

Draft

# TISCORNIA MARSH HABITAT RESTORATION AND SEA LEVEL RISE ADAPTATION PROJECT

Project Description

Prepared for  
Marin Audubon Society

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# TISCORNIA MARSH HABITAT RESTORATION AND SEA LEVEL RISE ADAPTATION PROJECT

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## Project Description

### Project Location and Setting

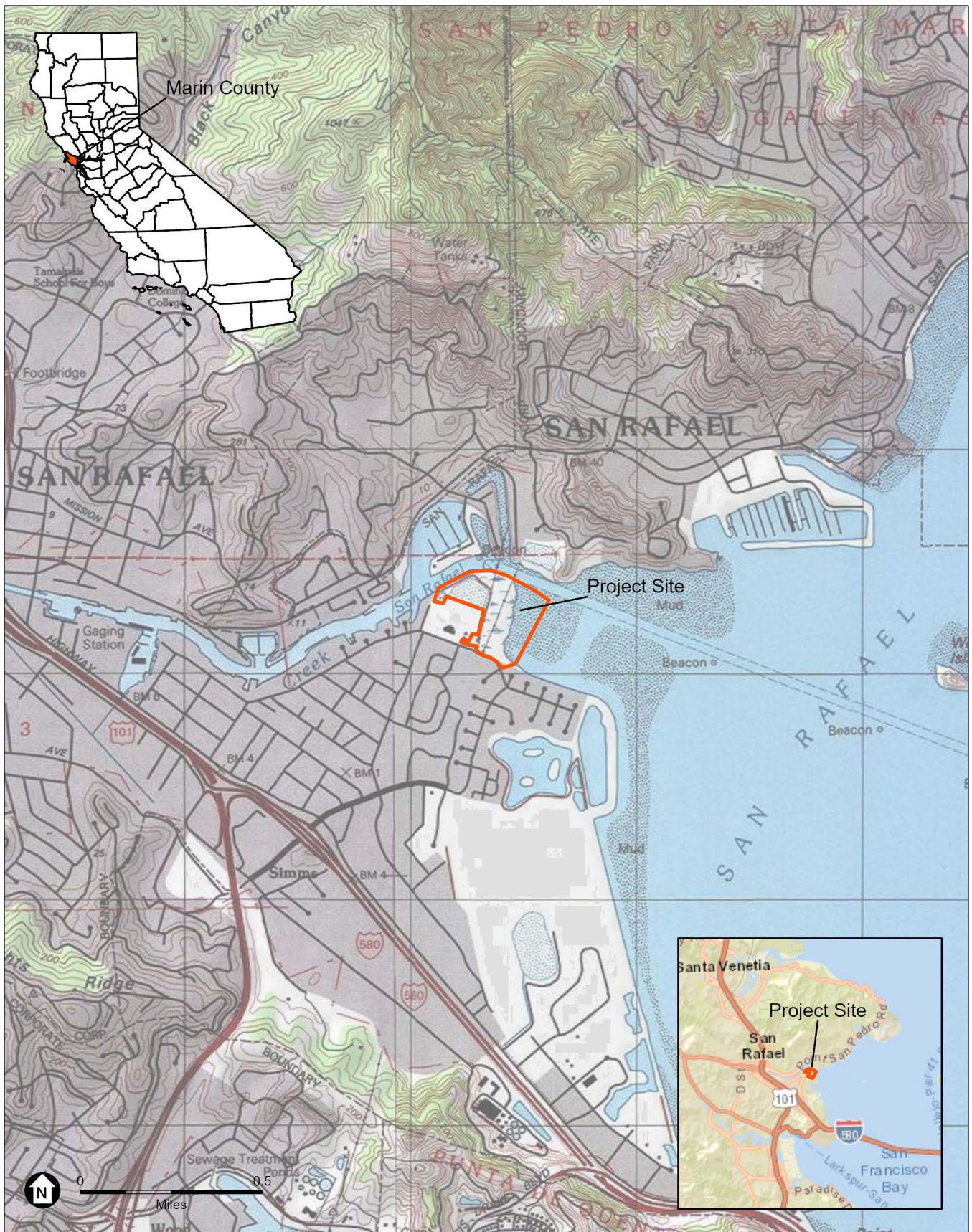
The Tiscornia Marsh Habitat Restoration and Sea Level Rise Adaptation Project (Proposed Project) would restore former tidal marshlands and improve shoreline levee on a 28-acre site at the confluence of San Rafael Canal and San Rafael Bay (**Figure 1**). The Project Site is along the north boundary of the Canal neighborhood in Central San Rafael, at Assessor's Parcel Numbers (APNs) 009-142-01, 009-032-06, 009-032-08, and 009-032-09.

Tiscornia Marsh is bounded on the west by the Al Boro Community Center and Pickleweed Park. To the north is San Rafael Canal and to the east is San Rafael Bay. The location of former Schoen Park (removed in 2019) lies south of the Tiscornia Marsh shoreline levee, on the southeastern portion of the Project Site, bordered by Spinnaker Point Drive (**Figure 2**). The shoreline levee that traverses the Project Site, which is used as a recreational trail, is part of the shoreline flood protection system for the southeastern shoreline of San Rafael Creek (Canal). The existing shoreline levee encloses Al Boro Community Center and Pickleweed Park and then extends east along the San Rafael Bay shoreline, past the Spinnaker and Baypoint developments and the Canalways property, and then on to the Richmond-San Rafael Bridge area. The west end of the existing shoreline levee ends on the west side of Pickleweed Park, adjacent to private residences, transitioning to lower ground elevations and an inconsistent flood protection system on private property along the south bank of San Rafael Canal.

### Background

The Project Site includes the 21-acre Tiscornia Marsh property and approximately 500 feet of shoreline levee/trail owned by Marin Audubon Society (MAS), as well as currently diked salt marsh within Pickleweed Park, approximately 2,000 feet of shoreline levee/trail, and a portion of former Schoen Park (now a vacant lot) owned by the City of San Rafael (City). Proposed Project activities would reconstruct highly eroded Tiscornia Marsh, reconnect the diked marsh in Pickleweed Park to tidal inundation, and fortify the local shoreline against sea level rise.

The low-lying Canal neighborhood adjacent to Tiscornia Marsh is currently at risk to coastal flooding, as is a significant extent of central San Rafael that occupies what was once tidal marshlands and open bay. The area is currently in the Federal Emergency Management Agency (FEMA) 100-year floodplain and will be increasingly susceptible to flood hazards as sea level



SOURCE: USGS, Esri

Project Name

**Figure 1**

Regional Setting

Tiscornia Marsh Restoration and Sea level Rise Adaptation







SOURCE: Aerial Imagery: Esri

160888.01

**Figure 2**  
 Project Location  
 Tiscornia Marsh Restoration and Sea level Rise Adaptation

rises, as described in Marin County's recent Marin Bay Waterfront Adaptation Vulnerability Evaluation (BayWAVE) (BVB, 2017). Much of the Canal neighborhood lies below high tide elevations, requiring pump stations to remove storm water and shoreline levees to protect against coastal flooding. The reach of San Rafael Creek shoreline upstream of the Project Site is vulnerable to flooding, as many buildings have encroached on the shoreline edge and there is no formal flood protection system.

The roughly 2,500 feet of shoreline levee on the Project Site is an un-accredited earthen berm, which varies in height and does not meet the FEMA freeboard requirements, with much of its length below the required elevation of the 100-year base flood elevation (BFE) plus two feet of freeboard. A segment of the levee near the former Schoen Park is even lower, below the 100-year BFE level. Portions of the shoreline levee segment on the Tiscornia and Pickleweed Park properties are therefore at risk of overtopping during an extreme coastal flood event, resulting in flooding of low-lying portions of the adjacent Canal neighborhood.

In addition, the tidal marshlands have experienced considerable erosion over the past 30 years, retreating as much as 200 feet, with approximately three acres lost. This erosion has resulted in the significant loss of habitat for the endangered Ridgway's rail and salt marsh harvest mouse, migratory shorebirds, and other important marsh wildlife. Marsh loss is exacerbated by the current lack of a functional wetland-upland transition along the marsh's landward boundary, which currently transitions abruptly to the steep levee embankment.

Both of these conditions are expected to worsen in the coming decades as sea level rises. Sea-level rise of about eight inches has already occurred in the last century and several feet or more of sea-level rise is projected by the end of this century. By elevating Bay water levels, sea-level rise will increase the frequency and severity of flooding along the City's shoreline.

## Anticipated Approvals and Permits

The anticipated regulatory permits and consultations that would be needed for the Project are shown in **Table 1** below. These potential permitting requirements are preliminary and may change during pre-application coordination with the regulatory agencies or as the project design develops.

## Project Description

Tiscornia Marsh would be restored to its former extents by beneficially reusing dredged material from local sources. A coarse beach would be constructed along the bayward edge of the restored marsh to resist future erosion. Tidal action would also be restored to the City-owned diked marsh at the north end of Pickleweed Park. Altogether, the project would reconstruct approximately four acres of eroded tidal marsh, preserve and protect the approximately eight remaining acres of Tiscornia Marsh, and restore approximately five acres of diked marsh by reconnecting it to tidal inundation. The Project would also construct a new 600-foot setback levee and improve approximately 1,100 feet of shoreline levee to achieve greater flood protection, public access, and habitat benefits. Major Project elements are summarized below.

**TABLE 1  
ANTICIPATED REGULATORY REQUIREMENTS**

<b>Agency</b>	<b>Governing Regulation</b>	<b>Potential Requirement*</b>
U.S. Army Corps of Engineers	Clean Water Act Section 404, Rivers and Harbors Act Section 10	Nationwide Permit Pre-Construction Notification
U.S. Fish and Wildlife Service	Endangered Species Act, Fish & Wildlife Coordination Act (FWCA), Migratory Bird Treaty Act (MBTA)	FESA Section 7 Consultation
National Marine Fisheries Service	Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act	FESA Section 7 and Magnuson-Stevens Fishery Conservation and Management Act Consultation
Bay Conservation and Development Commission (BCDC)	McAteer-Petris Act	Administrative Permit
State Water Resources Control Board	National Pollution Discharge Elimination System (NPDES)	Storm Water Pollution Prevention Plan for Construction Activities
San Francisco Bay Regional Water Quality Control Board	Clean Water Act Section 401; Porter-Cologne Water Quality Act	Water Quality Certification/Waste Discharge Requirements
State Lands Commission		Lease or lease amendment

## Coarse Beach Construction

A coarse beach feature (man-made beach constructed of course-grained materials like gravel), approximately 50 to 60 feet wide, would be constructed beyond the edge of Tiscornia Marsh, extending from the marsh's bay-side mudflat to an approximate elevation of nine feet above sea level. This crest elevation is anticipated to protect the area behind the beach from high tides, wave runup, and erosion during an average year's storm events. The crest of the beach would be planted with high marsh vegetation and would transition gradually to newly created tidal marsh on the landward side.

This coarse-grained feature would emulate naturally occurring beaches in San Francisco Bay, consisting predominantly of gravel, with a minor portion made of sand and gravel, and larger cobbles (e.g. 4- to 9-inch diameter) used for the beach subgrade. Coarser beach materials such as cobble would be more durable against storm events and less likely to drift laterally into the canal. The coarse beach would provide multiple benefits, including increasing the stability of eroding shorelines, creating aquatic, transitional, and/or wetland habitats, and providing a platform for ecosystem adaptation to sea-level rise. Over time, the coarse beach is expected to persist as sea level rises, responding by adjusting its profile landward and upward.

A series of retention groins, constructed of wood and/or rock, would be incorporated into the beach to restrict longshore drift and retain sufficient sand and gravel in the beach profile. In addition, a flexible jetty structure constructed of suitably sized cobble would be built at the north end of the new marsh and beach to reduce erosion and prevent the movement of beach sediment into the canal.

## Eroded Tidal Marsh Reconstruction

The existing mudflat outboard of Tiscornia Marsh would be filled to re-create approximately 4 acres of tidal marsh. The marsh would be created by placing approximately 40,000 cubic yards of locally-obtained Bay muds compatible with the existing marsh. Dredged sediments would be mechanically dredged, transported to the site via barge, and mechanically unloaded and placed in the existing mudflat.

Prior to dredged fill placement, the coarse beach would be partially constructed along the water's edge of the new marsh area, the crest of which would be high enough to contain dredged material and isolate the work area from open waters. Alternate Project features (i.e., ecotone slope, discussed below) and protection measures (e.g., coir logs) would contain the south and west sides of the fill placement area. Placed material would slowly experience consolidation by draining and drying.

Following fill placement, a tidal channel would be excavated along the existing marsh edge to connect to the existing marsh channel system that drains to the canal. To the extent feasible, the new channel would expose and/or recreate the overhanging vegetation at the marsh edge to provide preferred suitable conditions for Ridgway's rail foraging.

## Diked Marsh Restoration

The diked marsh bordering Pickleweed Park is at mid-marsh elevation and dominated by pickleweed, but it is isolated from the tidal action of the Bay by the shoreline levee. Tidal action would be restored by lowering and breaching the shoreline levee and excavating a tidal channel network of one to three branching channels, connecting the diked marsh to the Bay through the breached levee. Portions of the levee around the diked marsh would be lowered and revegetated to create disconnected high marsh and upland transitional habitat and to deter terrestrial predator access. Two non-native palm trees would be removed for this work.

There is a small City-owned pond west of the diked marsh that is disconnected from adjacent habitats and has limited ecological value. This triangular pit is fenced off and has no known drainage inlet or outlet. The pit would be partially filled as needed to connect the new setback levee to the existing shoreline. The remainder of the pit would likely be graded and planted to transition to the restored wetlands.

## Shoreline Levee Improvements

The shoreline levee/trail around the diked marsh would be lowered and breached (see *Diked Wetlands Creation* section above), replaced with a new setback levee along the north side of the soccer field, approximately 200 to 400 feet behind the location of the existing levee. The rest of the existing levee (approximately 1,100 feet on the west and south side of the existing Tiscornia Marsh) would be raised and/or widened in place to provide uniform flood protection meeting regional flood protection standards. The improved levee segments would also include asphalt-paved trails at the levee crest to provide a uniform surface for public access, whereas the existing trail segments are mainly unpaved.

The existing levee between Pickleweed Park and the west side of Tiscornia Marsh would be raised one to two feet, but no grading is proposed in or adjacent to the marsh in this segment. The improved levee along the south end of Tiscornia Marsh would be shifted landward onto City property to accommodate levee raising and the proposed ecotone slope (see *Ecotone Slope Development* section below). The total levee footprint, accounting for the ecotone slope, would be approximately 80 feet wide. The toe of the ecotone would be at the edge of the existing marsh, which is closer to the levee at the west end, and further away at the east end. Therefore, the amount of encroachment on the City's property would vary from 20 to 30 feet, west to east. The expanded levee would likely require removal of three to four existing trees, including non-native acacias and one pine tree.

## Ecotone Slope Development

The new setback levee and improved levee segments discussed above would include a gradually-sloped ecotone transition to the outboard marsh. This ecotone transition would provide both ecological and flood benefits, including high tide refugia for native marsh wildlife, shoreline erosion protection through wave-dampening, and allow for marsh landward transgression under future sea-level rise.

The ecotone slope would be located where feasible between existing and/or restored marsh and the shoreline levee. It would be constructed along the raised levee along the south end of Tiscornia Marsh, as well as the new setback levee between the soccer field and the diked marsh. Each segment is approximately 500 linear feet, for a total length of 1,000 feet. The ecotone would be sloped at 10:1 (horizontal: vertical) and would be approximately 30 feet wide, totaling roughly 0.7 acres.

The slope would be planted with native vegetation adapted to historic ecotones, intermixing high marsh and upland species adapted to infrequent flooding and salinity, and including grasses for nesting materials. Plant cover must be consistent throughout the year and reach elevations that remain emergent (above one foot in height) through the highest tides, so that small marsh mammals and secretive marsh birds can find cover from predation. The ecotone slope may be temporarily irrigated during the initial plant establishment period.

## Construction Phasing

Construction at the site would likely be phased over three to four years. The diked marsh would be restored first, to provide expanded marsh habitat for Ridgway's Rail and other wildlife, prior to constructing in and adjacent to Tiscornia Marsh. Levee improvements would be performed concurrently with diked marsh restoration to limit disruptions and eliminate soil off-haul.

The second phase of construction would include partially constructing the beach for containment. The exact timing of the second phase would be closely coordinated with planned dredging of source material. The beach and site preparation work would start six months to a year before dredged material is transported to the site.

## Construction Approach

Construction activities would be required for levee creation and improvements, marshplain restoration and creation, beach installation, and revegetation. Construction activities would include:

### Site Preparation:

- Setup of construction staging, access, storage, and fueling areas.
- Site preparation, including installing erosion and sediment control measures to protect existing diked and tidal marsh.
- Selective vegetation clearing in footprint of levee improvements and marsh channel excavation, including measures that are protective of salt marsh harvest mouse and other marsh wildlife.
- Removal of non-native trees as needed for levee raising in former Schoen Park and selective removal of non-native palm trees in the marsh.
- Over-water installation of crane platform on the San Rafael Canal.

### Shoreline Levee Improvements and Diked Marsh Restoration:

- Fill import and placement for levee raising and/or setback levee construction.
- Planting and temporary irrigation and erosion control of levee ecotone slope.
- Excavation of tidal channels within the diked marsh and placement of excavated material to construct the ecotone.
- Lowering and/or scarifying the perimeter levee, and reusing material onsite for the ecotone slope.
- Grading the pond to transition to the restored diked marsh.
- Final trail surfacing of the levee crest.

### Eroded Tidal Marsh and Coarse Beach Construction:

- Phased construction of cobble berm along the crest of the future beach and the cobble groin to serve as land-based access route and containment of the placed dredged material.
- Water-based import and unloading of dredged material from the crane platform on the San Rafael Canal, and mechanical placement and drying to recreate the tidal marsh.
- Placement and shaping of mixture of cobble, gravel, and shell hash to construct the beach.
- Excavating tidal channels connecting to the existing channel within the recreated tidal marsh. This would occur after placed fill material has time to consolidate.
- Shaping and planting the crest of the cobble berm to create smooth transition between the beach and newly constructed marsh.