
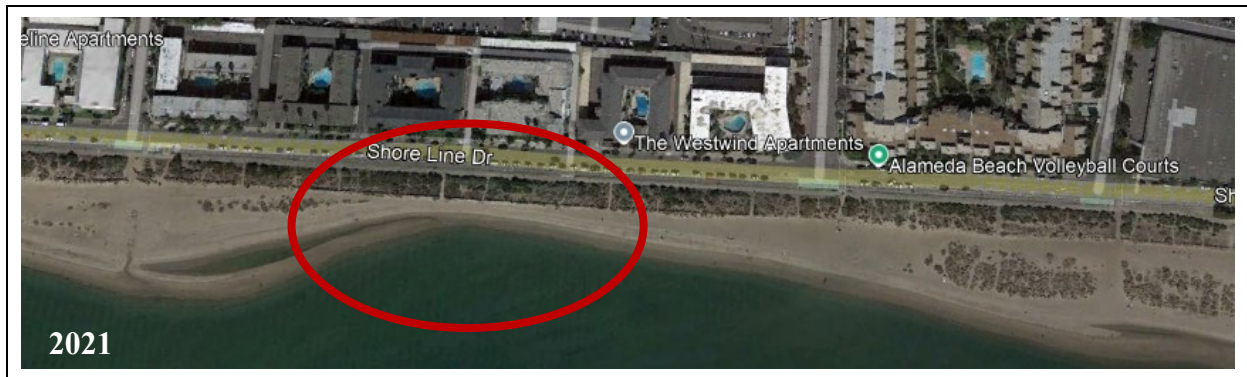


**Table 5-1 Strategy 4: Shoreline Maintenance**

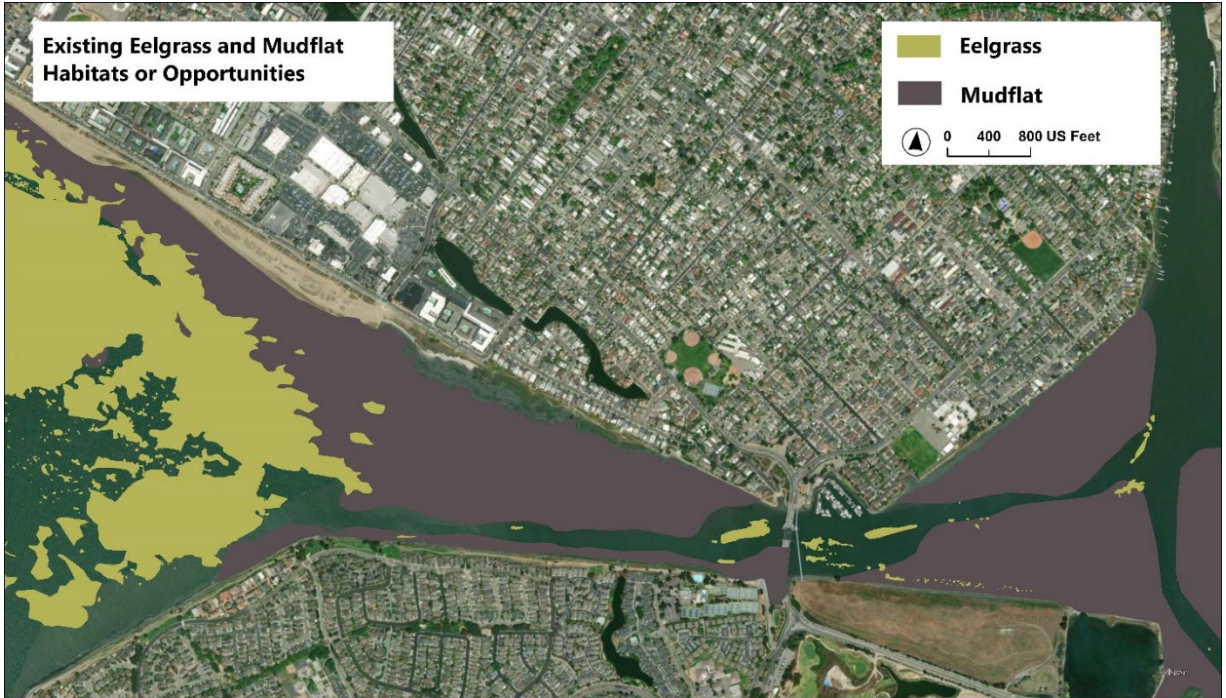
Strategy 4	Shoreline Maintenance		
<b>KEY PLANNING ISSUES:</b> Emergency Repair, Transportation	<b>VULNERABILITY ADDRESSED:</b> Ongoing coastal erosion is threatening areas such as Shoreline Drive, the Bay Farm Island northern shoreline, the San Francisco Bay Trail, and the Ballena Bay Shoreline. Additional areas could experience coastal erosion during high wind and wave events.		
<b>LEAD:</b> Public Works  <b>PARTNERS:</b> Planning, EBRPD	<b>STRATEGY SUMMARY:</b> Alameda and Bay Farm Island have both natural or “soft” shorelines and armored shorelines protected by seawalls, engineered revetments, and riprap. The areas at greatest risk of coastal erosion based on historical conditions are typically armored. However, rising seas and changing storm conditions are increasing the erosion risk of soft shorelines.  The shoreline is eroding in numerous places, exposing irrigation infrastructure and reducing habitat space and open space. Materials used to stabilize the shoreline include biodegradable organic, riprap and vegetation; all of which require periodic replacements and upgrades, especially after winter storms and extreme high tides.  Interim remedies are needed at select locations to prevent further erosion.  Between 2021 and 2023, design and permitting was initiated to repair two eroded locations along the Bay Farm Island Northern Shoreline and at South Shore Beach in 2024 by EBRPD.		
<b>TIMEFRAME:</b> Flood Risk Reduction Measure (0-3 years)	<b>STATUS:</b> Proposed	<b>HAZARD(s):</b> Coastal erosion	<b>COORDINATED STRATEGY:</b> Strategy 3, Strategy 5, Strategy 6, Strategy 11, City of Alameda CIP No. C35000
			



**Table 5-2 Strategy 5: South Shore Geomorphology / Ecological Study**

Strategy 5		South Shore Geomorphology / Ecological Study	
<b>KEY PLANNING ISSUES:</b> Data Gap / Uncertainty, Habitat		<b>VULNERABILITY ADDRESSED:</b> Sand movement along Crown Beach, South Shore Beach, Elsie Romer Bird Sanctuary, and within the San Leandro Bay Estuary is a key uncertainty for the implementation of nature-based strategies.	
<b>LEAD:</b> Planning  <b>PARTNERS:</b> Public Works, California State Parks, EBRPD		<b>STRATEGY SUMMARY:</b> South Shore and Crown beaches are manmade features requiring ongoing annual sand management. Understanding the natural movement of sand between the Bay and the beaches, and along the beach towards the San Leandro Bay Estuary will help inform potential natural-based pilot studies that may improve sand management and help address future sea level rise and coastal erosion. The study should leverage existing resources, including EBRPD sand management records, and include new modeling and research to better understand how geomorphic and ecological features, such as mudflat augmentation or eelgrass restoration, may reduce sediment loss and enhance sand management activities.	
<b>TIMEFRAME:</b> Flood Risk Reduction Measure (0-3 years)	<b>STATUS:</b> Proposed	<b>HAZARD(s):</b> Coastal erosion, Coastal overland flooding	<b>COORDINATED STRATEGY:</b> Strategy 4, Strategy 11

**Table 5-3 Strategy 10: Mudflat and Eelgrass Restoration Pilot Project**

Strategy 10		Mudflat and Eelgrass Restoration Pilot Project	
<b>KEY PLANNING ISSUES:</b> Habitat		<b>VULNERABILITY ADDRESSED:</b> The Elsie Romer Bird Sanctuary is at risk of coastal erosion, resulting in wetland and habitat loss.	
<b>LEAD:</b> Planning  <b>PARTNERS:</b> Public Works, EBRPD, California State Coastal Conservancy		<b>STRATEGY SUMMARY:</b> The findings from Strategy 5 may inform a pilot project to enhance sediment management, mitigate habitat loss, and dissipate wave energy. The project could include incrementally placing dredged sediment (of suitable quality) on the mudflats to help maintain the necessary elevation and structure of the mudflats as sea levels rise. The maintained mudflats could support submerged aquatic vegetation (e.g., eelgrass) and wetland habitat, promoting resilience of the bird sanctuary.	
<b>TIMEFRAME:</b> Near-term (3-10 years)	<b>STATUS:</b> Proposed	<b>HAZARD(s):</b> Coastal erosion	<b>COORDINATE WITH:</b> Strategy 5, Strategy 11
			

**Table 5-4 Strategy 11: Shoreline Drive / Crown Beach Adaptation**

Strategy 11	Shoreline Drive / Crown Beach Adaptation
<p><b>KEY PLANNING ISSUES:</b></p> <p>Existing Structures, Transportation, Recreation, Habitat</p>	<p><b>VULNERABILITY ADDRESSED:</b></p> <p>The vegetated sand dunes along Shoreline Drive provide coastal flood risk reduction to inland residences and businesses; however, with 12 inches of sea level rise, coastal floodwaters could overtop the shoreline and flood inland areas. Rising sea level may compromise the viability of the Elsie Roemer Bird Sanctuary's tidal wetland ecosystem, impacting Bay-wide diversity.</p>
<p><b>LEAD:</b></p> <p>Planning</p> <p><b>PARTNERS:</b></p> <p>Public Works, EBRPD, California State Parks</p>	<p><b>STRATEGY SUMMARY:</b></p> <p>As noted in Strategy 4, coastal erosion of the sand dunes is already threatening a portion of the Bay Trail and Shoreline Drive. As sea levels rise and storms increase in intensity, coastal erosion could become more widespread, increasing the extent of inland flooding. A more permanent solution is needed to mitigate coastal erosion and inland flooding, while also maintaining the beaches and tidal wetlands. Alameda's beaches are the most visited beaches in the Bay Area, providing recreation and economic benefits to the City. The Elsie Roemer Bird Sanctuary is one of the few remaining tidal wetlands on the Alameda shoreline, providing food and refuge for migrating and local bird populations.</p> <p>The project would replace the interim Strategy 4 and be informed by the findings of the Strategy 5 pilot study. A potential solution could include burying armor stone below the sand dunes (mitigating coastal erosion) and raising the heights of the sand dunes (mitigating inland coastal flooding). Beach access and a sand management plan should be included.</p> <p>This strategy could be planned, designed, and implemented in tandem with Strategy 3, 4, 6, and 10.</p>
<p><b>LIMITATIONS AND BARRIERS:</b></p> <p>In the near term, with continuation of dune management and annual sand redistributions, the beach may continue to provide a range of services to the community. Over the next decade these benefits may degrade without a clear vision established among EBRPD, the City, and the community for the future of the beach. Key questions include:</p> <p>How much of Crown Beach must be maintained as a beach to continue providing recreational benefits?</p> <p>Can the ecosystem services that the beach, dunes, and marsh provide be quantified and can a system be established to pay for their maintenance?</p> <p>How will tidal wetlands habitat be incorporated into the adaptation plans for the shoreline?</p> <p>Adaptation strategies that include expanding the beach into the Bay with fill may encounter permitting challenges related to the Bay Conservation and Development Commission (BCDC) policies, which limit fill in the Bay. However, BCDC may approve adaptation strategies with Bay fill that restore or enhance tidal wetlands. The City of Alameda should continue engaging in regional conversations encouraging BCDC to re-evaluate these policies as the Bay adapts to sea level rise.</p>	
<p><b>COSTS AND BENEFITS:</b></p> <p>Adapting the Crown Beach shoreline will benefit the nearby residential areas and businesses that receive direct flood risk reduction from the dunes. Maintaining the beaches and beach access will provide economic benefits to Alameda businesses and the City. Strategies that emphasize nature-based solutions, such wetland, dune, and eelgrass conservation and enhancement would support biodiversity into the future. Losing these ecosystems would impact local and Bay-wide biodiversity.</p>	



There will be trade-offs between maintaining the beaches and maintaining the transportation corridor along Shoreline Drive.

#### CASE STUDIES AND EXAMPLES:

As EBRPD and the City of Alameda clarify the vision for the future of Crown Beach (through the Crown Beach Master Planning process) and learn more about the geomorphology of the site with additional studies, it will be useful to examine other beach adaptation projects for guidance, such as the Cardiff Living Shoreline Project. This project, conducted by the San Elijo Lagoon Conservancy, California State Coastal Conservancy, and California State Parks in Encinitas, is building a 0.5-mile dune system on Cardiff State Beach to protect Highway 101 from sea level rise.

The San Francisco Bay Living Shorelines Project provides a local example of lessons learned on integrating eelgrass restoration and oyster reefs offshore.

#### TIMEFRAME:

Near-term (3-10 years)

#### STATUS:

Proposed

#### HAZARD(s):

Coastal erosion,  
Coastal overland  
flooding

#### COORDINATED STRATEGY:

Strategy 3, Strategy 4,  
Strategy 6, Strategy 10,

