

# 24. FOSTER CITY LEVEE

The City of Foster City

## VULNERABILITY SUMMARY

The vulnerability of the Foster City Levee system (Levee) is **moderate**. If overtopped, the levee would not provide its primary function; however, it was designed not to fail, making it moderately sensitive to coastal flooding. Exposure of the asset is low; it is tall enough to accommodate the baseline scenario. Adaptive capacity of the asset is high, as the lagoon pump system located just behind the levee will reduce the extent of interior flooding if the levee is overtopped. If the levee failed or lost function completely, the scale of the impact would be very high, as the 40,000 residents of Foster City and San Mateo, along with the cities' infrastructure and property, could be exposed to deep flood water.

<b>SENSITIVITY</b> Moderate	<b>EXPOSURE</b> Low	<b>ADAPTIVE CAPACITY</b> High	<b>CONSEQUENCES</b> High
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## ASSET CHARACTERISTICS

Address: Entire perimeter of Foster City

### Asset Description and Function:

The Levee protects 40,000 people in Foster City and San Mateo from coastal flooding. The Bay Trail on top of the levee provides a popular recreational asset to the region. The asset, which consists of an earthen berm, floodwall, and intake and discharge tide gates, does not meet federal accreditation standards for elevation. It is undergoing an improvement process and there are plans to raise the levee to meet accreditation standards and adapt to sea level rise. This asset profile pertains to the existing levee.



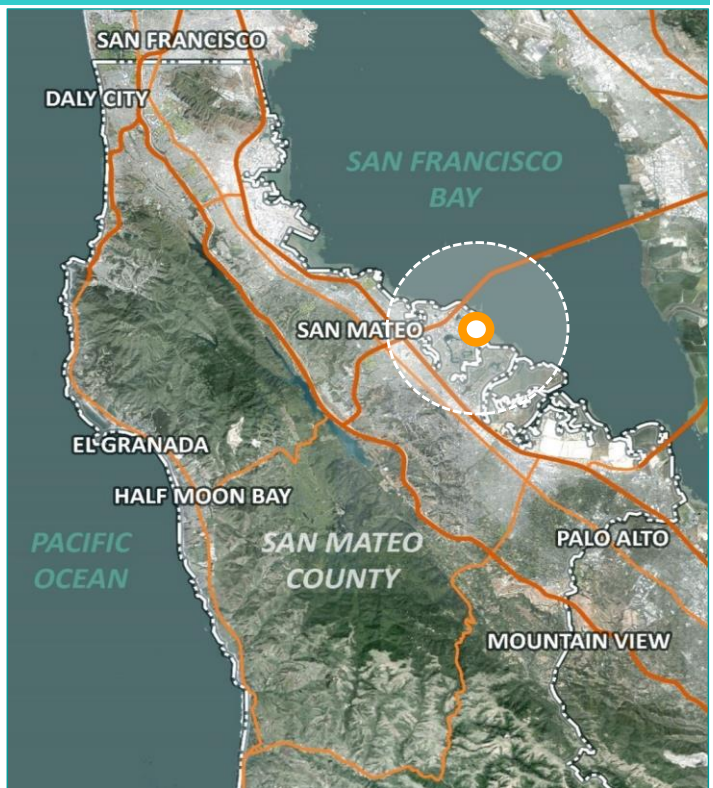
<b>Asset Type</b>	Flood Control Infrastructure
<b>Asset Risk Class</b>	4
<b>Size (Length)</b>	8 miles
<b>Year of Construction</b>	1960 (Improved in 1994)
<b>Elevation (average)</b>	12 feet NAVD
<b>Protection Provided</b>	17,000 properties
<b>Annual O&amp;M Cost</b>	\$20,000
<b>Special Flood Hazard Area</b>	N/A
<b>Physical Condition</b>	Excellent
<b>Landowner</b>	State of CA, Estero Municipal Improvement District, and City of Foster City

### Underground Facilities

The stormwater pump station discharges stormwater water collected in the lagoon to the bay. The floor elevation of the facility is at the same level as the levee. All other utilities including water, sanitary sewer, electricity and telephone services are underground.

### 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.



# FOSTER CITY LEVEE

## ASSET SENSITIVITY

The Levee itself is moderately sensitive to high water; it was designed to withstand overtopping from coastal inundation. While the Levee would likely not fail catastrophically if overtopped by floodwater, the asset would not perform its primary function (flood protection), and it would require the use of backup or redundant measures to reduce flooding. The trail on top of the Levee is sensitive to high water and would not be accessible if it were inundated.

However, while the Levee is only moderately sensitive, there are thousands of assets protected by the Levee system, including infrastructure, houses, and businesses, that are likely very sensitive to coastal flooding and especially sensitive to levee overtopping because they were likely not designed with flooding in mind.

Bike path along Foster City Levee.



## SHORELINE VULNERABILITY

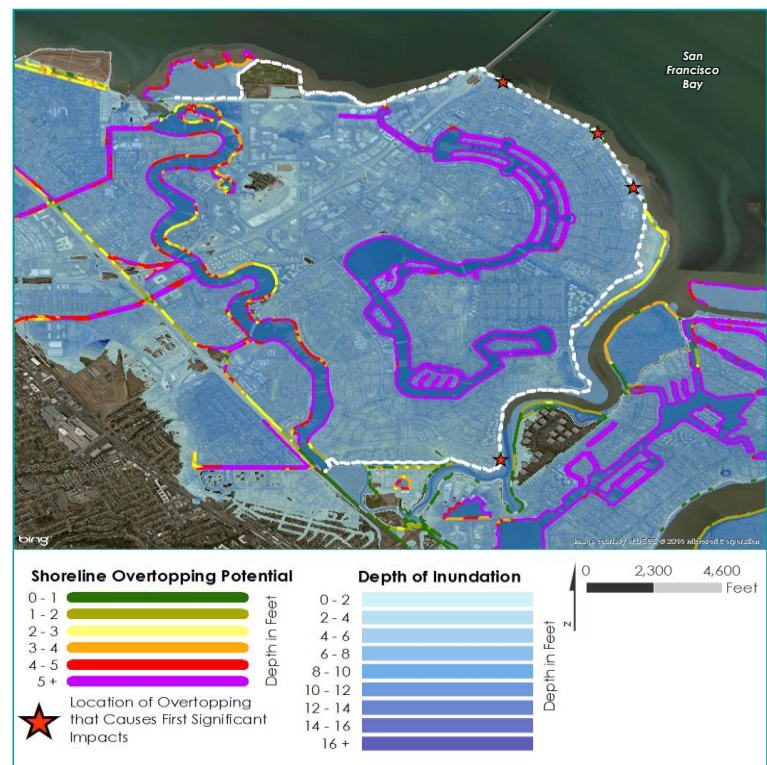
### Shoreline Overtopping Analysis

When water surface elevations reach between 48 and 52 inches above the current mean higher high water (MHHW) level, water from San Francisco Bay (in the northeast) and Belmont Slough (in the southeast) overtops the Levee, which could create widespread inundation in Foster City (assuming no intervention). These overtopping locations are indicated by the red stars on the map to the right.

### Cross-Cutting Vulnerabilities

Because the Levee and the Foster City Lagoon Pump System protect thousands of assets (including houses, businesses, and infrastructure), failure or overtopping of the levee and failure of the pump system could suddenly expose many assets and people to deep flood waters.

First Significant Impacts: 52 inches above MHHW.



# FOSTER CITY LEVEE

## SEA LEVEL RISE EXPOSURE ANALYSIS

### Exposure Discussion

The Levee is continuously exposed to daily tidal, wind, wave erosion, and scour, and to the occasional king tide or storm event. Though the asset has not been overtopped by coastal flooding so far, sea level rise will increase the frequency with which the Levee experiences high water, and thus the potential for overtopping. Roughly 12 inches of sea level rise will raise water levels enough so that there is water against the levee 24 hours a day (as opposed to just during high tides).

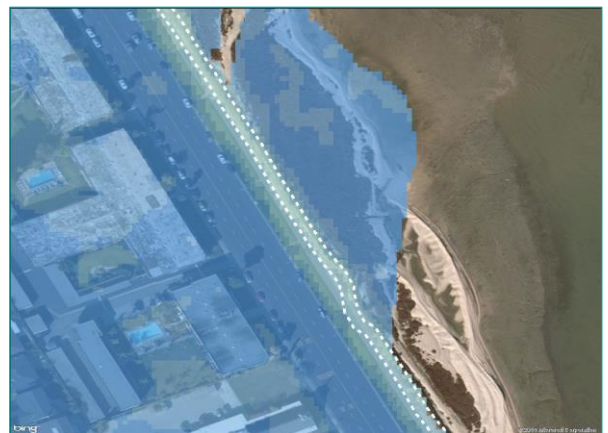
With no action, the Levee could be overtopped by significant storm surge or wave action today (between 48-52 inches high as noted in the previous map), causing flooding in Foster City in the interior of the levee. In contrast to areas not protected by a levee system, which will experience incremental flood exposure due to sea level rise, assets that are below sea level and protected by levees will experience no coastal flooding until the levee that protects them is overtopped or fails, at which point flood waters in the interior could be very sudden or deep. The depth and extent of flooding will depend on the high water conditions and the effectiveness of the lagoon pump system.

With no action, future coastal storm surge could overtop the lowest segment of the levee by up to 6 feet. However, Foster City plans to elevate the Levee, making this an unlikely scenario. The maps at the right show one of the vulnerable segments of the asset, and the table below reflects the maximum potential for overtopping at this specific segment of the Levee.

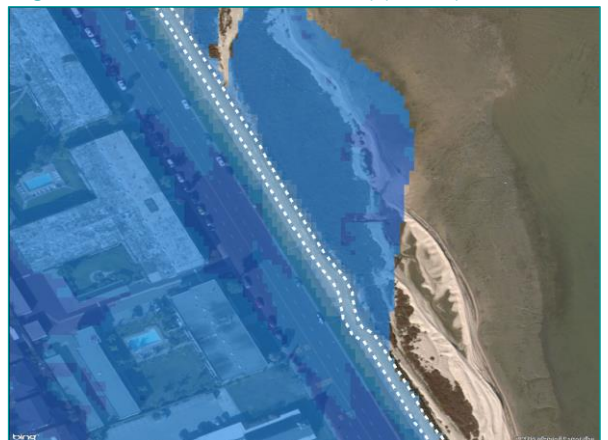
**Baseline Scenario:** Levee segment is not overtopped.



**Mid-Level Scenario:** Segment overtopped by 3 feet.



**High-End Scenario:** Levee overtopped by 6 feet.



### Exposure Analysis Results

Potential Inundation Depth (feet)		
Scenario	Minimum	Maximum
First Significant Impacts (52 inches)	0	1
Baseline 1% Flood	0	0
Mid-Level 1% + 3.3 feet	0	3
High-End 1% + 6.6 feet	5	6

# FOSTER CITY LEEVE

## ADAPTIVE CAPACITY, CONSEQUENCES, AND POTENTIAL ADAPTATION

### Adaptive Capacity

The Levee, when combined with Foster City's interior storm drain and pump system, has a high adaptive capacity to maintain the flood risk reduction function. Foster City operates a pump system (from the Corporation Yard) to reduce the depth and extent of interior, rain-driven flooding. The pump system capacity is up to 250,000 gallons per minute, which is roughly sufficient to pump water from the 1% annual chance rain event or from expected amounts of levee overtopping. Adaptive capacity will decrease in the future if no actions are taken, as pumping capacity will be insufficient to handle increased amounts of overtopping that could occur with sea level rise. The pumps can operate while inundated because they were designed to do so using diesel fuel instead of electrical power. There is also emergency equipment in the pump house at the Foster City Corporation Yard to support flood fighting, including 5,000 sandbags. There are additional stockpiles and boulders available if needed. The Foster City drainage and pump system can also drain the lagoon in advance of a storm or should the levee be overtopped for a short duration to accommodate floodwaters and prevent flooding of Foster City's streets, infrastructure, and property.

### Consequences

Consequences from the complete loss or failure of the Levee could be very high. Levee failure during a large storm with high water levels could result in catastrophic damages to property, infrastructure, and life safety. The Foster City Levee protects assets in Foster City, as well as some areas of San Mateo and Belmont. Flooding could damage up to 17,000 properties in the flooded area, estimated at up to \$75 million in replacement costs. Pending successful evacuation, damages and the life safety hazard could be reduced. If the asset were lost, Foster City's key services could be lost, including damages to the stormwater and wastewater systems, which could pose additional safety hazard and water quality impacts if untreated wastewater were released. Thousands of people would require shelters, and resources from other cities or counties might be required to help. Costs to repair damage to a breached levee vary but are expensive. See the Asset Profiles for the following assets in this inundation zone: San Mateo Police Department; Foster City Corporation Yard; and the Bayside STEM Academy.

### Additional Important Information

Because much of San Mateo County is low-lying along San Francisco Bay, a vulnerability in one part of the shoreline could affect many cities and assets nearby. Foster City is in the planning stages of raising the levee, but could still be exposed to sea level rise if neighboring cities do not also adapt to sea level rise. Adaptation requires a coordinated plan.

### Asset-Specific Adaptation

Foster City is currently undergoing a re-accreditation process for the levee, and plans to raise it to meet sea level rise projections up to 2050. Depending on the pace of sea level rise, the Levee may need to be raised again in the future to accommodate additional sea level rise. Adapting some of the protected assets may also be beneficial should the levee ever lose function.

### Other Vulnerable Levees

This is the only Asset Vulnerability Profile on vulnerable levees in the County. The vulnerability assessment analysis shows that there are an estimated 25.9 miles of vulnerable levees and floodwalls in the project area.

Bay Trail on top of levee system is a recreational asset.

