



## SAN MATEO COUNTY NATURE BASED SHORELINE PROTECTION STRATEGIES

# Colma-San Bruno OLU

### Identifying Nature Based Solutions

SeaChange SMC released a Countywide Sea Level Rise Vulnerability Assessment in 2018 identifying San Mateo County’s key vulnerabilities. Communities throughout the County are identifying potential adaptation strategies for the shoreline. Nature based strategies provide multiple benefits, but there are questions about what strategies work in which locations throughout the bay and how they integrate with engineered strategies. This fact sheet summarizes the types of strategies identified through a stakeholder driven process. Local communities and stakeholders can use this information as high level guidance to spur cross-jurisdictional collaboration and to identify potential project areas and concepts for further evaluation.

### Types of Nature Based Solutions

Below are examples of nature based strategies. More information and details on adaptation strategies are available at: [www.resilience.sfei.org/](http://www.resilience.sfei.org/)

**Marsh:** wetlands affected by daily tides that can decrease wave energy and erosion.

**Mudflat:** a stretch of mud exposed at low tides that can protect marshes from erosion.

**Ecotone/Horizontal Levee:** a gently sloping upland, and marsh habitat supported by a flood levee on the shoreline.

**Nearshore Reef:** mix of oyster shell and baycrete to support subtidal habitat and reduce wave energy.

**Submerged Aquatic Vegetation:** underwater vegetation such as eelgrass that traps sediment and slows erosion.

### What are Operational Landscape Units (OLU)?

OLUs are areas of the shoreline extending from subtidal (i.e. areas that are always underwater, including during low tides) to inland areas. In an OLU the geology, hydrology, and climate are similar so that adaptation planning in this area benefits from being aligned. OLUs, like watersheds, span across jurisdictions. More information and details on adaptation strategies are available at: [www.resilience.sfei.org/](http://www.resilience.sfei.org/)

### Colma-San Bruno OLU Summary

There are 5 OLUs in the County. The Colma-San Bruno OLU stretches along the shoreline between the area just south of Oyster Point Marina to Coyote Point Recreation Area.

The Sea Change SMC Sea Level Rise Vulnerability Assessment evaluated a number of key assets including Pump Station 4 along Colma Creek, the Millbrae Intermodal Station, Highline Canal Tidal Gate, Old Bayshore Highway and Airport Boulevard, San Mateo Police Station, SamTrans North Base Facility, and the South San Francisco-San Bruno Water Quality Control Plant.



# SEA LEVEL RISE VULNERABILITIES AND NATURE BASED SOLUTIONS

This map shows potential flooding from a 1% storm (baseline), and 3.3 (mid-level), or 6.6 feet (high-end) of sea level rise in blue. Potential nature based solutions are shown along the shoreline.

## South San Francisco

### Vulnerabilities

The baseline scenario could flood parts of the South San Francisco/San Bruno wastewater treatment plant. The mid-level scenario could flood the wastewater treatment plant, the area near Colma Creek, and flood Highway 101. Key flood management infrastructure including levees and floodwalls would be overtopped in the mid-level scenario.

### Nature Based Solutions

The County Flood Control District and South San Francisco are developing strategies to reduce flooding impacts. Around SamTrans North Base and the wastewater treatment plant an ecotone levee, beaches and mudflat improvements could help protect the area from flooding.

## San Bruno

### Vulnerabilities

In the mid-level scenario, flooding occurs in the 7th Avenue area to 5th Avenue, Lions Park, and Belle Air Elementary School. About 44% of the city's wetlands are also vulnerable. San Bruno will need to coordinate with SFO and South San Francisco to ensure its assets are protected.

## Belmont-Redwood OLU

- Baseline scenario\*
- Mid-level scenario (Baseline + additional 3.3 ft of sea level rise)
- High-end scenario (Baseline + additional 6.6 ft of sea level rise)

### Conditions suitable for:

- Mudflat augmentation
- Beach along natural shoreline
- Beach along fortified shoreline
- Horizontal levee
- Nearshore reefs

### Existing features:

- City boundaries
- Operational landscape unit boundaries
- Major roads
- Creeks
- Tidal marsh

\* Estimated impacts are based on 1% annual chance storm or 1 in 100 chance of a storm occurring in any given year.

## San Mateo

### Vulnerabilities

In the baseline scenario, part of Highway 101 is inundated. In the mid-level scenario, the levees that protect the City of San Mateo and Foster City are overtopped, leading to flooding of Highway 101 and surrounding areas.

### Nature Based Solutions

Foster City is raising its levee height to meet Federal Emergency Management Agency accreditation and to prepare for sea level rise, which will reduce the risk of flooding in some parts of San Mateo. San Mateo completed a number of flood prevention projects in 2012, and is upgrading pumps and raising their levee as part of the North Shoreview project. Additional protection could come from adding beaches along the shoreline of these structures. The County is improving the shoreline of Coyote Point Recreation Area to account for sea level rise, with raised levees and a perched beach.

## San Francisco International Airport

### Vulnerabilities

San Francisco International Airport (SFO) could see 197 acres flood in the baseline scenario and 2,044 acres flood in the mid-level scenario. SFO has limited redundancy and is highly sensitive to flooding, as are nearby airports that would also flood. Electrical substations, hazardous material sites, underground chemical storage tanks and wetlands are vulnerable.

### Nature Based Solutions

SFO is developing plans to protect from 3 feet of sea level rise and is working with neighboring cities. SFO would benefit from coordinating with Millbrae to add an ecotone levee near Bayfront Park, and northeast along the airport's southern runway, but has considerations regarding shorebirds and air safety.

## Burlingame

### Vulnerabilities

In the baseline scenario, a small portion of Bayshore highway floods. In the mid-level scenario, nearly all of Bayshore Highway and Highway 101 are flooded, nearly reaching the Caltrain tracks. Flooding, stormwater, and energy transmission infrastructure are vulnerable. Assets that may be important in responding in the event of a crisis will also be affected, including a fire station, communication towers, highways, and outpatient health care facilities.

### Nature Based Solutions

The City launched Sea Change Burlingame, and is working with other partners in the OLU on solutions. An ecotone levee in the lagoon could help reduce flooding as could a beach, eelgrass and mudflat improvements along the shoreline. Other strategies include reducing groundwater intrusion and increasing sediment delivery to support mudflats and beaches.

## Millbrae

### Vulnerabilities

The City of Millbrae has 4 acres of land that could flood in the baseline scenario. In the mid-level scenario, Highway 101 is flooded and infrastructure designed to prevent or minimize flooding is vulnerable. The wastewater treatment facility and pumps are vulnerable.

### Nature Based Solutions

The City is developing an adaptation plan which includes levees. Nature based solutions could include improving mudflat habitat and adding beach habitat along the shoreline in coordination with SFO.

### OLU-Wide Nature Based Solutions

Coarse beaches, mudflats, and eelgrass along the Bay trail could soften the shoreline, limit marsh edge erosion, dampen wave energy, and support recreation. Management of beaches would have to include longshore transport of coarse materials and may require groins. Green stormwater infrastructure could continue to be implemented in the watershed to reduce creek flooding in the low-lying developed areas.

## CO-BENEFITS

Not only do nature based shoreline protection strategies protect from rising sea levels, they support wildlife habitat, reduce erosion from waves, can store extra carbon from the atmosphere and reduce runoff of pollutants into the Bay. Protecting existing marshes, restoring salt ponds to marsh as possible, and adding nature based features throughout the OLU would provide the following benefits. The values below assume that planned and existing marsh habitat will keep pace with sea level rise through 2050. After 2050 modeling in the Bay suggests that additional restoration and protection efforts will be required to sustain marsh.



### Coastal Protection

Tidal wetlands reduce wave height and the risk to communities and coastal structures. Marsh restoration may reduce levee height requirements, costs of levees, and risk to communities and essential infrastructure.



### Habitat

No efforts to restore marshes are planned or underway, though opportunities exist. Areas north and south of the airport are suitable for marsh restoration that could create 124 acres of marsh and 99 acres of habitat for ridgway's rail. Planned beach restoration efforts would add 27 acres of beach, but an opportunity exists to restore 138 acres of beach. If pursued, almost the entire shoreline could be restored beaches and marshes.



### Recreation

A wealth of recreation opportunities exist along miles of shoreline parks and trails. Nearly 15% of the county's recreation occurs here. Sea level rise protection strategies along the coastline, especially beach restoration and alignment with the Bay and Water Trails could maintain recreation.



### Carbon

Existing marshes in San Mateo County store as much carbon dioxide as is emitted by over 22,000 cars each year. If efforts were made to restore marsh beyond what is currently planned or underway, by 2050 the amount of carbon stored and sequestered by marsh in the OLU could amount to almost 20,000 tons. This is roughly equivalent to removing nearly 4,000 cars from the road for a year for a total of 26,000 cars.



### Stormwater Retention

Marshes retain pollutants that might otherwise reach the Bay. If marsh were restored and maintained, in contrast to hardened shorelines, over 11,788 pounds of nitrogen a year could be kept out of the Bay.



# MOVING FORWARD ON REGIONAL SEA LEVEL RISE PLANNING



Through partnerships and the actions below, the County will continue to support strategies to reduce risks from sea level rise that protect vulnerable communities, enhance the use of nature based approaches and address regional impacts.



## Partner

early and often with community-based organizations to develop culturally competent and participatory outreach and engagement strategies based on community needs.



## Develop and Coordinate

messaging and outreach to a variety of audiences, including City Councils, the public, schools, and inland neighborhoods.



## Participate

in the Climate Ready SMC Collaborative, to learn and share information and best practices, and engage community leaders in solving these multi-jurisdictional challenges and support capacity building.



## Evaluate

existing plans and policies with tools and checklists to encourage cross-jurisdictional planning and implementation of nature based sea level rise adaptation projects, and assess necessary changes to land use regulations to support adaptation projects. Consider incorporation into Community Benefits Agreements, impact fees, and other relevant development strategies.



## Submit

joint applications through the Flood and Sea Level Rise Resiliency District to grant programs for projects that will address sea level rise across jurisdictions. Examples include Bay Winds Park, Millbrae/ Burlingame hotel district, Burlingame lagoon, Resilience By Design implementation, and SFO coordination.



## Monitor

existing and planned projects to inform future work and share with stakeholders, including updates to sea level rise risks based on planned and implemented adaptation projects, develop cost comparisons, and assess unanticipated impacts.

Summaries of the other OLU and workshops are available at [seachangesmc.org/current-efforts/nature-based-shoreline-protection-strategies/](https://seachangesmc.org/current-efforts/nature-based-shoreline-protection-strategies/)

