. Opinion Filed December 17, 2015.

considered less than significant if the changes in flows would not increase the frequency of CSDs above the long-term average specified in the NPDES permit for the SEP, the North Point Wet Weather Facility, and bayside wet-weather facilities.

Impact Evaluation

Note that each impact statement below corresponds to the impact statement in Section D.15, Hydrology and Water Quality, of the Initial Study (Appendix B) that also discusses the impact.

Impact HY-6: Development under the Plan, including the proposed open space improvements and street network changes, would not exacerbate future flood hazards in a manner that could expose people or structures to a significant risk of loss, injury, or death. (Less than Significant)

As discussed in the Environmental Setting, SFPUC inundation maps indicate that the Plan Area would not be permanently inundated with a sea level rise of 12 inches, which is expected by 2050 or a sea level rise of 36 inches that is expected by 2100.[397]

However, with 12 inches of sea level rise and 100-year storm surge, water levels could temporarily rise to 11 feet NAVD88 (-0.3 foot SFD). As shown on Figure IV.I-3, the southwest corner of the project area could be inundated to depths of at least two feet, with local inundation as deep as six feet.[398] With 36 inches of sea level rise and 100-year storm surge, water levels could temporarily reach 13 feet NAVD88 (1.7 feet SFD) and a larger area within the southwest portion of the Plan Area would be flooded. As shown on Figure IV.I-4, most of the area bounded by Sixth Street, Folsom Street, Fourth Street, and Townsend Street would be inundated to depths of at least two feet with localized areas being inundated to depths of approximately eight feet. Under both scenarios, flooding in the Plan Area would result because the Mission Creek water levels would exceed the height of existing features along the northern shore of the creek.

Implementation of the Plan could significantly exacerbate future flood hazards related to sea level rise if development under the plan would expose areas to flooding that would not otherwise be subject to flooding, increase the depth of inundation during flood events, or prolong the duration of flooding. Development under the plan could have such effects if it were to reduce the capacity of the stormwater system, alter the configuration of the Mission Creek shoreline, or lower the elevation of finished grades below future flood levels.

As discussed under Impact HY-1 in the Initial Study (Appendix B), the entire Plan Area is developed. Impervious surfaces cover most of Plan Area, with the exception of existing parks and open spaces. Individual development projects that would be proposed and approved pursuant to the Plan would be required to comply with the Stormwater Management Ordinance and Stormwater Management Requirements and Design Guidelines. Given that the Plan Area is almost entirely covered with impervious surfaces at present, the Stormwater Management Ordinance would require a large majority of projects to reduce the peak rate and total volume of stormwater runoff from the two-year 24-hour design storm. Accordingly, projects would be

[397] SFPUC, *Bayside Sea Level Rise Mapping*.
[398] Note that the green zone shown within the Plan Area on Figure IV.I-2 is a depressed area that is not hydrologically connected to flooding zones and would not be inundated until flood waters reached a sufficient elevation to reach the area.

required to incorporate LID techniques into project design and to implement stormwater BMPs to reduce the flow rate and volume of stormwater entering the combined sewer system. Recommended BMPs to achieve these goals include infiltration methods such as vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. This decrease in stormwater flows would offset overall increases in wastewater flows during wet weather such that total combined wet weather flows to the combined sewer system would not increase as discussed in Impact C-HY-2, below. Therefore, development in the Plan Area would not increase the frequency or severity of flooding due to the volume or rate of stormwater runoff, or cause flooding to occur in an area that would not be subject to flooding due to stormwater runoff without the project. Nor would the project include any modifications to the combined sewer system that would lessen the system capacity and result in flooding that would not have otherwise occurred. Further, the project would not alter the northern Mission Creek shoreline where low spots provide pathways for inundation.

As discussed in Impact HY-5 of the Initial Study (Appendix B), projects located in areas that are currently prone to flooding from the combined sewer system during wet weather would be reviewed by the SFPUC during the project approval process and may require additional actions such as incorporation of a pump station for sewage flows, raised elevation of entryways, special sidewalk construction, and deep gutters. These measures would reduce the potential for localized flooding to occur. Lastly, as discussed in the Setting Section above, improvements to the combined sewer system, proposed as part of the SSIP, are being planned with future sea level rise taken into consideration. Given all of the above, development in the Plan Area would not have the potential to exacerbate future flood hazards and this impact would be ***less than significant***. No mitigation measures are required.

Although development within the Plan Area would not exacerbate future flood hazards, portions of the plan area would be exposed to an increased risk of flooding in the future due to sea level rise. The Plan includes objectives, policies and implementation measures intended to "Maximize Flood Resilience." Policy 6.6.1would develop a sea level rise and flood management strategy for the Plan Area aimed at developing targeted policies and programs to reduce flood risk. Implementation Measures 6.6.2.1 and 6.6.2.2 are intended to ensure that new development meets the flood resistant building standards of the City's Floodplain Management Ordinance and *Building Code* and to develop and implement Flood Resistant Design Guidelines for representative building typologies in Central SoMa. Additionally, City capital projects, including critical facilities such as hospitals, jails, emergency response facilities (police, medical, and fire), and data centers used for City or other public data storage would be designed and constructed to minimize risks due to future flooding in accordance with the City's sea level rise guidance for capital projects as further discussed above under the heading "San Francisco Sea Level Rise Guidance."

Proposed Street Network Changes and Open Space Improvements

The proposed street network changes would not alter the elevation or grade of any of the streets and would not affect the northern shoreline of Mission Creek where low spots provide inundation paths for future flood flows. Further, in accordance with the Wastewater & Water Standards, the SFPUC would require that the reconfigured streets are designed to convey the existing flood flow capacity at a minimum.[399] Therefore, the

[399] San Francisco Public Utilities Commission, *General Manager Order, SFPUC Wastewater & Water Standards for Surface Improvement Project*, June 2014.

reconfigured streets and sidewalks would not redirect flood flows or exacerbate future flooding conditions. As discussed above under Regulatory Framework, street network changes and other capital planning projects of $5 million or more in areas subject to flooding resulting from future sea level rise would be subject to the City's sea level rise guidance.

The proposed open spaces along Fourth and Bluxome Streets would be located in areas that could be flooded in the future as a result of sea level rise (no other open spaces would be located in such areas). However, the proposed open space improvements at these locations would not include the construction of any structures or filling of land that could cause flooding to occur in an area that would not be subject to flooding without the project or otherwise exacerbate future flooding conditions. In addition, Plan implementation would not result in the removal of any open space areas or other features that would currently impede the intrusion of flood waters. Nor would any of the proposed improvements substantially alter the frequency or severity of flooding. Further, all of the street network and open space improvements would likely include stormwater BMPs to enhance the infiltration of stormwater and reduce flood potential. Therefore, the street network changes and open space improvements would not have the potential to exacerbate existing or future flood hazards and this impact would be ***less than significant***.

Mitigation: None required.

IV.I.5 Cumulative Impacts

Impact C-HY-2: Operation of individual development projects through implementation of the Plan, in combination with past, present, and foreseeable future development in San Francisco, would not exceed the wastewater treatment requirements of the Southeast Treatment Plant (SEP); violate water quality standards or waste discharge requirements; otherwise substantially degrade water quality; or result in an increase in the frequency of combined sewer discharges from the City's combined sewer system. (Less than Significant)

Growth within the Plan Area and most of the citywide growth would be on the city's Bayside, which is served by the SEP (and the North Point Wet Weather Facility in wet weather). In addition to the Plan Area, substantial growth on the Bayside would occur in the Market-Octavia, Central Waterfront, and Balboa Park Better Neighborhood Plan Areas; Candlestick Point and Hunters Point; Visitacion Valley; Mission Bay; and in the greater Downtown. To a lesser degree, growth would also occur in other areas such as transit corridors on Van Ness Avenue (and, potentially, Geary Street).[400]

As discussed above in the Setting, the volume of wet weather flows in the Bayside Drainage Basin varies due to the addition of stormwater during wet weather. When the increased flows exceed the combined storage and treatment capacity of the SEP and North Point Wet Weather Facility and the transport and storage boxes, excess flows are discharged to the Bay after receiving the equivalent of primary treatment. An increase in the frequency of CSDs from the watershed could be a concern because combined sewer discharges contain

[400] *San Francisco General Plan*, Housing Element, Part I, Data Needs and Analysis, adopted April 27, 2015; Section IV.A, Meeting Housing Needs: New Housing Development Potential Under Existing Zoning. Available at http://www.sf-planning.org/ftp/files/plans-and-programs/planning-for-the-city/housing-element/2014HousingElement-Part_I_ADOPTED_web.pdf.

pollutants for which the Bay and Mission Creek are designated impaired water bodies pursuant to the Clean Water Act. Two aspects of the project in combination could result in long-term changes in flows to the City's combined sewer system in the Channel urban watershed: changes in the amount of wastewater generated and changes in stormwater runoff volumes and rates. The effects of these factors on the combined sewer system are closely related, and the combined effect on the frequency of CSDs to the Bay is discussed below, along with the potential to exceed the wastewater treatment capacity of the SEP.

Changes in Wastewater Flows

Growth under the Plan along with other citywide growth would increase year-round wastewater flows to the Bayside Drainage Basin as described below.

Increases in Plan Area Wastewater Generation

The Plan would accommodate new development in the Plan Area, which would, in turn, result in an increase of up to 14,500 residential units and up to 63,600 jobs in the Plan Area. The volume of wastewater flows to the combined sewer system with implementation of the Plan would be directly related to the amount of water used for purposes such as washing dishes and clothes, hand washing, flushing of urinals and toilets, and water cooled heating and ventilation systems. The discussion below focuses on the increased water demand and associated wastewater generation that would occur with implementation of the Plan.

The anticipated growth in the Plan Area would conservatively increase the amount of water used by approximately 1.7 mgd, based on the SFPUC's water use calculator.[401] However, the related increase in wastewater flows would not be as great for several reasons. First, development projects implemented pursuant to the Plan would be required to comply with San Francisco's Non-Potable Water program, described in the Regulatory Setting, which requires the developers of buildings of 250,000 square feet or more to use non-potable water for toilet and urinal flushing. One potential source of non-potable water for these purposes is the use of graywater generated on site (e.g., wastewater from bathtubs, showers, bathroom sinks, lavatories, clothes washing machines, laundry tubs, and cooling). If future developers utilize on-site graywater for toilet and urinal flushing, the amount of wastewater discharged to the combined sewer would be reduced by the approximate volume of graywater used. Based on the SFPUC's water use calculator, approximately 0.9 mgd of the water demand would be suitable for use as graywater to fulfill the requirements of the Non-Potable Water Program. Because the program also allows the use of other non-potable water such as rain water and foundation drainage for these purposes, it is reasonable to assume that half of the non-potable water demand would be met with on-site sources of graywater. This would reduce wastewater flows by approximately 0.4 mgd, to 1.3 mgd.

Additionally, a portion of the water use is consumed on site, rather than discharged to the sewer. Consistent with the SFPUC's standard assumption for multi-family residential buildings, the amount of wastewater

[401] San Francisco Public Utilities Commission, Building-Scale Water Use Calculator. Prepared for Plan implementation by Environmental Science Associates, March 10, 2015. Default employment densities in the calculator were modified for consistency with Planning Department growth forecasts for the Plan Area, with the result being approximately 27 more employment than under default assumptions.

discharged to the sewer would be approximately 95 percent of the water use.[402] This would reduce wastewater flows by approximately 0.1 mgd to 1.2 mgd. Also, the above estimate of water use does not account for use of recycled water in conjunction with the proposed Central SoMa Sustainability polices.

Finally, the *California Building Code* is updated every three years; after each update, the City adopts most of the statewide changes into its own *Building Code*. Future code versions are likely to include more stringent water conservation and recycling requirements that would decrease the potable water demand for future development projects, although the effects of these as of yet undefined changes on wastewater flows cannot be quantified.

Increases in Citywide Wastewater Generation

Growth in the Plan Area would contribute to a citywide increase of about 92,000 residential units as well as a citywide employment increase of about 191,000 jobs by 2040. As a result, citywide water use would also increase as estimated in the SFPUC's 2015 Urban Water Management Plan (UWMP). As discussed in that document, the citywide water demand has historically declined prior to 2015, due in large part to increasingly more efficient plumbing fixtures. However, the SFPUC projects in the UWMP that the citywide water demand will reach a point at which conservation savings will no longer outpace anticipated population and job growth by around 2018.[403] Thus, the citywide water demand is forecasted to increase steadily through 2040. After accounting for the projected conservation savings, the retail water demand is projected to increase from 64.8 mgd in 2015 to 83.9 mgd in 2040. This is an increase of 19.1 mgd, or 29 percent over water use in 2015.

Based on the citywide projected 19.1 mgd increase in water use, year-round citywide wastewater discharges to the combined sewer system would increase by about 18.1 mgd by 2040, assuming a 95 percent conversion factor.

Effects on Wastewater Treatment Capacity

As stated above, most of the future development in San Francisco is expected to occur within the Bayside drainage basin of the combined sewer system which is served by the SEP. Existing dry-weather flows to the SEP are 60 mgd, or approximately 24.5 mgd less than the permitted 84.5 mgd capacity of the plant. The entire 19.1 citywide increase in wastewater flows would be approximately 74 percent of the remaining dry-weather capacity of the SEP. For the Plan Area, the increase in wastewater generation would be up to approximately 1.2 mgd of the projected city-wide increase as noted above. Therefore, during dry weather, impacts related to exceeding the wastewater treatment requirements of the San Francisco Regional Water Quality Control Board would be less than significant. No mitigation measures are required.

[402] The 95 percent of water use assumed to be discharged to the combined sewer system is consistent with the SFPUC's standard assumption for multi-family residential buildings (SFPUC, "Wastewater Service Charge Appeal" webpage: http://www.sfwater.org/index.aspx?page=132**;** reviewed February 28, 2016). The SFPUC assumes that non-residential (and single-family residential) uses discharge 90 percent of water used to the combined sewer. The 95 percent figure is used here for both residential and non-residential uses for purposes of a conservative assessment of combined sewer system demand.
[403] San Francisco Public Utilities Commission, *2015 Urban Water Management Plan for the City and County of San Francisco*, June 2016.

Changes in Stormwater Runoff

As discussed above, development within the Plan Area in combination with citywide growth would increase year-round wastewater discharges to the combined sewer system. While the amount of wastewater generated would be within the dry-weather capacity of the SEP, the increased flows could contribute to an increase in the frequency of CSDs from the Bayside Drainage Basin during wet weather with the addition of stormwater flows. However, anticipated reductions in stormwater flows would alleviate the effects of wastewater discharges on CSDs as discussed below.

In accordance with San Francisco's Stormwater Management Ordinance (*Public Works Code* Article 4.2) and Stormwater Management Requirements and Design Guidelines, individual development projects that would be proposed and approved pursuant to the Plan and individual development projects throughout the Bayside Basin would need to comply with the City's Stormwater Management Requirements and Design Guidelines. Accordingly, all projects that create or replace 5,000 square feet or more of impervious surfaces would be required to minimize the flow and volume of stormwater into the combined sewer system. The Plan Area, and most of the city, is almost entirely covered by impervious surfaces at present, and the vast majority of development projects would be located on sites that are already developed. Therefore, a large majority of projects would be required to achieve a 25 percent reduction in the peak rate and total volume of stormwater runoff from the two-year 24-hour design storm, compared to existing conditions.

To achieve compliance, the project sponsors for individual development projects would be required to incorporate low-impact design (LID) techniques into the project design and to implement stormwater BMPs to reduce the flow rate and volume of stormwater entering the combined sewer system. Recommended BMPs to achieve these goals include infiltration methods such as vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse of stormwater for non-potable uses such as landscape irrigation, toilet and urinal flushing in accordance with the City's Non-Potable Water Program would also reduce the volume of stormwater discharged to the combined sewer system. As discussed in Impact HY-4 of the Initial Study (Appendix B), the Stormwater Control Plan prepared for each project in accordance with the Stormwater Management Requirements and Design Guidelines would describe BMPs that would be implemented to achieve the specified reduction in stormwater flow rates and volumes as well as a plan for post-construction operation and maintenance of the BMPs. The plan must be reviewed and approved by the SFPUC to certify compliance with the Stormwater Management Requirements and Design Guidelines, and the SFPUC would inspect stormwater BMPs once they are constructed to confirm that they perform as designed.

With implementation of required stormwater control measures by individual development projects as required by the Stormwater Management Ordinance and the Stormwater Management Requirements and Design Guidelines, implementation of the Plan would contribute to a decrease in the volume of stormwater flows relative to existing conditions.

Net Impact on Combined Sewer Discharges

As discussed above, implementation of the Plan and other development projects in San Francisco would facilitate new development that would contribute to a citywide increase in year-round sanitary sewage flows, but would also decrease stormwater runoff to the combined sewer system through compliance with the Stormwater Management Ordinance and the Stormwater Management Requirements and Design Guidelines.

The estimated 1.2 mgd of wastewater produced as a result of plan implementation represents less than 0.1 percent of the annual 1.3 billion gallons of combined wastewater and stormwater discharge to the Bay via the Bayside CSD structures annually. The reduction in stormwater flows is expected to offset estimated increases in wastewater flows during wet weather such that there would not be an increase in wet weather CSDs.

Further, as described in the Setting, the SFPUC is implementing the SSIP, a $7 billion, 20-year capital program to proactively address system-wide needs and update the aging combined sewer system. Specific projects planned under the SSIP will improve the management of wet weather flows to the Bayside Drainage Basin of the City's combined sewer system. The Central Bayside System Improvement Project will include improvements to provide redundancy to the Channel force main that transports flows from the Channel Pump Station to the SEP and assist the SFPUC in controlling the number of CSDs from the Bayside Drainage Basin.[404] This project also includes construction of green and gray infrastructure to reduce stormwater flows to the combined sewer system. Improvements to the North Point Wet Weather Facility will include rehabilitation of the outfall to improve its operational reliability as well as wet weather pump station improvements. Green infrastructure projects in the Channel urban watershed include several measures to manage stormwater before it enters the combined sewer system and reduce the volume of stormwater discharges. These include integration of bioretention planters and permeable pavement into bulb outs along Fell and Oak Streets as well as in the parking lanes and alleys along and adjacent to the Wiggle bike path extending from Market Street to Golden Gate Park. Implementation of these projects would further reduce stormwater flows to the Bayside Drainage Basin which would contribute to a reduction in CSDs during wet weather.

Therefore, both cumulative and plan-level water quality impacts related to a violation of water quality standards or degradation of water quality associated with changes in CSDs to the Bay would be ***less than significant***.

Mitigation: None required.

Proposed Street Network Changes and Open Space Improvements

Neither the repaving, construction of wider sidewalks and sidewalk bulbs, and installation of mid-block traffic signals that would be conducted as part of the proposed street network changes, nor the proposed open space improvements, would substantially alter the street system or include construction of any facilities that would increase the volume of wastewater discharges to the combined sewer system. Additionally, these improvements would likely include stormwater BMPs to enhance the infiltration of stormwater and reduce stormwater discharges to the combined sewer system. Therefore, water quality impacts related to violation of water quality standards or degradation of water quality associated with changes in CSDs to the Bay would be ***less than significant*** for the proposed street network changes and open space improvements.

Mitigation: None required.

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[404] San Francisco Public Utilities Commission, Wastewater Enterprise Capital Improvement Program Quarterly Report (July 2014 to September 2014). December 2, 2014.

Impact C-HY-3: Development under the Plan, including the proposed open space improvements and street network changes, in combination with past, present, and reasonably foreseeable future projects, would not exacerbate future flood hazards that could expose people or structures to a significant risk of loss, injury, or death. (Less than Significant)

The geographic scope for impacts related to future flooding as a result of sea level rise includes the entire waterfront. The projects that are included in the cumulative scenario for purposes of this analysis are described in Section II.G, Other Reasonably Foreseeable Projects.

As shown in Figure IV.I-3 and Figure IV.I-4, existing and future development along the city's shoreline could be exposed to an increased risk of coastal flooding in the future due to sea level rise. However, neither the Plan, including proposed street network changes and open space improvements, nor any cumulative projects would alter the northern shoreline of Mission Creek where low spots provide pathways for inundation. Similarly, compliance with the City's Stormwater Management Ordinance and Stormwater Management Requirements and Design Guidelines would ensure that stormwater flows to the combined sewer system are reduced and would not exacerbate existing flooding conditions within the combined sewer system. Therefore, development under the Plan, including the proposed street network changes and open space improvements, in combination with past, present and reasonably foreseeable development would not increase the frequency or severity of flooding, or cause flooding to occur in areas that would not be subject to flooding without the proposed project in combination with cumulative development. Therefore, cumulative development would not have the potential to exacerbate existing or future flood hazards and this impact would be ***less than significant***.

Mitigation: None required.