12

Hydrology and Water Quality

This chapter of the EIR evaluates the potential impacts of the Project related to hydrology and water quality. This chapter also describes the existing hydrological and flood hazard conditions in and near the Project Area, and evaluates the extent to which these conditions may affect development of the Master Plan Update (Project) as proposed.

Although some of the information in the Environmental Setting draws from the 2007 Master EIR (MEIR), 2012 Supplemental MEIR (SMEIR) and 2002 Britannia East Grand Project (BEG) EIR, setting information for hydrology and water quality has been updated for this EIR using current data from the following sources:

- Federal Emergency Management Agency (FEMA) Flood Map Service Center
- County of San Mateo, Dam Failure Inundation Areas Map
- California Regional Water Quality Control Board, San Francisco Bay Region - Municipal Regional Stormwater NPDES Permit, Order #R2-2015-0049, NPDES Permit No. CAS612008
- California Water Service, *SB 610 Water Supply Assessment (WSA)*, November 2017 (see **Appendix 18**) [1]

Environmental Setting

Climate and Topography

The City of South San Francisco has a Mediterranean type of climate, characterized by dry, relatively cool summers and wet, mild winters. Average annual precipitation in the City is between 18 and 22 inches per year, increasing to 26 inches in the upper watershed west of the City.[2] Approximately 91 percent of the precipitation is received between November and April. Average daily temperatures range from a high of 73.4 degrees Fahrenheit in September to a low of 42.6 degrees Fahrenheit in January.[3]

The Project Area, located along the eastern shoreline of the City overlying artificial fill and Bay mud, is largely paved and occupied primarily by buildings and parking lots. At the center of the Project Area is San Bruno Hill. San Francisco Bay forms the eastern boundary of the Project Area, while the rest of the area is surrounded by mixed industry, warehouse, retail, office and hotel uses in the East of 101 Area.

The East of 101 Area generally slopes downward to the east towards San Francisco Bay. The Project Area is comprised of a hilly region to the southeast, formed by southeast-trending Coyote Point Fault Zone and low-

[1] California Water Service, *SB 610 Water Supply Assessment for the Genentech Master Plan Update*, November 21, 2017 (see Appendix 12A)

[2] City of South San Francisco General Plan, 1999

[3] Western Regional Climate Center, Weather Station: San Francisco WSO AP, California (047769) - Website accessed September 27, 2017, at: https://wrcc.dri.edu/Climate/west_coop_summaries.php

lying areas to the northeast. Elevations range from 182 feet above mean sea level at the top of San Bruno Hill to approximately 0 feet mean sea level at the low-lying areas in the northeast portion of the Project Area.[4]

Regional Hydrology

The largest watershed in the Project vicinity is the Colma Creek watershed. The Colma Creek watershed includes portions of San Bruno Mountain as well as urbanized areas of Daly City, Colma and South San Francisco. Most of this urbanized creek is channelized or conveyed underground to allow for urban development. The impervious surface area within the Colma Creek watershed was previously estimated at 63 percent, the highest in the County.[5] Colma Creek is a flood control channel maintained by the San Mateo County Department of Public Works that discharges into the San Francisco Bay just north of the San Francisco International Airport.

Runoff throughout the City is collected in the City's storm drainage system, which discharges to Colma Creek or San Francisco Bay.

Project Area Hydrology

Colma Creek does not intersect the Project Area nor does the Project Area drain to Colma Creek. Several drainage ditches are located throughout the Project Area (see **Figure 12-1**). These ditches are excavated in uplands for conveying stormwater runoff from the hillslopes and developed areas in the Project Area to the underground stormwater system, which eventually drains to the Bay. The Project Area's storm drain system consists of underground pipes that collect stormwater via inlets that outfall into the San Francisco Bay at various locations. The storm drainage system is based on gravity flow and does not require pumps to transport flows to the Bay. Existing runoff from the Project Area is regulated under the provisions of a Municipal Regional Stormwater NPDES Permit (MRP). Most of the Project Area is already developed and covered with impervious surfaces (i.e., buildings, parking lots or other structures). Nearly all stormwater becomes runoff and little infiltration into the ground and groundwater occurs.

Groundwater

The California Water Service Company (Cal Water) serves the potable water needs for the portion of the City east of I-280, where the Project Area is located, as well as the cities of San Carlos and San Mateo. The Project Area is in the South San Francisco District (SSFD) of the Cal Water service area. Cal Water prepared and adopted the 2010 Urban Water Management Plan in June 2011, which includes substantial information related to groundwater.[6] Groundwater has historically supplied 10 to 15 percent of the District's water demand.

The Project Area lies within the Visitacion Valley Groundwater Basin. The Visitacion Valley Groundwater Basin has relatively low storage capacity and minimal protection from potential surface contamination. Two sub-basins within the Visitacion Valley Basin underlie the Colma Creek Basin and the Westside Basin. The groundwater wells that supply the Project Area are from the Westside Basin. The Westside Basin is the largest groundwater basin in the upper San Francisco Peninsula. The basin's boundaries are generally defined by Golden Gate Park to the north, the San Bruno Mountains to the east, the San Andreas Fault and Pacific Ocean to the west, and the San Mateo Plain Groundwater Basin to the south. The basin opens to the Pacific Ocean on the northwest and San Francisco Bay on the southeast.[7]

---

4 U.S. Geological Survey, San Francisco South Quadrangle, California, 7.5 Minute Series (Topographic) 1980

5 City of Daly City Stormwater Pollution Prevention Program, 1998

6 California Water Service, *2015 Urban Water Management Plan, South San Francisco District*, June 2016

7 California Department of Water Resources, Bulletin 118 – Update 2003, Westside Groundwater Basin

Figure 12-1
On-Site Drainage Channels

Source: HT Harvey, 2018

The San Francisco Public Utilities Commission (SFPUC), Cal Water (South San Francisco and Colma), and the cities of Daly City and San Bruno participate in a joint Regional Groundwater Storage and Recovery Project. Groundwater storage and recovery consists of storing water in wet years and recovering that water for use during dry years. As part of this project, surface water is to be used instead of groundwater in wet years, allowing groundwater to recharge through rainfall and decreased pumping. In dry years, the saved water is to be pumped from groundwater well recovery facilities.[8]

Flood Hazards

The City of South San Francisco is highly urbanized with relatively high runoff generation rates.[9] These conditions increase the potential for flood condition in periods of heavy rainfall. Periodic flooding occurs along most of Colma Creek, but the principal flooding problems in the City exist near its eastern edge (just southwest of the Project Area) where flows in Colma Creek are restricted under the Caltrain railroad tracks and US 101.

Portions of the Project Area are subject to flooding, including inundation from sea level rise. Sea level rise is already affecting much of California's coastal region including the San Francisco Bay. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map panels, the shoreline of the Project Area is within the 100-year flood hazard zone (**Figure 12-2**). No portion of the Project Area is located in the 500-year flood hazard zone.[10]

Dam and Levee Failure

Dam failure often results from neglect, poor design or structural damage caused by a major event such as an earthquake or flood. When a dam fails, the quantity of water held back by the dam (i.e., the contents of the reservoir) is suddenly released downstream, causing damage in its inundation zone. Although there are no dams within the City of South San Francisco, several dams are in the nearby cities of San Francisco, Burlingame and San Mateo. Inundation zones resulting from failure of these dams would not reach the City of South San Francisco.[11]

As with dams, levee failure can occur in the event of a major earthquake or flood. The largest levees in the Northern California region are in the Sacramento-San Joaquin River Delta, on the American River, and on the Sacramento River. However, inundation zones resulting from failure of these levees would not reach the City of South San Francisco. Smaller levees are present throughout the Bay Area along the San Francisco Bay shoreline and in local ponds and creeks. These levees include those in the San Francisquito Creek flood control system, the Foster City and Redwood Shores levee trails, and the Cargill salt ponds. Inundation zones resulting from failure of any of these levees would not reach the City of South San Francisco.

Seiche, Tsunami, and Mudflow

Reservoirs, lakes, ponds, swimming pools and other enclosed bodies of water are subject to potentially damaging oscillations called seiches. This seismic hazard is dependent upon specific earthquake parameters (e.g., frequency of the seismic waves, distance and direction from the epicenter), as well as site-specific design of the enclosed bodies of water, and thus difficult to predict. Genentech's 1.5-million-gallon storage reservoir on the top of San Bruno Hill poses the greatest risk of seiche hazard in the Project Area.

---

8 Ibid

9 City of South San Francisco, General Plan, 1999

10 FEMA Flood Map Service Center - Website accessed September 27, 2017, at: https://msc.fema.gov/portal/

11 County of San Mateo, San Mateo County Hazards, Dam Failure Inundation Areas - Website accessed October 2, 2017 at: http://planning.smcgov.org/documents/san-mateo-county-hazards-dam-failure-inundation-areas

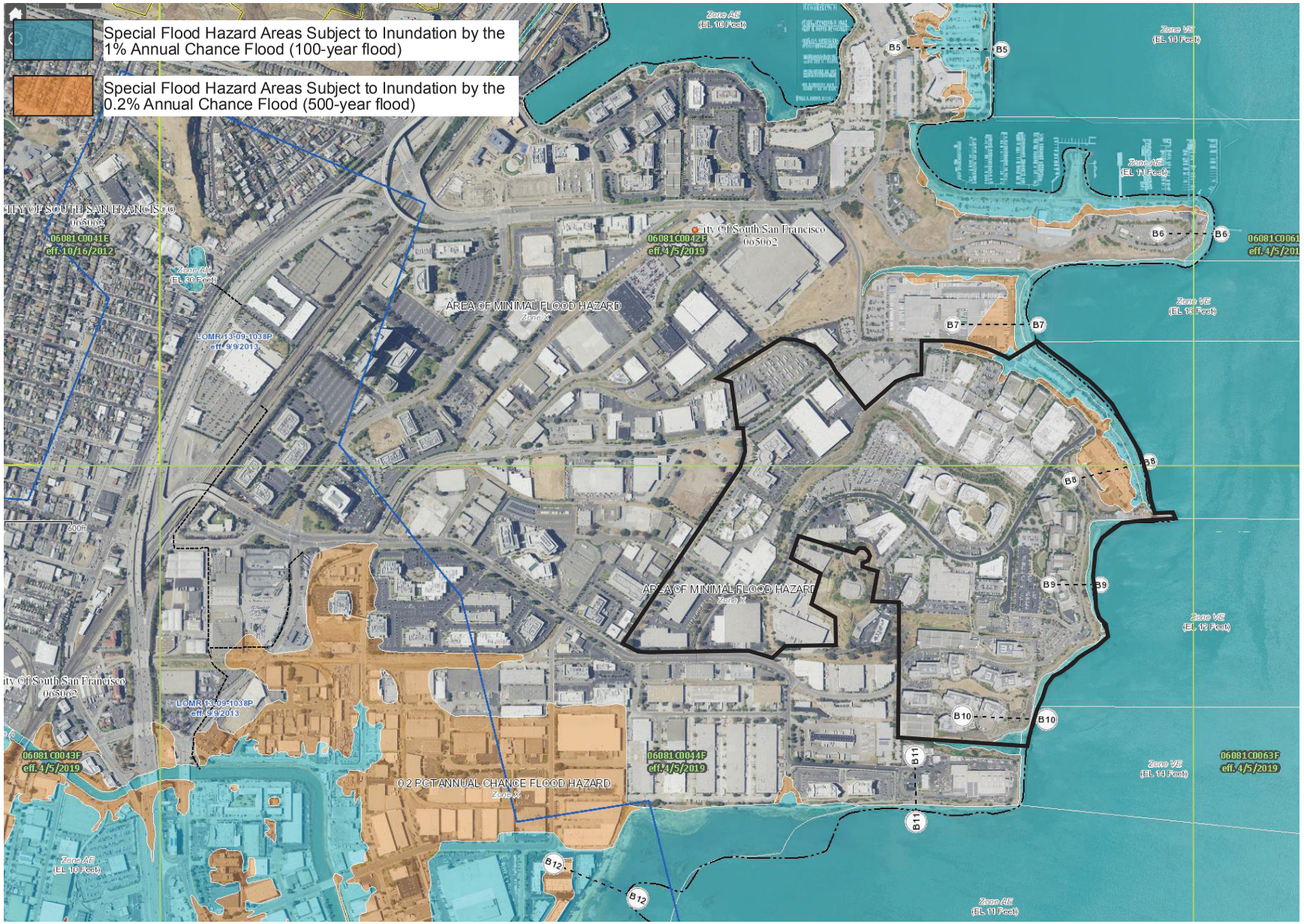


Figure 12-2
FEMA Flood Insurance Rate Maps, Panels 06081C0042F and 06081C0044F

Source: FEMA, April 2019

Earthquakes can also cause tsunamis (or tidal waves) in San Francisco Bay. As specified in the City's General Plan, two portions of the City are subject to inundation by tsunami—the northwest portion of the Project Area (Lower Campus) extending north past Oyster Point Marina Park, and the area of land south of the Campus bordered by Littlefield Avenue and Swift Avenue. Wave run-up is estimated at approximately 4.3 feet above mean sea level for tsunami with a 100-year recurrence and 6.0 feet above mean sea level for a 500-year tsunami.[12]

Mudflows (i.e., debris flows, mudslides) are rivers of rock, earth and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as during heavy rainfall, changing the earth into a flowing river of mud or "slurry." A slurry can flow rapidly down slopes or travel through channels, and can strike with little or no warning at avalanche speeds. A slurry can travel several miles from its source, growing in size as it picks up tree, cars and other material along the way. Mudflow hazards are primarily concentrated in the Hillside Zones of the City, where slopes are steep and covered with exposed soil. Hillside Zones are at the southern flank of San Bruno Mountain and near Skyline Boulevard, but not in or near the Project Area.[13]

Water Quality

Water quality in California is regulated by the U.S. Environmental Protection Agency's National Pollution Discharge Elimination System (NPDES), which controls the discharge of pollutants to water bodies from point and non-point sources. In the San Francisco Bay Area, this program is administered by the San Francisco Bay Regional Water Quality Control Board (RWQCB). The authority of the RWQCB includes permitting of stormwater discharges from municipal storm sewer systems (which includes the existing on-site drainage system), industrial processes and construction sites that disturb areas larger than one acre. The City of South San Francisco is a co-permittee of the San Mateo County Urban Runoff Clean Water Program, which is a coordinated effort by local governments to improve water quality in San Francisco Bay.

The San Francisco Bay RWQCB has listed the Lower and South San Francisco Bays as an impaired water body. The pollutants identified as causing impairment include chlordane, DDT (dichlorodiphenyltrichloroethane), dieldrin, dioxin compounds, furan compounds, invasive species, mercury, PCBs (polychlorinated biphenyls, trash and selenium.[14] Water pollutants enter San Francisco Bay from various sources, including municipal and industrial effluent, urban runoff, non-urban runoff, surface water tributaries, dredging and disposal of dredged material, atmospheric deposition, spills, and marine vessel discharge; mixing of these inputs occurs through semi-diurnal (twice a day) tides. During each complete ebb-flood cycle in the Bay, 10 to 30 percent or more of Bay water is replaced with new ocean water. During dry weather, each complete tidal cycle replaces about 24 percent of the volume of the Bay with new water.

Regulatory Framework

Federal Regulations

Clean Water Act

The Clean Water Act of 1972 establishes the basic structure for regulating discharges of pollutants into "waters of the United States." The Act specifies a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities and manage polluted runoff.

---

12 City of South San Francisco General Plan, 1999

13 Ibid

14 San Francisco Bay Regional Board, *Section 303(d) and Section 305(b) Integrated Report*, April 12, 2017

At the federal level, the Clean Water Act is administered by the U.S. Environmental Protection Agency (EPA). At the state and regional level, it is administered and enforced by the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs). The State of California has developed a number of water quality laws, rules and regulations, in part to assist in the implementation of the Clean Water Act and related federally mandated water quality requirements. In many cases, the federal requirements set minimum standards and policies and the laws, rules, and regulations adopted by the state and regional boards exceed the federal requirements.

National Flood Insurance Act

The U.S. Congress passed the National Flood Insurance Act in 1968 and the Flood Disaster Protection Act in 1973 to restrict certain types of development on floodplains and to provide for a National Flood Insurance Program (NFIP). The purpose of these acts is to reduce the need for large, publicly funded flood control structures and disaster relief. The NFIP is a federal program administered by the Flood Insurance Administration of FEMA. It enables individuals who have property (a building or its contents) within the 100-year floodplain to purchase insurance against flood losses. Community participation and eligibility, flood hazard identification, mapping, and floodplain management aspects are administered by state and local programs and support directorate within FEMA. FEMA works with the states and local communities to identify flood hazard areas and publishes a boundary map of flood hazards in those areas. Floodplain mapping is an ongoing process in the Bay Area and flood maps must be regularly updated for both major rivers and tributaries as land uses and development patterns change.

Executive Order 11988 - Floodplain Management

Executive Order 11988 directs federal agencies to avoid to the extent practicable and feasible short- and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Further, this Executive Order requires the prevention of uneconomic, hazardous or incompatible use of floodplains; protection and preservation of the natural and beneficial floodplain values; and consistency with the standards and criteria of the National Flood Insurance Program.

State/Regional Regulations

McAteer-Petris Act / San Francisco Bay Conservation and Development Commission

The McAteer-Petris Act is a provision under California law that preserves San Francisco Bay from indiscriminate filling. The Act established the San Francisco Bay Conservation and Development Commission as the agency charged with preparing a plan for the long-term use of the Bay and regulating development in and around the Bay, while the plan was being prepared. The San Francisco Bay Plan, completed in January 1969, includes policies on 18 issues critical to the wise use of the bay, ranging from ports and public access to design considerations and weather. The McAteer-Petris Act authorizes the Bay Conservation and Development Commission to incorporate the policies of the Bay Plan into state law. The Bay Plan has two features: policies to guide future uses of the bay and shoreline, and maps that apply these policies to the bay and shoreline. The Bay Conservation and Development Commission conducts the regulatory process in accordance with the Bay Plan policies and maps, which guide the protection and development of the bay and its tributary waterways, marshes, managed wetlands, salt ponds, and shoreline.

Porter-Cologne Water Quality Control Act

The Porter–Cologne Water Quality Control Act established the SWRCB and divided the state into nine regions, each overseen by a RWQCB. The nine regional boards have the primary responsibility for the coordination and control of water quality within their respective jurisdictional boundaries. Under the Porter–Cologne Water Quality Control Act, water quality objectives are limits or levels of water quality constituents

or characteristics established to protecting beneficial uses. The Act requires the RWQCBs to establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, also constitute water quality standards under the federal Clean Water Act. Therefore, the water quality objectives form the regulatory references for meeting state and federal requirements for water quality control. Each RWQCB is required to prepare and update a Basin Plan for their jurisdictional area. Pursuant to the Clean Water Act NPDES program, the RWQCB also issues permits for point source discharges that must meet the water quality objectives and must protect the beneficial uses defined in the Basin Plan.

San Francisco Bay Water Quality Control Plan (Basin Plan)

The San Francisco Bay RWQCB (SFRWQCB) is responsible for the development, adoption and implementation of the Water Quality Control Plan for the San Francisco Bay region. The Basin Plan is the master policy document that contains descriptions of the legal, technical and programmatic bases of water quality regulation in the San Francisco Bay Region. The Basin Plan identifies beneficial uses of surface waters and groundwater within its region and specifies water quality objectives to maintain the continued beneficial uses of these waters. Development pursuant to the Project is required to adhere to all water quality objectives identified in the Basin Plan.

National Pollutant Discharge Elimination System / Municipal Regional Stormwater Permit

The federal Clean Water Act (CWA) addresses urban stormwater runoff pollution of the nation's waters. In 1990, US EPA promulgated rules establishing Phase 1 of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase 1 program for Municipal Separate Storm Sewer System (MS4s) required operators that serve populations of 100,000 or greater to implement a stormwater management program as a means to control polluted discharges from these MS4s.

On November 19, 2015, the SFRWQCB issued countywide municipal stormwater permits as one Municipal Regional Stormwater NPDES Permit (MRP) to regulate stormwater discharges from municipalities and local agencies in Alameda, Contra Costa, San Mateo, and Santa Clara counties, and the cities of Fairfield, Suisun City and Vallejo. The City of South San Francisco, along with the cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos and San Mateo, and the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County joined together to form the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). They are collectively known as the San Mateo Permittees. [15]

Construction General Permit

Pursuant to the MRP, construction activities that include clearing, grading, and excavation are regulated by the California Construction Stormwater Permit (Construction General Permit). The Construction General Permit authorizes the discharge of stormwater to surface waters from construction activities, and prohibits the discharge of materials other than stormwater and authorized non-stormwater discharges, and all discharges that contain hazardous substances unless a separate NPDES Permit has been issued to regulate those discharges.

Provision C.6 of the MRP requires operators and developers of construction sites disturbing one acre or more of soil to file a Notice of Intent for permit coverage under the Construction General Permit. To obtain Construction General Permit coverage, construction operators/developers must prepare a Stormwater

[15] California Regional Water Quality Control Board, San Francisco Bay Region - Municipal Regional Stormwater NPDES Permit, Order #R2-2015-0049, NPDES PERMIT No. CAS612008

Pollution Prevention Plan (SWPPP) to demonstrate compliance with grading ordinances and other local requirements. The SWPPP must demonstrate implementation of seasonally appropriate and effective best management practices (BMPs) to prevent construction site discharges of pollutants into the storm drains, before approval and issuance of local grading permits. All construction greater than 1-acre in size are required to provide site-specific, and seasonally and phase-appropriate, effective BMPS in the following six categories:

- Erosion Control
- Run-on and Run-off Control
- Sediment Control
- Active Treatment Systems, as necessary
- Good Site Management
- Non-Stormwater Management

Typical BMPs contained in SWPPPs are designed to minimize erosion during construction, stabilize construction areas, control sediment and control pollutants from construction materials. The SWPPP must also include a discussion of the program to inspect and maintain all BMPs. The local permitting agency (e.g., South San Francisco and/or the SMCWPPP) must review applicant's erosion control plans and SWPPPs for consistency with local requirements. This review includes an assessment of the appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits, and verification that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction General Permit.

Stormwater Management Plan / Provision C.3 Requirements

The 2015 MRP also includes requirements to incorporate post-construction stormwater control and low-impact development (LID) measures into new development and redevelopment projects. These requirements are known as Provision C.3 requirements. The goal of Provision C.3 is for local permitting agencies to use their planning authorities to include appropriate source control, site design and stormwater treatment measures in new development and redevelopment projects to address stormwater runoff pollutant discharges, and prevent increases in runoff flows from new development and redevelopment projects.

Provision C.3.c establishes thresholds at which new development and redevelopment projects must comply (i.e., Regulated Projects), and local municipalities must apply standard stormwater conditions of approval for Regulated Projects that receive development permits. Current thresholds for determining when Provision C.3 applies to a project are generally based on the amount of impervious surface that is created and/or replaced by a project. Since 2006, a project that creates and/or replaces 10,000 square feet or more or impervious surface area is defined as a C.3 Regulated Project. As of 2011, the threshold for requiring stormwater treatment was reduced from 10,000 to 5,000 square feet of impervious surface for uncovered parking areas, restaurants, auto service facilities and retail gasoline outlets. The 2015 MRP also includes categories of 'Special Projects' for certain land development characterized as smart growth, high density or transit-oriented development that can either reduce existing impervious surfaces or create less accessory impervious areas and automobile-related pollutant impacts. These Special Projects may receive LID treatment reduction credits in recognition that density and space limitations may make 100% LID treatment infeasible. If approved by the Water Board, these Special Projects may be allowed credits against otherwise applicable treatment requirements by installing tree-box-type high flow-rate bio-filters or vault-based high flow-rate media filters.

Other than Special Projects, all other Regulated Projects must meet Provision C.3 requirements for post-construction stormwater control using a combination Low Impact Development (LID) stormwater controls that are capable of reducing long-term impacts of development on stormwater quality and creek channels.

These LID control measures for post-construction stormwater control are used reduce water quality impacts by preserving and re-creating natural landscape features, minimizing impervious surfaces, and then infiltrating, storing, detaining and evaporating stormwater into the air, and/or bio-treating stormwater runoff close to its source. These LID measures include:

- Site Design Measures: Site design measures are site-planning techniques for pollution prevention and reduction in flow rates and durations, by protecting existing natural resources and reducing impervious surfaces of development projects. Some examples of site design measures include minimizing land disturbance and preserving high-quality open space, minimizing impervious surfaces by using narrow streets, driveways and sidewalks, minimizing impervious surfaces that are directly connected to the storm drain system, clustering structures and paved surfaces and using landscaping as a drainage feature.
- Source Control Measures: Source control measures consist of either structural project features or operational "good housekeeping" practices that prevent pollutant discharge and runoff at the source, such as by keeping pollutants from coming into contact with stormwater. Examples of structural source controls include roofed trash enclosures, berms that control run-on to or runoff from a potential pollutant source, and indoor mat/equipment wash racks that are connected to the sanitary sewer. Examples of operational source controls include street sweeping and regular inspection and cleaning of storm drain inlets.
- Stormwater Treatment: The MRP requires stormwater treatment requirements to be met by using evapotranspiration, infiltration, rainwater harvesting and reuse, or bio-treatment. Stormwater treatment measures must be sized to comply with hydraulic design criteria. The following are commonly used treatment measures: bioretention areas, flow-through planter boxes, infiltration trenches, extended detention basins, green roofs, pervious paving and grid pavements, rainwater harvesting and use, and subsurface infiltration systems.

Local Regulations

San Mateo Countywide Stormwater Pollution Prevention Program

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) was established in 1990 to reduce pollution carried by stormwater into local creeks, the San Francisco Bay and the Pacific Ocean. The Program is a partnership of the City/County Association of Governments (C/CAG), each incorporated city and town in the county, and the County of San Mateo. Some of these requirements are implemented directly by municipalities, while others are addressed by the San Mateo Countywide Water Pollution Prevention Program on behalf of all the municipalities. The permit also requires a public education program, implementing targeted pollutant reduction strategies, and a monitoring program to help characterize local water quality conditions and to begin evaluating the overall effectiveness of the permit's implementation. The San Mateo Countywide Water Pollution Prevention Program takes the lead for implementing requirements of these permits.

City of South San Francisco General Plan

The General Plan contains policies designed to protect and improve water quality. Policies applicable to the Master Plan Update are as follows:

- 7.2-G-1: Comply with the San Francisco Bay RWQCB regulations and standards to maintain and improve the quality of both surface water and groundwater resources.

The General Plan contains policies designed to protect people and development from damage associated with flooding. Policies applicable to the Master Plan Update are as follows:

- 8.2-G-1: Minimize the risk to life and property from flooding in South San Francisco.

- 8.2-I-2: Use the City's development review process to ensure that proposed development subject to the 100-year flood provides adequate protection from flood hazards, in areas identified in Figure 8-3 [in the Health and Safety Element].

City of South San Francisco Municipal Code

Flood Damage Prevention

Chapter 15.56 (Flood Damage Prevention) of the South San Francisco Municipal Code promotes the public health, safety and general welfare by minimizing public and private losses due to flood condition. To accomplish this purpose, this chapter includes methods and provisions to:

- restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- control the alteration of the natural floodplain stream channels, and natural protective barriers, which help accommodate or channel flood waters
- control filling, grading, dredging, and other development which may increase flood damage, and
- prevent or regulate the construction of flood barrier which will unnaturally divert flood waters or which may increase flood hazards in other areas

The provisions contained in Chapter 15.56 of the Municipal Code are applicable only to development in flood hazard areas as defined by FEMA. The shoreline areas of the Project Area are subject to 100-year flood conditions due to coastal flooding and wave action.

Stormwater Management

Chapter 14.04 (Stormwater Management and Discharge Control) of the South San Francisco Municipal Code requires stormwater treatment requirements specified in the shared Regional Urban Stormwater NPDES permit (the MRP) be mandated for certain categories of new and redevelopment projects in the City of South San Francisco, based upon the amount of impervious area created, added or replaced by a project. Stormwater treatment requirements apply to new development and redevelopment projects, special land use categories, road projects and required site design measures for small projects and single-family homes as determined by the director of public works or designee. Treatment BMPs for regulated projects shall incorporate sizing design criteria as specified in NPDES Permit for water quality treatment of stormwater runoff prior to discharge.

City of South San Francisco East of 101 Area Plan

The East of 101 Area Plan provides detailed planning policies that are consistent with policies of the adopted South San Francisco General Plan. With respect to hydrology and water quality, the East of 101 Area Plan aims to reduce flooding by evaluating specific development proposals to determine drainage and flood protection requirements, and to prevent the degradation of water quality by minimizing erosion and sedimentation, and requiring that projects comply with NPDES permit requirements.[16]

[16] City of South San Francisco, East of 101 Area Plan, 1994

Impacts and Mitigation Measures

Thresholds of Significance

Based on the CEQA Guidelines, the Project would have a significant environmental impact if it were to:

1. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality
2. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impeded sustainable groundwater management of the basin
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would:
    a. result in substantial erosion or siltation on- or off-site;
    b. Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site
    c. 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
4. In flood hazard, tsunami or seiche zones, risk release of pollutants due to project inundation
5. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan

Approach to the Analysis

The Project Area includes the same study area as previously analyzed in the 2002 BEG EIR, 2007 MEIR and 2012 SMEIR, including similar potential Opportunity Sites, or locations where new development or redevelopment within the Genentech Campus is likely to occur. The majority of these potential Opportunity Sites are in the same or similar locations as were contemplated and analyzed in the previous EIRs, and certain information from these previous EIRs remain valid and applicable. The analysis of the Project presented below relies upon known conditions that are present in the Project Area, and as updated for this EIR.

Water Quality

Hydro 1: Future development pursuant to the Project could result in a violation of water quality standards or waste discharge requirements or otherwise substantially degrade water quality. **(Less than Significant with Regulatory Compliance)**

During Construction

Typical construction activities can result in degradation of water quality and violation of water quality and waste discharge standards. Construction activities may loosen soils, increase erosion and downstream siltation, potentially intercept contaminated groundwater during dewatering and allow for accidental spill or release of construction-related chemicals that may contact surface waters. Individual construction projects pursuant to the Project will involve excavation and soil stockpiling, boring and grading that will dislodge soil particles and therefore potentially cause soil erosion. If not properly managed, the dislodged soils could be washed into drainages by rain or by water used during construction. Project construction would also involve use of motorized heavy equipment including trucks and dozers that require fuel, lubricating grease and other fluids. Accidental chemical release or spill from a vehicle or equipment could affect surface water. Such spills

could become washed into the on-site drainages and eventually the Bay, or could infiltrate into soil affecting groundwater quality.

Depending on a number of factors including depth to groundwater, extent of excavation for building foundations or below-grade structures, soil types and site history, non-stormwater may be encountered during construction activities. Typical sources of non-stormwater include groundwater, water from cofferdams, water diversions and waters used during construction activities. When non-stormwater must be removed so that construction may be proceed, the removal of that water is typically accomplished through a dewatering process. Dewatering operations may occur during a wide range of construction activities including but not limited to demolition of pavement or structures, grading (including cut and fill slopes), utility trenching and installation, and installation of underground drainage facilities. Untreated water from construction site dewatering may contain pollutants that, if discharged to a stormdrain system or natural watercourse, may exceed water quality standards of the receiving water. Typical pollutants that may be encountered include sediment (the most common pollutant associated with dewatering operations), high levels of pH, and contaminant pollutants associated with current or past use of the site or adjacent land. Contaminant pollutants may include oil, grease, pesticides, solvents, fuels and other toxics that may be laden with sediments. Release of these pollutants into receiving waters could potentially harm wildlife in the Bay or interfere with the wastewater treatment plant's operation. Discharging contaminated or sediment-laden water from a dewatering site into any water of the state without treatment is prohibited.

Post-Construction

After construction, resulting increases in peak stormwater flows can also result in violations of standards intended to reduce sediments and contaminants in the stormwater system. New development pursuant to the Project would create or replace impervious surfaces. Increases in impervious surfaces would result in increased runoff and the potential for that runoff to carry pollutants to receiving waters, including the Bay. Stormwater runoff from impervious surfaces can generate nonpoint-source pollutants such as organic materials that increase the biological oxygen demand (the demand for oxygen in the water needed by aquatic life to survive), suspended solids, pathogens, sediment from erosion, air pollution fallout, nitrogen and phosphorus from chemical fertilizers, animal wastes, leachates from leaves, and pesticides.

Regulatory Requirements

All new development pursuant to the Project will be required to comply with all applicable regulatory requirements related to water quality. Compliance with local and regional provisions and regulations that implement federal Clean Water Act requirements would prevent potential impacts from rising to a level of significance.

Construction

Regulatory Requirement Hydro 1A - Construction General Permit/Stormwater Pollution Prevention Plan: All new qualifying construction projects pursuant to the Master Plan Update will be required to comply with Provision C.6 of the Municipal Regional Permit (MRP), including filing a Notice of Intent for permit coverage under the Construction General Permit.

1) To obtain Construction General Permit coverage, construction projects must include a Stormwater Pollution Prevention Plan (SWPPP) that demonstrates compliance with the City's Grading Ordinances and other local requirements.

2) The SWPPP must demonstrate implementation of seasonally appropriate and effective best management practices (BMPs) to prevent construction site discharges of pollutants into the storm drains, before approval and issuance of local grading permits.

3) Such construction projects are required to implement the stormwater BMPs identified by the San Mateo Countywide Stormwater Pollution Prevention Program, including plans to address

materials and waste management, equipment management and spill control, grading and earthmoving to prevent erosion, paving and asphalt work, concrete and mortar applications, painting and paint removal, landscaping and dewatering.

Regulatory Requirement Hydrology 1B - Permitting Requirements for Dewatering Discharges: Depending on volume and pollutant loads of non-stormwater discharges associated with an individual construction dewatering activity, and the dewatering methodology to be applied, different regulatory requirements apply. For non-stormwater dewatering discharges, each individual construction project shall obtain coverage either under the Construction General Permit, Statewide Low-Threat Discharge Waste Discharge Requirements (WDR) or a site-specific NPDES permit. Typical dewatering methods permitted pursuant to these regulatory requirements include:

1) Discharge to a Stormdrain. Authorized non-stormwater may be discharged to a storm drain under the Construction General Permit. A permit from the local sewer agency must be obtained prior to such discharge. This approach is generally appropriate for water that contains some sediment and/or pollutants, but sediment may require pre-treatment and acceptable pollutants and pollutant levels are defined by the sewerage agency. Such permits typically include provisions for fees, requirements for pre-discharge testing and reporting, and establishment of acceptable discharge limitations/prohibitions typically pertaining to the chemical quality of the water, discharge flow rates and quantities.

2) Managing Water within the Project Site: Accumulated non-stormwater may be retained and managed on the construction site, generally pursuant to statewide low-threat discharge Waste Discharge Requirements (WDRs). Retained water is evaporated, infiltrated into the soil, or is used onsite for dust control, irrigation or other construction-related purposes. This approach is generally appropriate for water that is free of pollutants, other than sediment.

3) Off-Site Treatment: This option is typically appropriate for water with toxic pollutants that cannot be discharged elsewhere. Under this approach, water is hauled off-site for treatment, typically involving a licensed commercial contractor who can remove, transport and dispose (or treat and recycle) polluted water. General requirements of this approach include acceptance of a NOI for coverage under the Construction General Permit, plus chemical testing of water quality and management of the water as hazardous waste, with applicable regulatory agency (typically RWQCB) oversight (see also Mitigation Measure Hazards-4: Site Assessment in the Hazards and Hazardous Waste chapter of this EIR).

4) Site-Specific NPDES Dewatering Permits: For those dewatering activities that cannot obtain permission to discharge to the local sanitary sewer and where the discharge cannot be regulated under the Construction General Permit or the statewide low-threat discharge WDRs, site-specific NPDES Dewatering Permits may be sought. General requirements for site-specific NPDES dewatering permits include monitoring and reporting as required by the Regional Board, and discharge and receiving water requirements (including water quality objectives, discharge prohibitions and TMDLs) as defined in the Basin Plan and specific NPDES permit obligations.

Implementation of the Construction General Permit and/or Statewide Low-Threat Discharge Waste Discharge Requirements (WDR) or site-specific NPDES permit requirements will reduce potential impacts to water quality during construction activities to a less than significant level. Best Management Practices (BMPs) will be required and incorporated into individual SWPPPs and other permits prior to approval of grading permits, providing an acceptable level of water quality protection.

Post-Construction

Regulatory Requirement Hydro 1C - Provision C.3 Requirements/Stormwater Management Plan: All new Regulated Projects pursuant to the Master Plan Update will be required to comply with Provision C.3 of the MRP, including requirements to incorporate post-construction stormwater control and low-impact development (LID) measures. Each individual development project must meet Provision C.3 requirements capable of reducing long-term impacts of development on stormwater quality. Some combination of the following post-construction stormwater controls will be required to demonstrate compliance with the hydraulic design criteria of the MRP:

1) Site design may include minimizing impervious surfaces that are directly connected to the storm drain system, or using landscaping as a drainage feature.

2) Source control measures may include roofed trash enclosures, berms that control runoff from a pollutant source, use of indoor mats/equipment wash racks that are connected to the sanitary sewer (where allowed under separate sewer discharge permits), and regular inspection and cleaning of storm drain inlets.

3) Stormwater treatments may be met by a combination of measures that may include, but are not limited to bioretention areas, flow-through planter boxes, infiltration trenches, extended detention basins, green roofs, pervious paving and grid pavements, rainwater harvesting and subsurface infiltration systems.

As indicated in SMCWPPP's C.3 Stormwater Technical Guidance document,[17] the entire East of 101 area (including the Project Area) is not included within the Hydromodification Management Control Area Boundary, and thus is not subject to hydromodification management (i.e., is not required to minimize the change in the rate and flow of runoff as compared to the pre-development conditions).

The Project does not include any specific proposal for development within the 100-foot shoreline band of BCDC jurisdiction, However, if Genentech were to consider any development within BCDC jurisdiction in the future, such development proposal would be subject to BCDC's Shoreline Development Permit process, including its requirements for protection of Bay water quality during construction and operation, and potentially additional project-specific environmental review.

Mitigation Measures

None needed.

Subsequent development pursuant to the Project will comply with the State, regional, countywide and City regulations as outlined in the Municipal Regional Stormwater NPDES Permit (MRP) issued by SFRWQCB in November 2015, as may be subsequently updated or amended. These regulations ensure that potential water quality impacts related to construction and post-construction activity pursuant to the Project will be reduced to a less than significant level.

Groundwater

Hydro 2: Future development pursuant to the Project will not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impeded sustainable groundwater management of the basin. **(Less than Significant)**

[17] accessed at: http://www.flowstobay.org/newdevelopment#hydromod

Direct Effects

The Project would result in increased development of the Genentech Campus, which is already developed with buildings and impervious surfaces. The total area of impervious surface created by the Project would not be substantially greater than the existing condition, although the Project will likely add new impervious surfaces in select areas where no prior development exists. Any increase in impervious surfaces will reduce the amount of surface water that can filter into the ground and recharge groundwater basins, but such decrease in filtration would not be substantial. Existing storm drainage systems in the Project Area currently intercept most rainfall and runoff waters, thus limiting the amount of groundwater recharge that occurs. Overall, new development pursuant to the Project may result in slight interference with groundwater recharge, but this impact would be less than significant.

California Water Service Company (Cal Water) supplies water to the Project Area, and new development pursuant to the Project would not individually draw down or otherwise substantially reduce the underlying groundwater resource.

Indirect Effects

Groundwater has historically supplied ten to fifteen percent of the Cal Water's South San Francisco District water demand. Groundwater is extracted from the Merced Formation of the Colma Creek Basin, a sub-basin of the Merced Valley Groundwater Basin. Locally this basin is referred to as the Westside Basin. The Westside Basin is the largest groundwater basin in the San Francisco Bay Hydrologic Region.

If the Project's water demand were to cause Cal Water to extract groundwater at a rate that would substantially deplete groundwater supplies or interfere substantially with groundwater recharge, this would be an indirect impact of the Project on groundwater resources. Additionally, if the Project's water demands were to contribute to cumulative water demands of the Cal Water service area such that these cumulative water demands would cause a net deficit in aquifer volume or a lowering of the local groundwater table level this would be an indirect impact of the Project on groundwater resources.

The Water Supply Assessment (WSA) prepared by Cal Water for use in this EIR concludes that, "*for the next 20+ years the South San Francisco District will be able to provide adequate water supplies to meet existing and projected customer demands, including full development of the 2017 GMPU (the Project) under normal, single dry year and multiple dry year conditions*." This conclusion is based on a number of factors, including "*current Westside Basin groundwater supplies and Cal Water's current and projected groundwater production rates from its active wells.*" [18]

As further described in the WSA report, the 2011 Westside Basin Model (version 3.1) indicates that, the sustainable municipal pumping rate [of the Westside basin] is 6.9 mgd. Cal Water, Daly City and San Bruno intend to coordinate their respective pumping rates so that 6.9 mgd is not exceeded on an annual basis. Cal Water has offered to limit its planned production of groundwater from the Westside Basin to 1.37 mgd (1,535 AFY), which is consistent with their current pumping capacity and historical pumping rates. [19]

The WSA report also describes the Regional Groundwater Storage and Recovery Project (a joint effort between SFPUC, Cal Water, and the cities of Daly City and San Bruno), which coordinates groundwater and surface water management in the South Westside Basin. This project is intended to increase water supply reliability during dry years or emergency conditions. Under this project, when the SFPUC determines that there is surplus water supply available, they will deliver some of this surplus water to the program participants in-lieu of groundwater pumping, thus leaving groundwater in storage in the Basin. When imported supplies are short, the participating pumpers could pump their designated quantities, and receive

[18] California Water Service, SB 610 Water Supply Assessment for the Genentech Master Plan Update, November 21, 2017

[19] Ibid

groundwater produced from SFPUC wells and an equally reduced quantity of imported water. The SFPUC wells will only be operated to extract the previously stored or banked supply. The expected groundwater storage gained from this reduced pumping is approximately 61,000 acre-feet. With that amount of additional groundwater available in the Basin, the agencies could pump at a rate of 7.2 mgd for a 7.5-year dry period. In January 2015, the SFPUC awarded funding for this project, and construction is expected to be complete in 2018.[20]

Based on information contained in the WSA report, the Project's water demands will not cause Cal Water to extract groundwater at a rate that would substantially deplete groundwater supplies or interfere substantially with groundwater recharge. Further, the Project's water demands will not contribute to cumulative water demands that would cause a net deficit in aquifer volume or a lowering of the local groundwater table level. Groundwater resource depletion is therefore not a significant direct or indirect effect of the Project.

Mitigation Measures

None needed.

Additional information regarding water supply and demand, and Genentech's on-going water conservation efforts, is provided in the Utilities chapter of this EIR.

Drainage Patterns and Runoff

Hydro 3: Future development pursuant to the Project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would result in substantial erosion or siltation on- or off-site, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site, or 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. (**Less than Significant with Regulatory Compliance**)

Off-Site Drainage

Colma Creek is the City's main natural drainage system. Colma Creek does not intersect the Project Area nor does the Project Area drain to Colma Creek. Development pursuant to the Project will not alter the course of Colma Creek, will not result in substantial erosion or siltation to Colma Creek and will not increase the rate or amount of runoff into Colma Creek in a manner that would result in flooding.

On-Site Drainage and Runoff

The City's stormdrain system within the Project Area consists of a variety of disconnected drainage systems including surface street drainage, underground storm drains and surface drainage channels. These stormdrain facilities collect runoff from the Project Area and outfall directly into the San Francisco Bay at several locations along the Project Area shoreline. This stormdrain system is based on gravity flow and does not require pumps to transport flows to the Bay, and is not connected to other off-site or downstream stormdrain facilities. This existing drainage system was generally designed and constructed to accommodate large-scale industrial development, with large capacity stormdrain pipes. Stormwater flows from these outfalls to the Bay are not treated at the outfall, so all water quality treatment occurs prior to discharge into the stormdrain system. Most of the Project Area is already developed and covered with impervious surfaces

[20] Ibid

(i.e., buildings, parking lots or other structures), so nearly all stormwater becomes run-off into this stormdrain system, and little infiltration into the ground and groundwater occurs.

The total area of impervious surface created by the Project will not be substantially greater than the existing condition. Most new development will consist of redevelopment of these existing impervious surfaces with new building sites. Thus, redevelopment of existing impervious area will generally not increase runoff or demand substantial increases in stormdrain capacity, and no expansion of the onsite stormdrain facilities is anticipated. Because the Project Area's stormdrain system drains directly into the Bay, no downstream drainage facilities are effected or influenced by runoff from the Project Area. New development will require localized drainage infrastructure to connect to the existing stormdrain system. These localized drainage system improvements will be required to demonstrate compliance with the water quality treatment requirements as established in the MRP (see discussion of water quality, above), but the volume of stormwater runoff generated by the Project is not expected to substantially increase above existing conditions. Because little or no additional stormwater runoff would be created, no substantial improvements or expansions to the existing stormdrain system is anticipated.

Alteration of Drainage Channels

Three surface drainage ditches are located within the Project Area (see prior Figure 12-1). These drainage ditches are excavated in upland areas for purposes of conveying stormwater runoff from the hillslopes and developed areas in the upper portions of the Project Area to the underground stormwater system, which drains directly to the Bay.

- Drainage Ditch #1: Drainage ditch #1 is a well-maintained cement lined ditch with source water feeding from piped inputs conveying stormwater from nearby impervious surfaces such as paved parking lots, paved roads and walking paths with associated storm drain infrastructure. All observed hydrologic inputs to this ditch appear to arise from either a series of pipes emanating from storm drains, or a cement curb cut that focuses flows into the ditch from an adjoining paved parking lot. The ditch appears to be piped underground, into storm drain infrastructure downstream.
- Drainage Ditch #2; Drainage ditch #2 is located on a hillslope and is entirely cement lined and well maintained. The water source at the origin of the ditch #2 is an approximately 2 to 4-inch pipe input with a faucet opening. The source of the pipe is likely from the buildings on the Upper Campus hilltop. Several other piped inputs were observed over the length of the ditch. The drainage ditch was excavated in uplands for the purpose of stormwater conveyance.
- Drainage Ditch #3: Drainage ditch #3 is also located on a hillslope and is entirely cement lined. The water source appears to be PVC piping that is located several feet upslope of the start of the cement channel. The source piping appears to arise from developed uplands located upslope, including storm drains from the paved parking lot. A few additional piped inputs were observed along the length of the ditch. The drainage ditch #3 appears to drain to stormdrain pipes downslope of this area.

These drainage ditches are part of the Project Area's overall stormdrain system. New development pursuant to the Project may result in the need or desire to alter the alignment, culvert or bridge over these drainage ditches, to develop or gain access to certain Opportunity Sites. As indicated in the Biology chapter of this EIR, these stormwater drainage ditches are not expected to be jurisdictional waters of the United States or the State, and have little or no habitat value. However, they are likely to be considered by the RWQCB to be part of the Project Area's existing stormwater management plans. Existing regulations (see below) would likely require that the drainage function of these ditches be retained or replaced if they are affected by new development.

Regulatory Requirements

Regulatory Requirement Hydro 1A - Construction General Permit/Stormwater Pollution Prevention Plan (see above)

Regulatory Requirement Hydro 1B - Provision C.3 Requirements/Stormwater Management Plan (see above)

All new Regulated Projects pursuant to the Master Plan Update will be required to comply with the C.3 provisions of the Municipal Regional Stormwater NPDES Permit (MRP) that regulate the water quality of stormwater discharges, including post-construction stormwater controls and low-impact development (LID) measures. Each individual development project must meet Provision C.3 requirements capable of reducing long-term impacts of development on stormwater quality. The MRP requires Stormwater Management Plans (SWMP), which in turn require source and treatment control measures. New development projects will be required to comply with existing federal, state and local stormwater regulations that include implementation of drainage control BMPs for water quality. Genentech will be required to adhere to applicable requirements of the MRP and Construction General Permit. These requirements include development and implementation of SWPPPs and SWMPs to minimize erosion during construction, stabilize construction areas, control sediment, control pollutants from construction materials and address post construction runoff quality. These requirements will be incorporated into individual development project designs and construction.

However, as indicated in SMCWPPP's C.3 Stormwater Technical Guidance document,[21] the entire East of 101 Area (including the Project Area) is not within the Hydromodification Management Control Area Boundary, and thus not subject to hydromodification management (i.e., is not required to minimize the change in the rate and flow of runoff as compared to the pre-development conditions).

Mitigation Measures

None needed.

All new Regulated Projects pursuant to the Master Plan Update will be required to comply with State, regional, countywide and City regulations, including those outlined in the Municipal Regional Stormwater NPDES Permit (MRP) issued by SFRWQCB in November 2015 (as may be subsequently updated or amended). Compliance with these regulations will ensure that potential alterations to existing drainage patterns do not result in substantial erosion or siltation or adverse effects to water quality, and maintain the functionality of existing on-site drainage channels.

Flood Hazards

Hydro 4: Future development pursuant to the Project would risk release of pollutants due to project inundation as a result of a flood hazard, tsunami or seiche. (**Less than Significant with Regulatory Compliance**)

Flooding

The Genentech Campus is located immediately adjacent to the Bay, with Bay shoreline along its entire eastern boundary. Portions of the San Francisco Bay Trail, a mostly contiguous trail around the San Francisco Bay, outline the coast around the Genentech Campus. Although the majority of the Project Area is not within a 100-year flood hazard zone, the immediate shoreline and the inlet at the southern portion of the Project Area are within the 100-year flood hazard zone as mapped by FEMA (see prior Figure 12-2). Coastal flooding and wave action during a 100-year storm would inundate certain portions of the immediate shoreline

[21] accessed at: http://www.flowstobay.org/newdevelopment#hydromod

bordering the Project Area.[22] Unlike flood flows along a drainage channel, such coastal flooding at the shoreline would not travel a substantial distance on land due to rising ground elevation. Coastal flood waters run up onto land and recedes back to San Francisco Bay. New development pursuant to the Project would not include housing, and no new structures would be placed on the shoreline that would be subject to or impede flows within the 100-year flood hazard zone. Certain potential Opportunity Sites identified in the Master Plan Update are near the shoreline, but subsequent and more detailed development plans for these sites will need to demonstrate compliance with regulatory requirements, including building pads that are elevated above the 100-year flood elevation.

Tsunami, Dam or Levee Failure; Seiche or Mudflow Inundation

According to the State of California Emergency Management Agency Earthquake and Tsunami Program, the southwestern portion of the South Campus is subject to potential inundation by a tsunami. The tsunami inundation line (see **Figure 12-3**) represents the maximum considered tsunami run-up from a number of extreme, yet realistic, tsunami sources. According to this map, "Tsunamis are rare events. Due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time." Because the occurrence of a tsunami is identified as rare and there ae no historical records of a tsunami affecting this area, the risks of tsunami are considered less than significant.

The Project Area is not prone to flooding in the event of dam or levee failure. Failure of a small-scale levee near the City would not release a volume of water such that the Project Area would become flooded.

The 1.5-million-gallon storage reservoir on the top of San Bruno Hill poses a potential risk of seiche hazard. However, the reservoir holds a relatively small volume of water, and water would drain away from the hill instead of ponding and resulting in high water levels.

The potential for inundation by mudflow is considered low because the Project Area contains few steep slopes of exposed soil. Hillsides in the Project Area are generally covered by development and/or landscaping. Rainfall onto these areas would encounter vegetation or impervious surfaces and would not pose a significant risk saturated soil resulting in mudflows. Impacts related to dam or levee failure, or seiche or mudflow inundation would be less than significant.

[22] FEMA Flood Map Service Center - Website accessed September 27, 2017, at: https://msc.fema.gov/portal/

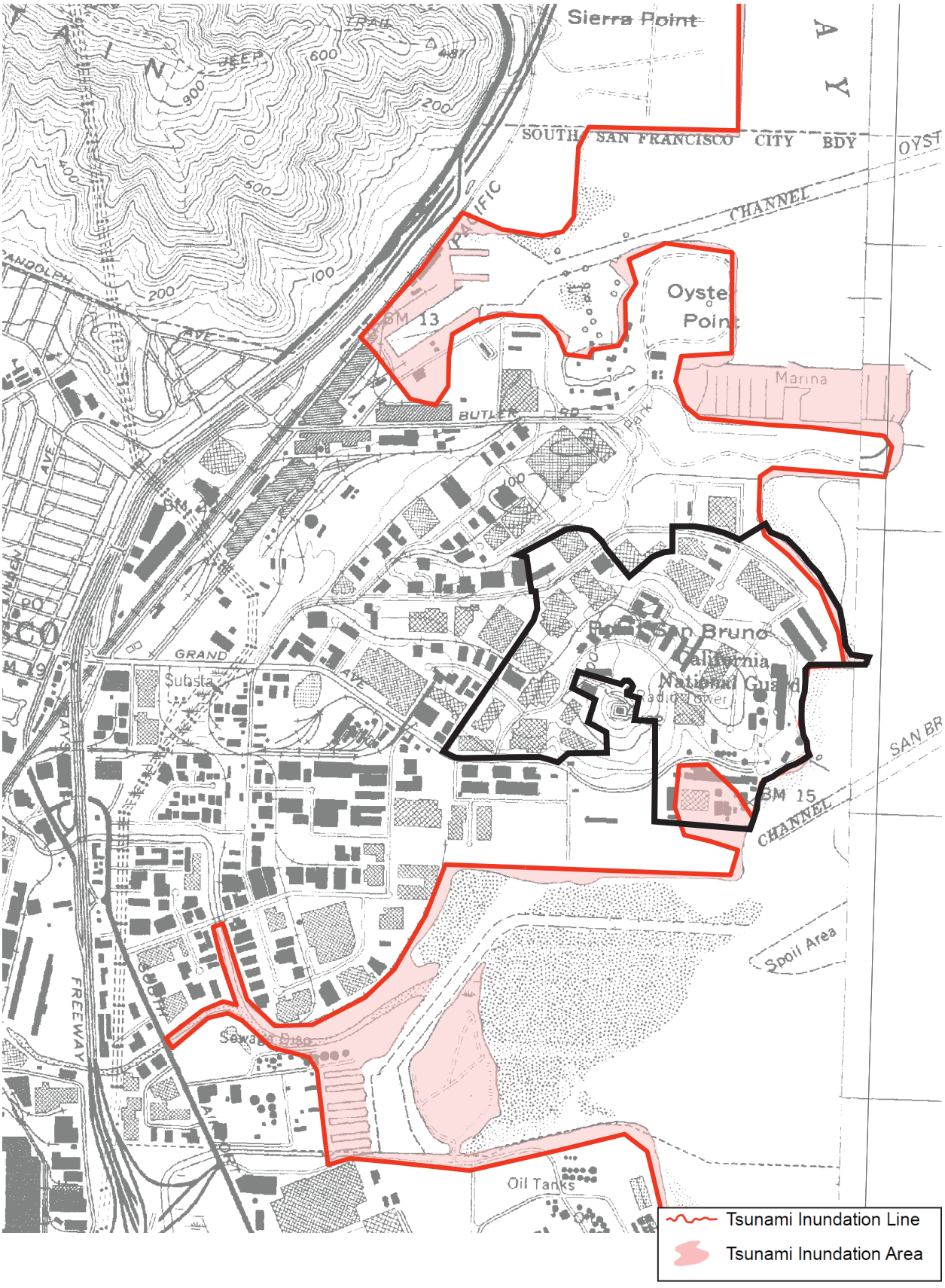


Figure 12-3
Tsunami Inundation Zone

Source: State of California Emergency Management Agency, Earthquake and Tsunami Program

Regulatory Requirements

All new development pursuant to the Project will be required to comply with all applicable regulatory requirements to address flood hazards, including but not limited to the following:

Regulatory Requirement Hydro 4A: National Flood Insurance Program: Executive Order 11988 is a federal regulation that requires the prevention of uneconomic, hazardous or incompatible use of floodplains; protection and preservation of the natural and beneficial floodplain values; and consistency with the standards and criteria of the National Flood Insurance Program.

Regulatory Requirement Hydro 4B: South San Francisco Municipal Code: Chapter 15.56, Section 15.56.140 of the South San Francisco Municipal Code identifies standards specific to construction in coastal high hazard areas.[23] Developments shall be elevated above the flood level, anchored and constructed of materials resistant to flood damage.

City of South San Francisco General Plan also includes policies to ensure that proposed development subject to the 100-year flood provides adequate protection from flood hazards. These policies and regulatory requirements will be incorporated into individual development project's construction activities.

Mitigation Measures

No mitigation measures are required.

All new development pursuant to the Project will be required to adhere to applicable codes and regulatory measures that ensure potential flood hazards are reduced to the maximum extent feasible. With compliance with these regulatory requirements, development pursuant to the Project would not expose people or structures to substantial risks involving flooding, nor would the Project risk release of pollutants due to project inundation as a result of a flood hazard, tsunami or seiche.

Cumulative Hydrology Effects

The Project will not result in a cumulatively considerable contribution to significant cumulative impacts on hydrology or water quality. The Project's potential contribution to cumulative impacts to hydrology and water quality is evaluated in the context of past, present, and reasonably foreseeable probable future development that may affect similar water resources in the same watershed. As indicated below, with implementation of applicable regulatory requirements, cumulative impacts to hydrology and water quality would be less than significant, and the Project would not result in a cumulatively considerable contribution to a significant cumulative hydrology or water quality impact.

Stormwater Runoff

Cumulative construction-related runoff from the Project and other past, current and reasonably foreseeable future cumulative development in the East of 101 Area could have adverse cumulative effects on hydrology and water quality, including increased stormwater runoff and pollutant loading to the Bay. However, all present and reasonably foreseeable development projects are required to comply with regulatory requirements that control the discharge of construction-period stormwater pollutants. Those regulatory requirements that apply to all cumulative construction projects include compliance with the Construction General Permit, and preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) pursuant to Provision C.6 of the Municipal Regional Permit (MRP). All construction-period SWPPPs required

[23] Per SSF Municipal Code 15.56.040, "Coastal high hazard area" means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. It is an area subject to high velocity waters, including coastal and tidal inundation or tsunamis. The area is designated on a flood insurance rate map (FIRM) as zone V1-V30, VE, or V (see Figure 12-2)

of cumulative development projects must demonstrate implementation of seasonally appropriate and effective BMPs to prevent construction site discharges of pollutants into the storm drains and the Bay. BMPs that are consistent with the San Mateo Countywide Stormwater Pollution Prevention Program must include measures to address materials and waste management, equipment management and spill control, grading and earthmoving to prevent erosion, paving and asphalt work, concrete and mortar applications, painting and paint removal, landscaping and dewatering. With implementation of the Construction General Permit and BMP requirements at each cumulative construction site, potential cumulatively significant impacts to water quality will be individually addressed prior to issuance of each grading permit. No individual construction site, including construction projects pursuant to the Project, would substantially contribute to cumulative construction-period water quality effects.

Post-Construction Runoff

All regulated cumulative development projects are required to design and implement Stormwater Management Plans that comply with applicable C.3 provisions of the MRP, including requirements to incorporate post-construction stormwater controls and low-impact development (LID) measures. These regulations are designed to protect water quality from all new cumulative construction and development, including the Project. As applicable, cumulative projects will also be required to demonstrate that stormwater volumes can be managed by downstream conveyance features such that they do not exceed the capacity of these facilities or induce flooding.

Drainage Patterns

Future development pursuant to the Project would not substantially alter the existing drainage patterns within the Project Area in a manner that would result in substantial erosion or siltation, or that would increase the rate or amount of surface runoff in a manner that would result in flooding.

Off-Site Drainage

Colma Creek is the City's main natural drainage system, and cumulative runoff from areas west of US 101 could potentially alter drainage patterns and water quality within Colma Creek. However, Colma Creek does not intersect the Project Area nor does the Project Area drain to Colma Creek. Rather, the Project drains directly to the Bay via on-site stormdrain systems. Development pursuant to the Project will not contribute to potential cumulative effects that might alter the course of Colma Creek, will not contribute to cumulative siltation effects in Colma Creek, and will not increase the rate or amount of cumulative runoff that contributes to Colma Creek.

Non-CEQA Hydrology Topic

The following topic does not directly relate to any environmental thresholds established by the City of South San Francisco and is not required to be evaluated in this EIR pursuant to CEQA. According to the California Supreme Court's decision in California Building Industry Association v Bay Area Air Quality Management District (S213478, December 17, 2015) and further supported in case law (*Ballona Wetlands Land Trust et al. v. City of Los Angeles [2011] 201 Cal.App.4th 455), CEQA generally does not require that public agencies analyze impacts that existing (or potential future) environmental conditions might have on a project's future users or residents*. An agency must analyze how environmental conditions might adversely affect a project's residents or users only where the project itself might worsen existing environmental hazards in a way that will adversely affect them, or if one of the provisions of CEQA that require such an analysis for certain airport, school and housing projects applies.

However, to aid the public and City decision-makers in evaluating and considering the merits of the Project, this topic is discussed below for informational purposes.

Sea Level Rise

The effects that potential future sea level rise may have on the Project is not a CEQA matter. Therefore, the analysis of sea level rise effects is provided for informational purposes only, but may also provide context for future City consideration of appropriate sea level rise adaptation strategies.

It is expected that a rise in average global temperature due largely to an increase in GHG emissions will be accompanied by a rise in the global sea level. Sea level rise occurs from rising average ocean temperatures, thermal expansion and melting of snow and ice. The rate and amount of sea level rise will be influenced by a rise in average temperatures and the speed of melting glacial ice.

The State of California provides planning guidance for assessing and adapting to the impacts of sea level rise. The State's current guidance, the California 4th Climate Change Assessment (updated in 2018), provides guidance to state agencies for incorporating sea-level rise projections into planning, design, permitting, construction, investment and other decisions.[24] The San Francisco Bay Area Region Summary Report is part of a series of 12 assessments to support climate action by providing an overview of climate-related risks and adaptation strategies tailored to specific regions and themes. Produced as part of California's Fourth Climate Change Assessment by leading climate experts, this summary report translates the state of climate science into useful information for decision-makers and practitioners to catalyze action that will benefit the region, the ocean and coast, frontline communities, and tribal and indigenous communities. [25] This latest guidance document incorporates recent scientific findings from the California Ocean Protection Council's Science Advisory Team Working Group - *Rising Seas in California: An Update on Sea-Level Rise Science*. [26] This document was produced by a Working Group of the California Ocean Protection Council Science Advisory Team (OPC-SAT), supported and convened by the California Ocean Science Trust, and provides the scientific foundation for the 2018 update to the Climate Change Assessment document.

Sea Level Rise Scenarios

According to this document, California has already experienced sea level rise of approximately 6 inches in the past century, and sea level rise is virtually certain to increase beyond this level. There are important open questions about how fast sea levels will rise and how extreme sea-level rise will become, but in spite of uncertainty, all trends point upward. The Fourth Assessment's projections underscore the dependence of sea levels upon greenhouse gas emissions and associated melt and ice-loss from Greenland and Antarctica. The California Ocean Protection Council's *Rising Seas* indicates that before year 2050, the differences in sea-level rise projections under different emissions scenarios are minor. These projections show a 50% probability that sea level rise in the San Francisco Bay will meet or exceed nearly 1 foot above 1991-2009 mean sea level, and a 67% probability that sea level rise in the San Francisco Bay will meet or exceed 7 to 13 inches by year 2050. Sea-level rise projections diverge significantly past mid-century, depending on uncertainties in future greenhouse gas (GHG) emissions, the sensitivity of climate conditions to GHG concentrations, and the overall capabilities of climate models. If GHG emissions continue at current rates, the California Ocean Protection Council's *Rising Seas* indicates that sea level rise in the San Francisco Bay has a 50% probability of reaching 18 to 30 inches above 1990 mean sea level, and a 67% probability of meeting 29 to 41 inches by year 2100. The

[24] California's Fourth Climate Change Assessment, accessed at: www.ClimateAssessment.ca.gov

[25] Ackerly, David, Andrew Jones, Mark Stacey, Bruce Riordan. (University of California, Berkeley), 2018, San Francisco Bay Area Summary Report, California's Fourth Climate Change Assessment, Publication number: CCCA4-SUM-2018-005

[26] Griggs, G, Árvai, J, Cayan, D, DeConto, R, Fox, J, Fricker, HA, Kopp, RE, Tebaldi, C, Whiteman, EA (California Ocean Protection Council Science Advisory Team Working Group). *Rising Seas in California: An Update on Sea-Level Rise Science*. California Ocean Science Trust, April 2017. Available online at: http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf

California 4th Climate Change Assessment also includes an additional very-low probability worst-case estimate that exceeds 9 feet of sea level rise.[27]

Other climate-change-induced changes to atmospheric-oceanic processes may also increase coastal flood hazards due to:

- Daily tidal inundation: As sea levels rise, the elevation of MHHW will continually increase. Without action, this increase in elevation will result in increased permanent inundation of low-lying areas.
- Annual high tide inundation (king tides): King tides result in temporary inundation, and are associated with nuisance flooding, such as occasional inundation of low-lying roads, boardwalks, and waterfront promenades. Typical king tides raise coastal waters approximately 14 inches above MHHW. In the winter (December, January, and February), king tides may be exacerbated by winter storms, making these events more dramatic. Without protective action, this regular, predictable flooding will occur more frequently and affect larger areas as sea levels rise.
- Extreme high tide inundation (storm surge): Depending on the type and intensity of cause(s), extreme tides range from 15 inches above MHHW (1-year extreme tide) to 42 inches above MHHW (100-year extreme tides) or higher. In one such recent event (December 11, 2014), Bay waters rose 18 inches above predicted tide levels due to coastal storm conditions during a heavy rain event.
- Weather and weather cycles: Climate change may affect the frequency and/or intensity of coastal storms, El Niño cycles and related processes. During El Niño winters, atmospheric and oceanographic conditions in the Pacific Ocean produce severe winter storms that affect Bay shorelines. No clear consensus has emerged about these projected changes, but a commonly identified trend is a tendency toward increased elevation of snowpack and correspondingly more precipitation falling in Delta watersheds as rain. This trend may increase the frequency of higher Delta flows into the Bay.
- Waves: Large waves, whether generated within the Bay or by large Pacific storms, can damage unprotected shorelines and drive floodwaters even higher. Typical impacts include damage to coastal structures such as levees, docks and piers, wharves, and revetments; backshore inundation due to wave overtopping of structures; and erosion of natural shorelines.
- Precipitation combined with high tides: When large rainfall events co-occur with particularly high tides, coastal waters can impede the drainage of rivers, creeks and stormwater systems to the Bay, resulting in inland flooding during storms. Typical impacts during high or extreme tides include failure of storm drainage infrastructure, drainage restrictions through outfalls, backup of floodwaters into low-lying areas during precipitation events, road closures and neighborhood flooding. [28]

The *Adapting to Rising Tides, Bay Area Sea Level Rise Analysis and Mapping Project* has produced inundation data and mapping products for all nine San Francisco Bay Area counties, representing ten different sea level rise scenarios and/or extreme tide water levels. Each of the mapped scenarios approximates either permanent inundation scenarios or temporary flood conditions from combinations of sea level rise and extreme tides likely to occur before 2100. Permanent inundation occurs when an area is regularly covered by daily tidal fluctuations. As sea levels rise, additional shoreline areas may be subject to permanent inundation. Temporary flooding occurs when an area is exposed to episodic, short-duration, extreme tide events of greater magnitude than normal tide levels (such as during storm surge or El Niño events). Shoreline and

[27] Griggs, et.al., California Ocean Science Trust, *Rising Seas in California: An Update on Sea-Level Rise Science,* April 2017, Table 1b, page 26

[28] San Francisco Bay Conservation and Development Commission (BCDC), Adapting to Rising Tides, Bay Area Sea Level Rise Analysis and Mapping, in collaboration with MTC and AECOM, page 11, accessed at: http://www.adaptingtorisingtides.org)

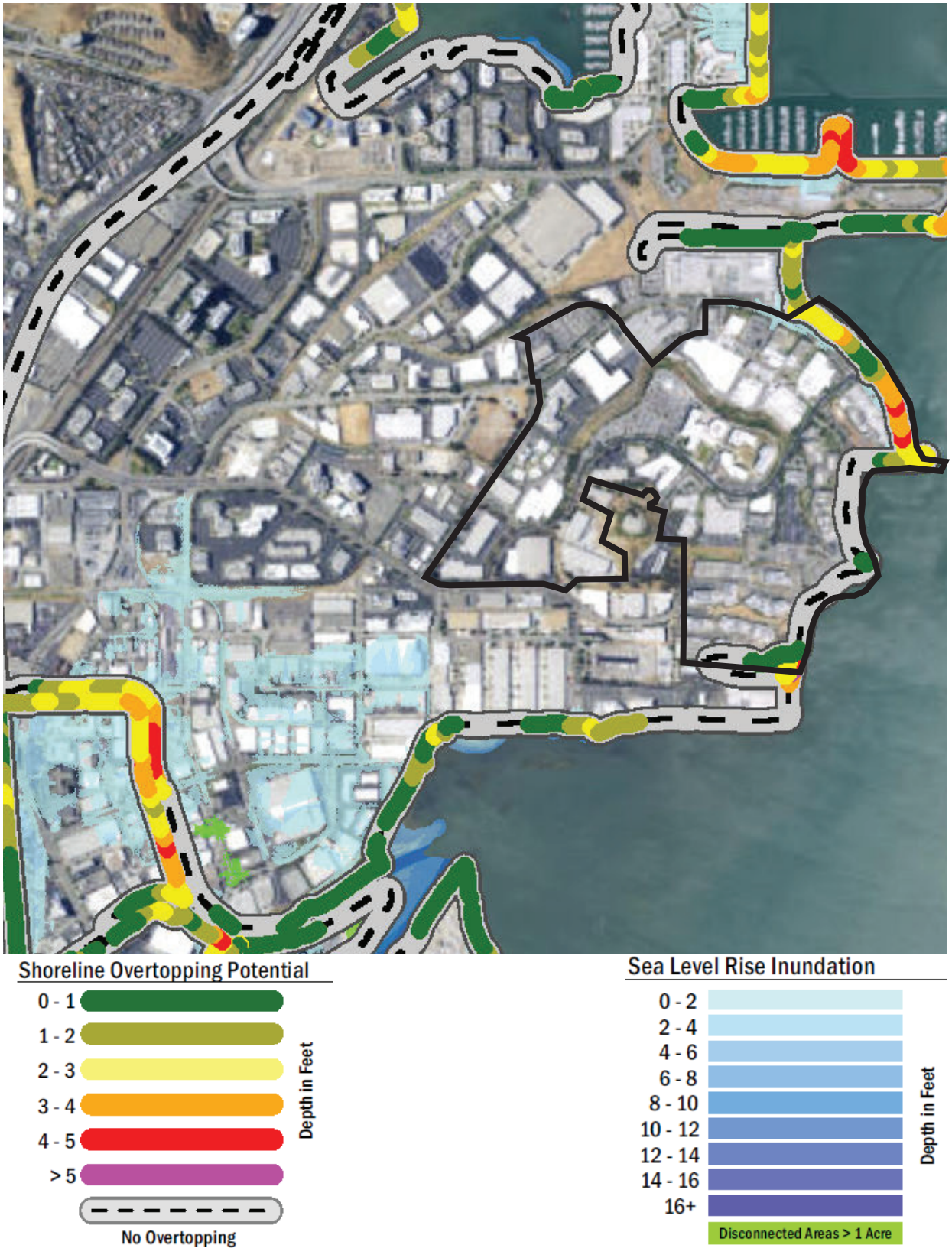
inland areas may be temporarily flooded during an extreme tide event, but may resume their intended function once floodwaters recede. [29]

Implications for East of 101 Area and Project Site

Two of the Adapting to Rising Tide scenarios are presented below, representing the potential range of sea level rise effects to the Project area and to the East of 101 Area in general. The first scenario (see **Figure 12-4**) represents a 12-inch rise in sea level (corresponding to *Rising Seas*' projection of a 50% probability in sea level rise by year 2050, plus a potential 50-year storm surge in the San Francisco Bay. Under this scenario, the Genentech Campus would be expected to experience only limited sea level rise inundation along Forbes Boulevard in the Lower Campus. Shoreline overtopping by 3 to 4 feet could be expected during the combined 50-year storm surge in the same general area along the Lower Campus. The Mid-Campus and South Campus are not shown as being affected by storm surges under this scenario. No other neighborhood Campus locations would be affected by sea level rise inundation or storm surge, as they are well removed from the shoreline and much higher in elevation. The more substantial effects of sea level rise under this scenario would be felt in the southerly portion of the East of 101 Area, generally south of East Grand Avenue. This area is expected to experience sea level rise inundation of between 2 and 4 inches, and the Colma Creek channel is projected to experience overtopping of between 3 to 5 inches along Harbor Way, Utah Avenue and Mitchel Avenue.

The second scenario (see **Figure 12-5**) represents a 42-inch rise in sea level (corresponding to *Rising Seas*' highest of sea level rise under a 67% probability by year 2100, plus a potential 100-year storm surge in the San Francisco Bay. Under this longer-term and more severe scenario, the Genentech Campus would only be expected to experience limited sea level rise inundation of 2 to perhaps 4 feet within the Lower Campus and in Forbes Boulevard, coupled with Lower Campus shoreline overtopping of 4 to 5 feet during the combined 100-year storm surge. The Mid-Campus and South Campus would remain unaffected by sea level rise inundation, but the South Campus might experience shoreline overtopping during storm surges of up to 2-feet under this scenario. No other neighborhood Campus locations would be affected by sea level rise inundation or storm surge, as they are well removed from the shoreline and much higher in elevation. The southwesterly portion of the East of 101 Area, including both sides of East Grand Avenue, is expected to experience sea level rise inundation of 4 to 6 inches. The Colma Creek channel is projected to experience storm-surge overtopping of as much as 5 inches along Harbor Way, Utah Avenue and Mitchel Avenue, and even 2 to 4 inches along East Grand Avenue at Forbes Boulevard.

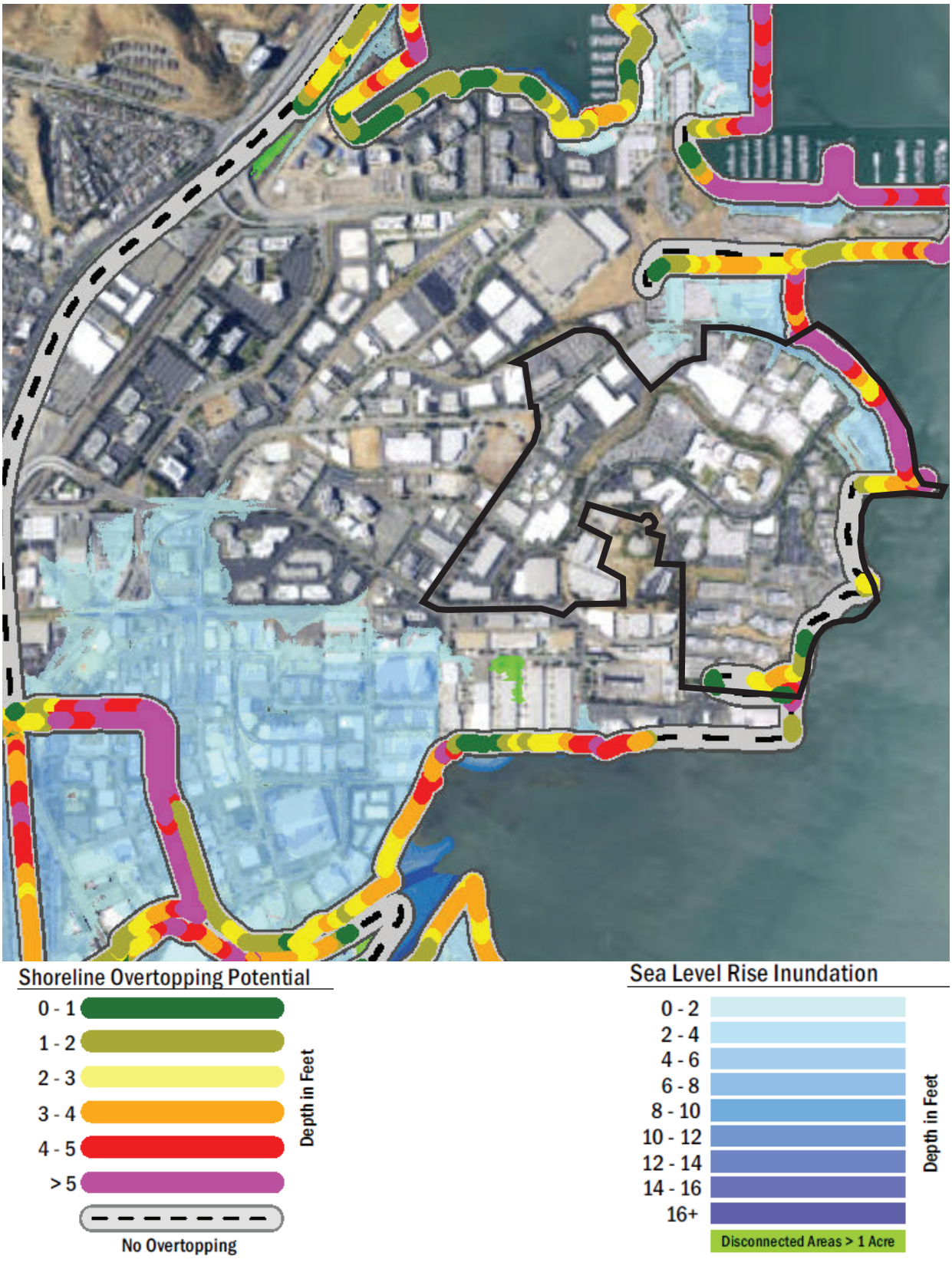
[29] Ibid, page 1



Corresponds to 12″ of sea level rise, plus a 50-year storm surge event

Figure 12-4
Sea Level Rise Scenario 1

Source: BCDC, et.al., *Adapting to Rising Tides,* Bay Area Sea Level Rise Analysis and Mapping Project, September 2017



Corresponds to 42″ of sea level rise, plus a 100-year storm surge event

Figure 12-5
Sea Level Rise Scenario 2

Source: BCDC, et.al., *Adapting to Rising Tides*, Bay Area Sea Level Rise Analysis and Mapping Project, September 2017

As indicated in these figures, most of adverse effects of mid-century sea level rise at the Genentech Campus will likely be confined to the 100-foot shoreline setback along the Bay. This setback restricts Campus development adjacent to sensitive natural areas such as tidal wetlands, which also provide for storm surge and wave dissipation. However, in the longer term (or under accelerated and/or more severe weather conditions) adaptation to sea level rise at the Campus may prove to be more critical. As new development occurs in these more susceptible areas of the Campus, Genentech will consider adaptation strategies that may include:

- Targeting new infrastructure investments (i.e., CUP/CHP construction) in areas that are at lower risk for inundation and storm surge potential
- Elevating the grade of certain areas (i.e., in the Lower Campus) above the expected sea level rise inundation zone, commensurate with new development or redevelopment projects, and
- Potentially building a levee to protect the lower Campus areas from inundation and erosion resulting from sea level rise

The 100-foot shoreline band along the Bay provides opportunity for construction of a levee, and the levee could be designed to include a top-of-bank relocation of the Bay Trail.

In the more southerly portion of the East of 101 Area, the shoreline and Colma Creek channel will become increasingly exposed to more substantial tide levels, and existing flood protection measures may not provide the same level of protection that they do today. This information may help the City of South San Francisco begin to plan for and develop operational strategies, assist in identifying and managing climate change-related risks and help identify trigger points for implementing broader East of 101 Area sea level rise adaptation strategies.