OAKLAND ALAMEDA ESTUARY PROJECT

Oakland Alameda Adaptation Committee (OAAC ADAPT)

PROJECT OVERVIEW

Description

The **Oakland Alameda Estuary Project** is a near-term sea level rise adaptation design concept to address increased coastal, stormwater, and groundwater flooding for up to two feet of sea level rise over the coming decades. The project will include strategies to elevate and adapt low-lying areas of the shoreline combined with green infrastructure such as rain gardens and storm drainage improvements.

Project Area

Oakland's Jack London District and Lake Merritt Channel, Alameda's northern shoreline by Marina Village including Caltrans' Posey/Webster Tubes (State Route 260), and the San Francisco Bay Trail.

Process

The design concept is being prepared in coordination with community members and key stakeholders. Funding is from a Caltrans Sustainable Communities grant and Measure BB, and terminates in February 2025. Design strategies will be developed to a conceptual level with current funding.

Refinement, continued stakeholder review and construction will be done with future funding. OAAC is pursuing up to $4 million in federal community project funding and up to $30 million from the federal Water Resources Development Act (WRDA) bill to complete the design and construct the Estuary project.

EXISTING CONDITIONS

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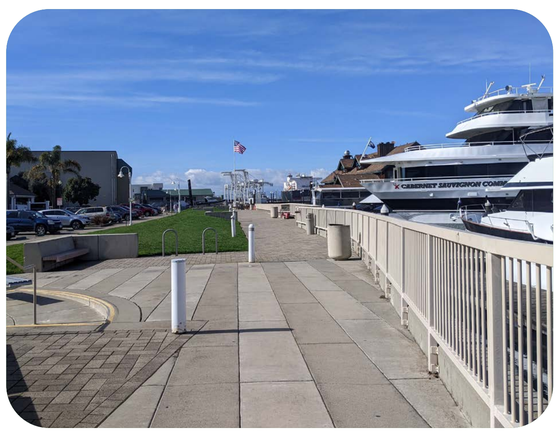
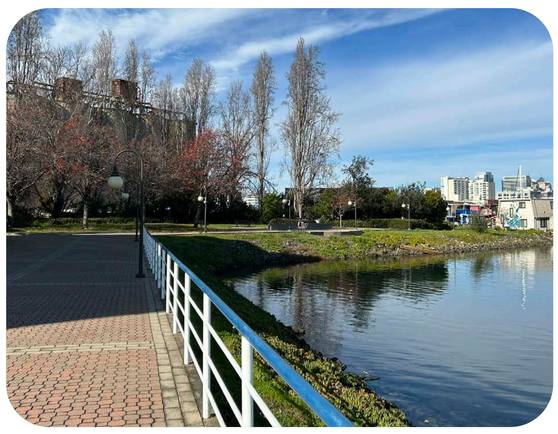


Bohol Circle

Oakmont Shoreline

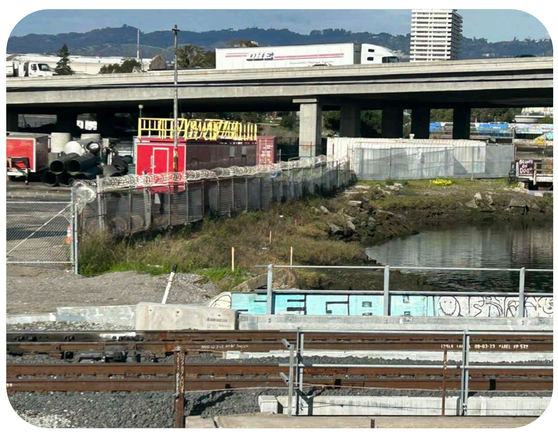
Portobello Marina

Embarcadero West / Estuary Bridge



View Towards Barnhill Marina

Barnhill Marina



Lake Merritt Channel

Lake Merritt Channel Outlet

Extended Stay America Hotel

Marina Village

Lawn at the Landing

Jack London Square

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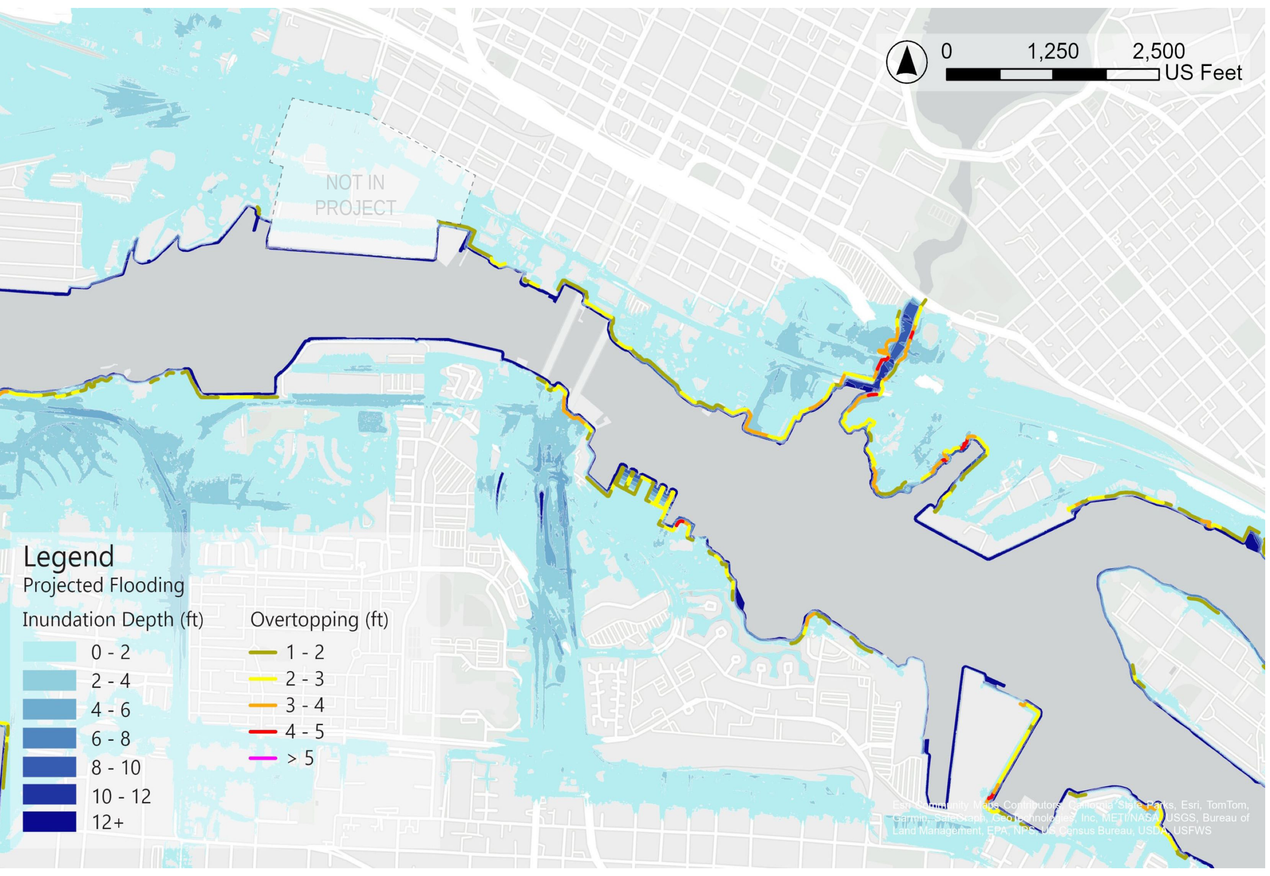
OAKLAND ALAMEDA SEA LEVEL RISE

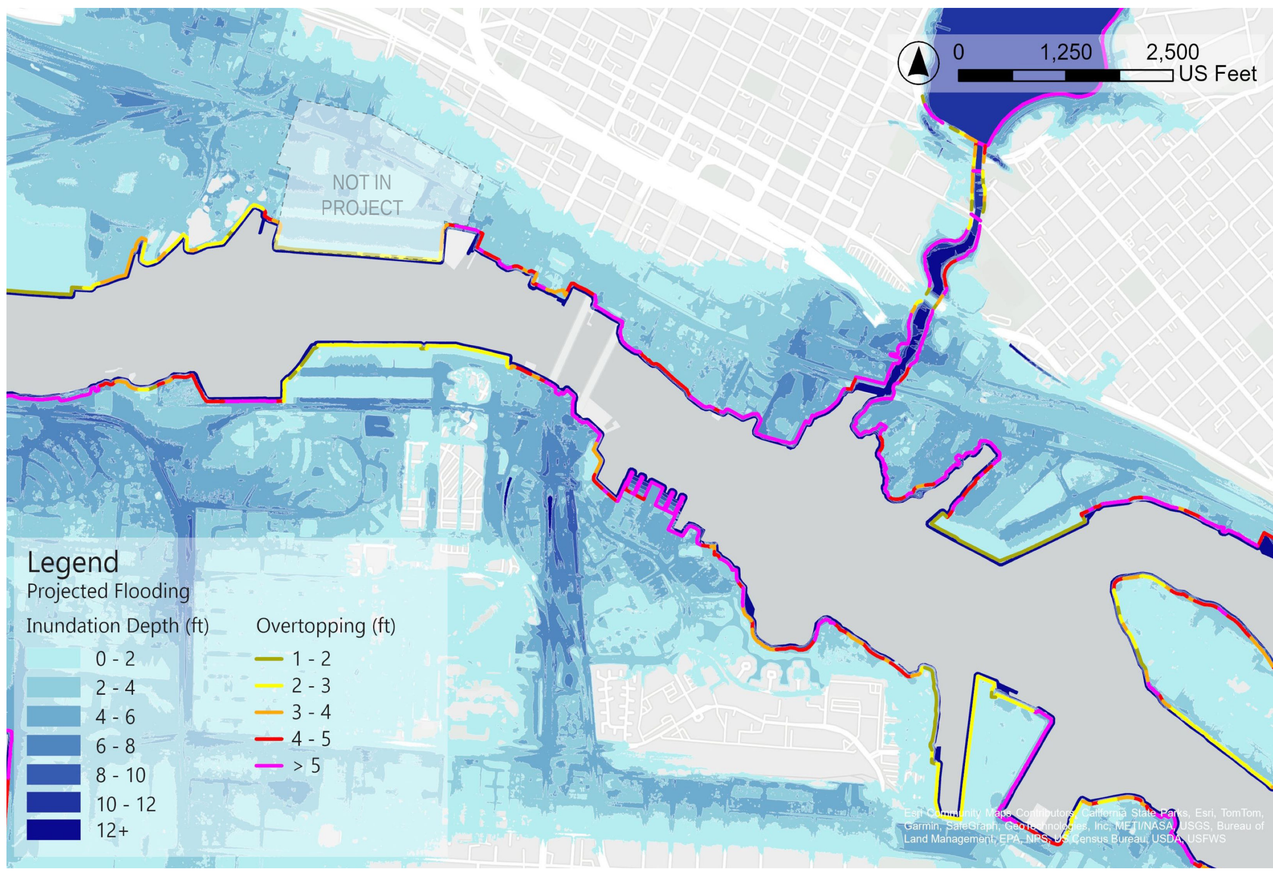
Oakland Alameda Adaptation Committee (OAAC ADAPT)

SEA LEVEL RISE AND COASTAL FLOOD HAZARDS

The lowest portions of this shoreline are already at risk of inundation during a major coastal flood. In the absence of adaptation, rising seas and coastal flooding will overtop shorelines more frequently. The areas most at risk of coastal flooding are areas of shoreline developed at low elevations that may allow water to flood areas further inland. Within the Estuary project area, the lowest areas of shoreline are adjacent to Mariner Square Drive and the Webster/Posey Tubes on Alameda and at the entrance to Lake Merritt Channel in Oakland.



100-year Coastal Flood with 2’ Sea Level Rise



100-year Coastal Flood with 5.5’ Sea Level Rise

SEA LEVEL RISE ADAPTATION TARGETS

Adapting to sea level rise requires that we determine where our shoreline needs to be elevated, how much, and when that change needs to happen. In order to determine this new elevation for the near-term time horizon (2080), we start with the current high tide level. Some of the lowest areas of our shoreline already experience coastal flooding. Then we consider the current 100-year (1% annual chance) Bay water level, which is observed during severe coastal storms. Adding projected sea level rise and freeboard (a buffer that accounts for uncertainty in our sea level rise water level estimates) brings us to our target design elevation of 14.0’ NAVD88 (a standard reference datum for measuring elevation).

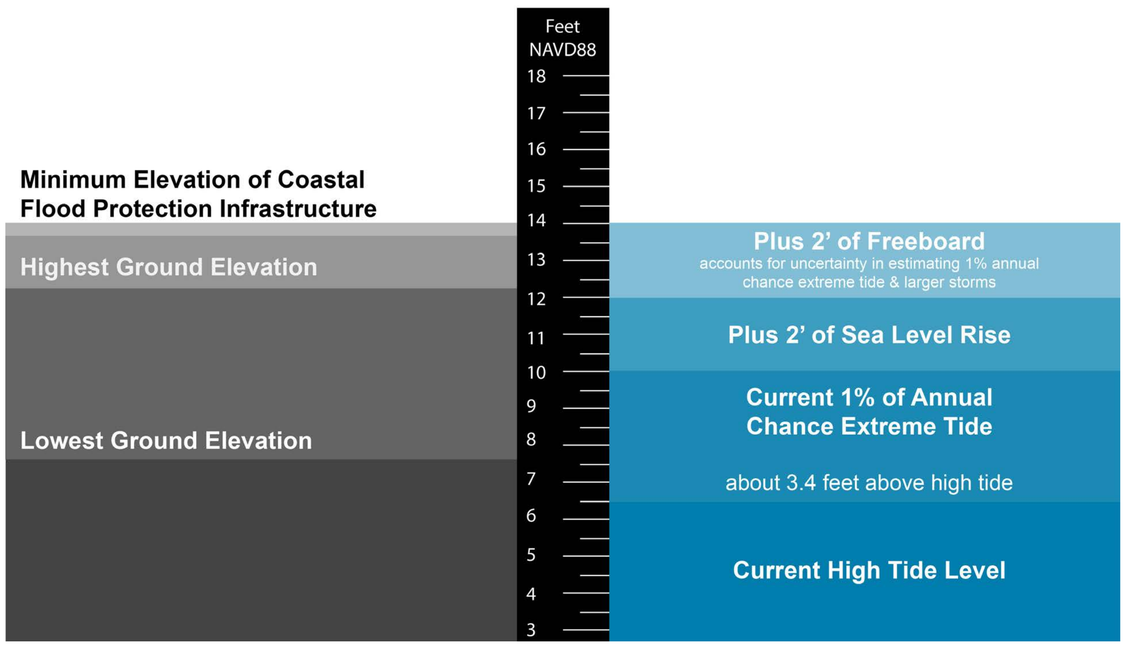
For the lowest points of our shoreline (those close to the high tide line), **this means elevating the edge approximately 7.0 feet in the near term**. Higher areas of will require less elevation with the goal of achieving a consistent level of protection around the shoreline.

Near Term

2080
35 to 50-year adaptation project lifespan

2’ of sea level rise

Protect to elevation +14.0



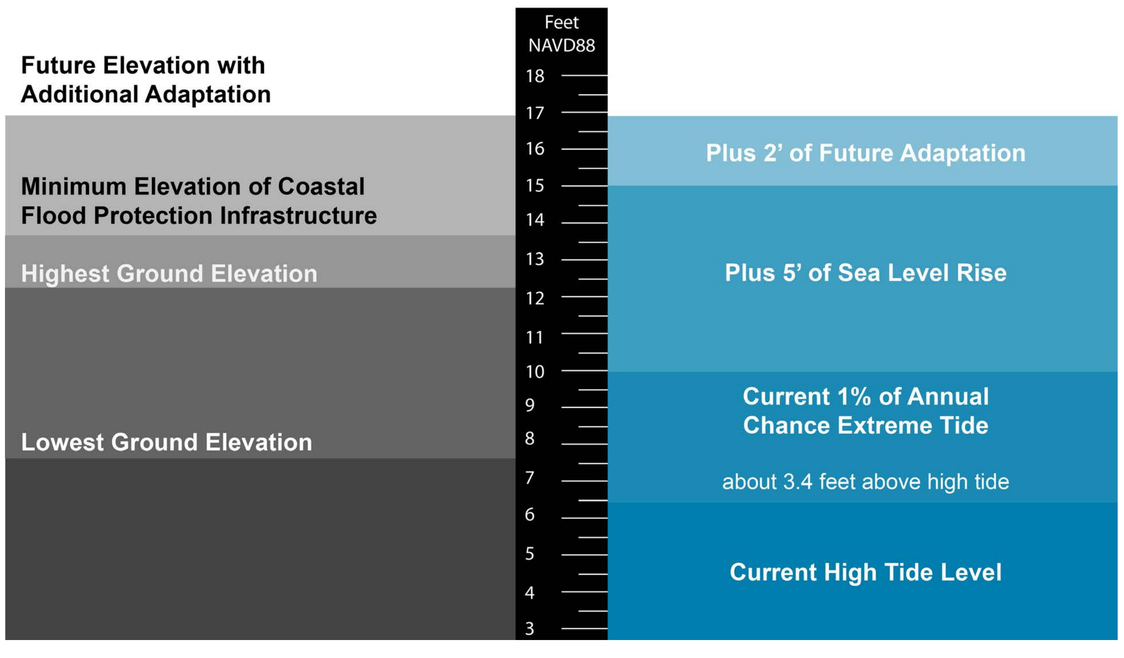
Near Term (2080, 30-50 Year Design Life, 2’ of SLR)
Protect to Elevation +14.0

Long Term

2100+
Build upon near term project

5’ of sea level rise

Protect to elevation +17.0



Long Term (2100+, 5’ of SLR)
Protect to Elevation +17.0

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OAKLAND ALAMEDA COASTAL FLOODING

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SEA LEVEL RISE SHORELINE ANALYSIS

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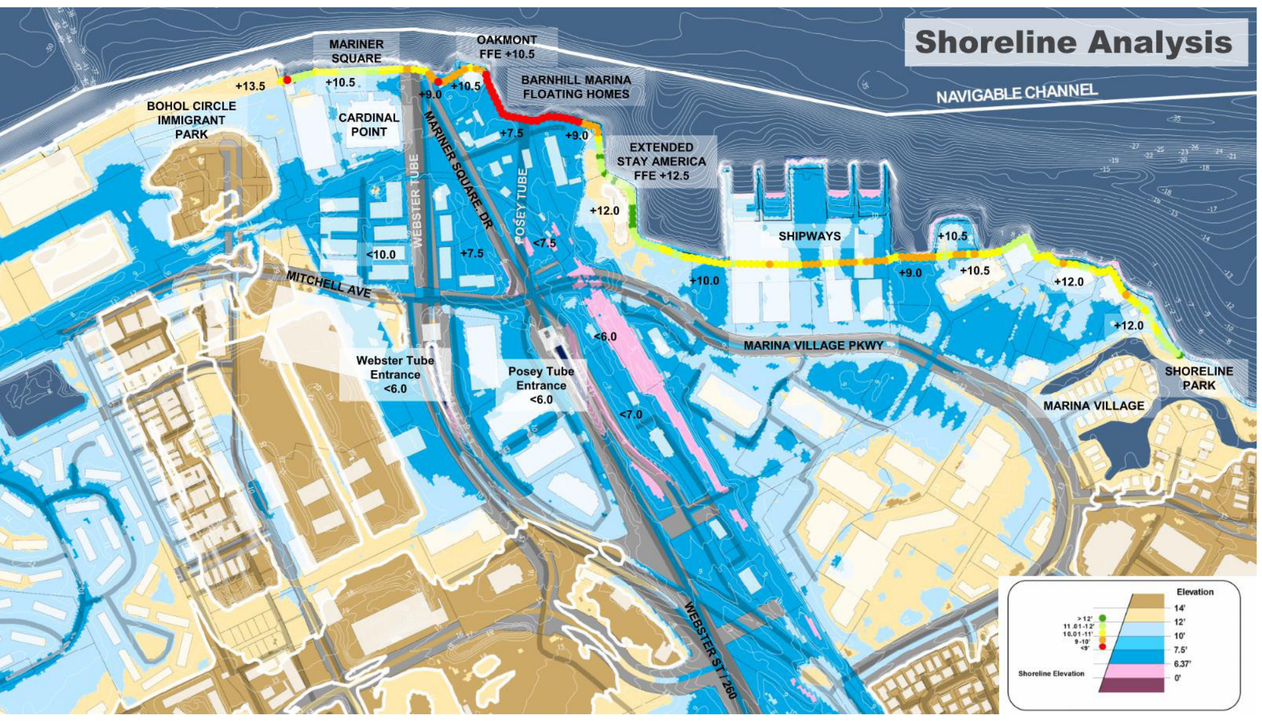

Alameda Northern Shoreline

Along the northern shoreline of Alameda, there are multiple locations where the current shoreline elevation is between 7.5 and 9.0, lower than the current base flood elevation of 10.0. These low elevations increase the risk of coastal flooding, particularly by Mariner Square Drive and the Webster/Posey Tubes.

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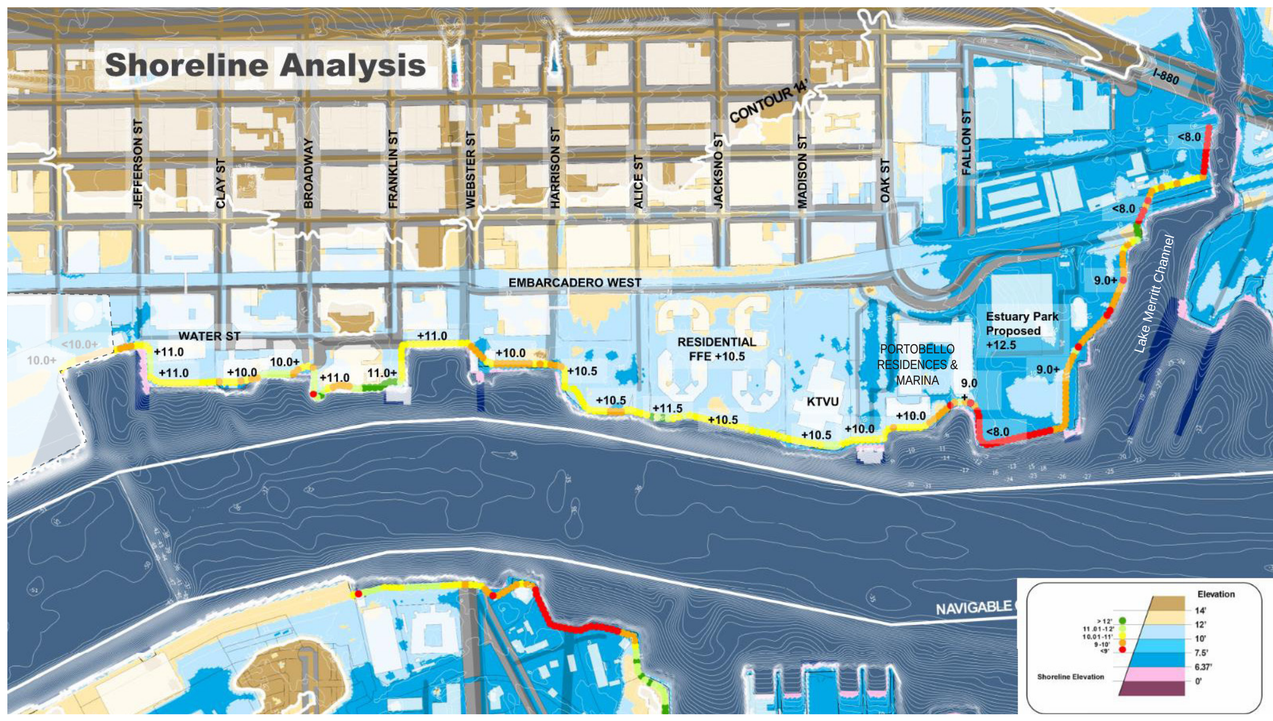

Oakland Jack London Square to Lake Merritt Channel

The Estuary shoreline of Oakland is at lower near-term risk than Alameda as the shoreline is generally higher in this reach. Elevations below elevation 10.0 are found between the Portobello Marina and Lake Merritt Channel. The design for Estuary Park includes elevating the park for near-term sea level rise and adapting to future sea level rise in the longer term. Additional protection is required farther north along the channel.

COASTAL FLOOD RISK SHORELINE ANALYSIS

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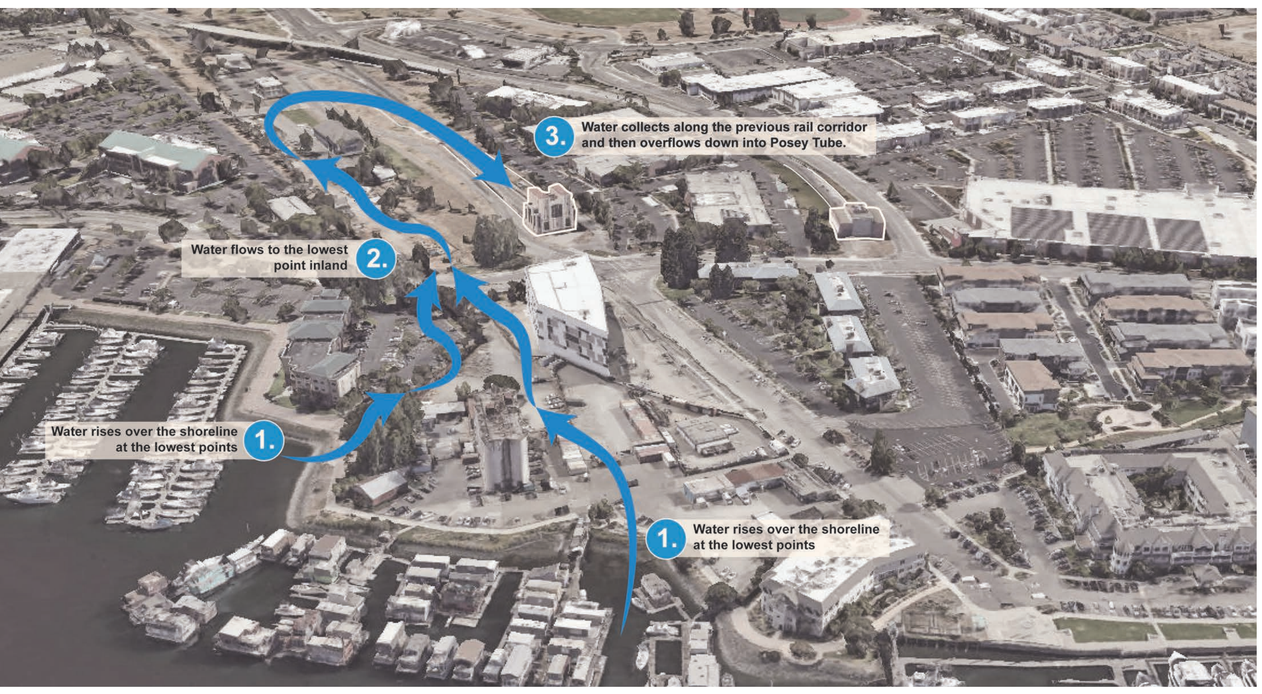

Increased Flood Risk for the Posey and Webster Tubes

The low elevations at the northern shore of Alameda increase the flood risk to the Posey and Webster Tubes. Water can overtop the shoreline at its lowest points, and then flow to lower areas inland and finally into the Tubes. This risk of this shoreline is already apparent during king tides.

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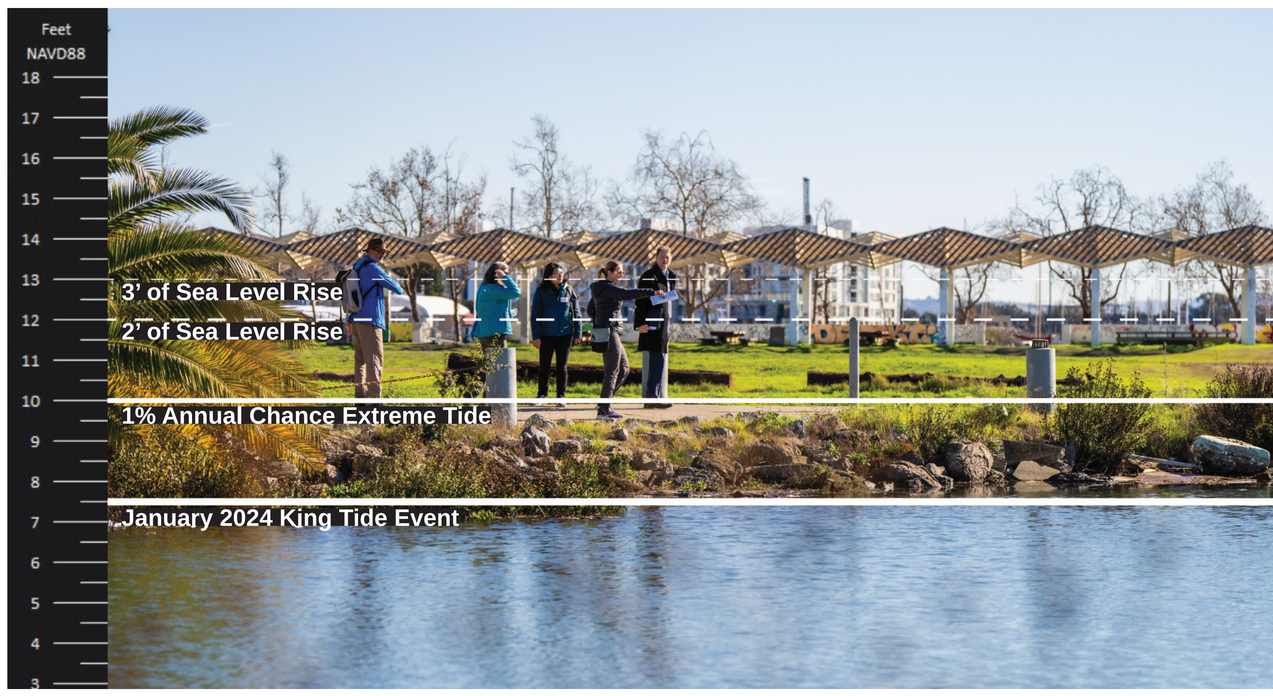

Lake Merritt Channel

The low elevations near the mouth of Lake Merritt Channel risk overtopping and putting the adjacent neighborhood at risk of coastal flooding. The Union Pacific rail line and bridge are particularly low and at the greatest risk of flooding.

King Tide at Barnhill Marina

King Tide at Lake Merritt Channel and Embarcadero West Bridge

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OAKLAND ALAMEDA INLAND FLOODING

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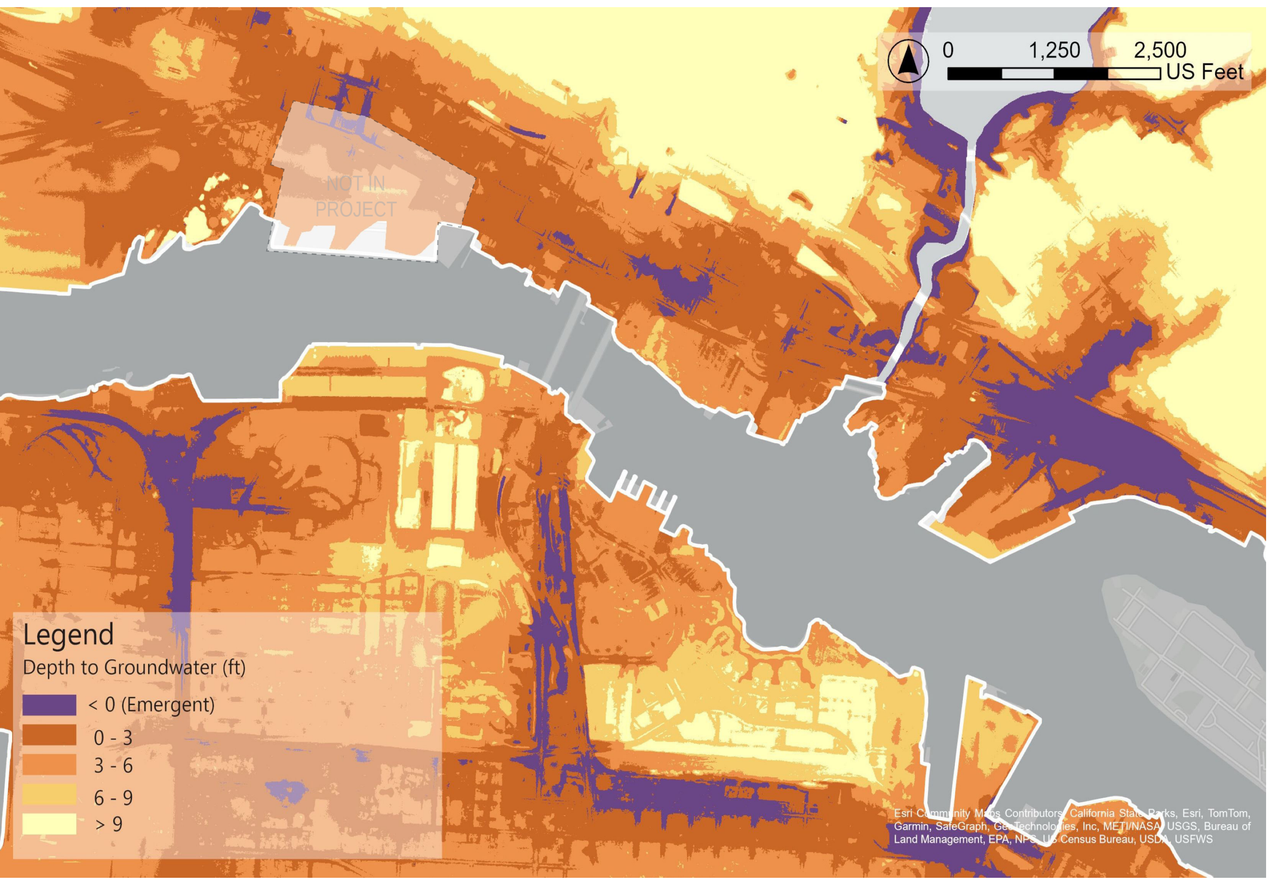
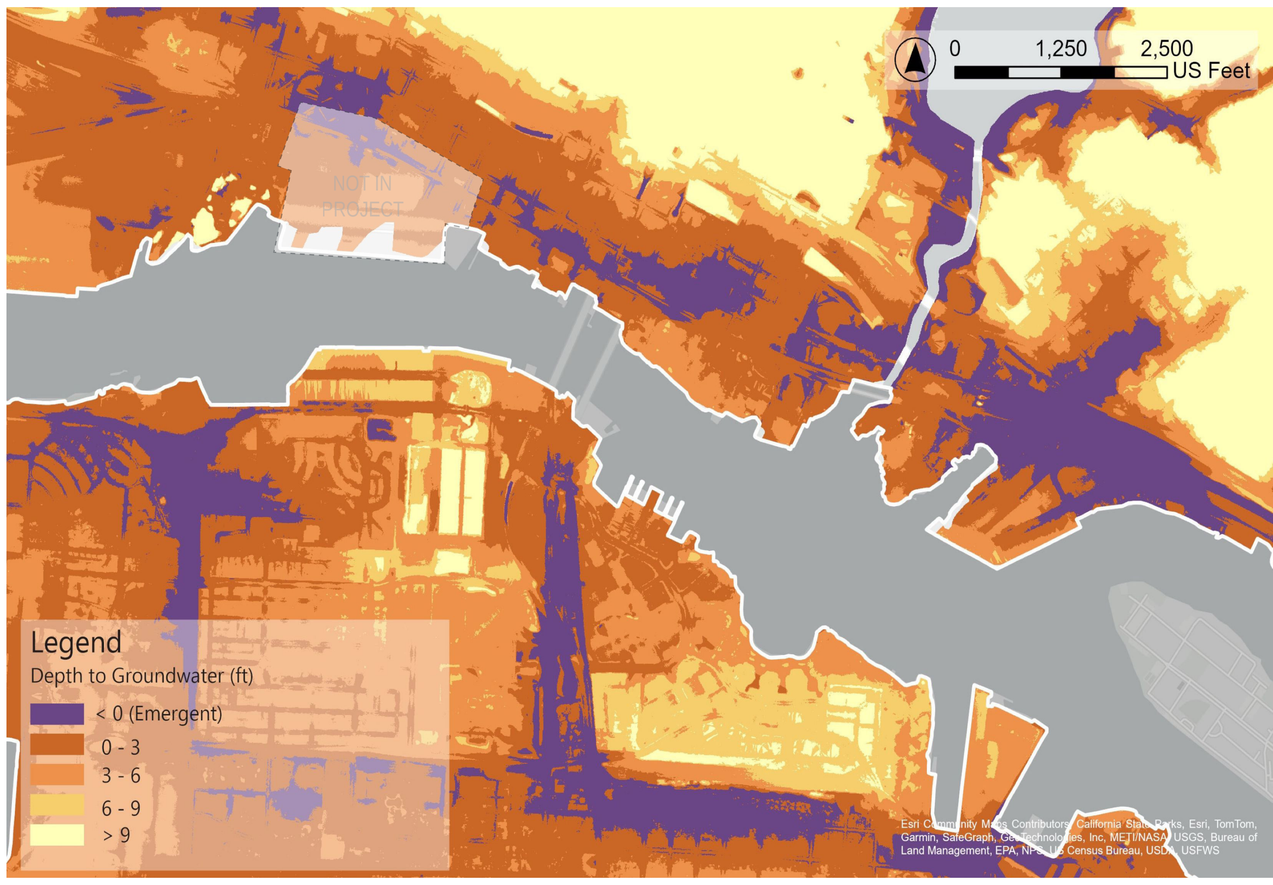
INLAND FLOODING AND GROUNDWATER RISE

As our climate warms, the intensity of rainfall events is increasing and sea levels continue to rise. During rainfall events, precipitation infiltrates into the ground, reducing the capacity of the ground to absorb water from future storm events and temporarily raising the local groundwater table. As a result, localized flooding can occur, and it is more common with storms that happen back-to-back. Meanwhile, rising bay water gradually pushes the groundwater table closer to the surface. During a storm, this further limits the capacity of the ground to absorb rainwater. The groundwater table can also rise above the ground surface and create permanent ponding on the land in places that have historically remained dry, even long after storms have passed. Portions of this project area could experience this ponding (or “emergent groundwater”) with as little as 1 foot of sea level rise. Inland flooding is caused by rainfall, and the rising groundwater table.



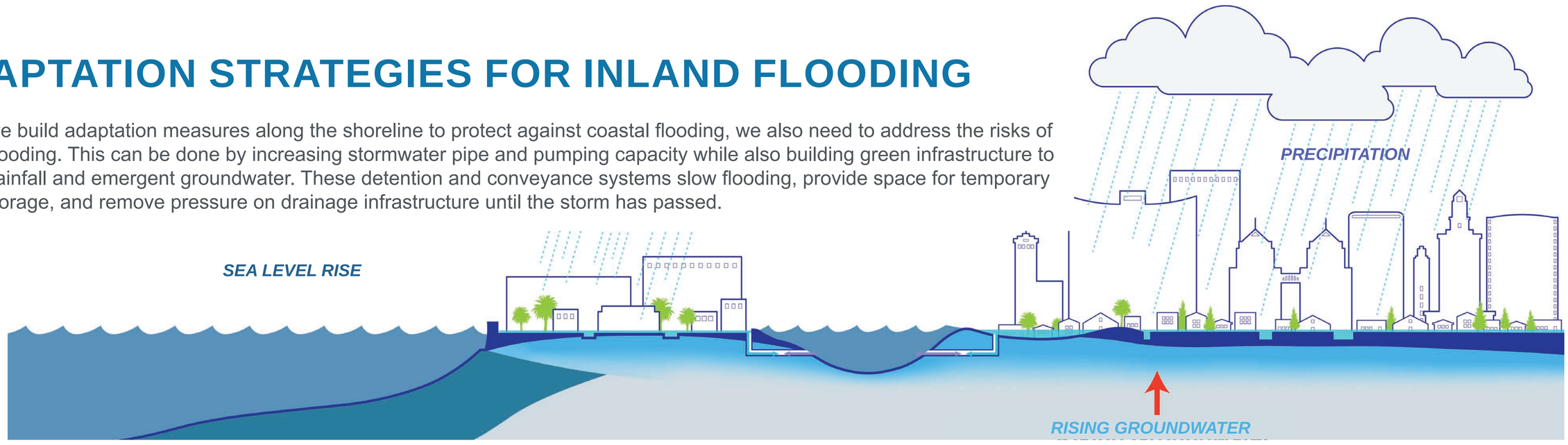
Depth to Groundwater with 2’ Sea Level Rise



Depth to Groundwater with 3’ Sea Level Rise

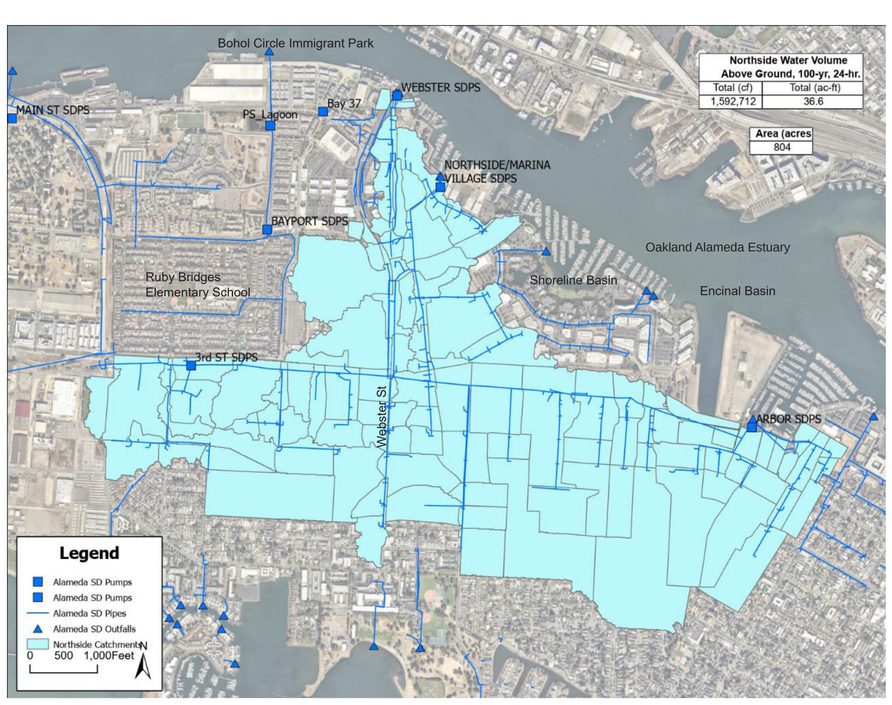
ADAPTATION STRATEGIES FOR INLAND FLOODING

When we build adaptation measures along the shoreline to protect against coastal flooding, we also need to address the risks of inland flooding. This can be done by increasing stormwater pipe and pumping capacity while also building green infrastructure to detain rainfall and emergent groundwater. These detention and conveyance systems slow flooding, provide space for temporary water storage, and remove pressure on drainage infrastructure until the storm has passed.



qvAlameda Northern Watershed and Storm Drain System

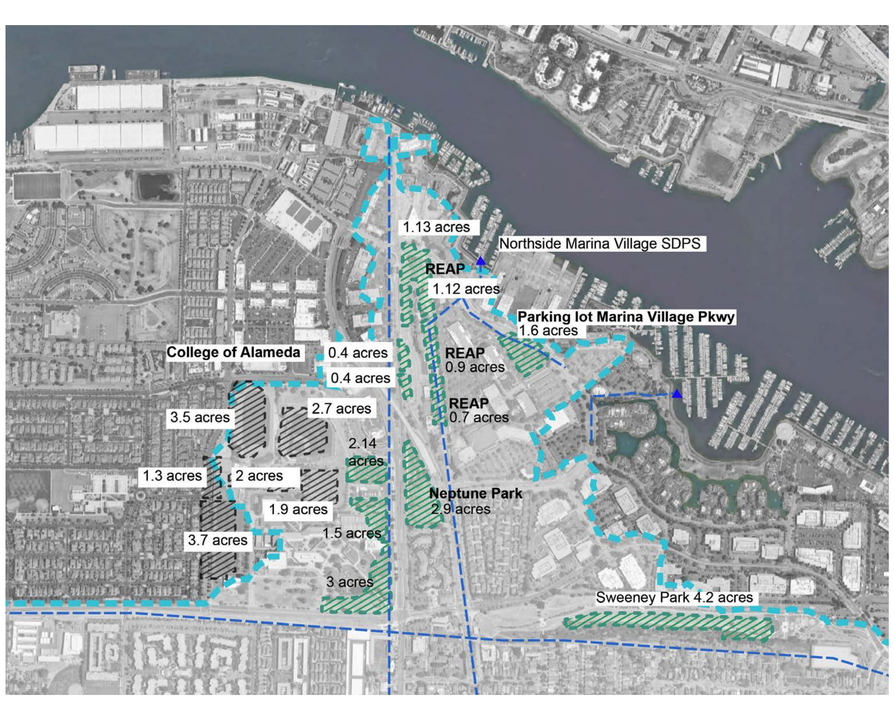
It is estimated that Alameda’s Northern Watershed requires an additional 37 acre-feet of stormwater detention to mitigate the current 100-year, 24-hour storm event. The water volume from this type of storm is estimated to increase by the following percentages in the coming decades.



		10-yr	100-yr
2050	3-hr	21.6%	25.8%
	24-hr	17.9%	22.1%
2060	3-hr	27.8%	32.7%
	24-hr	22.2%	26.8%
2070	3-hr	33.7%	39.3%
	24-hr	25.9%	31.2%
2080	3-hr	40.7%	47.1%
	24-hr	30.7%	36.6%
2090	3-hr	49.6%	56.9%
	24-hr	37.1%	43.7%
2100	3-hr	59.0%	67.2%
	24-hr	43.6%	51.0%

Proposed Detention Basins

In both the Alameda and Oakland project areas, space for new stormwater detention areas locations are being identified. Existing parks, such as Sweeney Park, could also be adapted to detain stormwater and still maintain current uses for play when detention is not needed. Green infrastructure basins provide additional benefits for habitat, parks, and streets when there isn’t an active storm. Where space is limited, green infrastructure may be combined with less visible grey systems.



Stormwater Basin at Fifth and Eucalyptus St, Alameda

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