# 23. SOUTH SAN FRANCISCO - SAN BRUNO WATER QUALITY CONTROL PLANT

City of South San Francisco
City of San Bruno

## VULNERABILITY SUMMARY

The South San Francisco San Bruno Water Quality Control Plant (WQCP) is a critical asset that is **highly vulnerable** to sea level rise. The site is vulnerable (exposed) at three spots along the shoreline, which could cause flooding of the Plant's power distribution, its most essential and sensitive component. A loss of power would cause the plant to shut down completely, and saltwater intrusion could result in unsanitary discharges. Adaptive capacity is low; there is no other plant to treat the wastewater in this area, and backup power is vulnerable to flooding. Total loss of service would damage the plant, and result in sewage backups or overflow.

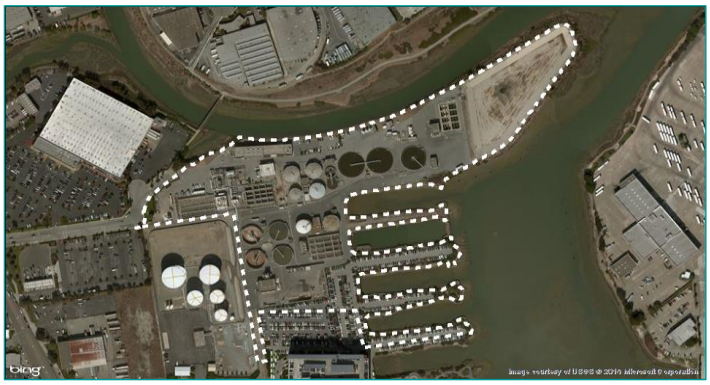
| *SENSITIVITY* | *EXPOSURE* | *ADAPTIVE CAPACITY* | *CONSEQUENCES* |
|---|---|---|---|
| *High* | *High* | *Low* | *High* |

## ASSET CHARACTERISTICS

195 Belle Aire Rd | South San Francisco

### Asset Description and Function:

The WQCP treats wastewater (influent) for approximately 100,000 people in South San Francisco, San Bruno, Colma, and part of Daly City. The plant also dechlorinates treated effluent for Millbrae, Burlingame, and San Francisco International Airport. The major treatment processes include screening, grit removal, primary and secondary treatment, and dechlorination. Treated water (effluent) is conveyed to San Francisco Bay via a deepwater outfall.



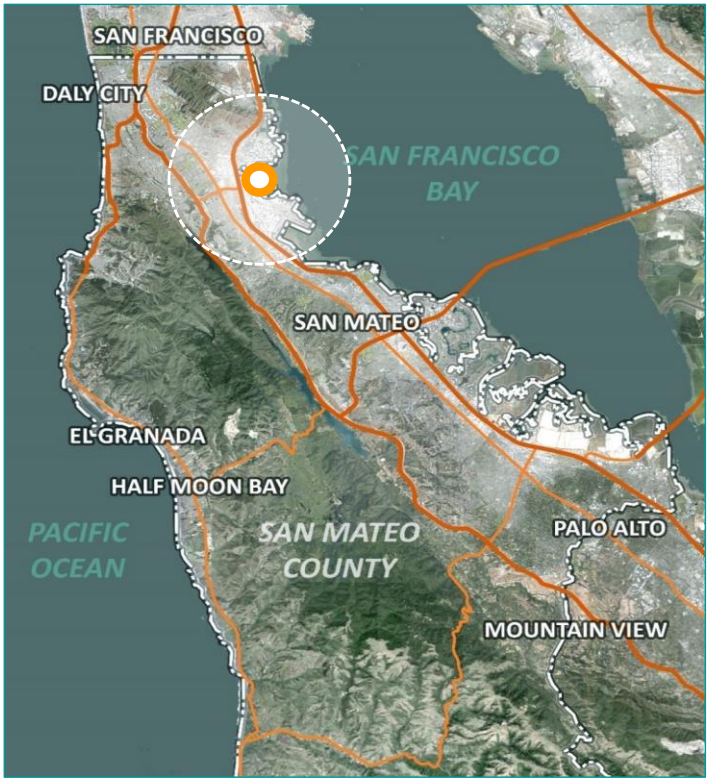
| | |
|---|---|
| **Asset Type** | Wastewater Treatment Plant |
| **Asset Risk Class** | 3 |
| **Size** | 21 acres |
| **Year of Construction** | 1950 |
| **Elevation** | 11 feet |
| **Level of Use (Dry Weather)** | 7.5 million gallons/day |
| **Annual O&M Cost** | $20,500,000 |
| **Special Flood Hazard Area** | Asset is in SFHA |
| **Physical Condition** | Fair |
| **Landowner** | City of South San Francisco |

### Underground Facilities

Power conduits, portions of grit removal, sump pump, power transmission system (wire and cables rated for waterlogged conditions).

### Environmental Considerations

The area near the site provides a habitat corridor that includes sand beaches, eelgrass, oyster beds, macroalgal beds, mudflats, rocky intertidal areas, and tidal marsh. The area is also an important avian stopover site as well as a spawning site for Pacific herring.



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## ASSET SENSITIVITY

The WQCP is very sensitive to inundation and high water. The power distribution system is the WQCP's most critical component. If flooded, the WQCP's main and backup power would be lost. A loss of power would cause the plant to shut down completely. Other sensitive components include the pumps, which are subterranean by design and would not work if inundated. Because off-site sanitary sewer pump stations (pump stations), which are part of the collection system, will still pump and convey water to the WQCP, both of these outages would result in on-site flooding or wastewater backup, which would lead to a spillover at the main control building and a loss of service.

In addition, a nearshore bypass line that can be used during extreme storm events to discharge fully treated effluent to Colma Creek is very sensitive to high water. If water levels become higher than the weir, creek water can cause backflow into the WQCP, affecting the usability of the nearshore bypass line. The weir was elevated 18 inches, but permanent high creek levels may decrease the level of service, preventing discharge during extreme storms. The WQCP is also very sensitive to salt water that could intrude from off-site pump stations or through the plant's underground discharge conduit. On-site fuel tanks have secondary containment and are not sensitive to flooding. The WQCP's effluent storage basin will not be affected by sea level rise.

Secondary clarifier, looking south.

## SHORELINE VULNERABILITY

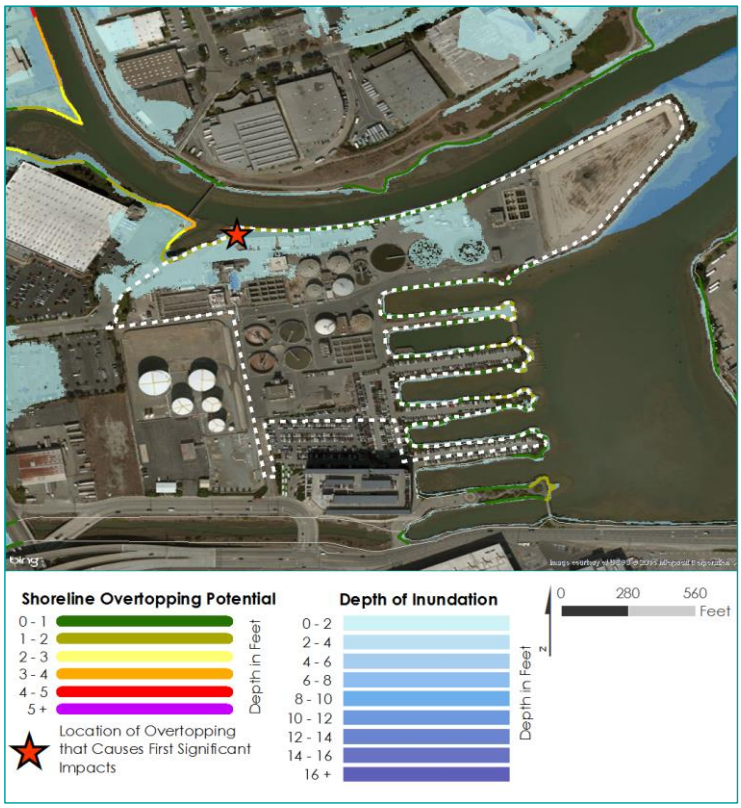
### Shoreline Overtopping Analysis

When water surface elevations in San Francisco Bay reach between 0 and 12 inches above the current mean higher high water (MHHW) level, Colma Creek would overtop the embankment at the northwestern edge of the property (red star), creating a potential flow path to the critical features of the asset. The first level of inundation with significant impacts to the asset does not occur until water elevations reach between 36 and 48 inches above MHHW.

### Cross-Cutting Vulnerabilities

The WQCP is vulnerable to collection system saltwater intrusion. If any of its off-site (low-lying) pump stations were exposed to salt water, the salt water would enter into the conveyance system. Excessive saltwater intrusion can affect the plant's biological treatment processes, and can lead to exceedance of effluent limitations. A loss of any pump station could affect the level of service of the collection and conveyance system. For more information see profile on Pump Station Number 4 (see AVP #8). Flooded access roads would inhibit the delivery of fuel and chemicals needed for operation and treatment.

**First Significant Impacts:** 48 inches above MHHW.



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## SEA LEVEL RISE EXPOSURE ANALYSIS

### Exposure Discussion

Though it has never flooded, the WQCP is currently exposed to high flows at three main locations on Colma Creek due to rainstorms combined with high tides and surges. Plant staff observed a 1997 high-water event on Colma Creek, which eroded 6 feet of shoreline just behind the administration building on the northwestern corner of the property. This part has since been reinforced with riprap (large, loose rock), but another low-lying spot in the northeastern part of the site just north of the secondary clarifiers enables a pathway for water to reach the transformer and power distribution system. Once on site, water could also enter the underground components of the asset. Finally, the nearshore bypass line that can be used during extreme storms to discharge fully treated effluent to Colma Creek is very sensitive to high water. If water levels become higher than the weir, creek water can flow up the line and the plant, impacting the usability of the nearshore bypass line.

Because it is tidally influenced, sea level rise will increase the frequency of high water in Colma Creek, thus increasing the potential to overtop low spots and potentially inundate part or all of the asset. Sea level rise also increases the frequency with which salt water could intrude over the discharge weir (which was recently elevated). More frequent higher water levels combined with major storm events will likely overwhelm the system more frequently because stormwater makes its way into the sewage treatment process, using up some of the pumping capacity.

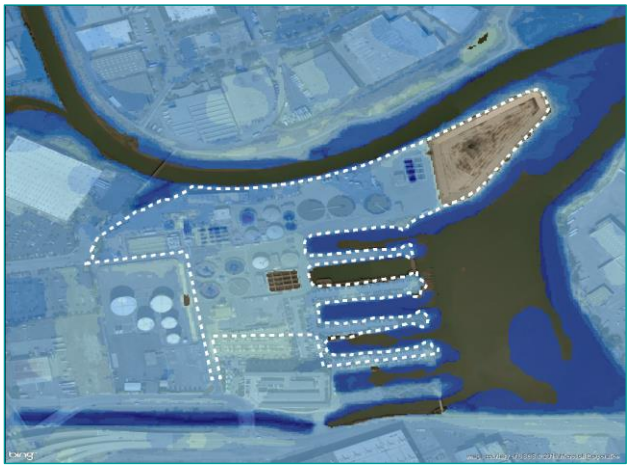
### Exposure Analysis Results

| Potential Inundation Depth (feet) | | |
|---|---|---|
| ***Scenario*** | ***Minimum*** | ***Maximum*** |
| First Significant Impacts *(48 inches)* | ***0*** | ***7*** |
| Baseline *1% Flood* | ***0*** | ***6*** |
| Mid-Level *1% + 3.3 feet* | ***0*** | ***15*** |
| High-End *1% + 6.6 feet* | ***0*** | ***19*** |

**Baseline Scenario:** Asset is not yet inundated.

**Mid-Level Scenario:** Asset inundation up to 15 feet.

**High-End Scenario:** Asset inundation of 0 to 19 feet.



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## ADAPTIVE CAPACITY, CONSEQUENCES, AND POTENTIAL ADAPTATION

### Adaptive Capacity

Adaptive capacity to both near-term flooding and long-term sea level rise is low. The plant has some built-in redundancies and enough diesel to operate the plant using generators for up to 48 hours. There are also staff on site 24 hours/day to respond to complications. However, there are not any flood mitigation measures in place for the WQCP's most vulnerable component (the power distribution system) and no way for the plant or its backup generators to function if power were lost. In addition, there is no other plant that can treat wastewater from this service area in the near term. Finally, the WQCP has no means of adapting should seawater enter the plant either from the collection system or from Colma Creek. Minor interventions may be possible to address near-term flooding, but long-term adaptation to sea level rise will require a major infrastructure upgrade both to the plant and to Colma Creek.

### Consequences

Consequences of flooding are high. Flooding the WQCP would result in direct damages to any number of plant components, which would have to be torn down and rebuilt. If the headworks were to flood, overflow would damage the grit processing room and it would have to be replaced. The loss of function would mean that overflow could discharge directly into Colma Creek without receiving treatment. If the plant lost power altogether, it is also possible for wastewater to back up in manholes and impact city streets. In addition, the plant could affect up to 100,000 customers in the service area. While few injuries would be expected from flooding, there would be a danger of electrocution for any on-site staff. Economic impacts based on the most recent valuation could range up to $282 million, though current direct replacement costs are unknown. EPA fines for discharging untreated effluent could add an additional $60 million or more.

### Additional Important Information

Plant expansion projects and additional construction has occurred in the following years: 1964, 1977, 1980, 1992, 1999, 2005 and 2015. Current capital improvements include plans to treat up to 40 million gallons per day of secondary effluent and replacing existing transformers. Sea level rise was not identified as a risk at the time of the design of these projects.

### Adaptation

On-site adaptation measures include nonstructural measures such as elevating or floodproofing water- or salt-sensitive equipment such as the power/electrical systems or the L-shaped weir, or potentially floodproofing any number of individual critical structures. It may be possible to build a seawall around the perimeter. Elevating the treated effluent discharge location (and associated infrastructure) may be required as more frequent high water levels on Colma Creek could prevent discharge, necessitating the use of the effluent storage much more frequently. Treating stormwater upstream through green or traditional stormwater infrastructure can also reduce high flows on Colma Creek.

### Vulnerable Wastewater Treatment Plants

There are Asset Vulnerability Profiles on the following vulnerable wastewater treatment plants: SAM Plant (AVP #2) and Silicon Valley Clean Water (AVP #14). The vulnerability assessment analysis shows that there are seven vulnerable wastewater treatment plants in the project area, including those in the City of Millbrae, City of San Mateo, City of Burlingame and at SF International Airport.

The asset is vulnerable to high water on Colma Creek.

Part of low-lying power and electrical system.