14. SILICON VALLEY CLEAN WATER WASTEWATER TREATMENT PLANT

Silicon Valley Clean Water (Joint Powers of Authority)

VULNERABILITY SUMMARY

The Silicon Valley Clean Water Wastewater Treatment Plant (Plant) is **highly vulnerable** to the impacts of sea level rise. The asset is very sensitive to loss of power, which would result in a complete loss of service of the Plant. Currently, the Plant is not exposed to coastal flooding; however, most of the Plant's critical components are at or below sea level. Shoreline overtopping or failure of the levee system that protects the Plant, therefore, could have catastrophic consequences for the functionality of the Plant. Adaptive capacity onsite is low, and there is no other facility that could treat influent (untreated wastewater) from this service area.

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

ASSET CHARACTERISTICS

1400 Radio Rd | Redwood City

Asset Description and Function:

The Plant treats wastewater for the cities of Belmont, Redwood City, San Carlos, and the West Bay Sanitary District. The West Bay Sanitary District provides services to City of Menlo Park, Atherton, Portola Valley, and areas of East Palo Alto, Woodside and unicorporated San Mateo. Influent is received from five major pump stations in Redwood Shores, Belmont, San Carlos, Redwood City, and Menlo Park. The conveyance system uses a pressurized force main to convey flows to the Plant, which is below sea level. Effluent (treated wastewater) discharges through a pipe with a one-way valve along the bottom of San Francisco Bay near the San Mateo Bridge. The system also includes two volume control equalization ponds located near Bedwell Bayfront Park.

Asset Type	Wastewater treatment plant
Asset Risk Class	3
Size	2,000,000 square feet
Year of Construction	1980
Elevation	Below sea-level to 11 ft.
Level of Use (Dry Weather)	29 million gallons/day
Annual O&M Cost	$23,000,000
Special Flood Hazard Area	Asset is not in SFHA
Physical Condition	Good
Landowner	South Bayside System Authority

Underground Facilities

There are pump and piping galleries, mechanical and electrical equipment, and a pump control center below ground.

Environmental Considerations

Special status plants, animals, and natural communities may be present in the project area. A more detailed analysis will be needed before implementing adaptation strategies.

SILICON VALLEY CLEAN WATER

ASSET SENSITIVITY

The Plant is extremely sensitive to coastal flooding and less sensitive to groundwater seepage or saltwater intrusion. The main power feed and distribution system (located at the southwest end of the property) is the Plant's most critical component, and if it were flooded, plant power and service would be lost. The electrical system that controls the effluent pumps is also an essential component of the Plant, and it is located underground. The plant has sump pumps, which are active 24 hours/day to prevent groundwater seepage from affecting plant components; however, a power loss could prevent the pumps from working, at which point water seepage could begin to affect plant components.

The Plant's main power supply comes from PG&E and its own cogeneration system. The cogeneration system consists of internal combustion engines that use digester gas to generate more than half of Plant's power demand. In case of utility power outages, the cogeneration system also shuts down. There are backup diesel generators that provide power in the event of utility power outages; however, they all depend upon the electrical distribution system, which means, if the electrical system is inundated, the generator will not work. The backup generator is also sensitive to flooding because its fuel supply system could be damaged by prolonged flooding.

Essential pump control station is underground.

SHORELINE VULNERABILITY

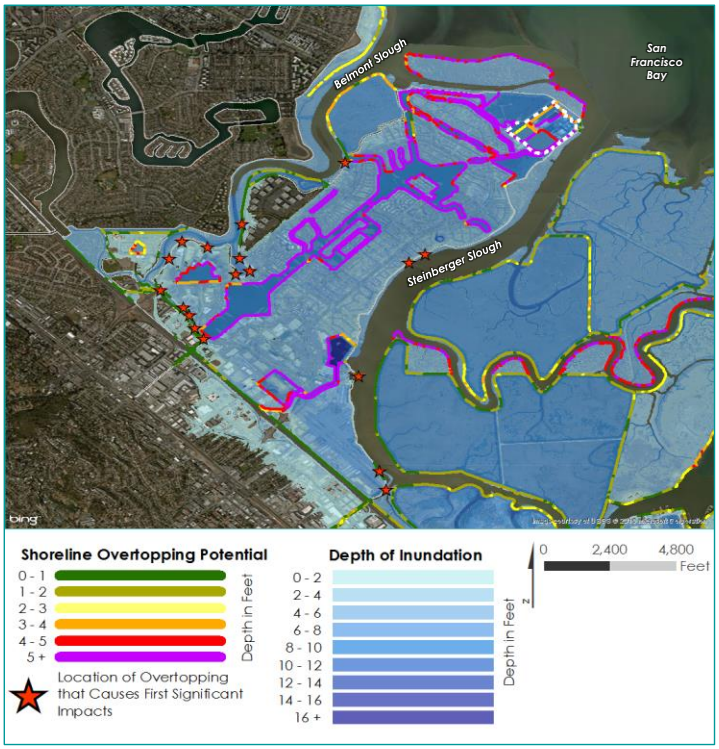
Shoreline Overtopping Analysis

The Plant is below sea level and protected by the levee system that protects Redwood Shores, which means it will experience no coastal flooding until the levee is overtopped or fails. When water surface elevations reach between 36 and 48 inches above mean higher high water (MHHW), water from Belmont and Steinberger Sloughs overtops the system of levees and berms protecting Redwood Shores (see red stars on map), creating a potential flow path to the asset. The Plant is approximately 1 mile from the nearest overtopped section of levee.

Cross-Cutting Vulnerabilities

The Plant is wholly dependent upon its five pump stations; if any of the pump stations were affected by flooding, this could disrupt the level of service at the Plant. The Plant is also very sensitive to changes in elevation of any of its components; this is critical for adaptation.

First Significant Impacts: 48 inches of SLR above MHHW.



SILICON VALLEY CLEAN WATER

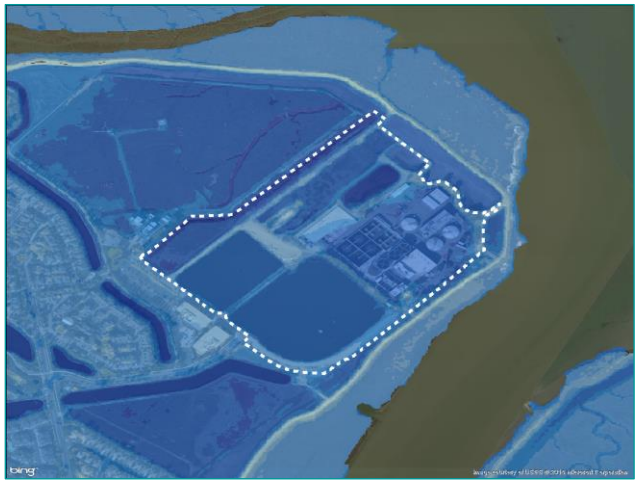
SEA LEVEL RISE EXPOSURE ANALYSIS

Exposure Discussion

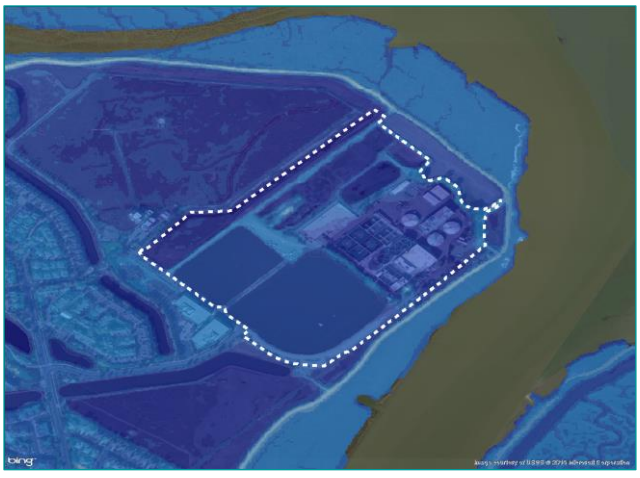
Current exposure is low, as the asset is protected by a levee managed by Redwood City and by a small portion of fiberglass sheets along the northeastern perimeter of the property. To date, the site has not experienced any coastal flooding, but there is evidence on site of water seepage through cracks in gallery floors. As with other assets protected by levees, exposure will remain low until the levee system is overtopped by high water in San Francisco Bay, or until it fails. After this point, flooding would be widespread, inundating the entire area that is protected by levees to water levels consistent with the water level in the Bay. Once overtopped, which could occur between 36 and 48 inches of sea level rise above MHHW (see "Shoreline Overtopping Analysis") or during a severe storm (see "Baseline Condition" on the right), water could flood 13 feet deep. With the high-end sea level rise scenario, flood waters could range from 5-18 feet deep. The Plant's main power feed and distribution system are at street level and would be flooded if the levee overtopped or failed. Many of the Plant's essential components are below ground; minor flooding would likely not be deep enough to reach the entrances because they are elevated roughly 9 feet above grade. However, because deep flooding that results from an overtopping of the levee system could result in water levels higher than the building entrances, these low-lying components are still at risk of flooding in the long-term.

Baseline Scenario: Asset not flooded.

Mid-Level Scenario: Flooding up to 15 feet deep.



High-End Scenario: Asset under 18 feet of water.



Exposure Analysis Results

Potential Inundation Depth (feet)		
Scenario	***Minimum***	***Maximum***
First Significant Impacts *(48 inches)*	***0***	***13***
Baseline *1% Flood*	***0***	***0***
Mid-Level *1% + 3.3 feet*	***2***	***15***
High-End *1% + 6.6 feet*	***5***	***18***

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ADAPTIVE CAPACITY, CONSEQUENCES, AND POTENTIAL ADAPTATION

Adaptive Capacity

Near- and long-term adaptive capacity are low as explained; there is no other wastewater treatment plant that could treat waste for this service area, and major improvements would require adaptation. The Plant cogenerates a significant amount of its own power using methane from the digesters onsite; however, policy requires that main power (PG&E feed) operates alongside the cogeneration, meaning if the main power feed is lost, the onsite power generation system (cogeneration) will shut down. The asset also has three backup generators at higher elevations with 5-6 days of diesel fuel to run them, but the fuel system itself is at a lower elevation and is vulnerable to flooding.

Consequences

The impacts of a temporary or permanent loss of the Plant would be high due to the scale of potential economic, environmental, and public health and safety consequences. Coastal flooding could cause direct damages that require repair or full replacement of any of the critical plant components. A loss of the Plant's power may result in sewage overflows onsite, which could threaten the health and safety of plant personnel who come into contact with it. Flooding also poses a health and safety hazard to the roughly 80 staff onsite due to potential electrocution, or due to exposure to floodwaters. Cascading impacts could be created if the plant were shut down; in this case, flooding or sewage overflow is possible at the pump stations offsite. Sewage backup is also possible in any number of manholes in the service area. This could affect businesses and residents who may be forced to evacuate. Up to roughly 200,000 people, including residents and businesses, could be affected. The release of untreated sewage directly into San Francisco Bay would have water quality and environmental impacts and could result in fines.

Additional Important Information

Improving cogeneration system capabilities to generate onsite power in island mode (with PG&E power outage) would greatly improve near-term adaptive capacity of the asset. New buildings onsite will be located where the temporary pond is now. The Plant undergoes regular capital improvement plan cycles, and they will consider sea level rise as new capital assets are built.

Asset-Specific Adaptation

In the near-term, the critical/electrical components could be floodproofed or elevated so the Plant could maintain functionality in the event of overtopping. It may also be possible to send an alarm to customers to reduce water use to minimize sewage backup. In the long-term, it may be necessary (though difficult) to relocate the Plant to higher ground, or raise the structural shoreline protection to reduce the likelihood of exposure. Because the Plant is already below sea level, elevating any of the components onsite affects the flows of all other components onsite.

Vulnerable Wastewater Treatment Plants

There are Asset Vulnerability Profiles on the following vulnerable wastewater treatment plants: SAM Plant (AVP #2) and SSF-SB WQCP (AVP #23). 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.

Ongoing upgrades and maintenance of the WWTP.

Sump pumps reduce groundwater seepage impacts.