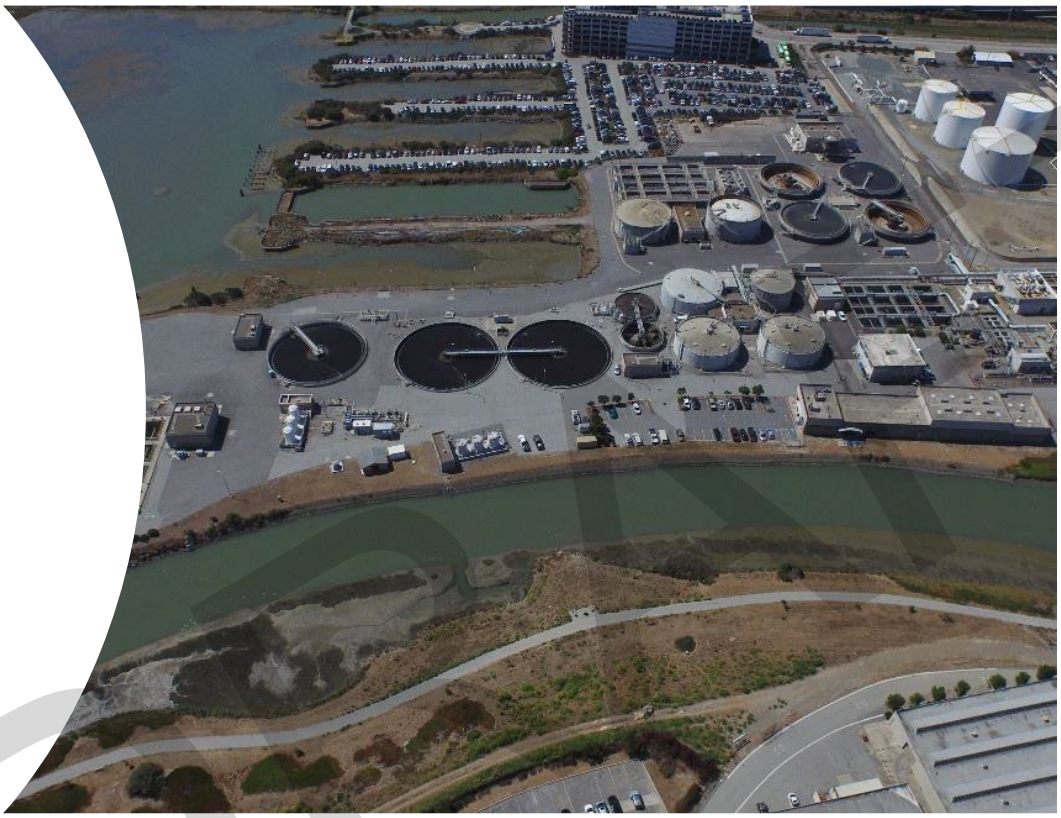
Lower Colma Creek Continuing Authorities Program Section 103 Project

Draft Detailed Project Report and Environmental Assessment



USACE San Francisco District

June 2022

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Acronyms

ABAG – Association of Bay Area Governments
AEP – Annual Exceedance Probability
APE – Area of Potential Effects
BAAQMD – Bay Area Air Quality Management District
BCDC – Bay Conservation and Development Commission
BMPs – Best Management Practices
CAP—Continuing Authorities Program
CAR – Coordination Act Report
CARB – California Air and Resource Board
CAAQS – California Ambient Air Quality Standards
CCC – California Central Coast
CEIWR-HEC – U.S. Army Corps of Engineers' Hydrologic Engineering Center
CERCLA – Comprehensive Environmental Response, Compensation and Liability Act
CEQ – Council on Environmental Quality
CEQA – California Environmental Quality Act
cfs – Cubic Feet per Second

CMP – Congestion Management Plan
CNDDB – California Natural Diversity Data Base
CNEL – Community Noise Exposure Level
CNPS – California Native Plant Society
CO – Carbon Monoxide
CO_{2eq} – Carbon Dioxide Equivalents
CSRM – Coastal Storm Risk Management
CWA – Clean Water Act
CZMA – Coastal Zone Management Act
D&I – Design and Implementation
DPR/EA – Detailed Project Report / Environmental Assessment
DPS – Distinct Population Segment
EAD – Equivalent Annual Damages
EFH – Essential Fish Habitat
EO – Executive Order
EQ – Environmental Quality
ESA – Endangered Species Act
FCSA – Feasibility Cost Sharing Agreement
FEMA – Federal Emergency Management Agency
FID – Federal Interest Determination
FTA – Federal Transit Administration
FWOPC – Future Without Project Condition
GHGs – Green House Gases
H&H – Hydrology and Hydraulics
HEC-FDA – Flood Damage Reduction Analysis
HTL – High Tide Line
HTRW – Hazardous, Toxic and Radioactive Waste
ICW – Inspection of Completed Works
LERRDD – lands, easements, rights-of-way, relocations, and disposal areas
LOS – Level of Service
LRSL – Local Relative Sea Level
LUST – Leaking Underground Storage Tank
MCC – Motor Control Center
MGD – million gallons per day
MLD – Most Likely Descendant
MMPA – Marine Mammal Protection Act
MSA – Magnuson – Stevens Fishery Conservation and Management Act
NAAQS – National Ambient Air Quality Standards
NAHC – Native American Heritage Commission
NAVD - North American Vertical Datum
NBSU – North Bayside System Unit
NED – National Economic Development
NEPA – National Environmental Policy Act
NFS – Non-Federal Sponsor
NHPA – National Historic Preservation Act
NMFS – National Marine Fisheries Service
NNBFs – Natural and Nature-Based Features
NO_2 – Nitrogen Dioxide
NOAA – National Oceanic and Atmospheric Administration
NPDES – National Pollutant Discharge Elimination System
OMRR&R – Operation, Maintenance, Repair, Replacement, And Rehabilitation

O_3 – Ozone
O&M – Operation & Maintenance
OSE – Other Social Effects
P&S – Plans and Specifications
PDT – Project Delivery Team
POOCCs – Problems, Opportunities, Objectives, and Planning Constraints and Considerations
PPA – Project Partnership Agreement
RCRA – Resource Conservation and Recovery Act
RED – Regional Economic Development
RLSC – Relative Sea Level Change
SFIA/SFO – San Francisco International Airport
SFEI – San Francisco Estuary Institute
SHPO – State Historic Preservation Offices
SLC – Sea-Level Change
SLR – Sea-Level Rise
SSPD – South Pacific Division
SPN – San Francisco District
SSF - SB WQCP – South San Francisco – San Bruno Water Quality Control Plant
SWRCB – State Water Resources Control Board
TMDLs – Total Maximum Daily Loads
TSP – Tentatively Selected Plan
RWQCB – San Francisco Bay Regional Water Quality Control Board
USACE – United States Army Corps of Engineers
USEPA – United States Environmental Protection Agency
USFWS – United States Fish and Wildlife Service
USGS – U.S. Geological Survey
WSEL – Water Surface Elevation
WQC – Water Quality Certification
YBM – Young Bay Mud

1. Introduction

1.1. Study Purpose, Need and Scope*

The Lower Colma Creek Continuing Authorities Program (CAP) 103 project is a coastal storm damage reduction project at a wastewater treatment plant in South San Francisco, California, adjacent to the San Francisco International Airport (SFO). The South San Francisco/San Bruno Water Quality Control Plant, and North Bayside System Unit Facilities (also referred to as South San Francisco – San Bruno Water Quality Control Plant, or abbreviated as SSF -SB WQCP) services an area with over 165,000 full time residents, plus the daily population of SFO airport. The purpose of this report is to analyze coastal storm risk management opportunities at the SSF -SB WQCP. This study addresses the need for coastal storm risk management in the project area. There have been no improvements to reduce flood risk in the area surrounding the plant, which is at risk from coastal flooding caused by storm driven waves. Flood risk is expected to increase over time due to the location of the plant, which is in a low-lying coastal area, near the confluence of Lower Colma Creek with the San Francisco Bay (Bay).

Coastal storm flooding events can inundate the facility, flooding subterranean control rooms, electrical motor control centers via underground conduits, and equipment, causing the plant and/or pump station 4 to shut down. Were this to occur, coastal storm flood events could disrupt wastewater treatment services and cause backups within the system, resulting in raw sewage backing up into homes, overflowing from manholes in streets, and being released untreated into the Bay. Should the plant be impacted by coastal flooding, there would be impacts to the local community, buildings, property, and infrastructure, as well as the environment. The study has analyzed the feasibility of managing the risk of coastal flooding at the SSF - SB WQCP, as well as opportunities to improve recreation in the area. This detailed project report (DPR) and Environmental Assessment (EA) is an account of the study process and findings, including analysis of how to avoid, minimize, and mitigate for impacts resulting from the project. Throughout the document, an asterisk denotes a section typically dedicated to the EA.

CAP projects are intended to provide straightforward solutions to simple water resources problems through smaller-scale projects. The level of analysis and investigation is scoped to match the complexity of the problems at hand. When compared to the General Investigations feasibility studies that the U.S. Army Corps of Engineers (USACE) performs for complex and larger scale problems, the CAP feasibility phase is intended to be quicker and efficiently focus analysis to arrive at a recommendation for implementation.

1.2. Location

The study is examining flood risk at the SSF - SB WQCP located in the City of South San Francisco, CA (SSF - SB), which is part of San Mateo County. South San Francisco is bordered by the cities of Brisbane to the north and San Bruno to the south (Figure 1). The project is within California's 14th Congressional District, which is represented by Congresswoman Jackie Speier.

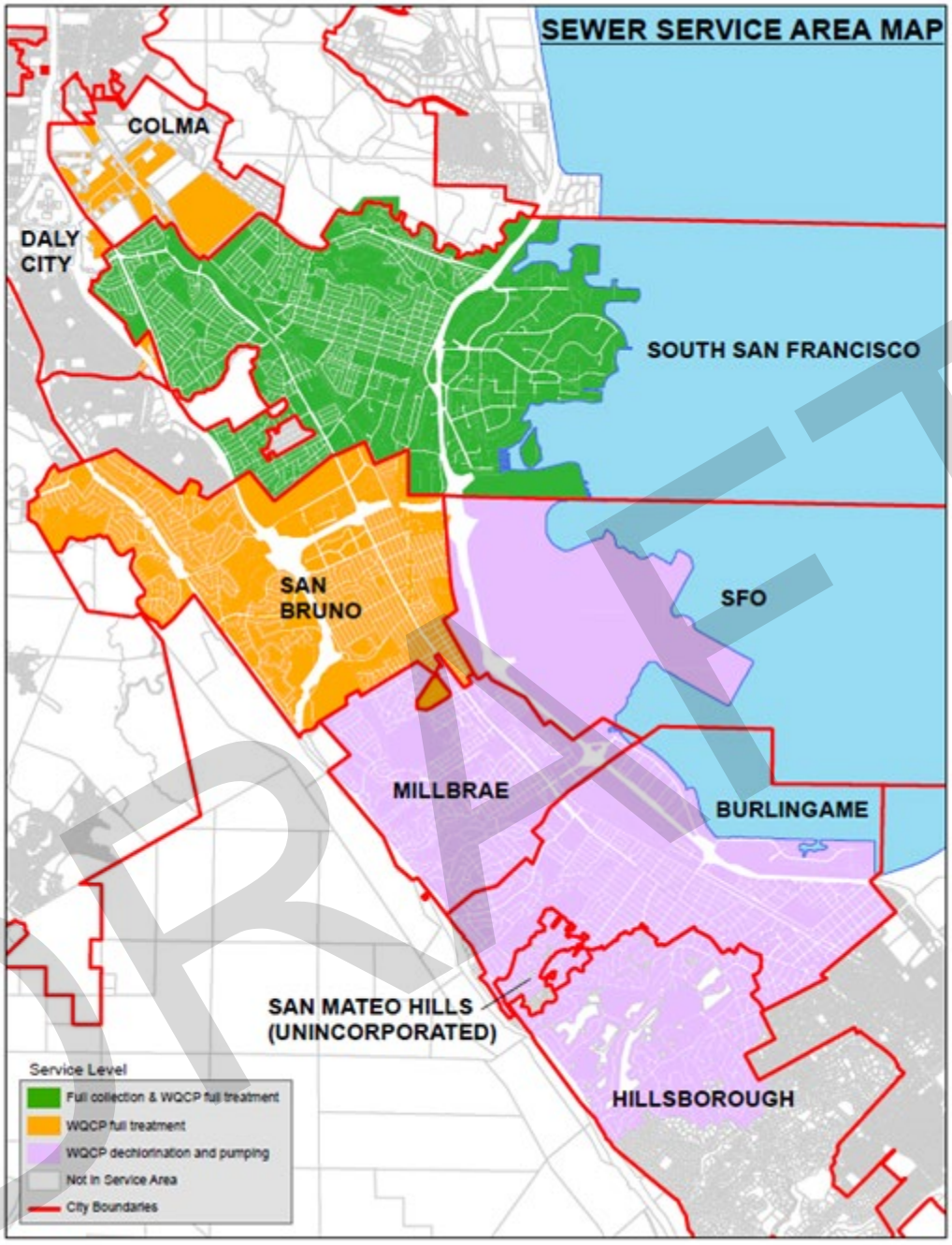

Figure 1. Service area by treatment/service type of the South San Francisco Wastewater Quality Control Plant

The project area is located on land that is lived on by the Bay Area's Indigenous peoples, past and present. Despite the centuries of colonization and genocide, Native communities persist today and are active in efforts to preserve and revive their culture. The Ohlone are the predominant Indigenous group of the Bay Area, including the Ramaytush of the San Francisco Peninsula, and the Muwekma Tribe throughout the region. Other Indigenous groups include the Graton Rancheria community (Coast Miwok

and Southern Pomo), Kashaya, Patwin, and Mishewal Wappo in the North Bay, and the Bay Miwok in the East Bay.

The plant is located in the City of SSF, just north of San Bruno, but services a larger area spanning several municipalities, plus SFO airport. Figure 1 shows the service area of the SSF-SB WQCP. The pink areas in Figure 1 have alternate wastewater treatment plants that they utilize, but rely on the SSF-SB WQCP for pumping and dechlorination services. The remaining green areas in Figure 1 are fully reliant on the SSF-SB WQCP for collection and full treatment of wastewater, while the orange area relies on the SSF - SB WQCP for full treatment, but has a separately operated collection system. This is discussed in more detail in Section 2.3.5. Disadvantaged communities and socially vulnerable groups make up a significant portion of the study area in San Bruno and South San Francisco. The study area also comprises affluent and majority white communities, such as Burlingame.

Figure 2 shows the SSF - SB WQCP and the three pump stations which pump directly to the plant, namely Pump Stations 4, 9, and 11. The plant is located along lower Colma Creek, at the confluence to the Bay.

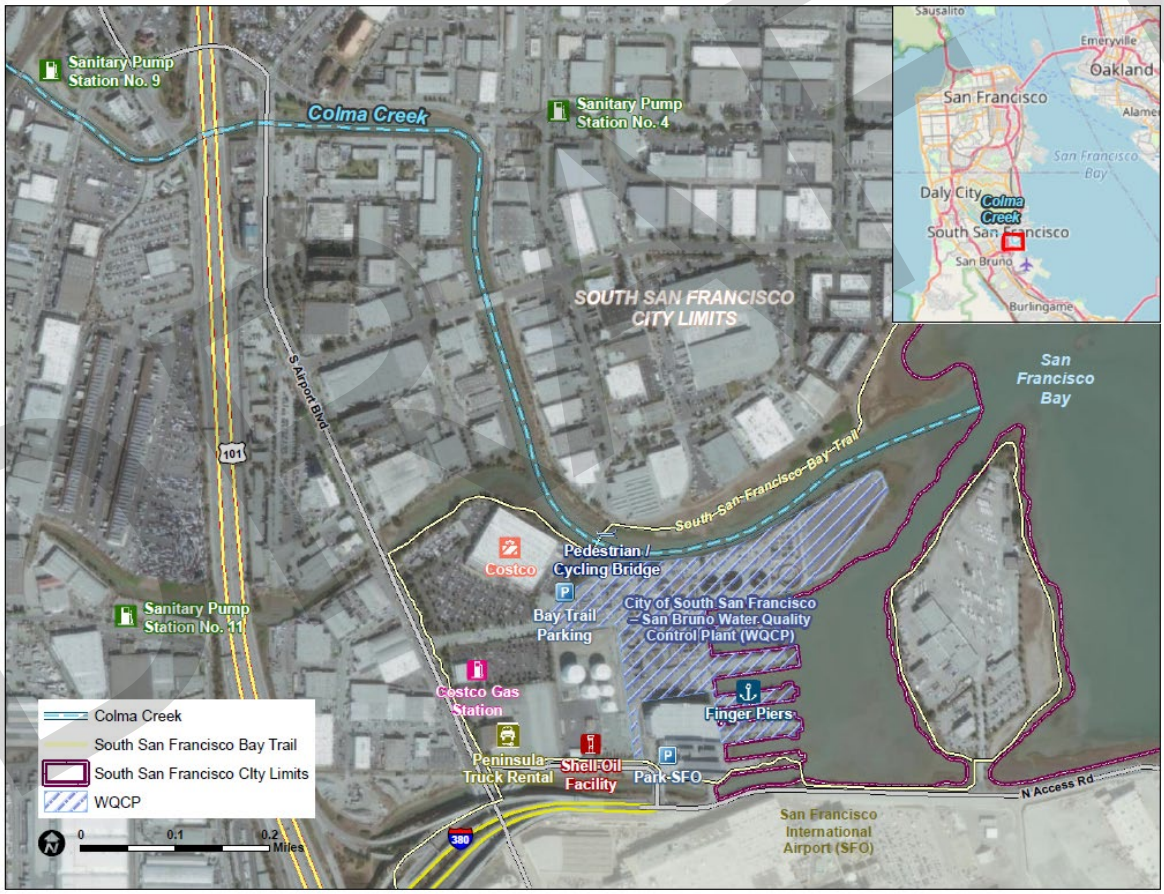

Figure 2. The South San Francisco Wastewater Quality Control Plant and nearest sanitary pump stations are located just north of San Francisco International Airport, along Colma Creek and San Francisco Bay.

The finger piers south of the main WQCP facilities were formerly utilized for ship building and now serve as overflow parking to Park SFO which rents space just south of the plant. Shell Oil, Peninsula

Truck Rental and Costco are neighbors of the plant to the west. The San Francisco Bay Trail runs along the opposite bank of Colma Creek from the plant and crosses the creek via a bridge just northwest of the plant, circling up and around Costco, along South Airport Boulevard, and east along North Access Road before rejoining the Bay coastline south of the plant at the southern terminus of the current trail.

1.3. Study Authority

This study is being conducted under Section 103 of the CAP. Projects implemented under this authority are formulated to protect multiple public and private properties and facilities, and single non-federal public properties and facilities against damages caused by storm driven waves and currents[1]. Projects may be structural (e.g., seawalls, groins, breakwaters) or non-structural (e.g., beach nourishment, relocation of structures). Section 103 was authorized under the River and Harbor Act of 1962 (P.L. 87-874), as amended, also referred to as Section 103 under the Continuing Authorities Program.

The CAP is a standing authority from Congress to study and construct projects within authority that meet the requirements and policies of the USACE, are of limited complexity, and are within the federal spending limits. In this case, the federal spending limit is $10 million, including the cost of the study, design, and implementation.

Federal interest to continue to the feasibility phase was determined on 27 August 2019, and a feasibility cost sharing agreement was signed on 25 November 2020 which initiated the study.

1.4. Non-Federal Sponsor and Cost Sharing

The study is cost shared 50/50 between the USACE and the City of South San Francisco, the non-federal cost sharing sponsor. Design and Implementation (D&I) of the project will be cost shared 65 percent federal and 35 percent non-federal.

1.5. Relevant Prior Studies and Reports

- The SSF - SB WQCP is one of the most critical infrastructure assets to the region and was identified as a Risk Class 3 Vulnerable Asset in the 2018 County of San Mateo Sea Level Rise Vulnerability Assessment. This analysis found the adaptive capacity of the plant to be low, with no other plant to treat the wastewater in this area, and both the primary and backup power sources vulnerable to flooding. It further concludes that a loss of power would cause the plant to shut down completely, resulting in saltwater intrusion as well as unsanitary discharges.
- The Final Report (February 2020) on Sea Level Rise Vulnerability and Consequences Assessment by the City and County of San Francisco assessed the vulnerability and consequences to wastewater treatment plants and pump stations in San Francisco, north of the project area.
- Prior year annual reports on the annual effluent quality and plant performance report for the South San Francisco-San Bruno Water Quality Control Plant.
- San Bruno Creek / Colma Creek Resiliency Study Final Report, prepared for the San Francisco International Airport and the Coastal Conservancy, August 2015, prepared by Moffatt and Nichol and AGS Joint Venture

2. AFFECTED ENVIRONMENT - EXISTING CONDITIONS*

This section summarizes the existing conditions of important resources in the project area, as well as the regulatory setting that applies to those resources.

[1] Per Engineering Pamphlet (EP) 1105-2-58 on the Continuing Authorities Program, Specific Guidance for Section 103, paragraph 30 (March 2019)

2.1. SURFACE WATER AND OTHER AQUATIC RESOURCES

2.1.1. Regulatory Setting

The paragraphs below describe the applicable components of the Clean Water Act and Coastal Zone Management Act, and how they apply to lower Colma Creek.

Clean Water Act (33 USC 1257 et seq.). The Clean Water Act (CWA) established the federal structure for regulating surface water quality standards and discharges of pollutants into waters of the U.S. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The genesis of the CWA, enacted in 1948, was the Federal Water Pollution Control Act. It was significantly reorganized and expanded in 1972 by the CWA. The CWA requires states to set standards to protect water quality. Specific sections of the CWA control discharge of pollutants and wastes into marine and aquatic environments, as discussed below.

Section 303 – Water Quality Standards and Implementation Plans (Title 40 CFR Part 131.2). This section of the CWA describes water quality standards as the water quality goals for a particular water body. The water quality goals are the designated uses for the water, and the criteria to protect those uses. A water quality standard defines the water quality goals for a water body, or portion thereof, by designating the use or uses to be made of the water, and by setting criteria necessary to protect those uses.

States adopt water quality standards that are approved by USEPA to protect public health or welfare, enhance the quality of water, and serve the purposes of the CWA. To serve the purposes of the CWA, as defined in Sections 101(a)(2) and 303(c), means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish, and wildlife, and provide water quality for recreation in and on the water. The standards should consider the use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other uses, including navigation.

The State Water Resources Control Board (SWRCB) administers the water quality standards developed under the CWA and the California Water Code. The SWRCB is required to routinely monitor the condition of water bodies in the state, and maintain a list of impaired water bodies having water quality concerns, in accordance with Section 303(d) of CWA. The RWQCBs are required to develop measures to restore impaired water bodies.

Section 303(d) – Impaired Water Bodies and Total Maximum Daily Loads. Under this section of the CWA, each state is required to identify those waters within its boundaries that do not meet water quality standards. The state must establish priority rankings for these waters and develop Total Maximum Daily Loads (TMDLs) to maintain beneficial uses and improve water quality. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards. Seasonal variations in loading and a margin of safety are considered when TMDLs are established. In California, the SWRCB and RWQCBs prepare the CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs.

Section 401 – Water Quality Certification. Under Section 401 of the CWA, Water Quality Certification (WQC) is required for any activity that requires a federal permit or license, and that may result in discharge into navigable waters. To receive certification under Section 401, an application must demonstrate that activities or discharges into waters are consistent with state effluent limitations (CWA Section 301), water quality effluent limitations (CWA Section 302), water quality standards and implementation plans (CWA Section 303), national standards of performance (CWA Section 306), toxic

and pretreatment effluent standards (CWA Section 307), and "any other appropriate requirements of State law set forth in such certification" (CWA Section 401).

In California, the authority to grant water quality certification is delegated to the SWRCB, and in the San Francisco Bay area, applications for certification under CWA Section 401 are processed by San Francisco Bay RWQCB. The CWA and USACE regulations (33 CFR Section 336.1[a][1]) require USACE to seek state WQC for discharges of dredged or fill material into waters of the United States.

Section 402 – National Pollutant Discharge Elimination System (NPDES) Permitting. Under Section 402 of the CWA, discharge of pollutants to navigable waters is prohibited unless the discharge complies with general or individual NPDES permits. This includes both point-source and non-point-source (i.e., stormwater) discharges. NPDES stormwater regulations are intended to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of structural and nonstructural best management practices (BMPs). BMPs can include educational measures, regulatory measures, public policy measures, or structural measures. Implementation and enforcement of the NPDES program is conducted through the SWRCB and the nine RWQCBs. The San Francisco Bay RWQCB (has set standard conditions for each permittee in the San Francisco Bay Area, which includes effluent limitation and monitoring programs.

Section 404 – Discharge of Dredged or Fill Material. Section 404 of the CWA regulates the discharge of dredged or fill material (e.g., fill, pier supports, and piles) into waters and wetlands of the United States, which includes San Francisco Bay. The USACE implements Section 404 of the CWA, and USEPA has oversight authority. Section 404(b)(1) of the CWA establishes procedures for the evaluation of permits for discharge of dredged or fill material into waters of the United States. In situations where the USACE proposes work that involves discharge of dredged or fill material into waters of the United States, the USACE must comply with the requirements of the Section 404(b)(1) Guidelines, although the USACE would not issue a permit for its own activities. Any discharge under Section 404 must also obtain a Section 401 WQC.

Coastal Zone Management Act. The CZMA, established in 1972 and administered by NOAA's Office of Ocean and Coastal Resource Management, provides for management of the nation's coastal resources, including water quality. The overall purpose of the act is to balance competing land and water issues in the coastal zone. For San Francisco Bay, BCDC is the regional coastal zone management agency, and is responsible for issuing concurrence with consistency determinations under the CZMA. The Bay Plan is BCDC's policy document specifying goals, objectives, and policies for BCDC jurisdictional areas. Pursuant to the federal CZMA, USACE is required to be consistent to the maximum extent practicable with the enforceable policies of the Bay Plan. The Bay Plan has enforceable policies that apply to several resource categories described in this document.

2.1.2. Surface Water

Surface water is affected by climate change beyond sea level rise impacts. This can include sediment availability reduction, changes in freshwater flows, increase in non-native species, and increased urbanization can affect surface water volumes and flows. Hazardous materials and contaminants could enter the surface water flow if overland flooding occurs as a result of sea level rise, especially if the pump stations and wastewater treatment plant are impacted. Surface water flooding could enter buildings and facilities, causing damage as well as impairing infrastructure and operations of emergency and medical services. If operations are impacted at the wastewater treatment plant, sewage could backflow and enter surface water flooding in the streets. Colma Creek currently has a TMDL listing for trash pollution.

2.1.3. Groundwater

Groundwater is a valuable resource and is present in alluvial groundwater basins. These basins include Westside, San Mateo Plains, San Pedro Valley, Half Moon Bay Terrace, San Gregorio Valley, and Pescadero Valley. Sea level rise is anticipated to increase the groundwater table and could have several impacts to groundwater resources in the County, especially in areas where municipal water supplies depend on groundwater (County of San Mateo, 2018). Sea level risk poses a limited risk to municipal supply wells due to their deep screening depths, the presence of shallow confining layers, and the distances of supply wells from the Bay. Groundwater is also not the primary resource for the potable water supply in the County. Groundwater flow in coastal aquifers could be affected by sea level rise, as an increase in water table elevation may result in basement flooding and compromised septic systems. It could also increase groundwater discharge to streams and result in local changes in the freshwater-saltwater interface (USGS, 2014). A recent study found that current maximum groundwater levels in the study area are approximate 1 to 2 meters below the ground surface, and that this area could be vulnerable to groundwater flooding as a result of future sea level rise (Plane et al. 2019).

2.1.4. Floodplains and Historic Flooding

Periodic flooding occurs in South San Francisco, but is generally confined to certain areas along Colma Creek north of the project site. The water levels in Colma Creek are highly influenced by both tidal action and storm events. The project site is located within a 1% annual exceedance probability (AEP) floodplain, colloquially referred to as the 100-year floodplain, designated by the Federal Emergency Management Agency (FEMA; 2012). The FEMA maps reviewed in a recent flood study (Carollo Engineers, 2010) indicate that the 1% AEP event occurring at high tide would raise water levels to 9.7 feet above mean sea level. The Maintenance Building at the project site lies at an elevation of approximately 12.82 feet (Carollo Engineers, 2010). While the water level is not regularly monitored in the stretch of the creek bordering the project site, near- flooding conditions have been observed outside the Maintenance Building (Carollo Engineers, 2010). As recently as October 13, 2009, the water level was measured to be 1.6 feet above the 1% AEP flood level (11.3 feet above mean sea level), which is approximately 1.5 feet below the Maintenance Building's foundation elevation. The project site is not substantially higher than potential flooding events.

2.1.5. Wetlands and Waters of the U.S.

The WQCP is on the site of former marshes and Baylands. There was also an island that likely provided high and dry ground for WQCP construction. Many of these former wetlands have been filled in and had their configuration changed as development in the area progressed. The extent of these former Baylands relative to the recommended plan alignment is shown in Figure 3.

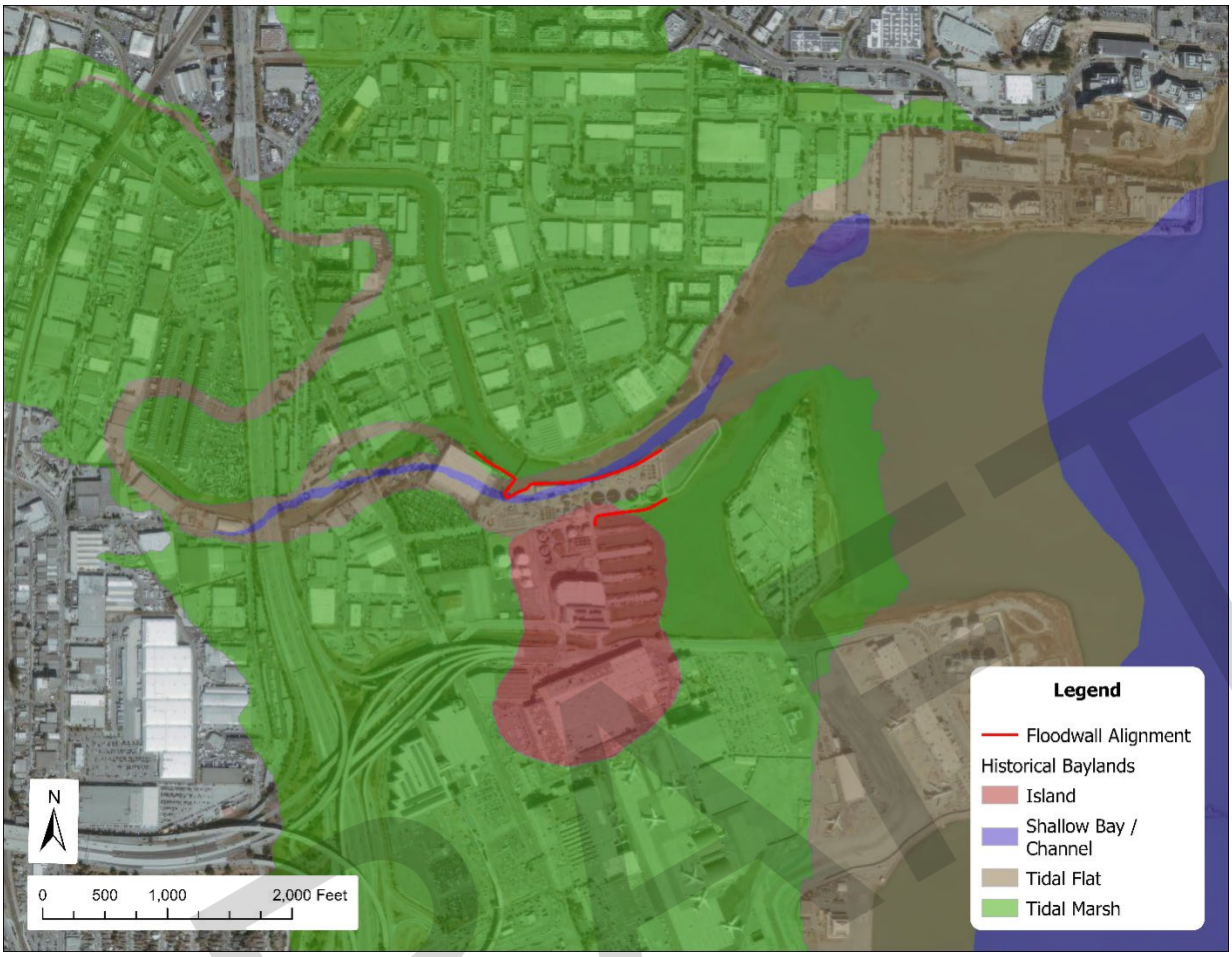

Figure 3. Historical Baylands in the vicinity of the project area shown with recommended plan alignment.

As the study area is located on the current shoreline of San Francisco Bay, there is a considerable amount of jurisdictional wetlands and Waters of the U.S. nearby. The channels and mudflats are other Waters of the U.S. and wetlands are intertidal marsh. To determine the extents of these jurisdictional waters and wetlands, the team used a combination of previously conducted delineations, satellite imagery, and in-situ measurements. Figure 4 shows the results of this delineation in the study area.

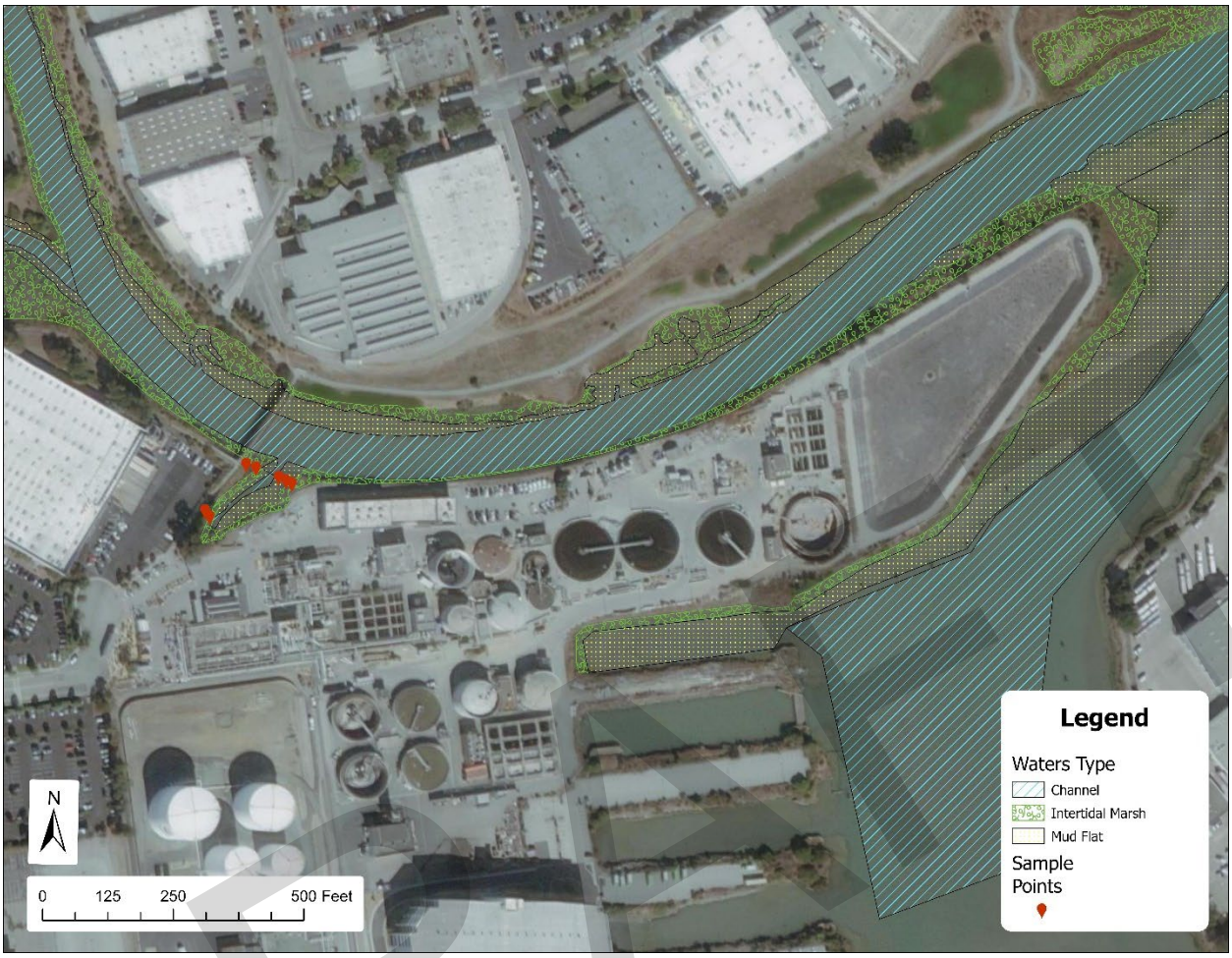

Figure 4. Wetlands and Waters of the U.S. in the vicinity of the study area.

2.1.6. Wastewater Facility

The WQCP is located on the shoreline of San Francisco Bay, just north of SFO Airport and south of Colma Creek. The project site lies on a peninsula with protected inlets of San Francisco Bay to the east and south. The WQCP site consists entirely of previously developed or landscaped areas with mostly industrial land use in the vicinity such as petroleum storage, warehousing, shipping and light manufacturing (BCDC, 1998).

The current average dry weather flow through the WQCP is nine million gallons per day (MGD) with peak wet weather flows of over 60 MGD. The permitted average dry weather flow capacity is 13 MGD (RWQCB, 2008). Wastewater treatment processes at the WQCP include screening and grit removal, primary clarification, secondary treatment by an activated sludge process, secondary clarification, disinfection, and dechlorination. Much of the treatment infrastructure components and their associated utilities (high voltage power cables, etc.) are located underground and therefore vulnerable to surface water flooding. These include expensive electronic control systems and other components essential to the plant's operation. The biosolids that the plant generates are concentrated using dissolved air flotation thickeners, anaerobically digested, and dewatered with belt filter presses. Biosolids are hauled from the WQCP site and used as alternative daily cover at the Potrero Hills Landfill in Suisun City, California (RWQCB, 2008).

The Cities of South San Francisco and San Bruno are members of the North Bayside System Unit (NBSU), a joint powers authority that also includes the Cities of Burlingame and Millbrae and San Francisco International Airport. Treated, disinfected wastewater from the WQCP enters the NBSU force main and combines with treated, disinfected wastewater from other NBSU members.

In addition to processing wastewater from the cities of South San Francisco and San Bruno, and the Town of Colma, the WQCP provides dechlorination treatment of the chlorinated effluent from the cities of Burlingame and Millbrae and San Francisco International Airport prior to discharging the treated wastewater into Lower San Francisco Bay.

The wastewater discharge is regulated by the National Pollutant Discharge Elimination System (NPDES) No. CAS0038130, Order No. R2-2008-0094 issued to the Cities of South San Francisco and San Bruno by the San Francisco Bay Regional Water Quality Control Board (RWQCB). In the event of peak wet weather flows that exceed secondary treatment capacity, the excess primary effluent bypasses the secondary treatment train and is disinfected and blended with secondary effluent prior to discharge. In the rare event of an emergency when all onsite storage of effluent has been filled to capacity and with adequate notice to the RWQCB, blended effluent is discharged into a near-shore outfall in Colma Creek. This outfall was most recently used in October of 2021.

2.2. CLIMATE

2.2.1. Existing Conditions

South San Francisco is classified as warm and temperate, with an average temperature of 56.4 degrees F and 22.9 inches of annual average rainfall. The winters are rainier than the summers and the least amount of rainfall occurs in July, while the greatest amount of precipitation occurs in February, with an average of 4.6 inches. Temperatures are highest on average in September, at around 62.7 degrees F, with the lowest average temperatures in the year occurring in January when it is around 49.2 degrees F (Climate-data.org, 2022).

2.2.2. Regulatory Framework

Recently the Council on Environmental Quality (CEQ) issued a final rule which restores the requirement that federal agencies evaluate all the relevant environmental impacts of the decisions they are making, including those associated with climate change (Whitehouse 2022). Climate change as a broad science can encompass air, water, and biological resources, though the root cause has been attributed by the majority of the scientific community to atmospheric carbon dioxide concentration and other green house gases (GHGs) such as methane and oxides of nitrogen, collectively referred to as GHGs (Mora 2018). In order to more easily make comparisons for GHGs released by different projects, various GHGs such as carbon dioxide, methane, and oxides of nitrogen are often combined into carbon dioxide equivalents (CO_{2eq}), by using the global warming potential of each gas as it relates to carbon dioxide, as found in CFR Title 40 Chapter I Subchapter C Part 98 Table A-1 “Global Warming Potentials”. In this way, all emissions from a given project could be converted to CO_{2eq} and used for comparing to a given threshold to determine whether GHG project emissions would represent a significant impact. Although the scientific community largely agrees on GHGs as a major driver of climate change and how to use CO_{2eq} to compare the total GHG emissions from various projects, CEQ and many air quality management districts have not yet issued a threshold for determining whether mobile source emissions from a project would result in a significant impact.

2.3. SOILS AND GEOLOGY

2.3.1. Regulatory Setting

No federal plans, policies, regulations, or laws related to geology, soils, or seismicity apply to the alternatives under consideration.

2.3.2. Existing Conditions

The site is located in a seismically-active region of California that is part of the Coast Ranges geomorphic province. This region is characterized by northwest trending valleys and mountain ranges running subparallel to the San Andreas Fault Zone. The closest active fault to the project site is the San Andreas Fault which is located approximately seven miles to the southwest (Jennings, 1994). According to the U.S. Geological Survey (USGS) Working Group, the San Andreas Fault and other regional active faults, including the Hayward and Calaveras faults, pose the greatest threat of significant damage in the Bay Area (USGS, 2003). The three faults exhibit strike-slip orientation and have experienced movement within the last 150 years.

Recent studies by the USGS (2008) indicate that there is a 63 percent likelihood of a Richter magnitude 6.7 or higher earthquake occurring in the Bay Area in the next 30 years. The project site could experience a range of groundshaking effects during an earthquake on one of the aforementioned Bay Area faults. Depending on a variety of factors such as distance to the epicenter, magnitude of the event, and behavior of underlying materials, groundshaking could be significant. Seismic shaking of this intensity can also trigger ground failures caused by liquefaction, potentially resulting in foundation damage, disruption of utility service and roadway damage. Considering the close proximity to the San Francisco Bay margin, the site is underlain by artificial fill, Bay Mud deposits (generally characterized as soft compressible clays with localized sand lenses), and bedrock. Liquefaction potential is generally highest in loose saturated sediments in the upper 50 feet. Based on the preliminary geotechnical report, groundwater is encountered at depths ranging from nine to 29 feet below ground surface (Fugro Consultants, Inc., 2013).

The subsurface soil conditions at the project site generally consist of existing fill overlying the soft silty clay known as Young Bay Mud (YBM), which in turn, overlie alluvium deposits. Fill soil encountered in the existing exploratory borings extended to depths ranging approximately from 5 feet to 11 feet. The fill soil generally consists of medium stiff to very stiff lean clay, with a heterogenous mix of dense gravelly sands with varying amounts of silts and clays. The thickness of the YBM underlying the fill soil varies from one area to another, generally, it increases from the inland (Southern) portion of the project site to the Bay and along the Riverbank. Alluvial deposits were encountered beneath the YBM and extended to the maximum depth explored. These deposits generally consist of over-consolidated medium stiff to very stiff lean and fat clay to sandy lean clay with some relatively thin, isolated layers of loose to dense silty sand and clayey sand.

2.4. BIOLOGICAL RESOURCES

2.4.1. Regulatory Setting

The following laws and executive orders pertain to the biological resources in the study area. Their implementation is a shared responsibility of both the action agency (USACE), and the agencies that administer those laws.

Fish and Wildlife Coordination Act (16 USC 661 666[c]). Under the Fish and Wildlife Coordination Act, any federal agency that proposes to control or modify any body of water must first consult with the United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), as

appropriate, and with the head of the appropriate state agency exercising administration over wildlife resources of the affected state.

Endangered Species Act (16 USC 1531 et seq.), as amended. The federal Endangered Species Act (ESA) protects threatened and endangered species and their designated critical habitat from unauthorized take. Section 9 of the ESA defines take as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Take incidental to otherwise lawful activities can be authorized under Section 7 of the ESA when there is federal involvement, and under Section 10 when there is no federal involvement. The USFWS and the NMFS share responsibilities for administering the ESA.

In accordance with Section 7 of the ESA, federal agencies and their designees are required to consult with the USFWS and/or NMFS to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat.

Magnuson-Stevens Fishery Conservation and Management Act (16 USC Section 1801 et seq.; Pub. L. 104 297; Pub. L. 109 479). The primary law governing marine fisheries management in federal waters of the United States is the Magnuson – Stevens Fishery Conservation and Management Act (MSA). Under the MSA, eight regional fishery management councils were created to manage fisheries and promote conservation, particularly focusing on management programs to rebuild overfished fisheries, managing commercial fisheries at sustainable levels, and protecting essential fish habitat (EFH). EFH is regulated and defined under the MSA as those waters (i.e., aquatic areas and associated physical, chemical, and biological properties) and substrate (i.e., sediments, hardbottom, structures underlying the waters, and associated biological communities) necessary to fish for spawning, feeding, or growth to maturity.

In accordance with the MSA, federal agencies and their designees are required to consult with NMFS on proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH for fish species covered under a fisheries management plan. NMFS is required to comment and provide conservation recommendations for any activity (sponsored by either federal or state agencies) that could impact EFH.

Marine Mammal Protection Act (16 USC 1361 et seq.). Under the Marine Mammal Protection Act (MMPA), all species of marine mammals are protected. The MMPA prohibits, with certain exceptions, the "take" of marine mammals. Under the MMPA, take is defined as the means "to hunt, harass, capture, or kill, or attempt to hunt, harass, capture, or kill." Under Section 101(a)(5)(D), an incidental harassment permit may be issued for activities other than commercial fishing that may impact small numbers of marine mammals. Amendments to this act in 1994 statutorily defined two levels of harassment. Level A harassment is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal in the wild. Level B harassment is defined as harassment having potential to disturb marine mammals by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

Migratory Bird Treaty Act (16 USC 703 712). The Migratory Bird Treaty Act established special protection for migratory birds by regulating hunting or trade in migratory birds. Furthermore, this act prohibits anyone to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR Part 21). Definition of "take" includes any disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young).

Executive Order 11990: Protection of Wetlands. This Executive Order ([EO] 42 Federal Register 26961, May 25, 1977) requires federal agencies to minimize destruction of wetlands when managing lands, when administering federal programs, or when undertaking construction. Agencies are also required to consider the effects of federal actions on the health and quality of wetlands.

Executive Order 13112: Invasive Species. The purpose of this order is to prevent the introduction of invasive species and to provide control for the spread of invasive species that have already been introduced. This order states that the federal government "…shall, to the extent practicable and permitted by law, not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."

2.4.2. Aquatic Resources

Colma Creek in the study area is a tidal channel that has water in it year-round. It has hardened banks that consist of either concrete floodwall or articulated concrete mat revetment, narrow floodplain benches with marsh vegetation and mudflats that are exposed at low tide. Leidy (2007) identifies five fish species that live in Colma Creek, two of which are native (threespine stickleback and staghorn sculpin) and three of which are non-native (rainwater killifish, western mosquitofish and yellowfin goby). Insufficient information exists to assess the historical distribution of salmonids in the Colma Creek watershed. The watershed currently does not contain suitable habitat to support salmonids (Leidy 2005). The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) multispecies salmonid recovery plan does not identify Colma Creek as suitable or critical habitat for steelhead, Coho or Chinook salmon (*Oncorhynchus spp.*). While Colma Creek itself is not designated critical habitat, the waters of San Francisco Bay are considered critical habitat for steelhead (Federal register No. 52488) up to the extent of extreme high tide and critical habitat for green sturgeon (*Acipenser medirostris*) up to the extent of mean higher high water (Federal register No. 52300). The tidal portion of Colma creek falls within these limits. Colma Creek has aquatic habitat for benthic invertebrates typical of tidal channels in the San Francisco Bay Area.

2.4.3. Terrestrial Resources

The project area consists entirely of previously developed or landscaped areas within the existing WQCP and is adjacent to tidal portions of Colma Creek, the San Bruno Slough, the San Bruno Canal and the San Francisco Bay shoreline. The project site is located in the City of South San Francisco (City) on a peninsula, south of Colma Creek, with protected inlets of San Francisco Bay to the east and south. The surrounding land uses are generally industrial in nature, including petroleum storage, warehousing, shipping and light manufacturing (BCDC, 1998). The proposed project components are not directly located in areas supporting special-status plants or wildlife or their habitat.

The California Natural Diversity Data Base (CNDDB) documents 55 special-status species within the San Francisco South USGS 7.5-minute quadrangle which includes the project site (CDFW, 2013). These species, as well as other special status species identified by the United States Fish and Wildlife Service (USFWS, 1984) and California Native Plant Society (CNPS, 2013) are listed in Appendix B. Several species of gulls were observed foraging in and around the project site, particularly near the secondary clarifiers; and Canadian geese were observed foraging and nesting in and around the effluent storage basin (ESA, 2013). Bird species could use the mudflats and banks of Colma Creek, adjacent to the project area, as a stopover in the Pacific Flyway migration corridor. Characteristic bird species of this area

include Canadian geese (*Branta canadensis*), Ross's goose (*Chen rossii*), gulls (*Larus sp.*), terns (*Sterna sp.*), western grebes (*Aechmophorus occidentalis*), sanderlings (*Calidris alba*), and whimbrels (*Numenius phaeopus*).

2.4.4. Threatened and Endangered Species

California Ridgway's rail (*Rallus longirostris obsoletus*). The federal and state listed California Ridgway's rail lives in coastal salt and brackish marshes and tidal sloughs. Year-round residents, Ridgway's rails stay mainly in the upper to lower zones of coastal marshes that are dominated by pickleweed and cordgrass. They feed in the lower marsh zone where tidal sloughs and channels provide important foraging habitat and cover from predators. Threats to the species include loss and degradation of salt marsh habitat, encroachment of human activities, genetic isolation due to habitat fragmentation, and predation from coyotes, red fox, raptors, raccoons, feral cats, and possibly river otters.

Four characteristic features characterize California Ridgway's rail habitat: (1) an extensive network of tidal sloughs providing direct tidal circulation; (2) salt and brackish marshes dominated by perennial pickleweed with extensive stands of Pacific cordgrass (*Spartina foliosa*) in the lower marsh elevation zones (in brackish marshes this species also uses areas supporting bulrush (*Schoenoplectus spp.*); (3) extensive marsh cover in the upper tidal zone consisting of pickleweed and marsh gumplant; and (4) abundant invertebrate populations for feeding, especially mussels (*Mytilus californianus, Ischadium demissum*) and mud crab (*Hemigrapsus oregonensis*) (San Francisco Estuary Project, 1992). Nests are typically constructed adjacent to relatively narrow channels with vegetated edges, which are the rail's preferred feeding areas. For predator avoidance, nest platforms are typically covered with cordgrass, pickleweed, gum-plant, salt grass, or drift materials (USFWS, 1984). The breeding season of California Ridgway's rail is from February to August. Nesting starts in mid-March and extends into August, with two peaks in nesting activity – during late April to early May, and late June to early July (USFWS, 1984).

A small population of the California Ridgway's rail (*Rallus longirostris obsoletus*) was reported from salt marsh habitat of San Bruno Point in 1975, however it is unlikely that the small areas of pickleweed in the project vicinity are sufficient in size to support a local population of this subspecies (CSSF, 1997). Survey results from the 2012 Invasive Spartina Project (ISP) confirm no recent observances of the California Ridgway's rails in or adjacent to the project area (Olofson Environmental, 2012). Survey results were taken from two points near the project area; one in the navigable slough northwest of the project area and the other from Colma Creek, adjacent to the WQCP. The last observance of a California Ridgway's rail was in 2011 at the navigable slough northwest of the project area.

San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) is found on the San Francisco peninsula in San Mateo and Santa Cruz counties. The species inhabits marshlands that border ponds and sloughs, riparian cover along streams, and bordering meadows with scattered brush. Suitable habitat is not available in the project area. Colonies of the federally endangered callippe silverspot butterfly (*Speyeria callippe callippe*) are known only to exist approximately two miles north of the project area within the San Bruno Mountain habitat. Depending upon environmental conditions, the flight period of the species ranges from mid-May to late July. The San Bruno Mountain Habitat Conservation Plan, in which the callippe silverspot butterfly was designated as a species of concern, permanently protects approximately 92 percent of its habitat on San Bruno Mountain. Because of the extensive urbanization within its historical range, no suitable habitat remains for the species other than at the two sites at which it is currently known to persist (USFWS, 1997) outside of the project area.

As mentioned above, the waters of the Bay adjacent to the project are critical habitat for the threatened Central California Coast (CCC) steelhead and the threatened Southern Distinct Population Segment (DPS) of green sturgeon.

2.5. AESTHETIC RESOURCES

2.5.1. Regulatory Setting

There are no federal plans, policies, regulations, or laws related to aesthetics that would apply to any of the alternatives considered.

San Mateo County General Plan. The San Mateo County General Plan contains policies generally intended to "protect and enhance the natural visual quality of San Mateo County" and "encourage positive visual quality for all development and minimize adverse visual impacts." Some policies relevant to this project include 4.17, which says that coastal development should be regulated "to protect and enhance natural landscape features and visual quality through measures that ensure the basic integrity of sand dunes, cliffs, bluffs and wetlands. For urban areas, policy 4.36a says that projects should "Maintain and, where possible, improve upon the appearance and visual character of development in urban areas."

2.5.2. Existing Conditions

The vista in the project area largely constitutes the urbanized portion of South San Francisco with commercial buildings on the eastern side toward San Francisco Bay. The view at the WQCP is characterized by commercial buildings and San Francisco International Airport on the south; light industrial facilities to the west and north of the WQCP; and Colma Creek on the north edge of the WQCP extending east into San Francisco Bay. The project site is developed with asphalt and paved surfaces, buildings, and wastewater treatment process units and structures. There are a number of light sources including building and yard lights associated with existing development and street and freeway lights in the vicinity. As the WQCP is an active sewage treatment facility, there can be sewage odors that escape the facility into the surrounding community.

2.6. RECREATION

2.6.1. Regulatory Setting

There are no federal plans, policies, regulations, or laws related to recreation that would apply to any of the alternatives considered.

San Francisco Bay Plan. In response to the mandate of the McAteer-Petris Act, BCDC developed the San Francisco Bay Plan (Bay Plan) (BCDC 1969, as amended). The Bay Plan is the primary plan governing development in San Francisco Bay; it is a comprehensive and enforceable plan for conservation of the water of the Bay and the development of its shoreline. Permits and consistency concurrences/certifications for federal construction projects are issued by the BCDC if it finds the activities to be consistent with the McAteer-Petris Act and the Bay Plan. In addition to any necessary permits, federal activities that affect BCDC's jurisdiction are subject to review by BCDC, pursuant to the federal CZMA, for their consistency with BCDC's federally approved coastal management program, including the McAteer-Petris Act and the policies and findings of the Bay Plan.

The Bay Plan includes policies for management of Bay resources and development of San Francisco Bay and its shoreline, including dredging and water-related industry. The Bay Plan also includes policies designed to promote water-oriented recreation facilities such as marinas, launch ramps, beaches, and fishing piers, in addition to landside parks along the shoreline.

San Francisco Bay Trail. Senate Bill 100, enacted in 1987, directed the Association of Bay Area Governements (ABAG) to develop a plan for the San Francisco Bay Regional Trail system (Bay Trail). The Bay Trail Plan, adopted by ABAG in July 1989, includes a proposed trail alignment; a set of policies to guide the future selection, design, and construction of routes; and strategies for implementation and financing. The San Francisco Bay Trail, when fully constructed, will consist of a 500 mile-long walking and cycling path around the entire San Francisco Bay, running through all nine Bay Area counties, 47 cities, and across the region's seven toll bridges. More than 350 miles of the trail have been constructed. Nearly 227 miles of the existing Bay Trail are paved, and 127 miles are natural surface trails of varying widths. In some locations, the Bay Trail consists of bike lanes and sidewalks. In addition to walkers and cyclists, the trail is used by joggers, skaters, birdwatchers, photographers, kite flyers, wheelchair riders, and picnickers. The Bay Trail provides both recreational and scenic viewing opportunities in a variety of different landscapes, including waterfront/marine, cityscapes, and mountain backdrops (ABAG and MTC 2021).

San Mateo County General Plan. The San Mateo County General Plan contains policies that encourage providers of park and recreation facilities to "Provide for a balanced and equitable system of park and recreation facilities. Consider identified and/or changing needs and the impact upon environmental, service, competing land use, fiscal and organizational constraints." In a similar vein to the Bay Plan and Bay Trail paragraphs above, the General Plan states that the County will "Support, encourage and participate in the development of a coordinated and linked system of recreation facilities and public access along San Francisco Bay."

City of South San Francisco General Plan. The City of South San Francisco's General Plan includes policies to "Improve bayfront access along its entire length and endorse the prominence of this important natural asset" and "Provide a comprehensive and integrated network of parks and open space; improve access to existing facilities where feasible."

2.6.2. Existing Conditions

The study area is in a relatively industrialized area with few recreation opportunities except the San Francisco Bay Trail. The closest park to the study area is located approximately 0.5 miles north at Walnut Park in the City of San Bruno.

The San Francisco Bay Trail is located immediately adjacent to the project area. On the north side of the project, a 200 ft span pedestrian bridge was constructed in 2008 to connect the bay trail across Colma Creek. The trail has a lollipop loop out east to the SAMTrans peninsula and goes inland to the south to bypass San Francisco International Airport. Due to security concerns, public access is not allowed on the facility grounds, except for special escorted occasions. While a Bay Trail alignment has been shown on plant property, past discussions have determined this to be not feasible because of security and safety concerns. The safety concerns are primarily associated with treatment chemicals maintained in bulk quantities at the plant site, described in more detail in Section 2.11.2. These chemicals are stored throughout the WQCP. There is insufficient space to have both unrestricted public access and safe and effective wastewater treatment at the WQCP.

2.7. CULTURAL RESOURCES

2.7.1. Regulatory Setting

Cultural resources are defined as several different types of properties ranging from precontact to historic archaeological sites, built-environment architectural properties such as buildings, bridges, or structures, and resources that have traditional, religious, or cultural significance to Native American Tribes such as

traditional cultural properties or even sacred sites. The study area is heavily developed, especially within the existing WQCP parcel. The vicinity of the WQCP was originally a mudflats and tidal marsh environment with a small hill situated at the center known as Belle Air Island. Adjacent and surrounding the WQCP today are portions of salt marsh within Lower Colma Creek, the San Bruno Slough and Canal, and San Francisco Bay shoreline. Most of the modifications throughout the Lower Colma Creek landscape includes industrial and residential development constructing sewage pipelines, petroleum storage, warehouses, shipping manufacturing, and commercial buildings.

Figure 5. Area of potential effects map for the undertaking along the WQCP and Lower Colma Creek.

Figure 6. Area of potential effects map for the undertaking around pump station 4.

National Historic Preservation Act of 1966, as amended (16 U.S.C. § 470). Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to consider the effects of a proposed undertaking on properties that have been determined to be eligible for listing or are listed in the National Register of Historic Places (National Register). The regulations implemented for the NHPA by the Advisory Council on Historic Preservation fall under Protection of Historic Properties 36 C.F.R. § 800. For purposes of complying with Section 106 of the NHPA, 54 U.S.C. § 306108, a Federal agency will decide the area of potential effects (APE) for the project or undertaking. The APE is defined under 36 C.F.R. § 800.16(d) as "the geographic areas or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." Additionally, the APE "is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking". The APE was defined based on the geographical area where alternatives would have direct impacts to cultural resources from ground disturbing work and the arrangement of staging areas.

National Environmental Policy Act. Under the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4327, federal agencies are required to consider potential environmental impacts—including those to cultural resources—and appropriate mitigation measures for projects with federal involvement. This document has been prepared in compliance with NEPA and California Environmental Quality Act (CEQA) regulations.

2.7.2. Precontact Context

A comprehensive framework to understand the pre-European contact (Precontact) cultural history of the San Francisco Bay Area has been developed by Milliken et al. in 2007. Their research divides California history into three temporal periods: the Early Period, the Middle Period, and the Late Period.

The earliest period in California human history is the Paleoindian Period (13,500 to 10,000 Before Present [B.P.]) with is characterized by big game hunter-gatherers occupying large geographic areas. Paleoindian Period sites have not yet been discovered in the San Francisco Bay Area.

The Lower Archaic of the Early Period (10,000 to 5,500 B.P.) is the earliest period archaeologically identified in the San Francisco Bay. This early period is understood through its geographic mobility along with stylistic artifacts ranging from milling slabs, hand stones, and wide leaf-shaped projectile points. By the Middle Archaic of the Early Period (5,500 to 2,500 B.P) cut shell beads and mortar and pestle artifacts are noted and documented in burial sites. These artifacts indicate a shift from mobile hunter-gatherer groups to a more sedentary lifestyle.

The Middle Period starting from the Initial Upper Archaic (2,500 to 1,570 B.P.) and Late Upper Archaic (1,570 to 950 B.P.) shows geographic mobility continuing with Ohlone groups establishing camps with longer periods of settlement in areas with a stronger diversity of resources for subsistence and use. The earliest Bay Area shellmiddens were recorded during this period. Artifacts associated with the Middle Period includes milling and grinding tools and obsidian and chert projectile points. Archaeological sites associated with this period are situated along a wider range of environments, suggesting a more dynamic economic base.

The Upper Middle Period is defined by small villages indicting a more sedentary way of living. A strong cultural shift in the trade network occurs around 1570 B.P. with the disappearance of Olivella saucer beads within the archaeological record. The Initial Late Period (950 to 450 B.P.) is characterized by social complexity within the lifeways of the Ohlone people: ranging from large, central villages with political leaders and socially complex activity sites and positions. Artifacts associated usually includes hunting bows and arrows, small corner-notched projectile points, and a wide diversity of beads and ornamental artifacts.

2.7.3. Ethnography and Ethnohistory

The project is on the ancestral territories of the Ramaytush Ohlone cultural group (Milliken 1995) who occupied the general vicinity of the San Francisco Bay area's peninsula. Ethnographic, historic, and archaeological research supports this claim. Many variations of culture, ideology, and diverse linguistic groups existed between the subdivisions of around 50 Ohlone villages throughout the Bay Area. This supports an interpretation different from past "static" understandings of California's Native Americans, where the Ohlone saw themselves as members of a specific village related to others by marriage, kinship, and language. The Ohlone engaged in hunting and gathering for subsistence, with their territory encompassing both coastal and further inland valley environments. A wide variety of plant and animal resources were available for the Ohlone people, from grass seeds, acorns, tubers, as well as bear, deer, elk, bird species, antelope, and rabbit which were primary resources in their diet.

Once European contact occurred in 1769, the Ohlone peoples' lifeways and society would be severely disrupted by the Spanish missionization system, disease, and displacement from their ancestral lands and resources. The Ohlone still have a strong presence in the San Francisco Bay Area despite the injustices they faced from the Spanish, Mexican, and American colonial regimes. The Ohlone people are active in

preserving their historic and precontact past and finding ways to restore their traditional lifeways in the modern changing environment of the San Francisco Bay Area.

2.7.4. Historical Context

The first historical period event documented in the San Francisco Bay Area is the Portola expedition. The native Ohlone people made initial contact with the Spanish during their search of Monterey Bay in 1769. Mission San Francisco de Asis was established north of the study area in 1776, beginning Spanish rule in the region until 1821 when the Mexican Revolution brought in a new period of Mexican rule. The South San Francisco area was originally part of Rancho Buri Buri, a 14,639-acre area that Governor Jose Castro granted to Jose Antonio Sanchez in 1835. The name derives from the Ramaytush Ohlone village *Urebure* along San Bruno Creek. The people of Urebure spoke the Ramaytush Ohlone language of *Yelamu* (Milliken et al 2009).

By the end of the Mexican American War in 1848 and the discovery of gold in 1849, California was soon admitted to the Union in 1850. San Mateo County was formed from parts of San Francisco and Santa Cruz County in 1856. Charles Lux bought 1,464 acres of Buri Buri land in 1855 and became a partner of Henry Miller, forming the firm Miller and Lux which offered butchery services in San Francisco. Miller and Lux was the largest producer of cattle in California and one of the largest landowners throughout the United States, owning around 1,400,000 acres directly and controlling 22,000 square miles of cattle and farmland in California. Peter Iler of Omaha established two stockyards and a marketplace for cattle in 1890 with the South San Francisco Land and Improvement Company and the Western Meat Company. South San Francisco was incorporated on September 19, 1908. The name "South San Francisco" followed the pattern planned by G.F. Swift, whose company had taken over the Western Meat Company, as his other plants were "South Chicago" and "South Omaha."

During the start of World War II in the 1940's, a growing need for a warship building industry developed along the San Francisco Bay shoreline. The initial development and filling of Lower Colma Creek's native mudflat and salt marsh environment begins around this time. A defense contract was signed in the late spring of 1942 for $18,000,000 between the United States Maritime Commission and the Barrett and Hilp Construction Company. The company already started their business building warships for World War II in San Francisco. The contract was to construct 28 large concrete barges, along with the necessary waterfront and plant facilities. The company leveled the salt marsh and tidal lands south of the WQCP, bulldozing the landscape and the hill known as Belle Air Island and backfilling it with excavated marsh material. Six-to-seven 400-feet long drydocks were constructed into the rock and soil. These "finger piers" between the drydocks exist today and are located on of the southern end of the WQCP parcel. The drydock or graving docks were cut into the land, with flooding gates established at the eastern ends so that when closed water could be pumped out and ships or barges are constructed on a dry floor. When ready, water was rushed back in, and the gates reopened for ships and barges to launch (Bloomfield 1998).

To service the wastewater needs of the growing population of the southeastern portion of San Francisco following World War II, the WQCP was initially constructed in 1953, with numerous additions and alterations over time to accommodate continued growth in the area. Around the same time span, the San Francisco International Airport grew much more than the water control plant. Airline's maintenance, storage, and parking have spread almost up to the water plant. North Access Road was built to serve the growing airport activity, although the name and addresses on that road were applied only in 1987. The most recent additions are the SamTrans Bus Facility on the area formerly known as Belle Air Island as well as the Costco store adjacent to the water plant. Both were constructed in 1986 and the area has

continued to grow from the light and freight forwarding industries (Bloomfield 1998). More recently, entrepreneurs and technical companies have gradually urbanized the area (Hoover et al., 2002).

2.7.5. Cultural Resources Existing Conditions

The table below summarizes the existing conditions for archaeological sites identified within a quarter mile buffer of the APE. These resources were identified from literature research completed at the Northwest Information Center located at Sonoma State University. One unevaluated archaeological site (CA-SMA-45) is located within the floodwall footprints of Alternatives 1 and 2.

Table 1. Existing conditions for archaeological sites.

SITE TRINOMIAL AND PRIMARY RESOURCE NUMBER	LOCATION	PERIOD OF SIGNIFICANCE	DESCRIPTION	NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY
CA-SMA-45 or Nelson 384 (P-41-000049)	Upstream of Colma Creek and within the footprint of the proposed alternatives. Approximate site boundary is a large buffer covering several buildings and the creek banks.	Precontact	Archaeological site record states CA-SMA-45 is located in San Mateo County. The exact location is not given by the investigator Nels Nelson. Existing site boundary drawn by researchers at the Northwest Information Center and is an approximate location.	Unevaluated
CA-SMA-380 (P-41-002164)	On the northern bank of Colma Creek. Site boundary does not extend into the creek and is separated from the south bank.	Precontact	Precontact shell midden buried under 500 centimeters of historic and natural fill. Discovered from subsurface testing in 2006 (S-031689).	Unevaluated
CA-SMA-42 (P-41-000046)	Approximate site boundary is around 200 feet from Pump Station 4.	Precontact	Archaeological site record states CA-SMA-42 is located in San Mateo County. The exact location is not given by the investigator Nels Nelson. Existing site boundary drawn by researchers at the Northwest Information Center and is an approximate location.	Unevaluated
CA-SMA-43 or Nelson 382 (P-41-000047)	Approximate site boundary is around 1,200 feet from proposed floodwall alternatives. Confirmed to not exist in the plotted area through subsurface testing in 2017.	Precontact	NWIC's site placement and extent are based on Nelson's rudimentary mapping, and no evidence of CA-SMA-41 or other nearby shell mounds were observed during Basin Research Associates' survey of the area (Anastasio and Garaventa, 1988). Historic maps indicate that CA-SMA-41 was located on the edge of a tidal marsh (Tillery, Sowers, and Pearce 2007). Subsurface testing in 2016 identified no cultural deposits and tidal marsh soils below certain fill.	Unevaluated
CA-SMA-41 or Nelson 380 (P-41-000045)	Approximate site boundary is around 2,000 feet from proposed floodwall alternatives. Confirmed to not exist in the plotted area through subsurface testing in 2017.	Precontact	NWIC's site placement and extent are based on Nelson's rudimentary mapping, and no evidence of CA-SMA-41 or other nearby shell mounds were observed during Basin Research Associates' survey of the area (Anastasio and Garaventa, 1988). Historic mapping indicates that CA-SMA-41 was located on the edge of a tidal marsh (Tillery, Sowers, and Pearce, 2007). AECOM boring cores identified no cultural deposits and tidal marsh soils below certain fill.	Unevaluated

CA-SMA-47 (P-41-000051)	Approximate site boundary is around 3,000 feet from proposed floodwall alternatives. Confirmed to not exist in the plotted area through subsurface testing in 2017.	Precontact	1920's archaeological site survey record states CA-SMA-42 sits in San Mateo County. However, the exact location is not given by Nelson. Site boundary drawn by the CHRIS is an approximate location.	Unevaluated

Historic Built-Environment Resources

The table below covers historic built-environment resources within or adjacent to the APE that includes buildings, structures, and districts meeting the 50-year age criteria to be a historic property. No historic built-environment resources were identified as eligible for listing on the National Register of Historic Places due to their lack of historic significance or lacking physical integrity to be considered a significant historic property worth preserving today.

Table 2. Existing conditions for historic built-environment resources.

HISTORIC BUILDINGS, STRUCTURES, OR DISTRICTS	LOCATION	DESCRIPTION	NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY
South San Francisco/San Bruno Water Quality Control Plant (P-41-002557)	Located at the east end of Belle Air Road covering the entire WQCP parcel as a district	Large acreage district adjoined to the open water of Colma Creek and San Bruno Canal with 13 contributing buildings and 26 structures at the time of evaluation.	Ineligible due to lack of historic significance (Bloomfield 1998)
Digester Tank No. 1 (P-41-002571)	Located on the WQCP parcel	Contributing built-environment structure associated with the WQCP district.	Ineligible due to lack of historic significance (Bloomfield 1998)
Chlorine Contact Tank (P-41-002580)	Located on the WQCP parcel	Contributing built-environment structure associated with the WQCP district.	Ineligible due to lack of historic significance (Bloomfield 1998)
Sludge Conditioning Tank (P-41-002573)	Located on the WQCP parcel	Contributing built-environment structure associated with the WQCP district.	Ineligible due to lack of historic significance (Bloomfield 1998)
RAS Diversion Box (P-41-002572)	Located on the WQCP parcel	Contributing built-environment structure associated with the WQCP district.	Ineligible due to lack of historic significance (Bloomfield 1998)
Tillo Building North (P-41-002577)	Located on the WQCP parcel	Contributing built-environment building associated with the WQCP district.	Ineligible due to lack of historic significance (Bloomfield 1998)
Shell Oil Company Tank Farm (P-41-002566)	Located on the WQCP parcel	Contributing built-environment structure associated with the WQCP district.	Ineligible due to lack of historic significance (Bloomfield 1998)
Barrett & Hilp's Graving Docks (P-41-002564)	Located on the WQCP parcel	Remnants of five piers between graving docks. The horizontal surfaces are no covered in grass and mounded. The graving drydocks were built by the Barrett & Hilp Construction Company to fulfill their World War II contract with the federal government to construct concrete barges.	Ineligible. Evaluated and determine to have significance under the NRHP Criteria B but lacking historic integrity (Bloomfield 1998)
Belle Air Island / SamTrans Facility (P-41-002563)	East of the WQCP	The northern SamTrans bus facility. A natural hill known as Belle Air Island was graded and covered by the facility's parking lots and maintenance buildings.	Ineligible due to lack of historic significance (Bloomfield 1998)
Costco Overflow Parking (P-41-002567)	West of the WQCP	Eastern part of a landscaped parking lot of customers of Costco.	Ineligible due to lack of historic significance (Bloomfield 1998)
Costco (P-41- 41-002568)	West of the WQCP	A very large, rectangular, one-story concrete commercial building. Its design is typical of the Costco sales buildings.	Ineligible due to lack of historic significance (Bloomfield 1998)

2.8. AIR QUALITY

2.8.1. Regulatory Setting and Existing Conditions

Regulation of air pollution is achieved through both national and State ambient air quality standards and emission limits for individual sources of air pollutants. As required by the federal Clean Air Act, the U.S. Environmental Protection Agency (USEPA) has identified criteria pollutants and has established the National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria, as well as thresholds to determine if a project is in compliance. The following criteria air pollutants have been classified for the project area: ozone (O_3)(nonattainment-marginal); carbon monoxide (CO)(Non-Attainment Moderate); nitrogen dioxide (NO_2)(Attainment-Maintenance); sulfur dioxide (SO_2)(Attainment-Unclassifiable); particulate matter less than 10 microns in diameter (PM_{10})(Attainment-Maintenance); and particulate matter 2.5 microns or less in diameter ($PM_{2.5}$)(Attainment-Unclassifiable) (EPA 2018). The State of California has also established its own more stringent set of air quality standards commonly referred to as the California Ambient Air Quality Standards (CAAQS). In addition to the criteria pollutants identified above, the CAAQS have been established for sulfates, hydrogen sulfide, and vinyl chloride.

The project site is located within San Francisco Bay air basin, which falls within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Pursuant to the federal and State Clean Air Acts, BAAQMD is required to develop plans to reduce emissions of pollutants for which the air basin is designated as non-attainment and to establish emissions thresholds for determining if a project is in compliance. The San Francisco Bay air basin is currently designated as non-attainment for the State 1- and 8-hour ozone standards as well as the State particulate matter (PM_{10} and $PM_{2.5}$) standards. With respect to the federal standards, the basin is designated as non-attainment for federal 8-hour ozone standard and the federal $PM_{2.5}$ standard. The basin is designated as a maintenance area with respect to the federal CO standard. BAAQMD has prepared the Bay Area 2010 Clean Air Plan, which includes ozone control measures and also considers the impacts of these control measures on particulate matter (PM), air toxins, and greenhouse gases in a single, integrated plan. The Clean Air Plan outlines control strategies to reduce emissions of ozone and ozone precursors to help the Bay Area achieve attainment for the State 1-hour ozone standard (BAAQMD, 2010). Please see the table below for the NAAQS, CAAQS, and federal and BAAQMD thresholds for determining if a project is in compliance.

Table 3. NAAQS, CAAQS, & Federal and BAAQMD Thresholds for Criteria Air Pollutants.

Criteria Pollutant [Federal Attainment Status]	NAAQS	Federal Threshold (Tons/Year)	CAAQS	BAAQMD Construction Threshold (Pounds/Day)	BAAQMD Construction Threshold (Tons/Year)
Reactive Organic Gases [Nonattainment-marginal]	N/A	100	N/A	80	15
Nitrogen Oxides (NO_x) [Attainment-Maintenance]	.05 ppm (Annual) .10 ppm (1-Hour)	100	.03 ppm (Annual) .18 ppm (1-Hour)	80	15
Ozone (O_3) [Nonattainment-Marginal]	.07 ppm (Annual)	100	.07 ppm (Annual) .09 ppm (1-Hour)	N/A	N/A
PM_{10} [Attainment-Maintenance]	150 µg/m^3 (24-Hour)	100	20 µg/m^3 (Annual) 50 µg/m^3 (24-Hour)	80	15
$PM_{2.5}$ [Attainment-Unclassifiable]	12 µg/m^3 (Annual) 35 µg/m^3 (24-Hour)	100	12 µg/m^3 (Annual)	N/A	N/A
Sulfur Dioxide (SO_2) [Attainment-Unclassifiable]	.03 ppm (Annual) .14 ppm (24-Hour)	100	.04 ppm (24-Hour)	N/A	N/A
Sulfate	N/A	-	25 µg/m^3 (24-Hour)	N/A	N/A
Carbon Monoxide (CO) [Non-Attainment Moderate]	9 ppm (Annual) 35 ppm (1-Hour)	100	9 ppm (Annual) 20 ppm (1-Hour)	N/A	N/A
Hydrogen Sulfide (H_2S)	N/A	-	.03 ppm (1-Hour)	N/A	N/A
Vinyl Chloride	N/A	-	.01 ppm (24-Hour)	N/A	N/A

2.9. NOISE

2.9.1. Regulatory Setting

Noise Control Act (42 USC Section 4901 et seq.). In 1972, the Noise Control Act was passed by congress to promote limited noise environments in support of public health and welfare. It also established the USEPA Office of Noise Abatement and Control to coordinate federal noise control activities. USEPA established guidelines for noise levels that would be considered safe for community exposure without the risk of adverse health or welfare effects.

City of South San Francisco General Plan. The City of South San Francisco General Plan Noise element contains one policy addressing noise from industrial sources and does not address construction noise. Policy 9-I-8 requires the control of noise at the source through site design, building design,

landscaping, hours of operation and other techniques for new developments deemed to be noise generators.

2.9.2. Existing Conditions

The intent of the various noise regulations is to protect the community from excessive, unnecessary and unreasonable noise. The nearest sensitive noise receptor to the proposed construction area would be residential uses on the west side of U.S. 101, approximately 3,500 feet to the west and southwest. These receptors currently experience a relatively high long-term community noise exposure level (CNEL) of 73.1 decibels (dBA) from aircraft operations of San Francisco International Airport (SFIA, 2007) as well as additional contributions from vehicle traffic on U.S. 101 and Interstate 380. Typical 50 ft noise levels from equipment potentially used in this project range from 76 to 95 dBA, but this noise is attenuated further with distance from the source.

2.10. TRANSPORTATION

2.10.1. Regulatory Setting

San Mateo County General Plan. The San Mateo County General Plan does not have detailed policies that relate to transportation impacts from non-transportation construction projects. Instead, it generally deals with the development of roadways, bikeways, public transit, and other modes throughout the County.

City of South San Francisco General Plan. The City of South San Francisco Policy states that the city should "Strive to maintain [Level of Service] LOS D or better on arterial and collector streets, at all intersections, and on principal arterials in the [Congestion Management Program] CMP during peak hours."

2.10.2. Existing Conditions

The WQCP is located on the shoreline of San Francisco Bay, just north of San Francisco International Airport. Access to the site is from South Airport Boulevard (via Belle Aire Road). South Airport Boulevard is a major four-lane arterial that connects with U.S. 101 and Interstate 380 (I-380) via ramps between the U.S. 101 / I-380 interchange and North Access Road. Belle Aire Road is a wide two-lane road and provides access to Costco as well as the WQCP. The U.S. 101 and I-380 freeways carry average daily traffic volumes of about 233,000 and 184,000 vehicles in the project area, respectively (Caltrans, 2012). Intersections in the project area currently operate at an acceptable level of service (TJKM, 2011). The South San Francisco General Plan provision 4.2-G-15 states that a level of service of D or better (volume to capacity less than or equal to 0.9) should be maintained on principal arterials like South Airport Boulevard.

The project is located very close (approximately 1 mile) to San Francisco International Airport.

2.11. HAZARDOUS AND TOXIC SUBSTANCES

2.11.1. Regulatory Setting

Comprehensive Environmental Response, Compensation and Liability Act/Superfund Amendments and Reauthorization Act. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) governs the liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous substance disposal sites. The National Oil and Hazardous Substances Pollution Contingency Plan outlines CERCLA's implementing regulations and provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances at sites identified on the National Priority List.

Resource Conservation and Recovery Act. The Resource Conservation and Recovery Act (RCRA) controls the management and disposal of hazardous waste. "Hazardous and/or toxic wastes," classified by RCRA, are materials that may pose a potential hazard to human health or the environment due to quantity, concentration, chemical characteristics, or physical characteristics. This applies to discarded or spent materials that are listed in 40 CFR Section 261.31 .34 and/or that exhibit one of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. Radioactive wastes are materials contaminated with radioactive isotopes from anthropogenic sources (e.g., generated by fission reactions) or naturally occurring radioactive materials (e.g., radon gas or uranium ore).

Toxic Substances Control Act. The Toxic Substances Control Act limits or prohibits the manufacture, processing, distribution, use, and disposal of certain toxic substances. The Toxic Substances Control Act contains requirements specific to asbestos, indoor radon abatement, and lead exposure reduction. Hazardous materials transported through the study area would be subject to these regulations.

California Environmental Protection Agency. Under the authority of the California Environmental Protection Agency, the Department of Toxic Substances Control and the RWQCB are responsible for overseeing the cleanup of contaminated sites in the San Francisco Bay Area. The Department of Toxic Substances Control also regulates disposal of hazardous wastes under California's Hazardous Waste Control Law. This law requires the filing of a Hazardous Waste Manifest detailing the hauling and disposal of the hazardous waste materials.

2.11.2. Existing Conditions

The California State Water Resources Control Board GeoTracker database was queried to identify potential hazardous, toxic and radioactive waste (HTRW) sites in the vicinity of the project area. A 3,000 ft radius circle from the WQCP's entrance returned 31 total sites (Table 4). This is a developed and industrial area, the majority of the returned sites are Leaking Underground Storage Tank (LUST) cleanup sites. The closest LUST site to the study area is at Pump Station #4 at 249 Harbor Way, but the tank was removed in November 1997 and the case was certified as closed by the San Mateo County Health Services Agency in August 2003. The nearest open site to the study area is at the Shell (Equilon) South San Francisco Terminal at 135 North Access Road, and this is currently in a verification monitoring phase.

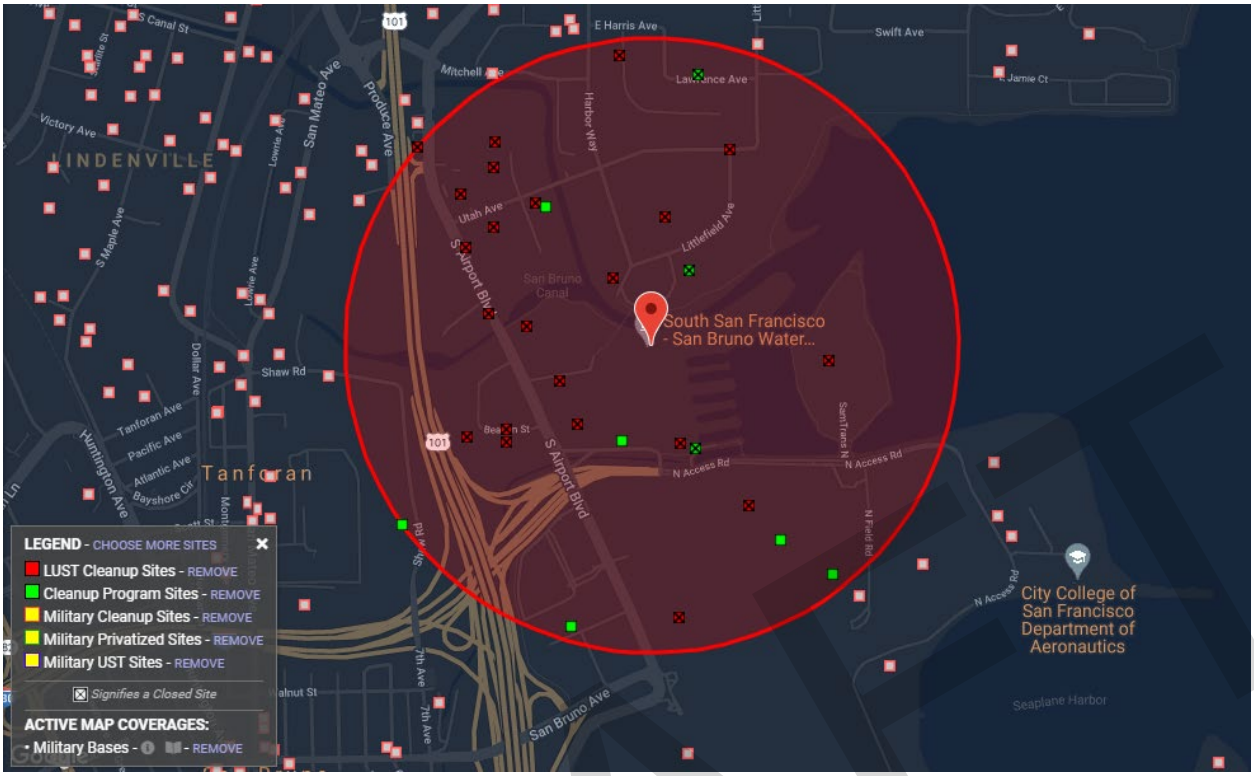

Figure 7. Screen capture of GeoTracker search radius relative to project area.

Table 4. List sites returned by GeoTracker in the vicinity of the project area.

SITE NAME	GLOBAL ID	SITE_TYPE	STATUS	ADDRESS	LATITUDE	LONGITUDE
AMJ ASSOCIATES	T10000006422	CLEANUP PROGRAM SITE	COMPLETED - CASE CLOSED	222 LITTLEFIELD AVENUE	37.64394	-122.397
BLUEPRINT STUDIOS TRENDS, INC.	T10000017250	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	344, 348, 352 SHAW RD	37.63714	-122.406
BOB LEECH'S AUTO RENTAL	T0608100753	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	435 SOUTH AIRPORT BOULEVARD	37.64244	-122.402
BURLINGTON AIR EXPRESS	T0608100093	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	140 BELLE AIR	37.64098	-122.401
CHEVRON 9-7875	T0608100864	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	300 SOUTH AIRPORT BOULEVARD	37.64599	-122.404
EMERY AIR FREIGHT	T0608100195	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	501 SOUTH AIRPORT BOULEVARD	37.63983	-122.4
EXIDE CORP	SLT2O322213	CLEANUP PROGRAM SITE	COMPLETED - CASE CLOSED	286 LAWRENCE AVE	37.64919	-122.396
FOLGER COFFEE CO	T0608100835	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	229 LITTLEFIELD	37.64537	-122.398
FUEL HYDRANT SYSTEM UNITED PARKING LOT	T0608191598	CLEANUP PROGRAM SITE	OPEN - INACTIVE	UNKNOWN SAN FRANCISCO AIRPORT LOT DD	37.63441	-122.401
GENERAL RENT-A-CAR	T0608100401	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	124 BEACON	37.63969	-122.403
GREYHOUND EXPOSITION SERVICES	T0608100244	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	100 UTAH	37.64508	-122.403

SITE NAME	GLOBAL ID	SITE_TYPE	STATUS	ADDRESS	LATITUDE	LONGITUDE
GROSVENOR AIRPORT INN	T0608101013	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	380 SOUTH AIRPORT BOULEVARD	37.64453	-122.404
HARMON SHRAGGE CO	T0608100252	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	280 WATTIS	37.6467	-122.403
JACKSON ARMS (FORMER)	T10000012532	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	152 UTAH AVENUE	37.64565	-122.402
KEN FUNK PROPERTY	T0608100188	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	264 SOUTH AIRPORT BOULEVARD	37.64724	-122.406
LUCCA PACKING CORP.	T0608100313	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	360 HARBOR	37.64372	-122.399
MONROE SCHNEIDER ASSOC.	T0608100351	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	274 WATTIS	37.64737	-122.403
REST PARKING GARAGE	T0608175368	CLEANUP PROGRAM SITE	COMPLETED - CASE CLOSED	195 NORTH ACCESS ROAD	37.63919	-122.397
RPM RENT-A-CAR	T0608100431	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	410 SOUTH AIRPORT BOULEVARD	37.64279	-122.404
SAMTRANS NORTH BASE	T0608100723	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	301 NORTH ACCESS ROAD	37.64153	-122.392
SAN FRANCISCO INTERNATIONAL AIRPORT - SFIA - UNITED AIRLINES MAINTENANCE CENTER AT SF AIRPORT	SL0608106162	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	SAN FRANCISCO INTERNATIONAL AIRPORT	37.63673	-122.394
SAN FRANCISCO INTERNATIONAL AIRPORT - SFIA - WASTEWATER - PLOT 52	T10000007995	CLEANUP PROGRAM SITE	OPEN - INACTIVE	SAN FRANCISCO INTERNATIONAL AIRPORT	37.63581	-122.392
SEWAGE PUMP STATION #4	T0608100772	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	249 HARBOR	37.64968	-122.399
SHELL (EQUILON) SOUTH SAN FRANCISCO TERMINAL	SL373231180	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	135 NORTH ACCESS ROAD	37.6394	-122.399
SIMEON PROPERTIES	T0608100498	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	290 UTAH	37.64715	-122.395
THOMPSON AIR CRAFT TIRE CORP	T0608100541	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	160 BEACON	37.63948	-122.404
TRICOR	T0608100824	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	182 BEACON	37.63936	-122.403
TRUX AIRLINE CARGO SERVICE	T0608100551	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	195 NORTH ACCESS	37.63931	-122.397
U-FREIGHT AMERICA INC	T0608100554	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	320 COREY	37.64573	-122.402
UNITED AIRLINES MAINTENANCE OPS CENTER	T0608100808	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	UNKNOWN SAN FRANCISCO AIRPORT	37.63466	-122.397
UNITED AIRLINES MOC	T0608101102	LUST CLEANUP SITE	COMPLETED - CASE CLOSED	UNKNOWN SAN FRANCISCO AIRPORT	37.63764	-122.395

Besides these existing sites, the WQCP maintains a set of chemicals and fuels onsite instrumental to its operations. In the unfortunate event of a spill or excessive exposure, these chemicals can be harmful to individuals. The WQCP has a strict management protocol for these substances that includes a Contingency Operations Plan and Spill Prevention Control and Countermeasure Plan, as required by its

NPDES permit. These chemicals are used to treat wastewater onsite at the WQCP and are stored in bulk quantities.

2.12. SOCIOECONOMIC AND ENVIRONMENTAL JUSTICE

2.12.1. Regulatory Setting

Presidential Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Executive Order (EO) 12898 requires all federal agencies to "…make achieving environmental justice part of [their] mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The EO directs federal agencies to perform the following activities:

- Analyze the environmental effects, including human health, economic, and social effects, of federal actions, including the effects on minority and low-income communities, when required by the NEPA.
- Provide opportunities for community input during the NEPA process, including potential effects and mitigation measures.
- Ensure that the public, including minority and low-income communities, have adequate access to public information relating to human health or environmental planning, regulations, and enforcement.

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. EO 13045 requires federal agencies to prioritize the identification and assessment of environmental health risks and safety risks that may disproportionately affect children, and ensure that policies, programs, and standards address disproportionate environmental health or safety risks to children that result from a project (68 Federal Register 19931).

2.12.2. Existing Conditions

Racial Demographics

The study area has a population that is majority people of color, who have historically been disadvantaged or been underrepresented for services, etc. The largest racial/ethnic group is Asian, comprising roughly 40% of the population, followed by LatinX, comprising roughly 33% of the population (Table 5). Over three quarters of the study area residents are people of color.

Table 5. Estimated populations by race/ethnicity and percentage of total population for the study area.

Race/Ethnicity	Est. Population	Est. Percentage of Total Population within Study Area
Hispanic/LatinX	25469	33.17%
Black or African American	1659	2.16%
American Indian and Alaskan Native	167	0.22%
Asian	31051	40.43%

Hawaiian and Other Pacific Islander	706	0.92%
Other	11984	15.61%

Low-Income Population

A significant portion of the study area is low income or impoverished (see Table 6).

Table 6. Poverty in the study area, for the cities of Colma, South San Francisco, and San Bruno.

City	Est. Population under 200% Poverty Level	Est. Percentage of Population under the 200% Poverty Level	Est. Under 50% Median AMI Households
Colma	1781	23.72%	840
South San Francisco	12994	18.75%	5051
San Bruno	7275	16.87%	3421

Social Vulnerability

Being low-income and/or racial minority can increase social vulnerability and the consequences incurred by flood events. There are additional factors which affect a group or person's resiliency in the face of flooding, such as age and mobility. Persons with physical disabilities, crowded households, or not having a vehicle can also make evacuation during a flood event more difficult, thus increasing social vulnerability.

An analysis using the BCDC community vulnerability dataset found that there are approximately nine thousand people in the plant's service area in the 'Highest Social Vulnerability' category, and another roughly six thousand in the 'High Social Vulnerability' category. Social vulnerability can be due to age, making it hard to evacuate or respond to emergencies (under 5 years old, or over 65 years). Figure 8 shows the vulnerability rankings of polygons located near the WQCP.

Table 7. Social Vulnerability Rankings and their estimated populations (BCDC 2020) within a 1-mile radius of the Water Quality Control Plant and Pump Station 4.

Social Vulnerability Ranking	Est. Total Population	Est. HH, Child Under 5	Est. HH, No Vehicle	Est. HH, with Disability	Est. HH, Single Over 65
Highest	8958	624	291	440	259
High	6236	377	89	493	160
Moderate	7986	391	271	584	331
Low	2117	119	36	98	16

Table 8. Percentage of Population within each Social Vulnerability Ranking within a 1-mile radius of the Water Quality Control Plant and Pump Station 4.

Social Vulnerability Ranking	% Est. Total Population	% Est. HH, Under 5	% Est. HH, No Vehicle	% Est. HH, with Disability	% Est. HH, Single over 65
Highest	35%	41%	42%	27%	34%
High	25%	25%	13%	31%	21%
Moderate	32%	26%	39%	36%	43%
Low	8%	8%	5%	6%	2%

The study area also comprises affluent and majority white communities, such as Burlingame which has a median household income of approximately $138,000, compared to $75,000 in the State of California, and is over 58 percent white (Census.gov, vintage year 2021).

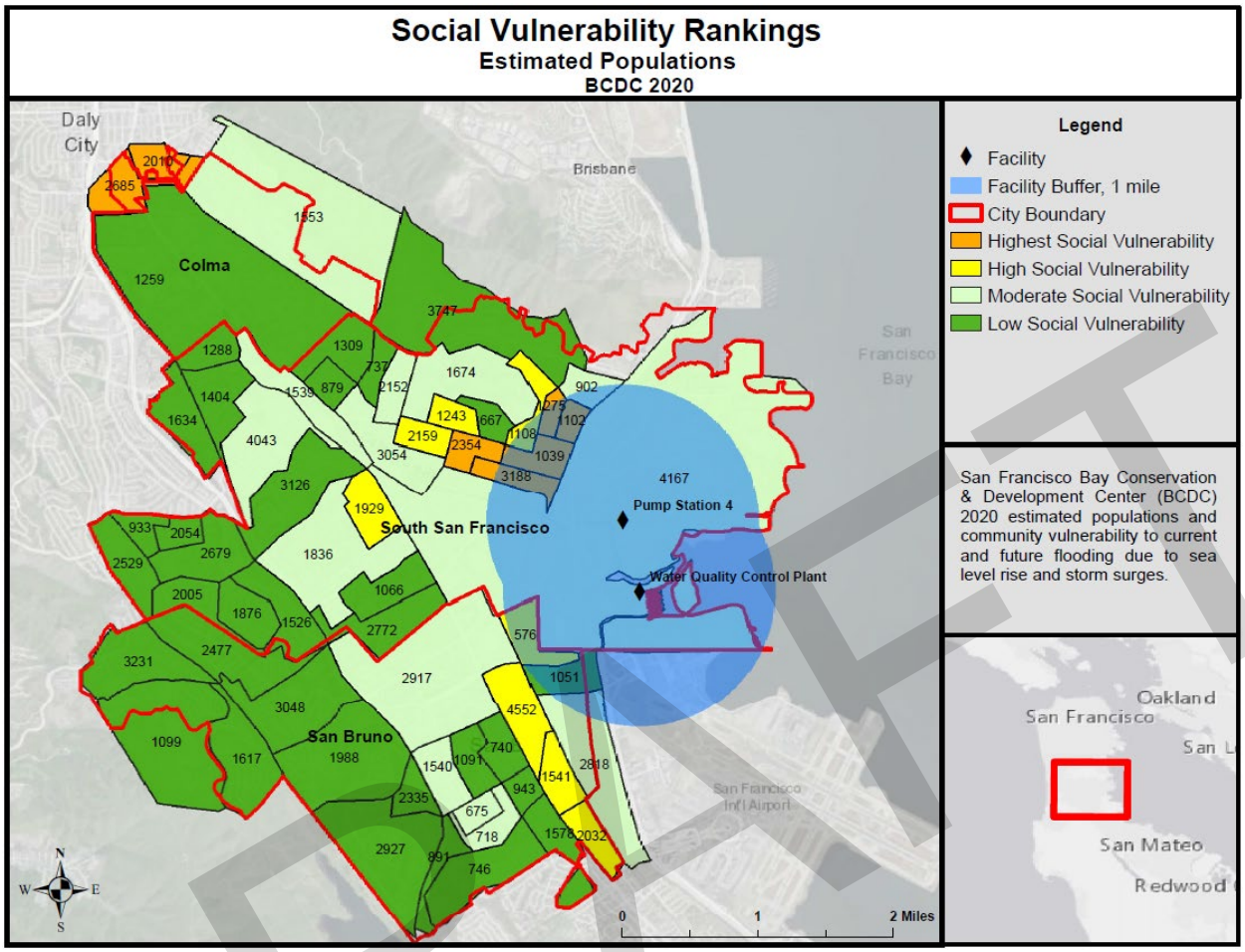

Figure 8. Social vulnerability rankings near WQCP service area. Numbers indicate population within each polygon. Several groups with the highest social vulnerability rankings would be impacted by plant shutdowns and sewage backups.

3. PLAN FORMULATION

A series of three mini-planning charettes were held in February and March of 2021 to develop the problems, opportunities, objectives, and planning constraints and considerations (POOCCs) for the study. The charettes were attended by the project delivery team (PDT, or team), members of the South Pacific Division review team, and the non-federal sponsor (NFS), as well as the NFS's contractor, Carollo Engineers, who have performed the design work on the SSF - SB WQCP and pump stations for over twenty years.

Prior to the charettes, the team held a kickoff meeting where the existing conditions were reviewed in detail, and the NFS conducted a virtual flyover tour of the plant and surrounding areas. The first charette focused on the POOCCS, and the second charette delved into existing and future without project conditions, sea level rise, public concerns, and key study risks and uncertainties. At the third charette a trained facilitator led the team in alternative formulation exercises, as well as development of screening criteria, and an initial screening of alternatives. Figure 9 and Figure 10 are taken from the PowerPoint

slide decks at the third charette and illustrate the USACE, or Corps, six step planning process, and risk-informed decision-making planning framework.

Figure 9. The USACE Six Step Planning Process was advanced through three mini-planning charettes. This image is taken from Charette 3 which was held on 2 March 2021 where the team formulated alternative plans.

Figure 10. The USACE Planning Process is meant to be risk informed, where more information is gathered to reduce uncertainty in decision-making as the project progresses, and balance the need for more information with the need to make timely decisions.

3.1. PROBLEMS AND OPPORTUNITIES

The following problems and opportunities were identified by the PDT for this project.

3.1.1. Planning Problems

The following problems currently exist, and flood risk is expected to increase in frequency and magnitude at this location as a result of sea level change.

1. Storm driven waves and currents cause coastal flood risk to the SSF - SB WQCP which can cause economic damages resulting from damage to infrastructure and contents, plant service shutdown, and cleanup costs from the backup of untreated effluent in homes, businesses, and streets throughout the service area.
2. There is a risk of service disruption to their roughly 112,000 customers resulting in potential business and household economic losses should significant flooding occur at the SSF - SB WQCP or at pump station 4.
3. Public and environmental health is at risk should coastal flooding cause the need for emergency releases of untreated effluent into Colma Creek and San Francisco Bay. Human recreational users who swim or kayak in Colma Creek and San Francisco Bay could get sick from exposure to untreated sewage. Illnesses may include gastroenteritis (diarrhea, vomiting), viral infections such as hepatitis, and infections of the skin or eyes. Sewage contamination may take weeks or months to fully clear, depending on the severity of the sewage release, tides/circulation, sunlight, salinity, and more. Eating uncooked filter feeding fish taken from a contaminated area may also result in illness, such as Hepatitis A and Norovirus. Further, the release of untreated sewage into Colma Creek and San Francisco Bay would elevate nutrients, pathogens, endocrine disruptors, heavy metals, and pharmaceuticals in creek, wetland and bay ecosystems. This contamination can spread to wildlife in the area, both aquatic and birds, and may impact vegetation through algal blooms, and more.
4. The coastal flood risk endangers human life and safety of the WQCP workers and operators should the plant flood.
5. Human safety is endangered from direct exposure to untreated sewage backing up in the sewer system and overflowing in toilets and manholes in the service area of the SSF - SB WQCP in the event of a plant shutdown caused by coastal flooding. The consequences would be similar to those described in problem 3, but the magnitude of the consequences is likely to be much higher in this scenario because the likelihood of direct interaction with untreated sewage would increase were it to back up into streets, businesses, and homes.

3.1.2. Planning Opportunities

Opportunities are positive conditions to be improved by an alternative plan. Solving problems and taking advantage of opportunities provide a basis for motivating and allocating the partners' pooled resources.

1. There is an opportunity to avoid or reduce discharges of untreated effluent into the Bay and avoid water quality degradation and associated impacts to human health and the environment.

The team also investigated opportunities to incorporate recreation features and habitat friendly designs, or natural and nature-based features into alternative designs. However, upon further investigation described in Section 3.4.1, the opportunities proved limited within the constraints of this study.

3.2. OBJECTIVES AND CONSTRAINTS

The CAP Section 103 project authority that this project is being conducted for coastal storm risk management (CSRM). Therefore, the project will prioritize meeting the CSRM-related objectives, within the constraints identified.

3.2.1. Planning Objectives

The following planning objectives were identified during the planning charettes, with input from the vertical team, the non-federal sponsor, and the PDT. The primary objectives are the coastal storm risk management related objectives the alternatives should primarily meet during evaluation. The secondary objectives are weighted less in the evaluation and screening of alternatives but are still objectives of the project.

Coastal Storm Risk Management Objectives:

1. Manage the risk of flooding at the SSF - SB WQCP and its pump stations throughout the 50-year period of performance, upon completion of the project.
2. Manage risk to human life and safety due to flooding at the SSF - SB WQCP and its pump stations throughout the 50-year period of performance, upon completion of the project.
3. Reduce the economic damages that result from flooding of the WQCP (including pump stations), and the associated potential service disruptions and/or plant shutdowns.
4. Reduce damages to the environment (people and other living things) that result from flooding and the associated releases of untreated effluent into Colma Creek or San Francisco Bay.

The objectives help to drive the formulation of alternatives that will meet the objectives of the project. In evaluating alternatives and selecting a recommended plan, the team analyzes the benefits of the various alternatives across all benefit categories, to include economic, environmental, social, equity, life safety, and more.

3.2.2. Planning Constraints

Planning constraints represent restrictions that limit the extent of the planning process. Constraints are designed to avoid undesirable changes resulting from the project. The team identified the constraint that the project cannot compromise the safety and security of the SSF - SB WQCP, which is critical infrastructure for the region. Furthermore, any environmental mitigation will need to refrain from creating nesting habitat for birds, which could cause bird strikes with airplanes coming in and out of SFO Airport which is directly south of the project area.

There is also the universal constraint that applies to all federal projects, that the project design, construction, and operations and maintenance plan must comply with applicable federal laws, regulations, and policies, such as the National Environmental Policy Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, the Clean Water Act, the Clean Air Act, the Coastal Zone Management Act, and the National Historic Preservation Act.

3.2.3. Planning Considerations

The following was identified and kept in consideration to help guide the planning process. The existing built-environment includes substantial and critical infrastructure that is expensive to move and provides essential services to a large service area. The SSF - SB WQCP is currently undergoing (as of February 2022) upgrades to digesters, various associated control systems, and secondary clarifier 4, and a sodium hydrochloride tank replacement. These upgrades cost over 56 million dollars. Past plant upgrades included expanding the capacity of the plant, adding treatment capacities, liquid treatment and digestive

capacity. Much of the existing electrical and pumping infrastructure is located in subterranean facilities that are vulnerable to flood water. Relocating, or raising this infrastructure is very costly and not always feasible, given the interconnected nature of the facilities which pipe and pump effluent between various treatment tanks, often using gravity to move wastewater. The main discharge pipe from force main station 4 runs directly under Colma Creek, adjacent to the plant. Additionally, force mains from Millbrae and Burlingame are located underground within the plant.

There is an abandoned Shell pipeline previously used for SFO airport on site. It has been capped and filled with water and identified on the utility map. Additionally, there are other buried utilities that are still in use located on site. These would be expensive to move. The study team considered ways to avoid the pipeline and other buried utilities in the formulation and evaluation alternatives, as well as in the cost contingency development.

The wastewater and collection system infrastructure in the area is aging and contributes stormwater to the wastewater system during rainfall events, resulting in larger inflows to the WQCP. The WQCP has a pond area for wet weather storage to help manage larger inflow events. The study team considered this increased inflow and consequent treatment services in the evaluation of effectiveness for how well each alternative was able to keep the plant operational during a coastal storm event. The team analyzed plant workers' needs to go between treatment facilities during rainfall events as a consideration, in particular for the non-structural analysis and life safety to plant operators.

There is California Ridgway's Rail habitat adjacent to the project site. Plan formulation considered how to avoid impacts to this, and maximize environmental quality benefits of the project by preventing untreated sewage releases which could adversely impact adjacent habitat. The plan formulation considered this and other habitat and impact avoidance, minimization, and mitigation which is discussed in section 5 of this report.

The project area is directly north of SFO airport. Flight safety risk and damage to airplanes can occur with bird strikes by airplanes going to or leaving SFO airport. Thus, the initial plan formulation considered the need to avoid increasing nesting habitat for birds which could increase the risk of bird strikes.

3.3. FUTURE WITHOUT PROJECT CONDITIONS

3.3.1. Coastal Storm Damage Risk

Water floods over the lowest point of entry on the creek bank north of the WQCP area at an elevation of 10.5 ft. If a wall is built to address this, the next lowest points of entry are along the south bank of the WQCP area at elevations of 11.74 ft, 12.79 ft, and 12.88 ft. After that, the next lowest point of entry is from overland flooding from west of the WQCP, which floods the WQCP area at 13.1 ft. If any water enters the WQCP area, the buildings may be flooded and damaged according to how the flood water elevation compares to their building floor slab elevations.

3.3.2. Climate and Sea Level Change

Environmental stressors due to climate change can compound local or regional vulnerabilities. A major climate change impact considered in the project is sea level change, given the project location by a tidally connected system. Sea level change as a consequence of anthropogenic causes can potentially increase the frequency of extreme water levels, which would likely worsen inundation in the project area and cause damage to infrastructure. Inundation at the plant is likely to cause the SSF - SB WQCP to shut down due to electrical systems failures. This would result in the inability to treat the sewage coming into the plant, or already there. Despite the plant being shut down, raw sewage would keep flowing into the plant, as users' flush toilets, do laundry, etc. In this emergency scenario, incoming sewage would overflow

dormant infrastructure and flow directly to the adjacent Colma Creek. There is a high likelihood that the plant operators would need to evacuate the plant for safety. Once the coastal storm event is over and adjacent flooding is controlled, the subterranean rooms and systems would need to be dewatered by pump, inspected, repaired, and tested prior to returning to service.

If pump station 4 were to be inundated with coastal flooding, the electrical systems would fail, causing the pump station to shut down. In this scenario, raw sewage would backup and emerge onto nearby streets in the area. As system users continue to flush toilets and discharge water into drains, then further raw sewage backups would occur in the general area until power could be restored to the area to reestablish pumping services. If pump station 4 remained out of services for longer than eight hours, then impacts would increase. As users continue to use the system, raw sewage would backup into basements in structures that are using the system. Pump station 4 is largely comprised of commercial users. These users may be able to bring in portable toilets to keep their business open. However, if sewage backs up in the business, they may need to close until it can be cleaned up. Industrial laundry facilities in the service area, for instance, need to discharge wastewater to operate, similar with biotechnical industries. These businesses which rely on discharging large amounts of wastewater likely would need to close temporarily.

As the frequency of extreme water levels and inundation at the WQCP increases, the frequency of the SSF - SB WQCP needing to utilize the emergency outfall to release untreated sewage into Colma Creek will also increase in the future without project condition. Similarly, in a FWOPC the service area of pump station 4 is likely to incur cleanup damages that increase over time with sea level rise. Business losses are also likely to increase over time, or the businesses may choose to relocate, or develop contingency plans to manage this risk.

The project developed relative sea level change projections for future conditions (up to 50 years from the baseline year, following Corps guidance "Incorporating Sea Level Change in Civil Works Programs"[2]. Planning studies and engineering designs evaluate the entire range of possible future rates of sea-level change (SLC), represented by three scenarios of "low", "intermediate", and "high" sea-level change. At any location, changes in local relative sea level (LRSL) reflects the integrated effects of global mean sea level (GMSL) change plus local or regional changes of geologic, oceanographic, or atmospheric origin. Sea level change projections have been developed by a variety of different entities and due to the uncertainty and complex nature of sea level change often the projections will vary significantly from one another.

The project used the USACE Sea-Level Change Curve calculator and relative sea level change (RLSC) from the NOAA Redwood City tide gauge location to evaluate RLSC projections. The current observed mean sea level trend is 0.0083 feet/year at the NOAA Redwood City tide gauge. The mean sea level RLSC trend using the Redwood City NOAA gauge is most applicable for south San Francisco Bay and reflects greater vertical land movement due to the bay mud formation underlying the south bay shoreline. Figure 11 shows the projected relative sea level change across the "Low", "Intermediate" and "High" scenarios.

[2] USACE Engineering Regulation (ER), USACE ER 1100-2-8162 (USACE 2019), incorporates new information, including projections by the Intergovernmental Panel on Climate Change and National Research Council (IPCC 2007, NRC 2012).

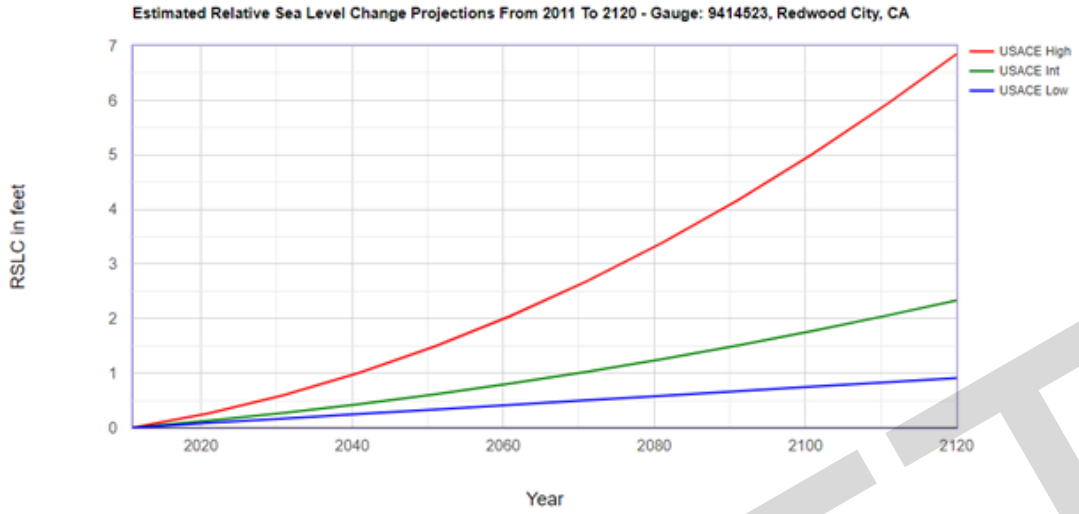

Figure 11. Estimated RLSC projections for NOAA station 9414523 Redwood City, CA.

These RSLC values were added onto modeled extreme water levels from the San Francisco Bay Tidal Datums and Extreme Tides Study (FEMA 2016) to develop future extreme water levels at the site for a range of annual exceedance probability (AEP) events (100% to 0.2%).

The figure below compares critical elevations at Pump Station #4 and the SSF-SB WQCP area to the 100% AEP with High SLR and the 1% AEP for Intermediate and High SLR. The elevation at which the critical elevations crosses the SLR curves shows when each facility is compromised and expected to flood. For example, for the current Pump Station #4, it floods from a 1% AEP in High SLR conditions around 2034. By 2080, it will flood from a 100% AEP event in Intermediate SLR conditions—in other words, annual flooding is likely starting around 2080 with Intermediate SLR. The SSF-SB WQCP area will already flood from 100% AEP events in 2033 in Intermediate SLR conditions. This demonstrates that though there is existing flood risk now, the risk of flooding greatly increases over time in this area due to SLR.

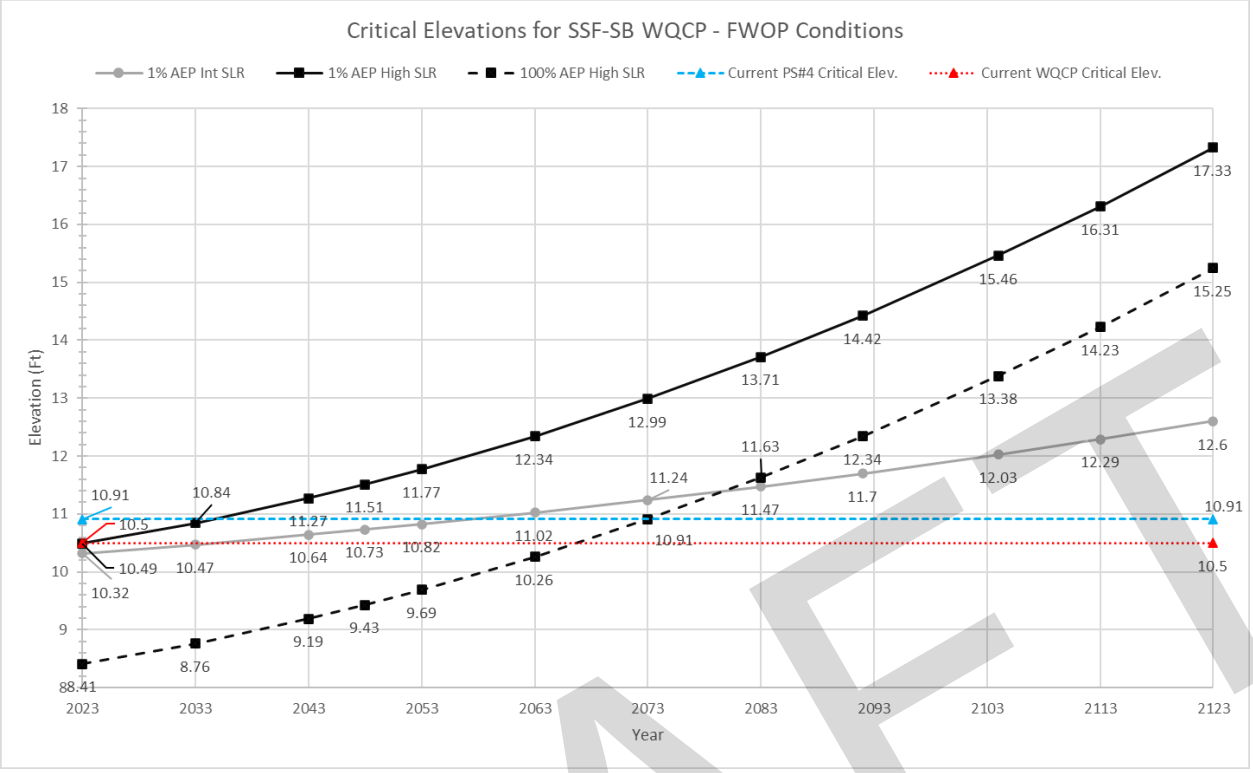

Figure 12. Critical elevations for Pump Station #4 (blue, triangle, dashed) and the WQCP area (red, triangle, dotted) shown with various RLSC projections to visualize when and how often impacts may occur in Future Without Project (FWOP) conditions.

3.3.3. Watershed Planning Efforts

The WQCP is currently undertaking a series of capital improvement projects. These projects include a wet weather improvements project to increase capacity during storm periods, a green energy project to install a solar photovoltaic array, and a digester replacement and rehabilitation project. The staff anticipates that this work will be completed prior to construction of this CAP project. The project team has also been coordinating with several other projects in the region to ensure that there are no conflicts. These projects are briefly summarized below.

Colma Creek was included in the Resilient by Design Bay Area challenge in 2017, which was a regional effort to come up with intersectional and equitable solutions to sea level rise around the Bay. The Colma Creek Connector project planning effort, led by architectural firm HASSELL+, focused on finding ways to restore habitat and improve public access to the Bay shoreline near Colma Creek. The team received follow-on grant funding to continue their efforts and prepare further technical studies, undertake community engagement, perform design and engineering work, and develop a permit acquisition plan. The Colma Creek Connector project footprint is adjacent to, but not directly overlapping with, the WQCP property.

The San Mateo County Flood and Sea Level Rise Resiliency District (One Shoreline) is currently conducting a survey of long-running projects to establish priorities for projects moving forward. These include a flood protection project from Utah Avenue to Navigable Slough to protect the properties at greatest risk and allow for future flood protection efforts to include the City's desire to enhance the

neighborhood through land use changes in the area, a channel bank improvement project by Produce Avenue, and long-term planning for Navigable Slough.

The City of South San Francisco is currently in the midst of a major update to their general plan. In the East of Highway 101 area, the intent is to create a vibrant mixed-use area that is well-connected to public transit and has increased residential development. This will likely increase residential connections to the WQCP. The updated plan is not yet finalized and therefore the current general plan (adopted in 1999) was used in the environmental effects analysis below.

3.4. MEASURES TO ACHIEVE PLANNING OBJECTIVES*

3.4.1. Preliminary Structural and Non-Structural Measures

During the planning charettes, 19 measures were identified for consideration in addressing the objectives of this study. Both structural and non-structural measures were identified. Non-structural measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Non-structural measures differ from structural measures in that they focus on reducing the consequences of flooding instead of focusing on reducing the probability of flooding. Natural and nature-based features (NNBFs) were also considered for managing coastal flood risk. Finally, the team also brainstormed a recreation measure for improving recreation, as this is also an authorized purpose of the study.

Initial Screening of Measures

Eleven structural measures, seven non-structural measures, and one recreation measure were identified for initial consideration. The team was able to use existing information, or rough cost calculations to screen the least promising measures from further consideration. This screening is summarized in Table 10 and described in greater detail in the "Excluded Measures" section. Five measures were ultimately retained and 16 were screened out. Two non-structural measures were screened for some application, but retained for more limited application, such as raising the electrical system and emergency exits only.

The CAP Section 103 projects cannot exceed $10 million federal expenditure, including the Feasibility Phase costs. With the 50/50 cost share between non-federal and federal on Feasibility Phase (estimated for this study at $1.5 million, including preliminary design development and environmental and tribal coordination), and a 35/65 cost share split between the NFS and the USACE for Design and Implementation Phase (D&I), this amounts to a roughly $12-15 million total project cost limit, including the study, permitting, design, and construction. Table 10 summarizes the initial screening of measures.

Table 9. Initial Screening of Measures for Lower Colma Coastal Storm Damage Reduction and Recreation

Measure (type of measure)	Retained / Screened	Rationale/Reason
Floodwall (structural)	Retained	There is sufficient space to site a floodwall and cost estimate is within CAP cost limit. Alignment can be pulled back from shoreline as much as practicable to avoid impacts to adjacent marsh near bridge on north end of WQCP. Floodwalls are compatible with plant operability.
Flood proofing of key structures (non-structural)	Retained	Depths of flooding are shallow and velocities are low, which makes flood proofing a viable potential measure. Cost is competitive compared to other

Measure (type of measure)	Retained / Screened	Rationale/Reason
		measures. As SLR progresses, frequency of operation to seal plant from flooding would increase. Impacts to operability and performance of plant are likely to increase over time. Safety to workers is also a concern that was identified during initial screening, as operating during flood conditions could endanger workers at the plant.
Flood warning system (non-structural)	Retained	For the non-structural operation, the flood warning system is necessary to ensure all flood proofed doors, windows, and stop log vehicular access gate are closed and properly sealed. Because these facilities will be used daily, with doors and gates opened for access, these would need to be closed for the non-structural plan to be effective.
Ring Levee (non-structural)	Screened for main WQCP Retained for pump station 4	Insufficient space For pump station 4, there is room for a small retaining wall type concrete floodwall around the perimeter station, with a stop log gate for vehicular access. Cost is well within CAP cost limit.
Raise critical assets in place (non-structural)	Screened for most assets Retained for electrical system only	Infeasible/not cost effective compared with floodproofing It is not feasible to floodproof the entire network of subterranean electrical system, which is particularly hazardous if flooded. Raising electrical only was retained.
Natural and Nature-Based Features, or NNBFs (structural)	Screened	Areas most suitable for NNBFs do not correlate well with where NNBFs would be needed for managing coastal storm risk. The shoreline on the water side of the proposed floodwall on the northern edge of the plant already has a concrete revetment to protect the bank from erosion, otherwise NNBFs could have been considered there for erosion protection. See ecotone levee measure below, which is another NNBF that was considered. Wetland restoration or transitional habitat at the finger piers would be beneficial from a habitat perspective, and could be considered in other effects.
Improvements to SF Bay Trail (recreation)	Screened	Rerouting the SF Bay Trail to go around the WQCP along the creek and bayside was screened because it would pose an unacceptable public safety risk of exposure to deadly airborne chemicals in the event of an accident, a risk of vandalism to the plant, a degraded olfactory

Measure (type of measure)	Retained / Screened	Rationale/Reason
		recreator experience, and also because there is not likely to be sufficient space for a 12 foot wide paved trail without wetland/creek impacts to habitat, and the cost is likely to exceed allowable thresholds for recreation within the CAP limits.
Temporary /deployable flood barriers (structural)	Screened	Not cost effective compared to floodwalls.
Storm surge barrier at the mouth of Colma Creek (structural)	Screened	Exceeds the cost limit of CAP
Ecotone levee combo with floodwall (structural)	Screened	Insufficient space, given the required side slopes for ecotone levees, an ecotone levee providing CSRM for the WQCP would fill in the entire creek width in order to provide sufficient flood risk management.
CSRM Improvements to Finger Piers (storage and parking area) (structural)	Screened	Insufficient damages to support CSRM measures in this location.
Drainage pump system (structural as they would be implemented in combination with tide gates or storm surge barriers)	Screened	Exceeds the cost limit of CAP
Standard Levee (structural)	Screened	Insufficient space
Standard levee/floodwall combo (structural)	Screened	Insufficient space
Dredging Colma Creek (structural)	Screened	Not effective in addressing coastal flood risk / meeting objectives
Relocate entire treatment facility (non-structural)	Screened	Cost (in the billions of dollars) exceeds benefits and CAP cost limit
Relocate structures of concerns (non-structural)	Screened	Infeasible/not cost efficient
Leverage another treatment facility (non-structural)	Screened	Not effective as other nearby treatment facilities are also at risk for coastal flooding
Tide gates (structural)	Screened	Exceeds the cost limit of CAP

Excluded Measures

The following measures were identified as exceeding the CAP 103 cost threshold:

Tide Gate with Pump Station and Storm Surge Barrier with Pump Station

The San Bruno Creek / Colma Creek Resiliency Study conducted in 2015 identified two larger scale structural measures to manage coastal flood risk on, adjacent to, and upstream of Colma Creek. These are a tide gate with pump station and a storm surge barrier. Storm surge barriers typically also require at least one pump station to functionally manage the risk of flooding. The pump station(s) are needed to pump water back outside of the gate or barrier when it is closed during a flood event, unless interior drainage rainfall and flood water can be stored via surface storage or detention until flood waters recede and the tide gate or storm surge barrier can be opened again. Figure 11 below is shows three potential alignments identified for the tide gate in this 2015 report and Figure 12 shows three potential alignments identified for the storm surge barrier.

A tide gate is generally much smaller than a storm surge barrier and typically they are designed to be used once or twice a day during high tide to prevent tide-induced flooding. Tide gates are much more common than storm surge barriers, though functionally they perform similarly in that they can be opened and closed to prevent coastal flooding up to their design event.

Because both tide gates and storm surge barriers are permanent structures built in a channel and connecting to high ground adjacent, their construction and operation may impact the tidal influence, ecology, and habitat around and under them. Depending on the ecological sensitivity of the area, this could result in associated environmental mitigation costs, a need to avoid impacts, or even a conclusion that impacts are unmitigable and unacceptable. The ecological impacts and acceptability of these measures was not performed for these measures, as they were screened based on construction cost alone. However, should either be further investigated, this would require a full impact analysis.

The PDT used parametric costs estimates developed by USACE for projects throughout the country to provide screening level rough estimates on what these measures would cost.

The team assumed the middle alignment with a length of 265 feet and a pump station, which would need to tie into existing high ground adjacent to the SSF - SB WQCP. The team costed out a 30-foot total height/depth of the tide gate which includes the underwater portion (top elevation of the gate would be NAVD 12.99 feet). This height was roughly based on managing the risk of a 1% AEP event in year 2073 with a high sea level rise curve assumption.

The cost of a pump station is correlated with how many cubic feet per second (cfs) it will need to pump. This is highly dependent on regional rainfall, local hydrology, correlation/volume of inflow of water, duration of the tide gate or barrier closure for the event, how much storage for water is available inside the gate closure, size of potential storm surge, expected wave size and setup, and more. If there is insufficient space to store floodwaters, a larger pump station is needed.

For rough screening cost purposes, the team assumed that a pump station would be constructed that could pump the 2-year cfs, or approximately 2,127 cfs[3]. The lowest cost "basic" pump station is estimated to cost $22,000 per cfs (certified cost from USACE Walla Walla Cost Engineering Center, 2020). Therefore a 2,000 cfs pump station, to be paired with a tide gate, at this location would cost $44 million. A 3,000 cfs basic pump station would cost $90 million to construct. A small 575 cfs Argentine pump station is estimated to cost $15 million. The tide gate cost would depend on the specification of the design, but would add multiple millions of dollars, plus environmental mitigation, design, and project management

[3] Cfs discharge is taken from the South San Francisco/San Bruno Water Quality Control Plant Flood Protection Study, 2012, which used USACE's Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) to calculate discharges at various locations along Colma Creek and Navigable Slough. This cfs is from Utah Avenue location on Colma Creek, proximate to the SSF - SB WQCP.

costs. Therefore, the tide gate plus pump station and storm surge barrier plus pump station measures can be screened based on the cost of the pump station alone exceeding what can be constructed in the CAP.

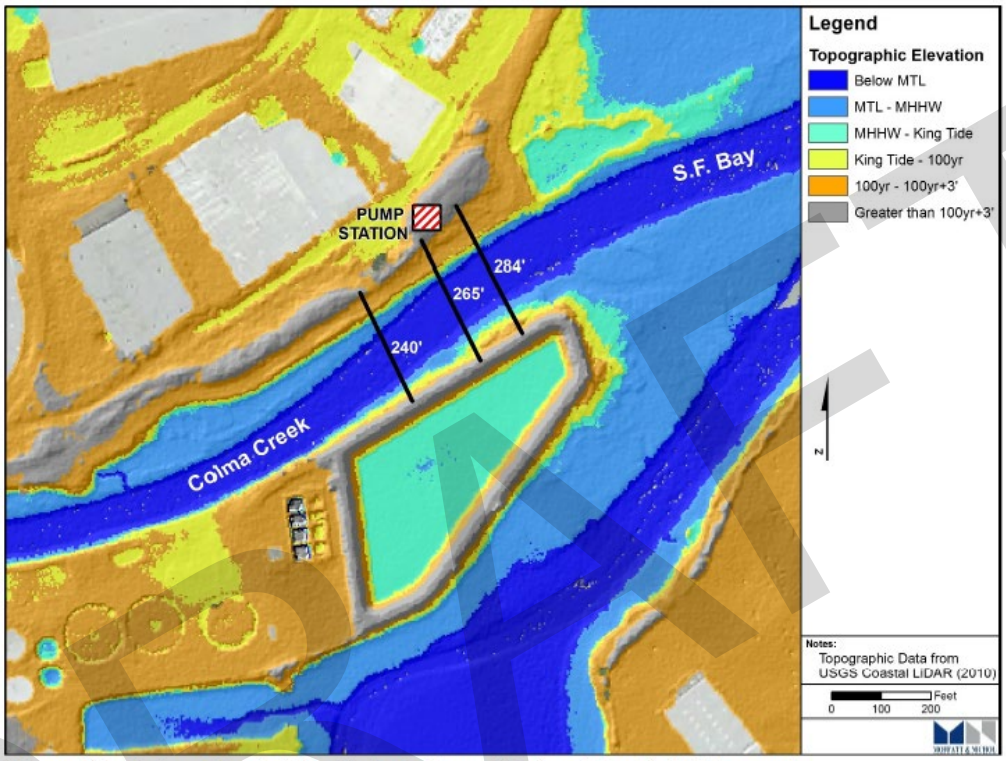

Figure 6-1. Colma Creek Tide Gate & Pump Station Potential Alignments

Figure 13. Potential Alignments for Tide Gate and Pump Station on Colma Creek, source: San Bruno Creek / Colma Creek Resiliency Study (2015)

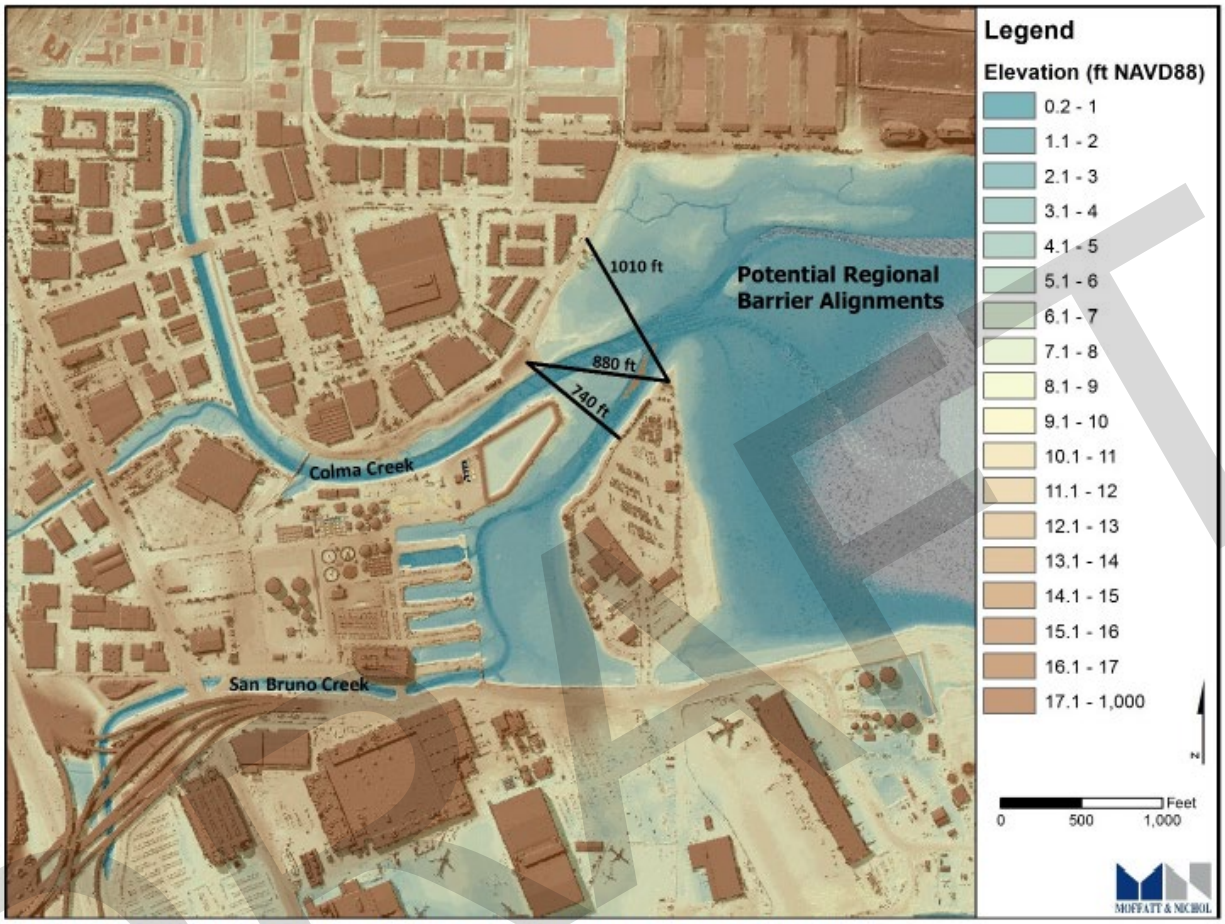

Figure 6-2. Regional Tide-Barrier Structure Potential Alignments

Figure 14. Potential Alignments for a Storm Surge Barrier along Colma Creek. Source: San Bruno Creek / Colma Creek Resiliency Study Final Report (2015)

Storm Surge Barrier

The storm surge barrier for Colma, referred to in Figure 13 as the Regional Barrier, is roughly estimated cost between $57.3 million and $134.2 million, not including the cost of tie-ins nor pump station(s).

Of these measures, the storm surge barrier with pump stations may warrant further general investigation outside of the CAP as a means of managing the residual flood risk for the larger study area residences and businesses, which was outside of the scope of this effort and what is achievable under the CAP cost limit.

Relocating the Plant

During the planning charettes at the outset of the study the team discussed whether the whole plant could be relocated further inland to reduce coastal flood risk. Plant operators and Carrollo Engineers who have performed maintenance and upgrades to the WQCP since 1999 estimated that this cost would be in the billions of dollars range, due to the complex and expensive embedded infrastructure, which includes a

system of sewage pipes, pumps, and treatment facilities and discharges. The system is largely gravity fed, which is based on location, and needs access to discharge points within the SF Bay, which makes proximity to water a benefit for the plant, though it comes with coastal flood risk. It was determined to be impractical and cost prohibitive to relocate the WQCP and this measure was screened without the need for further analysis.

Measures Screened Due to Insufficient Space:

The following measures were overlaid in the project area using best professional judgement for width, height, and alignments and were shown to very clearly not fit within the project area due to insufficient space:

Levees, Combination of Levees and Floodwalls, and Ecotone Levees

In order to construct a levee for CSRM at the SSF - SB WQCP, Civil Engineering estimates that roughly 75 feet would be needed along the alignment to accommodate the width of the levee. The existing widths around the WQCP were measured in GoogleEarth and found to be between approximately 13 and 26 feet. Thus, there is no location along the edge of the WQCP with enough space to accommodate a levee, so the levee measure and the combination of levees and floodwalls measure were both screened early for this reason.

The team also considered the nature-based more ecologically beneficial ecotone levee measure. Ecotone levees are gently sloping levees that extend out into the channel to provide marsh/wetland habitat and coastal storm risk management. The concept drawing (Figure 14), which was taken from the San Francisco Estuary Institute (SFEI) and the Aquatic Science Center's San Francisco Bay Shoreline Adaptation Atlas, 2018, illustrates the concept of an ecotone levee. In essence, ecotone levees can replace lost or absent natural resiliency that marshes and wetlands can provide in coastal systems.

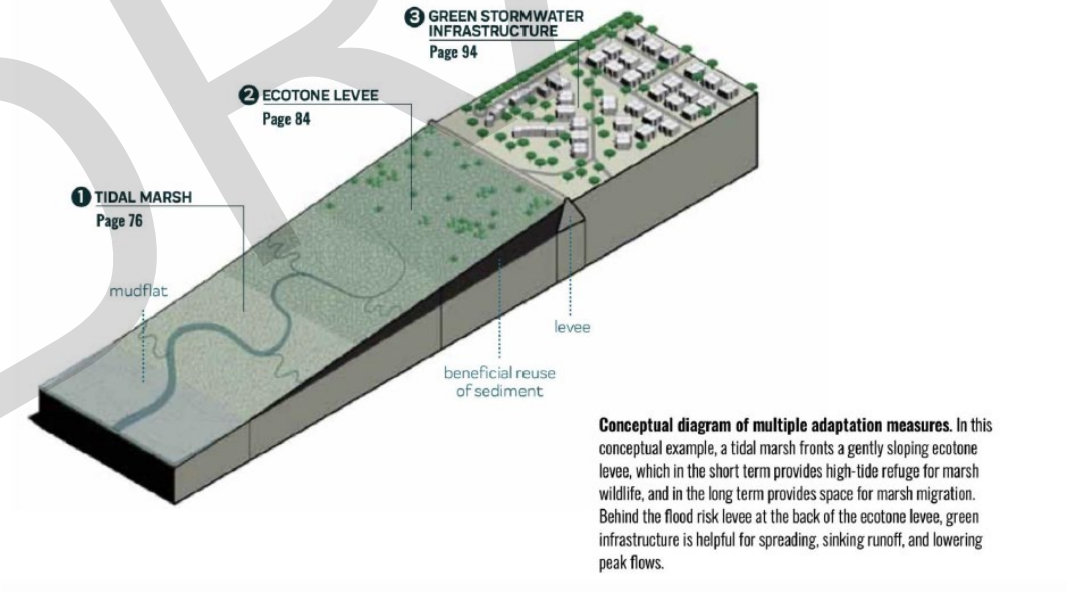

Figure 15. Concept drawing of an ecotone levee to reduce the risk of flooding from coastal storm events or storm surge. Source: SFEI SF Bay Shoreline Adaptation Atlas, 2018

The USACE Shoreline II feasibility study project delivery team which is evaluating the feasibility of constructing ecotone levees in this region estimate that ecotone levees should have slide slopes of 12:1 or

15:1. In drawing out the ecotone levee measure for Lower Colma Creek, these side slopes would mean that the entire creek would need to be filled in, creating, in effect, a dam. Therefore, this measure was screened as not being suitable for this location.

The following measures were screened based on professional judgement that they would not be effective in meeting the objectives of the study:

Dredging

The team considered whether dredging and maintaining the Colma Creek channel to a deeper depth could provide the intended flood conveyance capacity to manage the coastal flood risk. Reduced conveyance capacity from sediment accumulation increases the flooding risk for areas surrounding the channel. In the vicinity of the SSF - SB WQCP sediment include watershed derived sediments as well as marine sediments from tidal exchange. While the relative contribution of each of these sources is not known, it is hypothesized that a large fraction of the sediment in the channel is derived from watershed sources (County of San Mateo, 2016). It is expected that this may provide a slight reduction in flood risk for fluvial events but would not be a significant reduction for coastal events and flooding due to future sea level rise, where the majority of the damages in the future without condition are projected. Dredging was therefore determined to not be an effective measure and was screened from further analysis.

Leveraging another wastewater treatment facility

The team considered whether another wastewater treatment facility could be leveraged to phase out or augment the SSF - SB WQCP. However, all of the nearby additional wastewater treatment plants in the vicinity are also located on the coast and face similar coastal flood risk. Therefore, this would not be an effective nor complete solution, so this measure was screened.

NNBFs

NNBFs such as wetlands and marshes can provide erosion control when placed in front of a CSRM feature, like a berm, which is subject to erosion, or to avoid undercutting due to erosion for a floodwall foundation. The study team considered placing NNBFs in front of proposed CSRM features, in this case floodwalls, where wave action might warrant the need for erosion control features. In this case, the north floodwall alignment already has an articulated concrete mat revetment along the existing bank which is intended to protect the bank and the WQCP from erosion due to wave runup. Other areas north and west further upstream Colma Creek have existing fringe marsh or are outside of the more active wave zone. The same is true for the south floodwall location, which is protected from wave action due to its position. There are areas along the storage pond or finger piers which are suitable for wetland restoration or enhancement, they just do not correlate well with where NNBFs would be needed for managing coastal storm risk. Thus, NNBFs as erosion control were screened out.

Recreation trail realignment

Routing the trail along the Bay adjacent to the WQCP poses an unacceptable safety risk to trail users who could risk exposure to dangerous airborne chemicals. For this reason, the pedestrian/bicycle bridge was originally sited well upwind of the plant. Rerouting the Bay Trail outside of the plant along Colma Creek would also pose an unacceptable security threat to critical infrastructure. Insufficient space exists between the plant and the high-water line along Colma Creek to accommodate a 12-foot-wide recreation trail without going into the waters of the U.S. Finally, rerouting the Bay Trail along the SSF - SB WQCP is likely to degrade the olfactory experience of trail users, and may not be considered an aesthetic improvement by trail users for this reason. Recommend updating the SF Bay Trail Planned Route Map to

reflect infeasibility of a trail around the SSF - SB WQCP. Alternative inland route identified has a high estimated cost and would not substantially improve recreational experience from the existing experience.

The following measures were found to not be cost effective compared to other measures which were retained:

Temporary or deployable flood barriers

Temporary or deployable flood barriers can be used where it is preferable in day-to-day non-flood conditions to have access, such as in a roadway, or crossing. They are more costly than a normal floodwall that is always in place, but in some instances the added functionality or operability can justify that cost. In this case, there is no added benefit for constructing a deployable floodwall, so this measure was screened as not being cost effective compared to a regular floodwall.

Relocated key structures of concern

Each facility within the SSF - SB WQCP has its function, and this function often involves interaction with the neighboring structures, such as conveying effluent from one treatment tank to the next for various phases of treatment. They function as a system and relocating key structures piecemeal is not a cost effective way to manage risk, nor is it likely to be implementable within CAP due to the high cost of the complex infrastructure. For example, the primary treatment system was constructed in 1999 and cost roughly $18 million (1999 dollars), including tanks, pumping, and control systems. To relocate just this one system, you'd need to reconstruct it and demolish the old one, since these structures are concrete and capped in place. Then, the primary treatment pipes would need to be run to the headworks to connect it to incoming sewage, and also connected outbound to aeration basins for biological treatment. Finally, the old connections would need to be decommissioned.

The same conditions exist for the secondary clarifier system. Secondary clarifier #4 construction was completed in 2022 for roughly $1.5 million dollars. Although this is a singular structure, its pumping electrical and control systems are connected to several other structures and processes within the WQCP. There are three secondary clarifiers, four primary clarifiers, and support buildings, pumps, drives, and other related equipment that this example applies to. In order for the relocation to be complete, all of the connected structures would need to be relocated, and the old subterranean network would need to be decommissioned, and new ones added. These examples only represent two of the many treatment systems at the WQCP.

This measure was therefore screened early using professional judgement that it would not be cost effective compared to other measures still in consideration, such as floodwalls.

Retained Measures

Five measures were retained and developed into alternatives.

Structural Measures

These structural measures were retained for further analysis.

- Floodwall

Nonstructural Measures

These nonstructural measures were retained for further analysis.

- Ring floodwall, with stop log gate
- Flood proofing

- Flood warning system
- Raising critical assets in place

3.5. FORMULATION AND COMPARISON OF ALTERNATIVE SOLUTION SETS

In combining measures into alternatives, the team sought to establish a range of risk management via a smaller floodwall alignment on only the lowest lying side of the plant (north side of the plant only), tying into high ground, and a second more comprehensive alignment that included a floodwall along the southern side of the plant as well (see Figure 16). The remaining boundaries of the plant were determined to be either sufficiently high in elevation to not require a floodwall, as they did not overtop for any scenario that was modeled; or in the case of the finger piers, to flood slightly during some modeled events but to not cause significant damages. Where the San Francisco Bay Trail crosses the alignment by the Costco parking lot, the elevation is already high. There is a low spot directly east of that which would be filled to raise it to the minimum elevation, to not create a low point where water can flow across the floodwall. The trail would therefore be unimpeded and continue to allow recreation. The floodwall would tie into the trail just east of where the green line begins in the left of Figure 15. This floodwall would vary in height above grade based on the ground elevation, but is roughly three to four feet high.

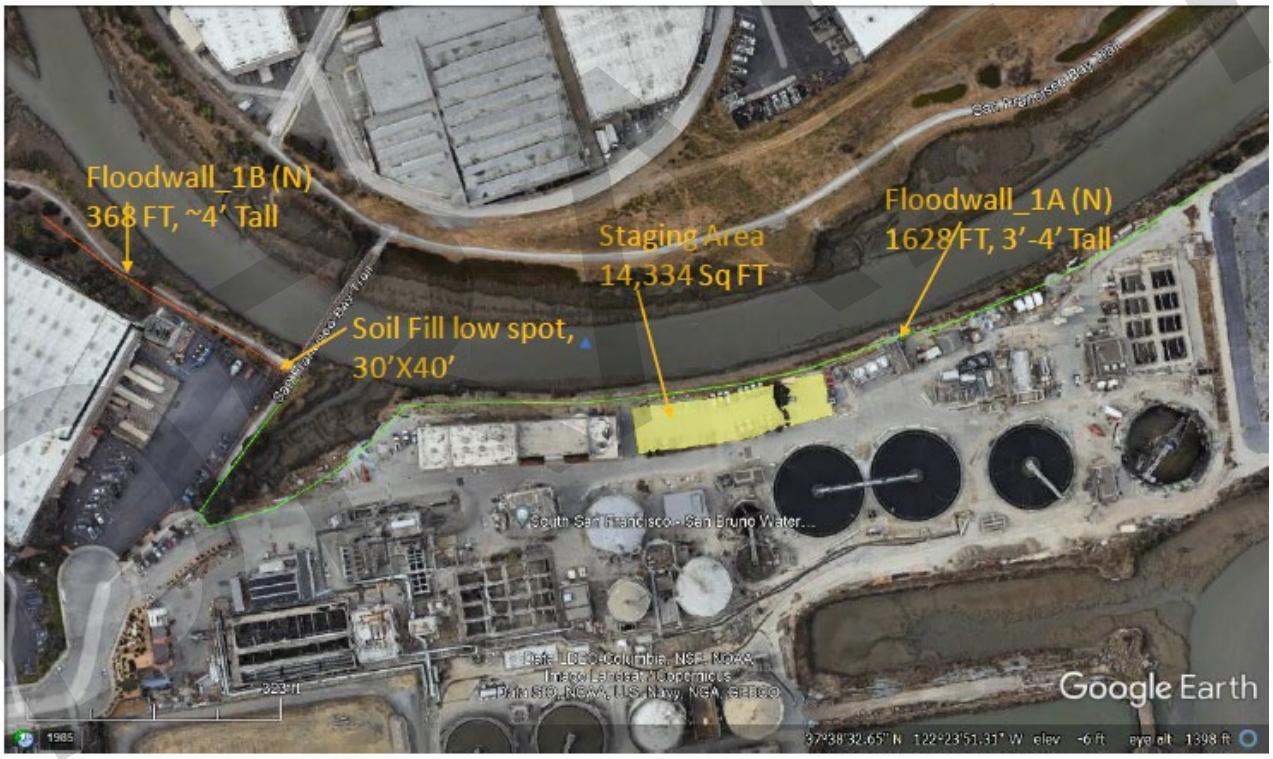

Figure 16. The floodwall on the North side of the WQCP is included in Alternatives 1 and 2, and would extend from the creek side of Costco, east to tie into higher elevation by the eastern side of the plant. The SF Bay Trail will not be impeded.

Figure 17. Alternative 2 also includes a shorter floodwall along the southern edge of the plant where elevations are lower, in addition to the north wall shown in Figure 4.

Figure 18. Alternatives 1, 2, and 3 all include a ring floodwall at sanitary pump station 4, which is roughly 2 feet high at grade, with a stop log gate which would need to be closed in a flood event to keep water out.

There is no critical infrastructure at risk in the finger pier location. The finger piers are currently used by the City of South San Francisco for miscellaneous storage, for example old street lights, and overflow airport parking by the leasee Park SFO, who operates a large parking garage further upland from the finger piers (see Figure 2). Damages in this location are not significant enough to justify measures here,

and these uses could be relocated to avoid flood damages. The existing marsh that fringes the WQCP, and the finger piers were identified as potential mitigation locations for this project.

Both floodwall alternatives and the non-structural alternative include a non-structural measure of a small ring floodwall around pump station 4, which was determined to be at high risk from flooding. This will likely be a small-scale sheetpile I-wall which does not require excavation, roughly two feet high at grade on average, with a stop log gate to provide vehicular access. The subterranean control room and infrastructure at this location result in high consequences from flooding, including sewage backups into residences and streets, flowing through manholes and toilets.

Floodproofing Pump Station 4 was determined to be infeasible, and a smaller perimeter alignment was considered, but determined to impede operations as vehicles access the grated access panels. Flood proofing was not feasible to protect the "at-grade" 480Volt Motor Control Center (MCC), a 12kV utility power (PG&E) transformer, an emergency standby-by power generator, and multiple subgrade conduit vaults that connect the station's equipment to their respective power sources. These structures would be inundated with flood water, causing all utility and emergency backup power supplied to the station to fail. This would ultimately cease operation of the station to convey sewage, subsequently, causing the station to overflow. Thus, a full perimeter wall, 2 feet above grade on average, with stop log vehicular gate access, was included. An early flood warning system is also necessary to ensure that the stop log gate is sealed prior to flood waters reaching them.

The proposed project does not include any residential components and the proposed improvements would not likely be significantly damaged in the event that flooding occurs.

3.5.1. Alternative Plan Descriptions

Three alternatives were included in the final array for final comparison, plus a No Action alternative. The non-federal sponsor did not request consideration of a Locally Preferred Plan. The non-structural only plan is not implementable within the CAP cost limit, but was retained per the requirement to include a complete nonstructural only plan in the final array of alternatives for flood risk projects within USACE.

No Action Alternative—in this scenario, the federal government would take no action to address coastal flood risk at the SSF - SB WQCP and pump stations. Coastal flood risk would increase over time.

Alternative 1—the **North Floodwall Alternative** includes an I-wall (sheetpile) floodwall, approximately 3 to 4 feet above grade at WQCP at the north side of the WQCP adjacent to the right-bank of Creek. At Pump Station 4, a perimeter sheetpile floodwall, approximately 2 feet above grade, would be constructed, with stop log gate for vehicular access and early warning system so that plant operators would know when to seal the stop log gate.

Alternative 2—the **North and South Floodwall Alternative** includes an I-wall (sheetpile) floodwall, approximately 3 to 6.5 feet above grade at WQCP at the north side of the WQCP adjacent to the right-bank of Creek, as well as a second shorter approximately two-four foot-high floodwall south of plant adjacent to San Francisco Bay. At Pump Station 4, a perimeter sheetpile floodwall, approximately 2-4 feet above grade, would be constructed, with stop log gate for vehicular access and early warning system so that plant operators would know when to seal the stop log gate.

Alternative 3—Nonstructural Only Alternative would dry floodproof 23 structures at the main WQCP by installing water tights doors and windows and using membranes to waterproof structures. The subterranean interconnected electrical system is not practicable to flood proof and would need to be elevated, as it is currently all subterranean. This plan also includes a low floodwall, roughly 2 feet high, and stop log gate around Pump Station 4, and add flood warning system to alert plant staff when to close

the stop log gate, similar to Alternatives 1 and 2. To be complete, this alternative would likely also require elevated exit doors and walkways to allow plant operators to maneuver between buildings to operate the plant and allow safe egress during flood events. However, the cost for elevated walkways and exits was not included in the cost estimate for this alternative, which is already orders of magnitude more costly. This would only add to the cost.

A key objective of the project is to maintain operability of the WQCP during a flood event to avoid loss of pumping and wastewater treatment services throughout the service area. Flood proofing can cost effectively protect the buildings and their contents from damages, however, as a standalone measure it would not meet all of the objectives of the project. Flood proofing alone would not allow for the WQCP to be operated, nor would it be a safe environment for plant operators. In assessing the non-structural only plan, the team realized that the plant operators would need to be able to access valves and control panels during a flood state where the buildings are sealed off. In order to safety do so with up to roughly 3.8 feet of water in some places, elevated walkways and exits would need to be constructed.

Furthermore, flood proofing the electrical system was determined to be infeasible as well as too high a risk for life safety. Below Figure 20 is a map of the subterranean electrical system. There are 11 motor control centers, which are circled in red in below Figure 20, that operate and power various parts of the plant, located throughout the plant. Each has at least one subgrade vault to provide access to cables and

conduits when they need to be checked or maintained, with cables and conduits going between them underground.

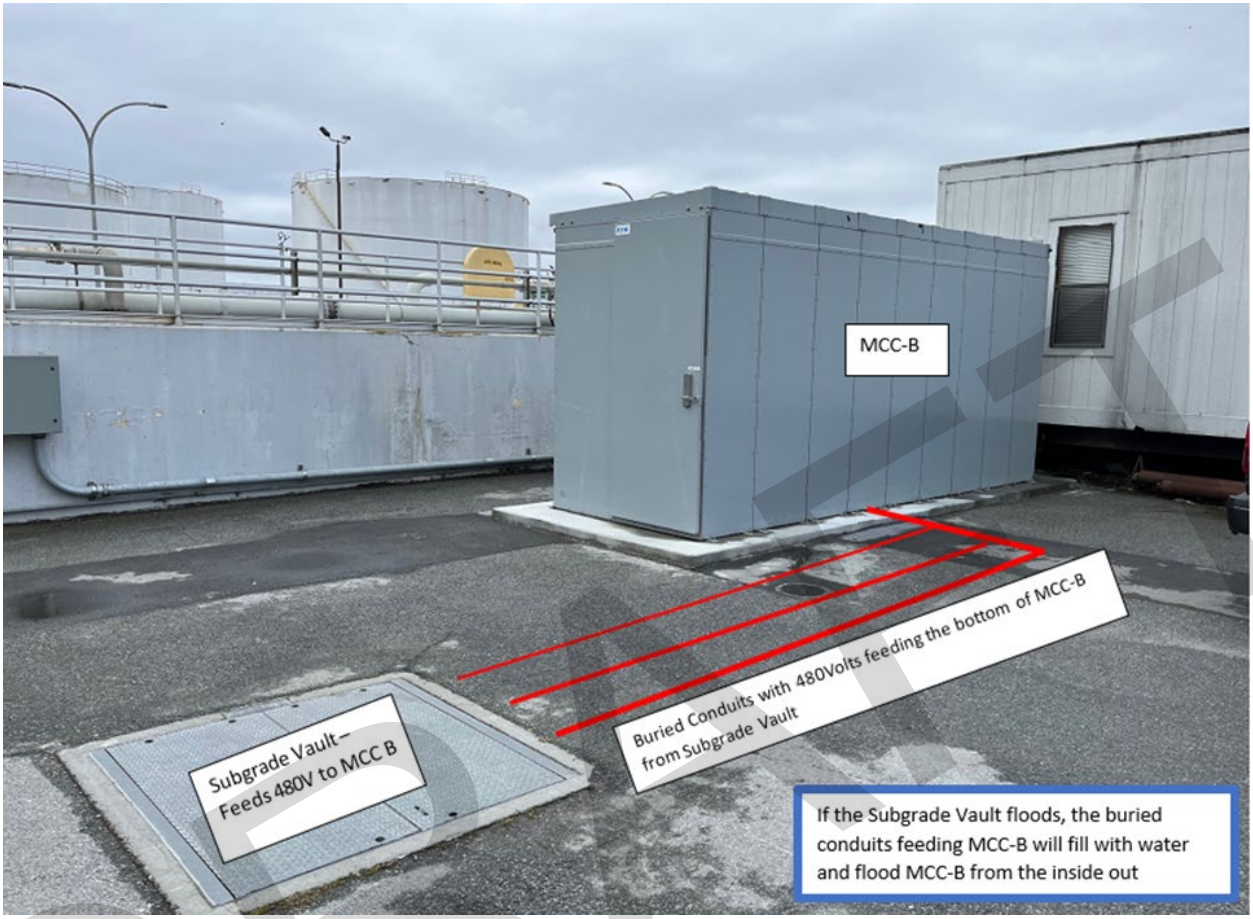

Figure 19. Photo of one of the eleven Motor Control Centers (MCC) at the SSF - SB WQCP, which each have buried conduits connecting through a subgrade vault. These conduits are vulnerable to flooding and could funnel water to the MCCs, which power various facilities throughout the plant.

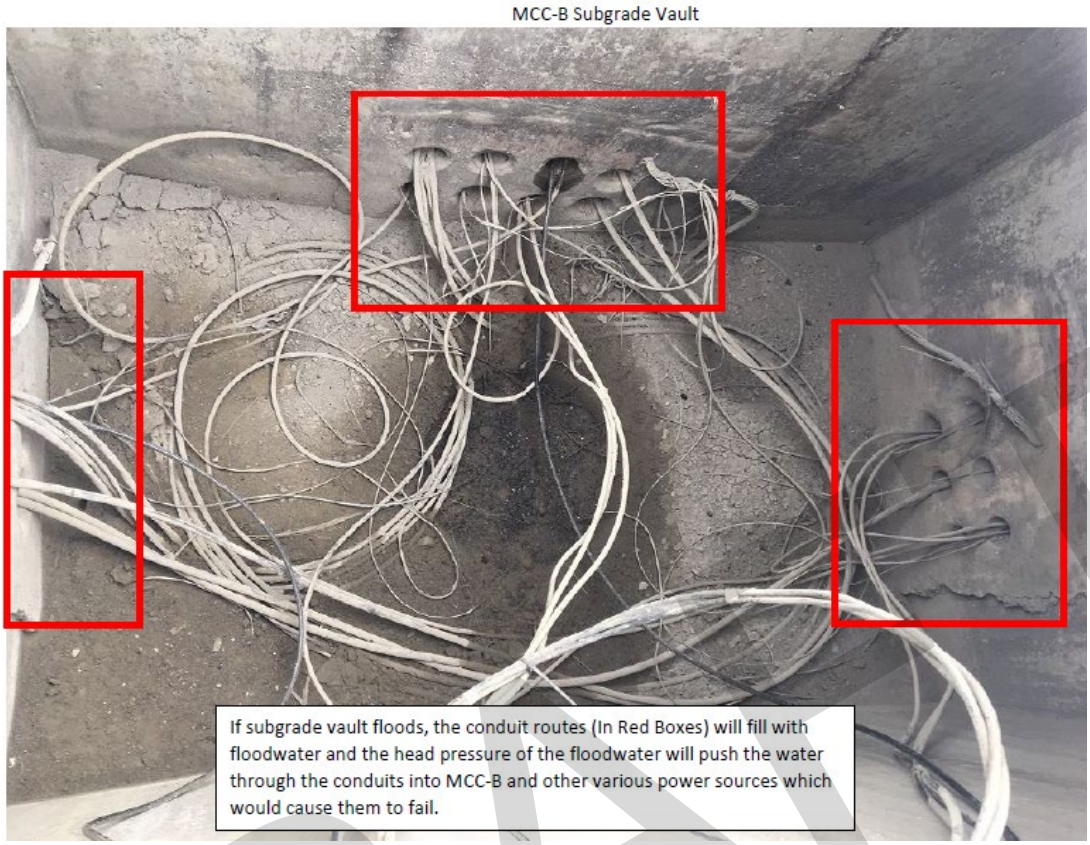

Figure 20. Image of the inside of a subgrade vault at the SSF - SB WQCP, like the one pictured in Figure 15, with electrical conduits which connect the MCCs to the various plant facilities to power them.

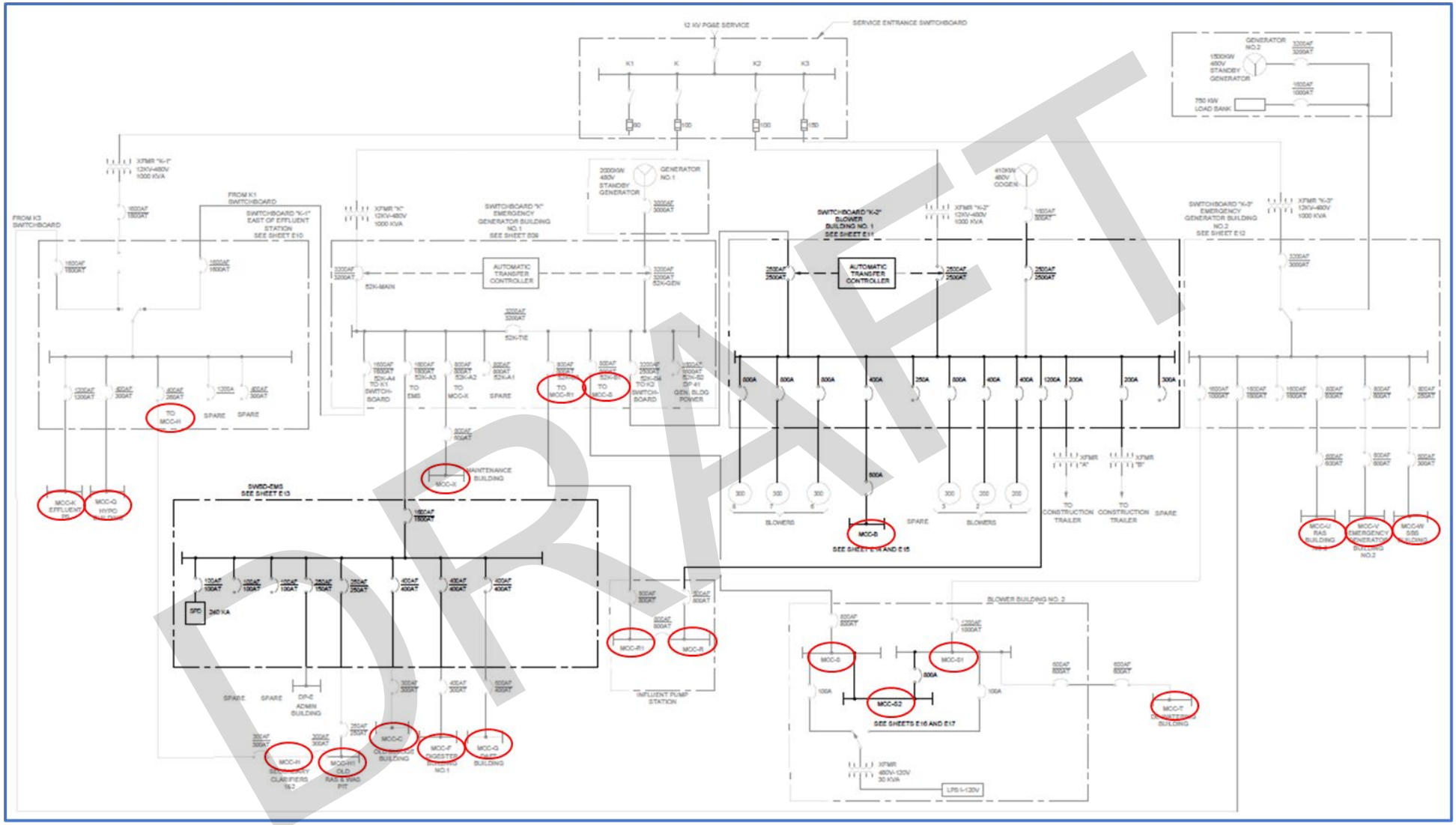

Figure 21. Map of the SSF - SB WQC Electrical Single-Line Diagram. This map shows the layout and connections of the subterranean electrical system that powers the plant.

These subterranean vaults are located throughout the plant, and need to be accessed for operation. Figure 20 shows a map of the many master control centers circled in red that are connected through myriad subterranean conduits (pictured in Figure 19) which could conduct water throughout the system. A photos of a master control center is shown in Figure 18. Since one objective is to keep plant operational in a flood state, the only feasible way to protect the electrical system non-structurally, is to elevate it. Elevation is also safer from a worker safety perspective to manage the risk of electrocution during a flood, since plant operators would still be present in a flood state to maintain treatment services/pumping.

The Policy Directive from the Assistant Secretary of the Army (Civil Works) on *Comprehensive Documentation of Benefits in a Decision Document*, dated 5 January 2021 requires by policy that the team include a nonstructural only plan in the final array of alternatives. Alternative 3 exceeds the cost limit for CAP and would otherwise be screened, but is included per policy. It is not, however, a reasonable alternative subject to environmental analysis under NEPA.

3.5.2. Comparison of Alternative Plans

The Flood Damage Reduction Analysis (HEC-FDA) 1.4.3 software developed by the U.S. Army Corps of Engineers' (USACE) Hydrologic Engineering Center (CEIWR-HEC) provides the capability to perform an integrated hydrologic engineering and economic analysis in the evaluation of flood risk management plans. Due to the nature of the flooding in the study area, which will result as a combination of sea level rise and coastal storms leading to flooding withing the Main SSF - SB WQCP, rather than as a result of wave attack and erosion, HEC-FDA is considered to be the appropriate modeling tool for this effort.

To carry out the flood damage analysis for this study, two HEC-FDA models will be built for each SLR scenario: one model to estimate flood damages from the base year to 2053, and a second model to estimate damages from 2053 to 2073. Using two time periods is how SLR is calculated in HEC-FDA. Inputs to both HEC-FDA models will include base/first year and future year without- and with-project WSEL for all eight ACE events. Additional model inputs include depth-damage curves for each of the structure types, contents for each structure type and floodplain structure elevations. HEC-FDA will calculate flood depths at each structure from the WSEL, which provide the water's stage, and structure elevations. This approach to estimating flood depths minimizes the potential future work required to re-run the HEC-FDA models in the event that there are changes to the coastal modeling.

HEC-FDA combined flood depths and frequencies with the floodplain asset information to compute equivalent annual damages (EAD), annual exceedance probability, and other performance statistics both without- and with-project. The final without- and with-project equivalent annual damages (EAD) estimate under each SLR scenario will be calculated from the EAD outputs from each model. This will be done via post-processing in a spreadsheet outside of the FDA model. The table below displays the computed damages and benefits for the analyzed alternatives.

Table 10. Economic Analysis of Project Alternatives.

With-Project Equivalent Annual Damages & Damages Reduced (April 2022 Price Level, Federal Discount Rate - 2.25%)				
	No Action	**Alternative #1 (Intermediate SLR)**	**Alternative #2 (Intermediate SLR)**	**Alternative #3 (Intermediate SLR)**
With-Project Avg Annual Flood Damage	$774,843	$248,794	$0	$15,184
Annual Damages Reduced	$0	$526,049	$774,843	$759,659
Project Costs				
Project Cost	$0	$7,463,000	$9,632,000	$149,125,000
PED	$0	$1,443,000	$1,820,000	$25,948,000
Construction Management	$0	$663,000	$837,000	$11,930
Real Estate Cost	$0	$1,411,000	$1,411,000	$0
Cultural Mitigation	$0	$150,000	$150,000	$0
Environmental Mitigation	$0	$650,000	$650,000	$0
Total Investment Costs	$0	$11,780,000	$14,500,000	$175,084,930
Average Annual Costs	$0	$394,846	$486,016	$5,868,560
Annual O&M Costs	$0	$67,000	$67,000	$0
Total Average Annual Costs	$0	$461,846	$553,016	$5,868,560
Results				
Annual Net Benefits	--	**$64,203**	**$221,826**	**-$5,108,901**
Benefit-to-Cost Ratio	--	**1.14**	**1.40**	**0.13**

The evaluation of the Final Array of Alternatives for how effective, efficient, complete, and acceptable they are is summarized in Table 11. The team used existing analysis, collective expertise and professional judgement to assess and evaluate the alternatives. A more comprehensive evaluation of benefits, in addition to effectiveness, efficiency, completeness, and acceptability was performed on the final array of alternatives and is summarized in Table 12 and described below. The metrics are noted in the Tables 11 and 12. Where the metrics are qualitative, the rationale for ranking is explained.

Effectiveness measures how well the plans meet the primary CSRM objectives of the project, and how feasible they are to construct, etc. Effectiveness at meeting objectives was evaluated for each objective. All the alternatives were determined to be highly effective for reducing economic damages from flooding (objective 2) and reducing damages to the environment from flooding and effluent releases into Colma Creek and SF Bay (objective 3), based on the initial assessment. For managing risk to human life and safety (objective 1), the team had concerns that Alternative 3 could pose safety hazards to plant operators who were going between buildings and operating the plant when up to 3.77 feet of floodwaters surround the buildings. Measures to manage this risk for Alternative 3 were added, such as raising the electrical system and elevated exits and walkways. Nonetheless, the team concluded that Alternative 3 was less safe to plant operators, than the structural alternatives where there is less risk of floodwaters entering the plant

property and endangering operator safety. The plant operators would need to evacuate should the risk of overtopping occur for Alternatives 2 and 3.

Efficiency was analyzed in the context of cost effectiveness, in this case initially using rough costs and then again using net NED benefits. Acceptability refers to whether the plan is legally implementable. Completeness is the extent to which a given alternative provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. Alternative 2 ranked high in all categories, followed by Alternative 1, which ranked high in all but efficiency, where it ranked medium because it has fewer net benefits than Alternative 2. Alternative 3 was low in efficiency due to the very high cost of $72 million before a 107% contingency is added. The contingency was developed during an Abbreviated Cost and Schedule Risk Analysis which documents great uncertainty and complexity associated with final design and cost of this alternative. Alternative 3 also ranked medium for constructability, as it involves specialized construction, and medium for life safety since plant operators would be operating the plant in a flood condition, with water surrounding the buildings.

Table 12 summarizes the comprehensive benefit screening that the team performed to identify a plan that maximizes benefits across all benefit categories. The four benefit accounts that the USACE analyzes are National Economic Development (NED), Environmental Quality (EQ), Other Social Effects (OSE), and Regional Economic Development (RED). While the primary objectives of the study are all related to managing the risk of flooding due to coastal storms and tide driven events, the team looked to maximize the benefits that our alternatives could provide. Cleanup costs for sewage backups in the service area are measured in the NED account, as are repair or replacement of damaged property. However, OSE was an important benefit category for this project due to the serious impact to people and society that would come from large scale raw sewage exposure and contamination in homes and streets, which this project aims to manage the risk of. These impacts could be to human health, mental health, and animal health, as well as economic impacts associated with a public health disaster. No monetary value has been placed on this, nor life safety, but the benefit to the nation of avoiding these damages to society are captured qualitatively in the OSE account. There were also life safety components to consider for plant operators, since an objective of the study is to keep the plant operational during a coastal storm, plant operators would need to be able to safety remain on site, without undue risk to their lives. Finally, much of the communities that this WQCP services are socially vulnerable communities who have been historically disadvantaged. Impacts to these communities can be harder to recover from as they may have less resources, options, and access to services. This was evaluated with screening criteria 6b, looking at equity in benefits to environmental justice communities.

Operability is defined as the ability to efficiently operate and maintain a facility or facilities over their life cycle when the facility is built according to the project's plans and specifications. In this case not all plans would have the same operability for the SSF - SB WQCP. In particular, the nonstructural alternative would alter the way the WQCP operates in both a normal and flood environment, and would require changes to how the operators move around the plant and between buildings, as well as how the electrical system functions. The work to elevate the electrical system may require periodic outages during construction, which would impact plant performance. Plant performance would also be impacted if the plant operators needed to evacuate the plant due to unsafe flooding, which is more likely in Alternatives 1 and 3. There is also the performance of the CAP 103 CSRM project, which is a safety risk assessment category to measure how the project will perform when subjected to these events. It has to do with failure probabilities. This was measured qualitatively pre-TSP milestone and a failure analysis will be performed on the TSP to inform final design. In the initial comparison of alternatives for performance, the nonstructural plan was considered most at risk for failure since there is a high risk that one or more doors or panels would be left open/unsealed prior to an event, since there are so many entry points to the plant's subterranean system and they are accessed multiple times a day.

EQ analysis was broken into comparison of each plan to habitat EQ and cultural resources EQ, as they performed differently. Cultural resources EQ is negatively impacted by more ground disturbance exposing archaeological sites. Alternatives 1 and 2 proposes structural work near the banks, which have the possibility of disturbing buried cultural deposits as well as Native American ancestral remains. The EQ benefits for habitat are tied to avoiding emergency releases of untreated effluent into Colma Creek and San Francisco Bay. In that sense, Alternatives 2 and 3 are more effective, than Alternative 1 which mitigates less risk than Alternatives 2 and 3.

Table 11. Comparison and Evaluation of the Final Array of Alternatives

Qualitative Ranking Categories Green = High Yellow = Med Red= Low	**Screening Criteria: Effectiveness** ***Achieves Primary Objective to Manage Coastal Flood Risk***			**Screening Criteria: Effectiveness**	**Screening Criteria: Efficiency**	**Screening Criteria: Completeness**	**Screening Criteria: Acceptability**
	Primary Project Objective #1: Manage risk to human life and safety	**Primary Project Objective #2: Reduce Economic Damages from Flooding**	**Primary Project Objective #3: Reduce damages to env from flooding and effluent releases**	**Feasible / Constructable (High/ Medium/ Low)**	**Cost Effectiveness ($/Net Benefits)**	**Benefits Realized Without Further Action From Others (Yes/No)**	**Legally Implementable (Yes/ Yes, but requires significant coordination / No)**
Alternative 1: North Floodwall + Pump Station 4							
Alternative 2: North & South Floodwall + Pump Station 4							
Alternative 3: Nonstructural Only - Raise electrical system + Flood proofing + Pump Station 4							

Table 12. Comprehensive Benefit Evaluation and Comparison of Final Array of Alternatives

	Screening Criteria #1: Efficiency ($ cost effective $)	Screening Criteria #2: Effectiveness (meets primary objectives)	Screening Criteria #3: Acceptable (Implementable)	Screening Criteria #4: Completeness (standalone)	Screening Criteria #5a: Environmental Quality (EQ) habitat	Screening Criteria #5b: Environmental Quality (EQ) Cultural Resources	Screening Criteria #6a: Other Social Effects (OSE), life safety	Screening Criteria #6b: Other Social Effects (OSE), environmental justice	Screening Criteria #6c: Other Social Effects (OSE), impact to people/society of raw sewage exposure	Screening Criteria #7: Operability	Screening Criteria #8: Performance
Final Array of Alternatives	**Green = High Yellow = Med Red = Low**	**Green = High Yellow = Med Red = Low**	**Green = High Yellow = Med Red = Low**	**Green = Yes Yellow = Complete for all but the very infrequent flood events where plant workers would leave due to safety and plant would shut down Red= No**	**Green = High Yellow = Med Red = Low**	**Green = No impacts to Cultural Resources Yellow = Medium impacts to cultural resources Red= High impacts**	**Green = manages risk Orange = Unsure/medium Red = Negative Impact**	**Green = Equitable benefits/damages and avoids impacts to vulnerable Orange = Unsure/medium Red = Negative or Unequitable Impact/Benefits**	**Green = Equitable benefits/damages and avoids impacts to vulnerable Orange = Unsure/medium Red = Negative or Unequitable Impact/Benefits**	**Green = High Yellow = Med Red = Low**	**Green = High Yellow = Med Red = Low**
Alternative 1: North Floodwall + Ring Floodwall at Pump Station 4 with gate + flood warning system											
Alternative 2: North & South Floodwall + Ring Floodwall at Pump Station 4 with gate + flood warning system											
Alternative 3: Nonstructural Only - Raise electrical system + Flood proofing 23 structures + ring floodwall at Pump Station 4 + Flood warning system											

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Table 14 looks at the sensitivity of our tentatively selected plan to the full range of SLR scenarios (low, intermediate, and high). It was determined that SLR has little effect on the performance of our Tentatively Selected Plan over the 50-year period of analysis. This is because Alternative 2 only overtops with the most extreme of the modeled 153 events, namely the .02% AEP high sea level rise scenario in year 2073. In other words, the Tentatively Selected Plan is very resilient to sea level rise over the next 50 years.

Table 13. With Project Equivalent Annual Damages Reduced, or Projected Economic Benefits to the Nation, with Varying Degrees of and High Sea Level Rise in the Future

With-Project Equivalent Annual Damages & Damages Reduced (April 2022 Price Level, Federal Discount Rate - 2.25%)						
			TSP			
	No Action	**Alternative #1 (Intermediate SLR)**	**Alternative #2 (Intermediate SLR)**	**NED Sensitivity to Low SLR (ALT2)**	**NED Sensitivity to High SLR (ALT2)**	**Alternative #3 (Intermediate SLR)**
With-Project Avg Annual Flood Damage	$774,843	$248,794	$0	$0	$10,820	$15,184
Annual Damages Reduced	$0	$526,049	$774,843	$774,843	$764,023	$759,658
Project Costs						
Project Cost	$0	$7,463,000	$9,632,000	$9,632,000	$9,632,000	$149,125,000
PED	$0	$1,443,000	$1,820,000	$1,820,000	$1,820,000	$25,948,000
Construction Management	$0	$663,000	$837,000	$837,000	$837,000	$11,930
Real Estate Cost	$0	$1,411,000	$1,411,000	$1,411,000	$1,411,000	$0
Cultural Mitigation	$0	$150,000	$150,000	$150,000	$150,000	$0
Environmental Mitigation	$0	$650,000	$650,000	$650,000	$650,000	$0
Total Investment Costs	$0	$11,780,000	$14,500,000	$14,500,000	$14,500,000	$175,084,930
Average Annual Costs	$0	$394,846	$486,016	$486,016	$486,016	$5,868,560
Annual O&M Costs	$0	$67,000	$67,000	$67,000	$67,000	$0
Total Average Annual Costs	$0	$461,846	$553,016	$553,016	$553,016	$5,868,560
Results						
Annual Net Benefits	--	**$64,203**	**$221,826**	**$221,826**	**$211,006**	**-$5,108,901**
Benefit-to-Cost Ratio	--	**1.14**	**1.40**	**1.40**	**1.38**	**0.13**

Figure 22 below plots with-project critical elevations at pump station 4 and the main SSF-SB WQCP over 100 years against varying rates of SLR. This comparison shows the main WQCP overtopped during a 1%

annual exceedance probability event with high sea level rise around year 2074, roughly 51 years after construction. Pump station 4 does not get overtopped during the 1% AEP with high SLR until roughly 67 years after construction. After the critical thresholds for the 1% AEP are exceeded, the frequency of overtopping would be expected to increase more as SLR continues. Pump station 4 floodwalls could be raised prior to these thresholds being met, and the stop log gate replaced. However, the floodwalls at the main WQCP may require replacement past the 50 year project life, depending on how quickly sea levels rise.

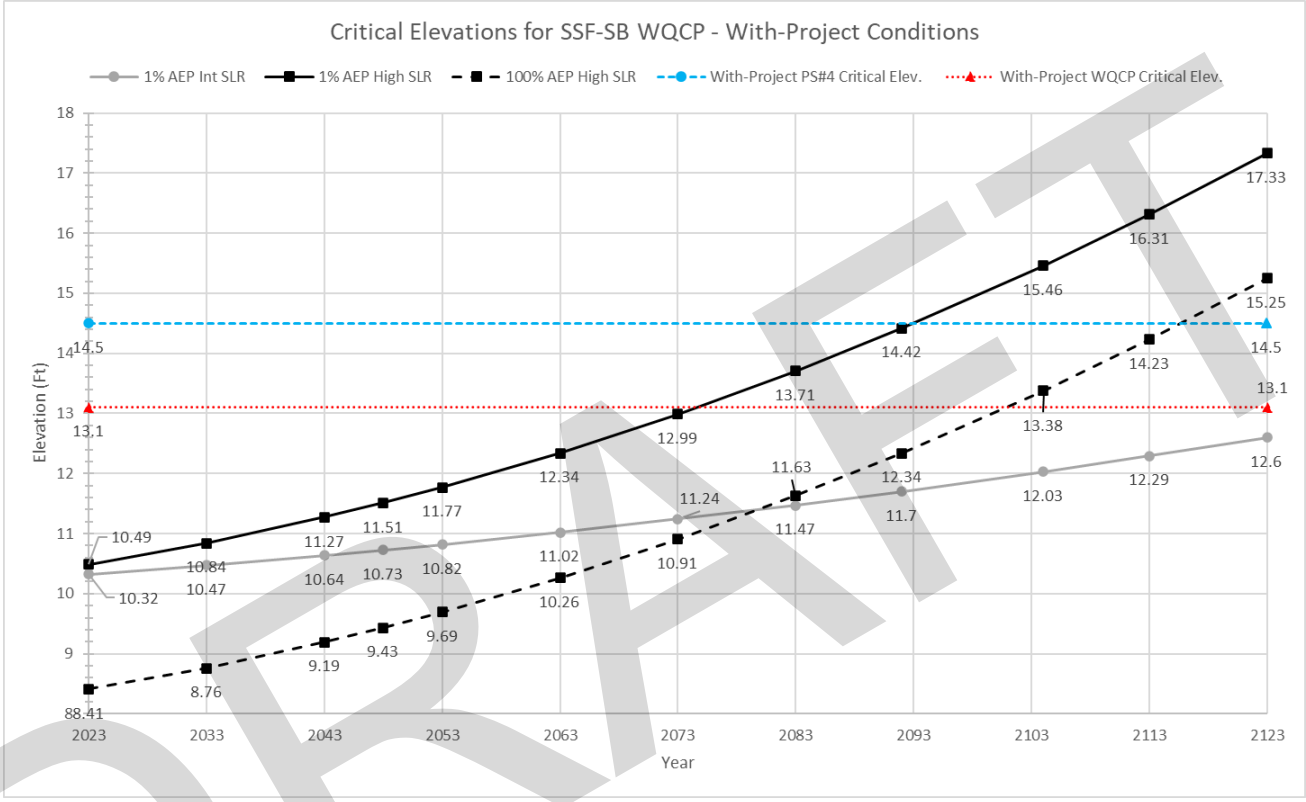

Figure 22 . Critical elevations for Pump Station #4 (blue, triangle, dashed) and the WQCP area (red, triangle, dotted) shown with various RLSC projections to visualize when and how often impacts may occur in Future With-Project conditions.

3.5.3. Risk and Uncertainty

Residual Risks

The reliability of structural flood protection lies in its design, height, and location. The structure must be strong enough to withstand the forces of the flood waters, tall enough to not be overtopped in a flood event, and located properly to block flood waters completely. Failure in any of these categories will result in flood waters reaching behind the structure. While unlikely, a more extreme event than was included in the design phase could occur, and a flood wall cannot perform for an event it was not designed for.

Similarly, non-structural flood protection systems must be properly designed and executed. Raising electrical systems is effective only if they are raised high enough. Flood warning systems are only effective if they operate properly and provide accurate information far enough in advance, and if people take the needed actions to evacuate and/or deploy non-structural flood protection measures. Floodproofing doors, windows, and other entrances or at-risk systems is only effective if the

floodproofing measure is properly applied or executed, leaving room for human error in the high-pressure environment of a flood disaster.

No flood protection project can ever reduce flood risk to zero. Even the most well-built levees and floodwalls carry a residual risk of failure or overtopping during large floods. Damages could be exacerbated by the failure of a structure, as flood waters pouring over or bursting through a barrier could have more energy, pressure, and debris load than a gradual inundation.

Risk to Life Safety

Projected flood depths during coastal flood events at the WQCP and pump stations are shallow—between 0.01 to 3.77 feet for a 0.2% annual exceedance probability event in 2073, using the USACE intermediate sea level rise curve for without-project conditions. Flood water velocities are not expected to exceed 1.0 feet per second in the WQCP area. These factors indicate lower risk to life safety as the waters are relatively shallow and slow moving. However, life safety was still a key factor in evaluating the alternatives, as plant operator safety needed to be evaluated and considered carefully, especially since many of the WQCP facilities are subterranean, so could be fully flooded in the future without project condition, and pose serious life threat to any plant operator who did not evacuate.

For the WQCP to function, it must have workers on site and able to go safely between buildings. In evaluating the non-structural alternative, buildings would be flood proofed, but floodwater would otherwise be ponding around them. One objective of this study is to avoid plant shutdowns and loss of wastewater treatment services during a coastal storm event. Given the need for workers to manage flows and levels of the treatment tanks, etc., human life/safety assurance was a key factor for evaluating the alternatives. The PDT evaluated the safety of the operating environment for the wastewater treatment plan for workers during a flood event, and non-structural measures such as operating safety standards were also be evaluated. This was important to include as even shallow water can knock someone off their feet if attempting to walk through it.

Environmental Risk Factors

Only minor uncertainty risks exist under environmental factors. Currently there is no compensatory mitigation for the project; however, during the state water quality certification process, mitigation may be required as a part of the permit conditions. Potential features may include a marsh migration zone, vegetation/tree plantings along the stream corridor, or methods of construction (best management practices). Prior to construction of the project, a qualified biologist will conduct endangered species surveys. Based on current knowledge of the environmental resources and potential impacts of the project, no further uncertainty is known.

Engineering Risk Factors

There is a small risk that fluvial could be more of a factor in the project flood risk than assumed. This could increase the flood risk beyond what the team formulated for. The assumption that fluvial flood influence is negligible was based on analysis of previous studies which showed tidal dominance in this area. The TSP is the largest of the plans analyzed, which mitigates this risk should it be realized.

There is also a risk that overland flooding could behave differently than modeled and threaten the WQCP where structural measures are not proposed. In order to mitigate this risk, the team performed additional H&H model refinement and ran unsteady downstream tidal events to increase confidence in model results.

Implementation Risk Factors

There is a risk that unanticipated buried utilities will need to be relocated, which could increase the cost and duration of construction. The team has reviewed existing information and conducted a comprehensive review of as-built drawings, and aligned the proposed floodwall to reduce/mitigate this risk.

There is a risk that outside factors, such as the price of materials, inflation, weather, and workforce availability could increase construction costs. The contingency for the cost estimate considered and included these risks, which should manage this risk to implementation.

3.6. TENTATIVELY SELECTED PLAN*

3.6.1. Tentatively Selected Plan Description

Alternative 2—the **North and South Floodwall Alternative** includes a 2,000-foot-long I-wall (sheetpile) floodwall, approximately 3 to 6.5 feet above grade at WQCP at the north side of the WQCP adjacent to the right-bank of Creek, as well as a second 700-foot-long approximately 2 to 4-foot-high floodwall south of plant adjacent to San Francisco Bay. The sheetpile flood walls will be topped with a concrete cap. The footprint of disturbance will be limited to four feet on either side of the wall centerline. At Pump Station 4, a perimeter sheetpile floodwall, approximately 2 to 4 feet above grade, would be constructed, with stop log gate for vehicular access and early warning system so that plant operators would know when to seal the stop log gate.

Alternative 2 meets the CSRM objectives of managing risk to human life and safety by managing the risk of the WQCP and Pump Station 4 flooding, up to an extreme tide elevation of 12.34 ft during a 0.2% AEP event with 50 years at the Intermediate SLR rate from the base year of 2023, with a wall crest elevation of 13.5 ft. Design will be finalized during Design and Implementation Phase. Design updates that remain within the authority and do not increase the total project cost more than ten percent do not require a post authorization change report. To allow for any future optimization without the need to reinitiate impact analysis through the National Environmental Policy Act, this EA presents a buffered range in wall height, up to 15.5 ft NAVD88. The TSP design includes a wall crest elevation of 13.5 ft, which prevents flooding through the low spots on the north side from the Colma Creek channel and through the low spots on the south side of the WQCP area. With the TSP in place, the WQCP is still susceptible to overland flow from the west, but this flooding was found to enter the WQCP area only at extreme tide elevations greater than 13 ft. This would allow plant operators to keep the plant operational and avoid emergency releases of raw sewage into Colma Creek and San Francisco Bay due to plant shutdowns. It would also manage the risk of coastal flooding causing raw sewage to back up into homes and streets if pump stations were to fail or the plant were to not be able to accept pumped sewage. Alternative 2 reduces economic damages that could occur annually by $774,843 and has annual net benefits of $340,612 and a benefit to cost ratio of 1.78. It improves resiliency to sea level rise for the project area region. The likely recommended plan also improves social justice by managing risk of impacts to human health and safety, as well as aesthetic impacts of raw sewage in socially disadvantaged communities.

Finally, Alternative 2 is relatively straightforward and simple to implement, with the majority of construction and staging occurring on WQCP property, limited excavation required, and low and mitigatable impacts to habitat and cultural resources. Because the sheetpile I-walls with concrete caps proposed for Alternatives 1 and 2 cannot be raised later, they are not inherently adaptable. While Alternative 1 is still vulnerable to 0.2% AEP events with 20-50 years at the Intermediate SLR rate from the base year of 2023, Alternative 2 manages risk including 0.2% annual chance events with 50 years at the Intermediate SLR rate from the base year of 2023. Alternative 1 is vulnerable to 10% AEP events with 50 years at the High SLR rate and 0.2% AEP events with 25 years at the High SLR rate, while

Alternative 2 is vulnerable only at 0.2% AEP events with 50 years at the High SLR rate. In this sense, Alternative 2 reduces the risk of needing future adaptation based on higher rates of future SLR, and is a more resilient plan. Because the additional cost for this added resiliency is not very high, the net benefits from the project increase with this added increment.

Alternative 2 is also implementable within the CAP cost limit and authority. Any future expansions of the SSF-SB WQCP should incorporate known flood risk into future facilities designs, elevating entry points above the maximum modeled flood depths, and reviewing flood maps as part of the design. Where practicable, elevating electrical systems and walkways for future expansions should also be considered. Proper drainage plan should also be implemented for future expansions to ensure water does not pond and travel across the plant, potentially inundating and damaging subterranean infrastructure.

3.7. IMPLEMENTATION

3.7.1. Agency Requirements

Project implementation requires approval of the DPR first and foremost. Following report approval, the project is eligible for design and implementation. The design and implementation phase of the project can begin after USACE approves the DPR and receives funding, and the non-federal sponsor approves a project agreement.

Once federal construction funds are appropriated, USACE and the non-federal sponsor would enter into a Project Partnership Agreement (PPA). This PPA would define the federal and non-federal responsibilities for implementing, operating, and maintaining the project.

Following the signing of the PPA and the design approval, USACE would officially request the sponsor to acquire the necessary real estate for project implementation. The advertisement of the construction contract(s) would follow the certification of the real estate acquisition and right-of-entry. The final acceptance and transfer of the project to the non-federal sponsor would follow the delivery of an operation and maintenance manual and as-built drawings. Assuming full funding, the first structural component of the TSP would be constructed by the year 2023.

3.7.2. Cost Share Requirements

Pursuant to Section 103, WRDA 1986, 33 USC 2213, the non-federal cost share for (i) structural flood risk management is at a minimum of 35 percent of total costs for the project, including 5 percent in cash, with LERRD value credited toward the sponsor's cost share, with the sponsor's total share capped at a maximum of 50 percent; and (ii) non-structural flood risk management is a flat 35 percent of total costs for project allocated to non-structural flood risk management, with LERRD value credited toward the sponsor's share. Subject to available appropriations, the sponsor's LERRD expenses will be reimbursed to the extent those expenses are creditable and exceed the sponsor's required cost share, pursuant to Section 103, WRDA 1986, 33 USC 2213. The tables in sections 3.7.2.1 through 3.7.2.4, on the following pages, describes the cost share provisions for the TSP.

Lower Colma Creek Cost Apportionment (Project First Cost)

Table 14. Cost Apportionment Table.

Account	Item	Federal Cost	Non-Federal Cost	Total Cost
Feasibility Costs				
0	Feasibility Costs	$585,000.00	$585,000.00	$1,170,000.00
Construction Costs				

01	Lands, Easements, Relocations, Right of Way and Disposal Sites	$0.00	$134,400.00	$134,400.00
11	Floodwalls	$6,260,800.000	$3,371,200.00	$9,632,000.00
06	Environmental Mitigation	$422,500.00	$227,500.00	$650,000.00
18	Cultural Mitigation	$97,500.00	$52,500.00	$150,000.00
30	Planning, Engineering and Design	$1,183,000.00	$637,000.00	$1,820,000.00
31	Construction Management	$544,050.00	$292,950.00	$837,000.00
	TOTAL	$9,092,850.00	$5,300,550.00	$15,603,000.00

The target implementation schedule is shown in Table 15 for the Lower Colma Creek Section 103 CAP project. This is the schedule to complete the Feasibility Phase, enter into the Design and Implementation Phase, and the tentative schedule to achieve the first construction contract for the project.

Table 15. Implementation Schedule

Milestone	Schedule	Executed Date
Feasibility Cost Sharing Agreement		November 2020
Tentatively Selected Plan (TSP) Milestone		March 31, 2022
Interagency & stakeholder meetings (USFWS, NMFS, BCDC, Water Board, USEPA, Colma Creek Citizens Advisory Committee)	March 2022	March 2022
Draft Detailed Project Report (DPR)	May 27, 2022	
ATR/Public/Policy & Legal Reviews of Draft DPR/EA	May 27, 2022 – July 8, 2022	
Public Meeting	June 2022	
DPR edits from reviews	July 9, 2022- January 15, 2023	
Complete and Submit Final Report	January 23, 2023	
Final Report Milestone / Approval	March 7, 2023	
Initiate D&I Phase	April 2023	
Execute PPA	Summer 2023	
Site Design Surveys – Initiate Design	Summer – Fall 2023	
Complete Plans and Specifications	Fall 2023	
Agency Reviews P&S through BCOES	Winter 2023	
First Construction Contract Award	End 2023	

3.7.3. Non-Federal Sponsor Responsibilities

Sponsor Support and Capability. The non-federal sponsor fully supports the TSP and submits a statement of self-certification of financial capability to accompany the final report package. They are willing and financially able to support the TSP moving forward through plans and specifications (P&S) and implementation. The sponsor has conducted significant construction efforts for the SSF - SB WQCP in the past, and has a dedicated funding stream to implement coastal storm damage reduction projects through the City's five year sewer rate plan approved by City Council in 2021. The sponsor has clear legal authority to conduct coastal storm risk management projects with federal partners. There is no locally preferred plan (LPP).

Implementation Schedule. USACE proposes that Alternative 2 would begin implementation shortly following approval of the detailed project report (DPR). This would signify implementation starts in FY24. Details provided in Table 16.

Sponsor Responsibilities. As part of the implementation of the selected plan, the City of SSF would acquire all necessary lands, easements, relocations, rights-of-way, and disposal areas (LERRDs) and seek crediting or reimbursement for those costs in excess of the required cost share.

In order to obtain work in kind credit, all work must be performed in accordance with federal, state, and local laws and regulation. Any regulated materials recovered as part of the abatement process would be disposed of in a certified landfill. To meet the CERCLA all appropriate inquiry standards, an updated Phase 1 Environmental Site Assessment (ESA) consistent with ASTM E1527 procedures must be completed within 6 months of construction contract award. The costs to perform the sampling and analyses and update to the Phase 1 ESA have been included in the final cost allocation tables. All costs associated with abatement and disposal of asbestos and lead containing material are 100% non-federal responsibility and are not included as project costs. Cost-share responsibilities are defined in Section 3.7.2 and 3.7.3.

Following DPR approval, this project would be eligible to enter into a PPA to advance the TSP from Feasibility phase into final design.

4. ENVIRONMENTAL EFFECTS OF TENTATIVELY SELECTED PLAN AND NO ACTION*

This section will identify potential environmental effects of the No Action alternative and TSP (Alternative 2). Alternatives 1 and 3 were considered but determined to not meet the purpose of the project, nor compare favorably to Alternative 2 in NED benefit analysis, and therefore were not reasonable alternatives that should be carried forward for full environmental consideration. Due to the various reasons presented in Section 3 above, all measures other than those included in the TSP were eliminated from in-depth environmental consideration. An impact will be considered significant if it has an adverse and unmitigable effect to any resource relative to the regulatory setting and existing conditions described in Section 2 above.

4.1. SURFACE WATERS

For the purposes of this analysis, an effect on water quality may be considered significant if an alternative would do any of the following:

- Substantially degrade water quality through long-term alteration of physical and chemical characteristics (i.e., temperature, salinity, pH, and dissolved oxygen);
- Substantially degrade water quality because of long-term increased turbidity;
- Violate any water quality standards; or
- Substantially degrade surface or groundwater water quality because of mobilization of contaminated sediments or release of hazardous materials.

4.1.1. TSP Effects

Construction of the floodwalls in the TSP could cause minor increases in sedimentation and bank erosion during clearing and grubbing, and sheetpile installation. Once the work is completed including seeding and replanting of disturbed areas, the TSP will have a long-term benefit of reducing flood hazard to the

WQCP. Figure 21 below shows the TSP alignment relative to jurisdictional waters in the project area. The wetland delineation was used to avoid impacts to Waters of the U.S.

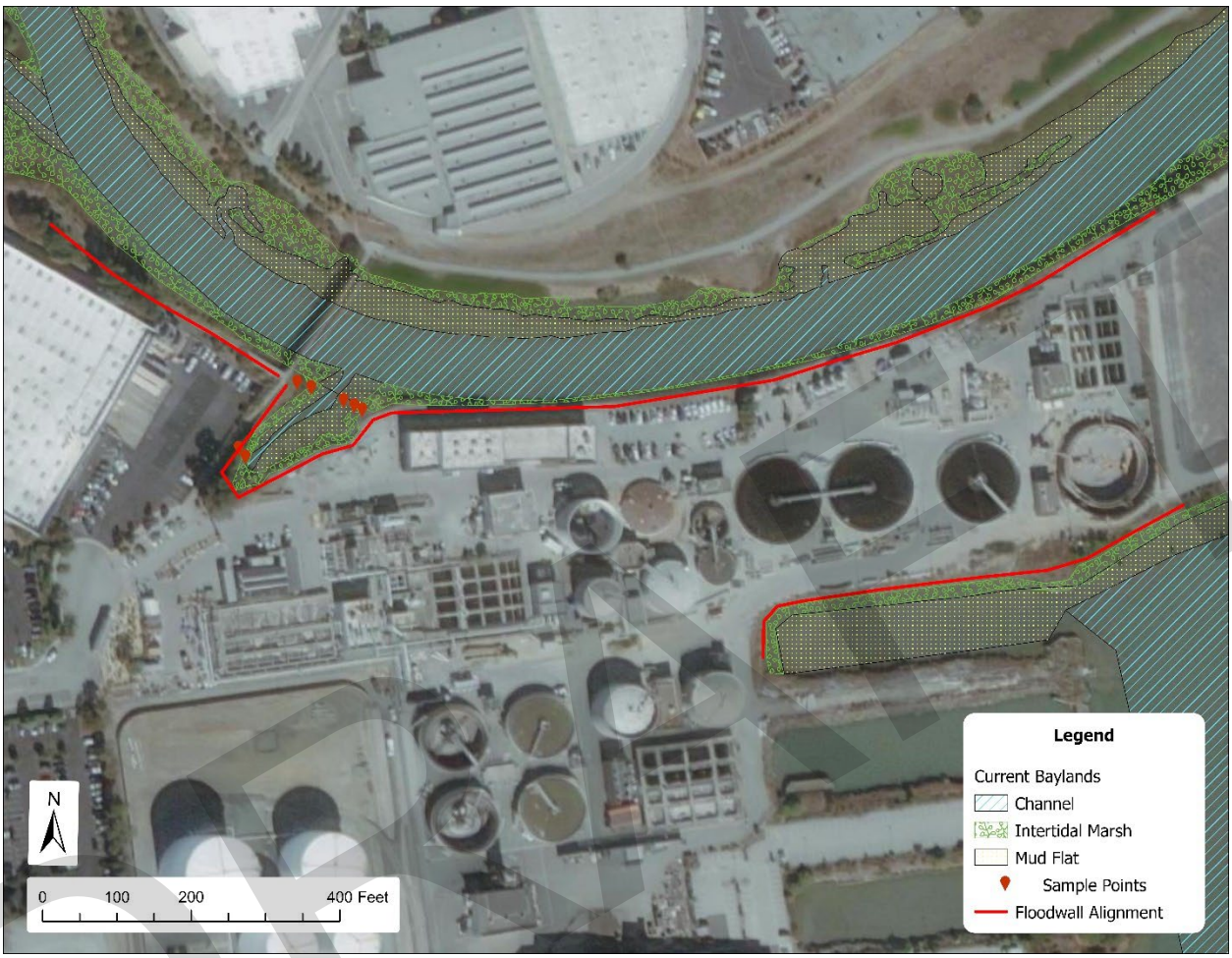

Figure 23. Floodwall alignment relative to jurisdictional waters.

The floodwall will manage flood risk for the WQCP for the duration of the study's economic period of analysis. The wall crest height of 13.5 NAVD88 will protect against a 0.2% ACE event with 50 years of sea level rise under the USACE Intermediate curve (Figure 22). For more information, see the hydrology, hydraulics and coastal Appendix F.

Figure 24. With-project floodwall alignments shown in red. Flood inundation resulting from a tidal event with maximum elevation of 12.65 ft, which exceeds the maximum elevation of 12.34 ft from a 0.2% ACE event with 50 years of intermediate sea level rise.

4.1.2. No Action Effects

The No Action Alternative would allow existing conditions to continue with negative impacts occurring during storm and high tide events. Releases of untreated wastewater associated with a flooded WQCP would have significant negative impacts on the water quality of Colma Creek and San Francisco Bay. These negative impacts would become increasingly worse with future sea level rise. Figure 23 shows the inundation that would result from a 0.2% ACE event following 50 years of sea level rise under the USACE Intermediate curve. Although flood depths are shallow at both the WQCP and pump station #4, damages are significant because of extensive below-grade infrastructure that is vulnerable to flood damages.

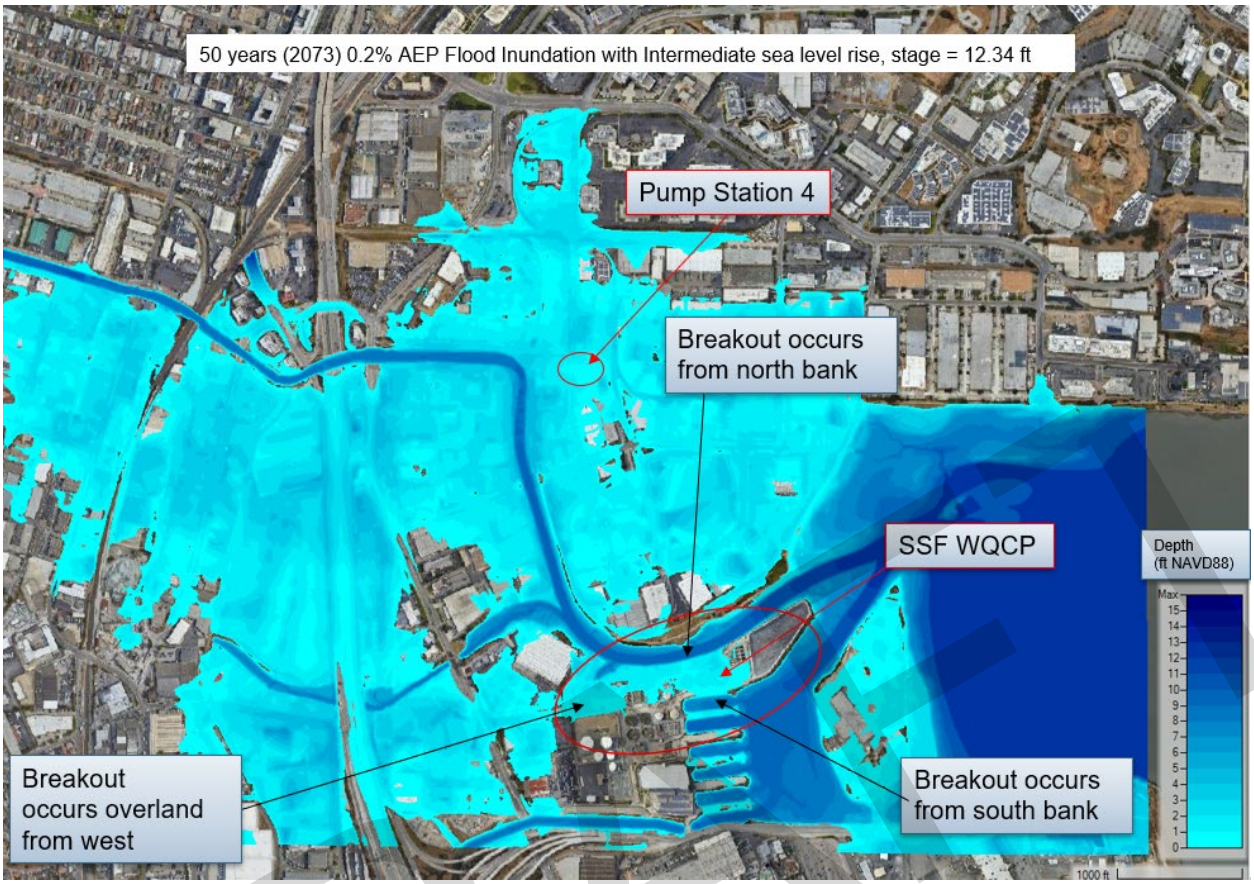

Figure 25. Flood inundation (no action) resulting from 0.2% AEP with 50 years of Intermediate sea level rise.

4.2. CLIMATE

4.2.1. TSP and No Action Effects

Carbon emissions would only be increased temporarily during the project from construction equipment emissions. Currently the BAAQMD and the Council on Environmental Quality do not have any thresholds established for determining if the greenhouse gases to be released would constitute a significant impact. However, these emissions would be very small in comparison to the total constant output of the surrounding urban area, such as San Francisco County, which has an output measured in millions of metric tons per year (UCB 2020). See Table 16. Greenhouse Gas Emissions Analysis Results. Table 16 for a summary of greenhouse gas emissions. Therefore, given this qualitative analysis, the TSP and the No Action Alternative would not have a measurable adverse effect on the local and/or global climate. Further detail about the TSP emissions is available in the Air Quality environmental effects Section 4.8.1. For the full analysis please see Appendix B, Environmental Analysis and Coordination, which includes GHG Analysis.

Table 16. Greenhouse Gas Emissions Analysis Results.

Total CO2eq (lbs/day)	9632.165
BAAQMD Daily GHG Threshold (CO2eq)	None
Project Exceeds BAAQMD Daily GHG Threshold?	**No**
Total Project CO2eq (Tons)	722.4124
Council on Environmental Quality Yearly GHG Threshold (CO2eq) (Tons)	None
Project Exceeds Council on Environmental Quality Yearly GHG Threshold?	**No**

4.3. SOILS AND GEOLOGY

4.3.1. TSP Effects

The TSP would construct floodwalls along parts of the WQCP perimeter. The impacts to soils from the floodwall would be minimal expect under its limited footprint. The floodwall would extend approximately 12 feet below the ground surface, and is expected to have minimal impacts on subsurface drainage.

4.3.2. No Action Effects

The No Action Alternative would maintain the existing conditions and therefore no minor benefits to the physiography would be realized

4.4. BIOLOGICAL RESOURCES

Based on the biological resources present or potentially occurring in the project area, for the purposes of this analysis, an effect may be considered significant if the alternative would do any of the following:

- have a substantial adverse effect, either directly or through habitat modifications, on any terrestrial or pelagic species;
- interfere substantially with the movement of resident or migratory fish or wildlife species;
- cause substantial adverse, long-term effects to the benthic community directly or through habitat loss; or
- harm populations of migratory birds through direct impact or impacts to their migration.

4.4.1. TSP Effects

The TSP has an impact area of approximately 21,500 ft² (0.5 acres). The vast majority of this is in ruderal grassland situated on artificial fill. The wall alignment has been shifted to minimize impacts to marsh

species. The vegetation within 4 feet of either side of the wall alignment will be cleared prior to construction, except in areas where this 4-foot buffer overlaps with tidal marsh vegetation.

To minimize impacts to biological resources, the project will include the following avoidance and minimization measures:

- Prior to construction, the project area will be surveyed by a qualified biologist for nesting birds. If active nests are found, the biologist will set up a 50 ft buffer until the nests are no longer active. If the nesting bird is a raptor, the biologist will set up a 250 ft buffer until the nest is no longer active.

4.4.2. No Action Effects

Under the No Action plan, existing habitat would not be impacted by construction activities. However, with sea level rise, tidal habitats would migrate upslope as much as possible within the limited margin available between the Bay and the developed area of the WQCP. The risk of untreated sewage discharge would increase over time with sea level rise, along with the corresponding risks of acute toxicity and harmful algal blooms to fish and wildlife adjacent to the plant area.

4.5. THREATENED AND ENDANGERED SPECIES

Based on the special status species and habitats present or potentially occurring in the action area for an alternative, for the purposes of this analysis, an effect may be considered significant if the alternative would do any of the following:

- have a substantial adverse effect, either directly or through habitat modifications, on any species listed as threatened or endangered under, or otherwise protected by, the ESA;
- alter or diminish critical habitat, EFH, or mudflats.

4.5.1. TSP Effects

The threatened and endangered species described above that fall under USFWS jurisdiction include California Ridgway's Rail, San Francisco garter snake, and Callippe silverspot butterfly. Because the nearest populations and areas of suitable habitat are located at least several miles away from the project, the project will not have an effect on these species.

The threatened species described above that fall under NOAA Fisheries jurisdiction include the CCC steelhead and southern DPS green sturgeon.

To minimize impacts to threatened CCC steelhead critical habitat, the project will include the following avoidance and minimization measures:

- Equipment is not allowed below the level of extreme high tide to minimize impacts to sensitive habitats.
- For any work below the level of extreme high tide, the work area shall be isolated at low tide to allow any fish present in the area to escape to areas with deeper water.

4.5.2. No Action Effects

Similar to section 4.4.2 above, the No Action plan would not impact existing habitat. However, with sea level rise, tidal habitats would migrate upslope as much as possible within the limited margin available between the Bay and the developed area of the WQCP. The risk of untreated sewage discharge would increase over time with sea level rise, along with the corresponding risks of acute toxicity and harmful algal blooms to threatened and endangered species present near the plant area.

4.6. AESTHETIC RESOURCES

This analysis of visual resources is based on qualitative evaluation of the extent and implications of changes to existing visual resources. Consideration was given to specific changes in the visual composition, character, and valued qualities of the affected environment. For the purposes of this analysis, an effect on aesthetics or scenic resources may be considered significant if the alternative would do any of the following:

- substantially damage scenic resources associated with a designated or eligible scenic highway;
- permanently block or disrupt existing public scenic views or reduce public opportunities to view scenic resources;
- substantially reduce the existing scenic quality from public viewpoints;
- conflict with applicable zoning and other regulations governing scenic quality; or
- create a new source of substantial light or glare which would adversely affect nighttime views in the area.

4.6.1. TSP Effects

There would be some aesthetic impacts associated with 3 to 6.5 ft tall wall along the TSP alignment, but as the entire study area is already developed and industrialized the overall nature of the viewshed would not change.

4.6.2. No Action Effects

With the No Action plan, there would be no immediate impacts to recreational, scenic and aesthetic resources. With future sea level rise, the Bay Trail could be vulnerable to closures during storm events. While the aesthetic resources will not immediately change without implementation of the TSP, the potential for future untreated wastewater releases could negatively impact both resources in the study area.

4.7. RECREATION

Effects to recreational facilities were evaluated by considering the potential for construction methods and equipment, and the nature of project operation, associated with each alternative to modify or alter the nearby recreational resources described in detail in section 2.6. For the purposes of this analysis, an effect on recreational resources may be considered significant if it would:

- result in a permanent, substantial decrease or loss of public access to any waterway or public recreational land;
- create an additional demand for recreational facilities that is beyond their capacity; or
- increase the use of recreational facilities to such a degree that substantial physical deterioration would occur.

4.7.1. TSP Effects

The nearest recreational facility is the Bay Trail that goes through the future TSP alignment. The TSP was designed to avoid impacts to the Bay Trail as much as possible. During construction, the Bay Trail may be closed at times when work is occurring immediately adjacent to the trail alignment, but access to the pedestrian bridge will be maintained.

4.7.2. No Action Effects

With the No Action plan, there would be no immediate impacts to recreational, scenic and aesthetic resources. With future sea level rise, the Bay Trail could be vulnerable to closures during storm events.

While recreation will not immediately change without implementation of the TSP, the potential for future untreated wastewater releases could negatively impact both resources in the study area.

4.8. CULTURAL RESOURCES

The methodology used for identifying historic properties and cultural resources in the study area includes review and development of environmental, precontact, ethnographic, and historical contexts associated with the project area's cultural resources as well as meaningful consultation with Tribes. The regulatory setting summarized in the existing conditions section provides an overview on how historic significance and integrity is determined when evaluating archaeological and historic built-environment resources as a historic property eligible for listing on the National Register of Historic Places. The information was also used to provide an initial assessment of discovering unanticipated archaeological resources for certain ground disturbing activities before archaeological testing can be conducted.

4.8.1. TSP Effects

An effect to a cultural resource would be considered significant if it rose to the level of an adverse effect, as defined under Section 106 of the NHPA. Section 106 outlines the process in which federal agencies are required to determine the effects of their undertakings on historic properties. Analysis of the potential impacts was based on evaluation of the changes to the existing historic properties that would result from implementation of the project. In making a determination of the effects to historic properties, consideration was given to: specific changes in the characteristics of historic properties in the study area; the temporary or permanent nature of changes to historic properties; the introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's historical features; and the existing integrity considerations of historic properties in the study area and how the integrity was related to the specific criterion that makes a historic property eligible for listing in the National Register.

The threshold also applies to any cultural resource that has not yet been evaluated for its eligibility to the National Register or if the proposed action disturbs a traditional cultural property. Analysis of potential impacts to cultural resources may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment by introducing visual or audible elements that are out of character for the period the resource represents, or neglecting the resource to the extent that it deteriorates or is destroyed. Analysis considers both direct and indirect impacts.

Direct impacts refer to the causality of the effect to historic properties. This means that if the effect comes from the undertaking at the same time and place with no intervening cause, it is considered "direct" regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.). Indirect impacts to historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. Any adverse effects on historic properties are significant. Effects are adverse if they alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the National Register so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

Impacts are expected only for precontact archaeological sites being exposed or disturbed from ground disturbing work. Under Alternatives 1 and Alternative 2, ground disturbance and excavation based on the footprint of the floodwalls would potentially impact site CA-SMA-45 depending on its confirmed location and depth within the footprint of the floodwall. Impacts to the site will be better understood after subsurface testing determines the absence or presence of CA-SMA-45 at certain depths along the Lower Colma Creek banks.

USACE will minimize impacts to the site during construction by having archaeological and tribal monitors present for any ground disturbing work during construction of the TSP's floodwalls along Lower Colma Creek. In the event that an adverse effect is identified to a historic property previously identified or discovered during ground disturbing work, a legally binding Memorandum of Agreement will be developed following the regulations set forth in 36 C.F.R. § 800.6. The document will determine mitigation measures and be developed in consultation between the USACE, SHPO, the City of South San Francisco, and affiliated Tribes before implementation. Mitigation measures will address efforts for the TSP to avoid, minimize, or mitigate impacts for a cultural resource. Mitigation measures may include recordation of cultural deposits uncovered during ground disturbance to contribute to the archaeological record, as well as reburying of recorded cultural material in coordination with all consulting parties involved in the Section 106 process.

In the event that ground disturbance uncovers human remains, all work must be halted in the vicinity of the discovery until a qualified archaeologist and USACE official can visit the site of discovery and determine whether Health and Safety Code § 7050.5, State CEQA Guidelines 15064.5(e), and PRC § 5097.98 should be followed. These state mandates have processes to follow in the accidental discovery of any human remains in a location other than a dedicated cemetery.

In accordance with PRC § 5097.98, the San Mateo County Coroner must be notified within 24 hours of the discovery of potentially human remains. The Coroner must then determine within 2 working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she must contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with PRC § 5097.98. The NAHC then designates an affiliated Tribe to be the Most Likely Descendant (MLD) with respect to the human remains within 48 hours of notification. The MLD will then have the opportunity to recommend to the project and landowners means for treating or disposing, with appropriate dignity, the human remains and associated grave goods within 24 hours of notification.

4.8.2. No Action Effects

Under the No Action Alternative, ground disturbance and excavation would not occur. In accordance with Section 106 of the NHPA, archaeological sites would not be adversely affected under the No Action Alternative and would be left undisturbed from the development of the floodwalls. Natural forces in the future, such as erosion of the creekbanks, would potentially expose cultural deposits or be washed away by fluvial processes.

4.9. AIR QUALITY

For the purposes of this analysis, an effect on air quality may be considered significant if the alternative would:

- Substantially contribute to air quality degradation or conflict with a State Implementation Plan to achieve National Ambient Air Quality Standards; or
- Generate substantial amounts of uncontrolled fugitive dust.

4.9.1. TSP Effects

Based on the Federal and regional emissions thresholds established by EPA and BAAQMD using the NAAQS and CAAQS, an emissions inventory and air quality analysis was performed using the steps below to ensure that project emissions would not exceed these thresholds.

Step 1 (Emissions Inventory)

Calculate the total emissions across all of the construction equipment for each day for each criteria air pollutant, to calculate the daily emissions expected. For this step emissions factor data will be needed, such as those available through the South Coast Air Quality Management District (SCAQMD 2021a, SCAQMD 2021b, SCAQMD 2021c).

Step 2 (Emissions Inventory)

Sum the results of step one for each criteria air pollutant and multiply by the number of working days over the total construction schedule for each calendar year and convert to tons to calculate the total emissions expected to be released for the project, to calculate the yearly emissions expected.

Step 3 (Air Quality Analysis)

Compare the results of step one and two with the applicable threshold from the EPA, CARB, and/or BAAQMD to ensure project emissions are below the thresholds for each individual criteria air pollutant.

The results of the air quality analysis for the proposed TSP action alternative are presented below in Table 17. For the full emissions inventory please see Appendix B. Based on this process for the emissions inventory and air quality analysis, it was determined that the emissions associated with the TSP alternative are below applicable Federal and BAAQMD thresholds, and thus, the project would not cause an impact to air quality. For the full air quality analysis please see Appendix B.

Table 17. Air Quality Analysis Results for the TSP Alternative.

	ROG	CO	NOx	SOx	PM10	PM2.5
Peak Daily Emissions (lbs/day)	2.851	23.829	18.113	0.050	0.775	0.679
BAAQMD Thresholds of Significance (Construction)(lbs/day)	54.000	None	54.000	None	82.000	54.000
Project Emissions Exceed BAAQMD Threshold?	**No**	**No**	**No**	**No**	**No**	**No**
Total Project Emissions (Tons)	0.214	1.787	1.359	0.004	0.058	0.051
EPA NAAQS Yearly Significance Thresholds (Tons)	100	100	100	100	100	100
Project Emissions Exceed Federal Yearly Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

Since air pollutant emissions are a function of population and human activity, emission reduction strategies set forth in the Bay Area 2010 Clean Air Plan were developed based on regional population, employment, and housing projections. The proposed project would not facilitate an increase in population in the air basin nor would it generate housing or substantial employment opportunities leading to increased population or vehicle miles travelled in the region. As such, the assumptions contained within the Bay Area 2010 Clean Air Plan would not change based on the proposed project.

4.9.2. No Action Effects

No effects to air quality are anticipated based on the no action alternative.

4.10. NOISE

For the purposes of this analysis, an effect on noise may be considered significant if an alternative would:

- exceed FTA construction noise guidelines criteria of 90 dBA during daytime hours or 80 dBA during nighttime hours at residential receptors, or 100 dBA during any hour at other receptors.

4.10.1. TSP Effects

The nearest sensitive noise receptor to the proposed construction area is the residential area on the west side of U.S. 101, approximately 3,500 feet to the west and southwest. At this distance, noise from the

loudest activity (vibratory pile driving) would be reduced to 59 dBA (calculated using FTA formula for simplified assessment and not considering the additional attenuation that would be provided by intervening buildings), which would be below the typical ambient noise level for these receptors which currently experience a long-term CNEL of 73.1 from aircraft operations of San Francisco International Airport (SFIA, 2007) as well as additional contributions from vehicle traffic on U.S. 101 and Interstate 380. Because of the high levels of background noise and lack of sensitive receptors adjacent to the project area, the TSP's impact on noise is considered less than significant.

4.10.2. No Action Effects

Under the No Action plan, there will be no change in noise effects to sensitive receptors in the project area.

4.11. TRANSPORTATION

For the purposes of this analysis, an effect on land-based transportation may be considered significant if the alternative would do any of the following:

- substantially impact vehicular traffic circulation by causing South Airport Boulevard to have a worse LOS rating than D;
- substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access; or
- Eliminate or substantially inhibit public transit, bicycle, or pedestrian circulation.

4.11.1. TSP Effects

With implementation of the TSP, construction works and equipment would access the site via Highway 101, South Airport Boulevard, and Belle Air Road. According to the City of South San Francisco General Plan, South Airport Boulevard has a daily vehicle capacity of 40,000, and existing volume of 22,000 (current LOS rating of B). To maintain an LOS rating of D or better, the volume divided by capacity has to be less than 0.9. This means that the traffic volume cannot go above 36,000 vehicles per day. The TSP will result in far fewer than 14,000 trips per day (by several orders of magnitude), and so the effect will be less than significant. Figure 26 below shows the haul route entering the main project area from Belle Air Road.

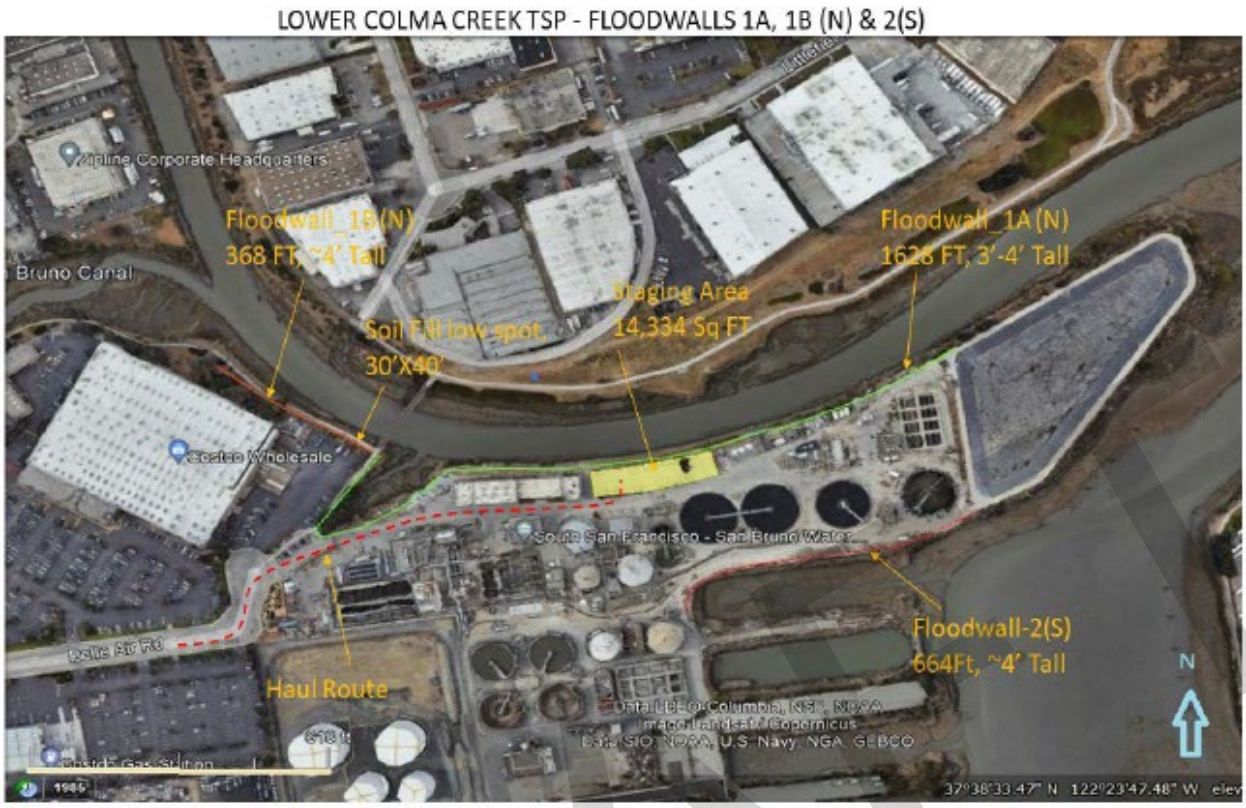

Figure 26. Haul Route shown with TSP alignment.

4.11.2. No Action Effects

Under the No Action plan, there will be no effect to transportation and vehicle circulation patterns. In the event of flooding and WQCP shutdown, there would likely be an increase in traffic associated with site cleanup after the event.

4.12. HAZARDOUS AND TOXIC SUBSTANCES

An alternative's potential effects related to HTRW would be considered significant if the alternative would:

- Create a significant hazard to the public or the environment through the transport, use, or disposal of substantial amounts of hazardous materials or wastes.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

4.12.1. TSP Effects

The TSP would have no effect on identified HTRW sites in the project area. The nearest identified site, which is the LUST cleanup site at pump station #4, has been remediated and closed. Furthermore, the footprint of the ring wall at pump station #4 does not overlap with the cleanup footprint.

4.12.2. No Action Effects

Under the No Action plan, there will be no effect to listed HTRW sites in the project area. However, with increased sea level rise and associated increased flood risk, there will be greater potential for releases of chemicals and raw sewage in the case of WQCP inundation and shutdown.

4.13. SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

To add more specificity to the significance criteria outlined in the beginning of Section 4, the effects of a project alternative would be considered significant if the alternative would have substantial adverse human health or environmental resource impacts that would disproportionately harm low-income or minority communities. According to the BCDC community vulnerability database referenced in Section 2.12 above, there are at least 15,000 people in the high and highest social vulnerability categories who live within a mile of the WQCP and pump station 4.

4.13.1. TSP Effects

The TSP would cause some minor adverse effects from increased emissions during construction, but these would be limited to a relatively short time period and minor in comparison to the emissions from the surrounding area. The TSP would have significant beneficial effects by increasing the flood resiliency of critical infrastructure that serves economically disadvantaged and socially vulnerable communities.

4.13.2. No Action Effects

Under the No Action plan, flood risk would continue to increase with sea level rise as described in earlier sections of this document. As sea level and the risk of increasingly intense storms both rise, the chances that the WQCP will get inundated and shut down will correspondingly increase. This would have a major impact on people in the area because of the potential for raw sewage to flow back into homes. Figure 8 above shows that the area serviced by pump station 4 has a significant population in the highest social vulnerability category. If the pump station and/or WQCP shut down, these people would be affected disproportionately, as they may not have the resources to find other housing following a disaster. Because of this, the No Action plan has a significant and adverse impact on socially vulnerable communities in the project area.

4.14. CUMULATIVE EFFECTS

4.14.1. Past and Present Actions

Based on the WQCP's past actions and community's current needs, this critical infrastructure will continue to operate as it has for the past several decades. The WQCP will soon finish its recent round of capital improvement projects and continue discharging treated wastewater to the Bay. Colma Creek itself is currently a degraded (in terms of habitat) flood control channel. Clearing of the invasive *Spartina* from the area has removed endangered CA Ridgway's rail habitat, but as the native *Spartina* species returns, the rails may return as well.

4.14.2. Reasonably Foreseeable Future Actions

Implementing this project will allow the WQCP to continue operating well into the future as sea level rises. Other regional climate adaptation projects, likely under the direction of One Shoreline, will be implemented with a focus on providing community-oriented benefits like recreation and habitat restoration while still improving flood resiliency. These projects are described in greater detail in Section 3.3.3 above. While these projects are still not defined well enough to be incorporated into the future without project conditions in any specific way, there is no inherent conflict between them and the TSP. With the combination of safe and resilient infrastructure (improved as a result of the TSP), habitat restoration and recreation improvements, it is anticipated that the overall quality of the human environment in this area will improve in the coming years, despite climate change and sea level rise.

4.14.3. Combined Effects on Resources

When combined with other actions of the past, present, and future and considering the uncertainty of the effects of future population and development growth, the sturdy area would likely be incrementally improved with the combined effects of the project.

5. AVOIDANCE, MINIMIZATION AND MITIGATION OF ADVERSE EFFECTS*

Table 18 lists the avoidance and minimization measures that will be incorporated into project implementation.

Table 18. Avoidance and Minimization Measures to be incorporated into project implementation.

Resource	Measure
Biological Resources	Prior to construction, the project area will be surveyed by a qualified biologist for nesting birds. If active nests are found, the biologist will set up a 50 ft buffer until the nests are no longer active. If the nesting bird is a raptor, the biologist will set up a 250 ft buffer until the nest is no longer active.
Threatened and Endangered Species	Equipment is not allowed below the level of extreme high tide to minimize impacts to sensitive habitats.
Threatened and Endangered Species	For any work below the level of extreme high tide, the work area shall be isolated at low tide to allow any fish present in the area to escape to areas with deeper water.
Recreation	Limit trail closures during project construction to the maximum extent practicable. Maintain access to the pedestrian bridge during construction.
Cultural Resources	Perform subsurface testing and archaeological and tribal monitors present during any ground disturbing work.

6. IMPLEMENTATION REQUIREMENTS

6.1. PROJECT PARTNERSHIP AGREEMENT

The local sponsor supports the selected plan for the Lower Colma Creek CAP 103 project. The San Francisco District anticipates working with the South Pacific Division Office of Counsel to utilize a model project partnership agreement for the project design and implementation phase. Project partnership agreement negotiations would follow the approval of the final detailed project report (i.e. the Final Report Approval milestone).

6.2. LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS AND DISPOSAL AREAS (LERRD)

Land, Easements, Rights-of-Way, Relocation, and Disposal Areas (LERRDs): There are no impacted utilities/facilities that require relocation identified at this time. Lands include the WQCP and Pump Station #4 facilities. The real estate cost estimate for the TSP was developed in accordance with ER 405-1-12 and based upon footprints delineating project requirements developed for feasibility level design by the San Francisco District Engineering Division. The two variations for structural alternatives (Alternative 1 and Alternative 2) were reviewed for LERRDs requirements and include the types of acquisition as follows:

- An estimated 0.33 acre is required for staging.
- An estimated 0.27 acre is required for construction.

The non-federal sponsor will acquire the minimum interests in real estate to support the construction and subsequent operation and maintenance of the future USACE project. USACE Real Estate Division anticipates Perpetual and Temporary Easement acquisition will be required.

Once the project partnership agreement (PPA) process is complete, the San Francisco District Engineering Division will prepare the final design for advertisement and construction. During this process the tract register, and tract maps will be updated to reflect any modifications to include final staging areas, access requirements, construction haul routes, and recreation features. This information will be used for review of future crediting purposes.

6.3. OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION

Site-specific preliminary estimates of Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) requirements were developed for the TSP by PDT members from cost estimating, design, and planning and are incorporated in the analysis. The OMRR&R of this project will be at 100% non-federal expense, however USACE will perform inspections. The Inspection of Completed Works (ICW) program is an Operations and Maintenance program that provides for USACE inspections of federally constructed flood risk management projects. A draft OMRR&R manual will be developed preceding a project's final design state and used by the counties and the USACE to ensure that the project is maintained to USACE standards. Annual and periodic 5-year ICW inspections will be performed for the Lower Colma Creek Project which will be based on the O&M manual requirements and current USACE maintenance standards. The OMRR&R manual will provide a detailed description of the management activities for the floodwall, channel, vegetation, sediment, debris, bank erosion, concrete surfaces, and other activities to provide the design flood risk management of the TSP. If the project is required to provide compensatory mitigation for unavoidable impacts, a mitigation and monitoring plan will be prepared prior to release of the draft report. Requirements vary by the type of measure being implemented at the site. Based on these requirements and site-specific considerations such as size and location, costs were developed for each site as provided by line item in the Economic Appendix and description of the TSPs within the detailed project report.

These preliminary estimates reflect price scheduling available from prior projects, indexed where necessary.

6.4. REGULATORY REQUIREMENTS*

6.4.1. Clean Water Act

Impacts to wetlands associated with flood control measures were evaluated for compliance with Section 404 of the Clean Water Act administered by USACE. The boundary of jurisdictional waters was used to avoid impacts, and therefore a 404(b)(1) evaluation has not been conducted. Section 401 Water Quality Certification is granted in the project area by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), but if there is no 404 discharge of fill, a 401 certification is not required. An analysis of impacts to jurisdictional waters can be found in Appendix B.

Best Management Practices would be implemented during construction to address erosion and sediment control as work will be performed adjacent to the Bay. The construction contractor will be required to get a Construction General Permit and implement a Stormwater Pollution Prevention Plan. If project plans changed and work was required below the ordinary high watermark or within wetlands, then applicable permitting and analysis would be completed prior to construction.

6.4.2. Fish and Wildlife Coordination Act

The USFWS assisted the PDT by providing a Coordination Act Report (CAR) under the Fish and Wildlife Coordination Act. The CAR was generally supportive of the project and can be found in Appendix B.

6.4.3. Endangered Species Act

The PDT has assessed the project impacts to species listed under the ESA and their designated critical habitat and has found that the project is either not likely to adversely affect or will have no effect on any of these species or habitats. This will be documented through informal consultation with USFWS and NMFS. A draft biological assessment can be found in Appendix B.

6.4.4. Coastal Zone Management Act

The PDT has assessed the project's consistency with the applicable and enforceable policies of the Bay Plan. This Consistency Determination is provided as a part of Appendix B and will be submitted to BCDC prior to release of the Final EA/DPR.

6.4.5. National Historic Preservation Act

The PDT is continuing consultation with Tribes, SHPO, and the public as required under Section 106 of the National Historic Preservation Act. SHPO agreed to be a NEPA cooperating agency for this study, and the Ohlone Indian Tribe is consulting on a subsurface testing strategy at site CA-SMA-45.

7. PUBLIC AND STAKEHOLDER INVOLVEMENT*

7.1. PUBLIC INVOLVEMENT

This section will be updated with a summary of public comments following review of the draft report.

7.2. STAKEHOLDER AND AGENCY COORDINATION

7.2.1. Federal Agencies

EPA

The USEPA has agreed to be a NEPA cooperating agency for this study. They are assisting with NEPA review and provided some input in a coordination meeting with the PDT. They have generally been supportive of the project.

US Fish and Wildlife Service

The USFWS has primarily been involved in the project through the process of writing the CAR. They have attended coordination meetings, site visits, and provided input about the project's impacts to ESA listed species.

NOAA Fisheries

NOAA Fisheries has agreed to be a NEPA cooperating agency for this study. They have attended coordination meetings, site visits, and provided input about the project's impacts to ESA listed species and EFH.

7.2.2. State Agencies

BCDC

BCDC staff have attended coordination meetings and provided input to the project relative to their jurisdiction. Their primary concern has been that the project evaluates whether or not it is providing maximum feasible public access in the project area.

SFBRWQCB

SFBRWQCB staff have attended coordination meetings and provided input to the project relative to their jurisdiction. They have advised the PDT on the potential for required compensatory mitigation if the project results in fill in Waters of the U.S.

7.2.3. Local Agencies

The PDT has been coordinating with One Shoreline regarding their projects in the vicinity of the study area. There have been no fundamental conflicts identified, but One Shoreline has expressed a concern that the wall crest elevation is lower than they have typically been using on other projects in the area.

7.2.4. Non-Governmental Organizations

The team met with the Colma Creek Citizen Advisory Committee on March 8, 2022 and presented information about the study and proposed alternatives and scope. Historical society consultation letters were sent out on March 8, 2022.

7.2.5. Native American Tribes

The team has initiated consultation with six Native American Tribes.

Tribes and Section 106 Tribal Consulting Parties

- The Ohlone Indian Tribe (consultation ongoing and occurred early on in April 2021)
- The Amah Mutsun Tribal Band of Mission San Juan Bautista
- The Costanoan Rumsen Carmel Tribe
- Indian Canyon Mutsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- Rumsen A:ma Tur:ataj Ohlone

Tribes were invited to an interagency meeting held on January 10, 2022 but did not attend. The team consulted with the Ohlone Indian Tribe by phone in February 2022. Formal Section 106 tribal consultation letters were sent out on March 8, 2022. A response was received from the Ohlone Indian Tribe requesting subsurface testing be completed to determine the location of CA-SMA-45 and recommending the presence of tribal monitors during future fieldwork and potentially during construction. No other responses from tribes have been received to date. Subsurface testing to identify the presence or absence of CA-SMA-45 will be completed before the project is implemented. Tribal monitors will be employed for ground disturbance work associated with this project. The cost to do this has been included in the project cost estimate.

7.3. Finding Of No Significant Impact

A draft finding of no significant impact will be included as Appendix A to this document.

8. RECOMMENDATION*

I recommend that the selected plan, which maximize net economic benefits and comprehensive benefits, described in this report for coastal storm risk management at the SSF - SB WQCP and associated pump station 4 in the City of South San Francisco, California, be authorized for implementation. The proposed project consists of one structural measure combined with two nonstructural measures. The project will provide significant reductions to the risks of future flooding in the watershed at a presently estimated fully funded total project cost of $13,855,000; provided that, except as otherwise stated in these recommendations, the exact amount of non-federal contributions shall be determined by the Chief of Engineers following policies satisfactory to the President and the United States Congress prior to project implementation, in accordance with the following requirements to which non-federal interest must agree prior to implementation:

1) Pursuant to Section 103, WRDA 1986, 33 USC 2213, the non-federal sponsor will provide a minimum of 35 percent, but not to exceed 50 percent of total flood damage reduction costs for structural measures as further specified below:
   a) Provide the required non-Federal share of design costs allocated by the Government to flood damage reduction in accordance with the terms of a design agreement entered into prior to commencement of design work for the flood damage reduction features;
   b) Provide, during the first year of construction, any additional funds necessary to pay the full non-federal share of design costs allocated by the Government to flood damage reduction;
   c) Provide, during construction, a contribution of funds equal to 5 percent of total flood damage reduction costs;
   d) Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the flood damage reduction features;
   e) Provide, during construction, any additional funds necessary to make its total contribution for flood damage reduction equal to at least 35 percent of total flood damage reduction costs;
2) Pursuant to Section 103, WRDA 1986, 33 USC 2213, the non-Federal cost share for non-structural flood risk management is a flat 35 percent of total costs for project allocated to non-structural flood risk management, with LERRD value credited toward the sponsor's share.
3) Shall not use funds from other federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;
4) Provide all LERRDs determined by the Government to be necessary for the construction, operation, and maintenance of the project;
5) The Non-Federal Sponsor will also conduct the demolition/removal of the structures and perform this work to be cost shared via in-kind crediting. The Non-Federal Sponsor will coordinate demolition/removal with LRN Construction office, proper permitting, contract approvals will be obtained.
6) Per ER 1105-2-100, E-85, the sponsor will be required to eliminate all existing lands uses associated with the residential structures in the buyout plan. This also signifies the elimination of all previous services to those areas previously held in residential property. The sponsor will be required to maintain these properties as open space.

7) For so long as the project remains authorized operate, maintain, repair, replace, and rehabilitate (OMRR&R) the completed project, or functional portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government.
8) Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon land which the non-Federal sponsor, now or hereafter, owns or controls access to the project for the purpose of inspection, and if necessary after failure to perform by the Non-Federal Sponsor, for the purpose of completing OMRR&R on the project. No completion of OMRR&R by the Federal Government shall operate to relieve the Non-Federal Sponsor of responsibility to meet the Non-Federal Sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance.
9) Hold and save the United State free from all damages arising from the construction, OMRR&R of the project and any project related betterments, except for damages due to the fault or negligence of the United State and its contractors.
10) Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under LERRDs that the Federal Government determines to be required for the construction and OMRR&R of the project.
11) Assume complete financial responsibility, as between the Federal Government and the Non-Federal Sponsor, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under LERRDs the Federal Government determines to be required for construction and OMRR&R of the project.
12) As between the Federal Government and the Non-Federal Sponsor, the Non-Federal Sponsor shall be considered the operator of the project for the purpose of CERCLA liability. The sponsor will OMRR&R the project in a manner that will not cause liability to arise under CERCLA.
13) Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring LERRDs for construction and OMRR&R of the project, and inform all affected persons of applicable benefits, policies, and procedures, in connection with said Act.
14) Participate in and comply with applicable Federal floodplain management and flood insurance programs in accordance with section 402 of Public Law 99-662 and Executive Order 11988.
15) Not less than once each year, inform affected interests of the limitations of the protection afforded by the project;
16) Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.
17) In addition to these specific actions, Metro Nashville will be required by ER 1105-2-100, appendix F-11 to uphold the requirements for partnership for the design and implementation phase, signified by the project partnership agreement.
18) Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C.1962d-5b), and Section 103(j) of the WRDA of 1986, Public Law 99-662, as amended (33 U.S.C.2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has

entered into a written agreement to furnish its required cooperation for the project or separable element.

The recommendations contained herein reflect information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program nor the perspective of higher levels within the Executive Branch. Consequently, the recommendations may be modified before they are approved for implementation.

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