San Francisco Bay Conservation and Development Commission
375 Beale Street, Suite 510, San Francisco, California 94105 tel 415 352 3600 fax 888 348 5190
State of California | Gavin Newsom – Governor | info@bcdc.ca.gov | www.bcdc.ca.gov

March 24, 2023

Consistency Determination Summary

Strategic Aquatic Sediment Placement Pilot Project

(For Commission consideration on April 6, 2023)

BCDC Consistency Determination Number:	C2022.011.00
Federal Agency:	U.S. Army Corps of Engineers
Project Description:	Place up to 100,000 cubic yards of sediment dredged from the Redwood City Federal Navigation Channel in a 138-acre subtidal area to test whether the tides and currents would transport the sediment into Whale's Tail intertidal mudflats and marsh, and potentially portions of Eden Landing Ecological Preserve, thus augmenting the natural sediment supply to the tidal marsh. The pilot project would include monitoring of the project to determine its efficacy.
Location:	Within the San Francisco Bay Coastal Zone, in a subtidal and intertidal areas of the Bay, adjacent to and within Whale's Tail Marsh and Eden Landing Ecological Reserve in the City of Hayward, Alameda County.
Consistency Determination Filed Complete:	February 20, 2023
Deadline for Commission Action:	June 15, 2023
Staff Contact:	Brenda Goeden (415/352-3623; brenda.goeden@bcdc.ca.gov)

Project Overview

Project Description

The U.S. Army Corps of Engineers (USACE) proposes to test a novel approach to increasing sedimentation at Whale's Tail Marsh and adjacent mudflats. The overarching goal is to determine if this technique would support the adaptation of marshes and mudflats to rising seas in the future. While Whale's Tail Marsh is not currently drowning, it is important to test this potential tool early such that its efficacy is better understood, and barriers and benefits can be assessed prior to needed sea level rise adaptative management.

This pilot project approach includes placement of up to 100,000 cubic yards (cy) of sediment dredged from the Redwood City Federal Navigation Channel at an approximately 138- acre subtidal area located adjacent to and two miles from Whale's Tail Marsh. The goal is to use the local tidal hydrology, i.e., tides and wind driven currents, to transport the dredged sediment onto Whale's Tail marsh and adjacent mudflats to augment the natural sediment supply to the marsh. The purpose of testing this technique is to determine whether in-water aquatic placement of sediment is a cost-effective measure that would assist marshes and mudflats in adapting to rapidly rising seas. The pilot project includes pre-, concurrent, and post-placement monitoring of the subtidal placement site, adjacent mudflats, fringing tidal marsh, and specific areas within the Eden Landing Ecological Reserve connected to the Bay via tidal channels.

The proposed project involves work within San Francisco Bay Coastal Zone and Management Program, including subtidal and intertidal areas of the coastal zone. The placement site and target marsh and mudflats are located with the City of Hayward boundaries, in Alameda County.

Figure 1. Vicinity Map. Dredged sediment will be provided by the Redwood City Federal Navigation Project in Redwood City, San Mateo County. The Pilot Project subtidal placement site is located in the City of Hayward in Alameda County.

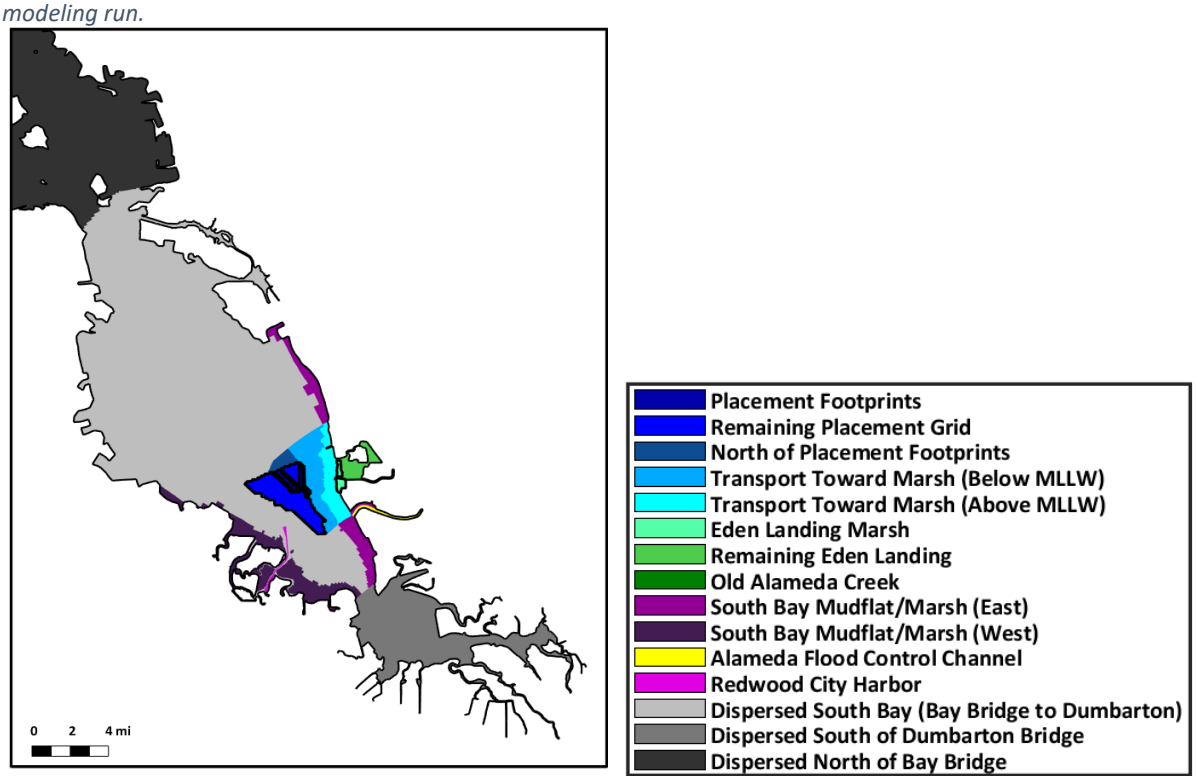
The USACE states that the goal of the pilot is to determine if this Engineering with Nature approach can be a successful, lower-cost method to achieve beneficial use of sediment relative to the cost of traditional placement options (i.e., ocean, in-Bay, or upland sites). This project aims to understand: (1) the scale of sediment deposition post-placement at the placement site, on the intertidal mudflat, and on the adjacent tidal marsh; (2) wind, wave, and sediment flux conditions pre- and post-placement across the interconnected subtidal-mudflat-marsh complex; and (3) the recovery time for the physical and biological systems, including adjacent eelgrass beds and the subtidal habitat.

The USACE anticipates beginning the project in September 2023 and continuing through November 2023, with dredging at the Redwood City Harbor federal navigation project. Prior to dredging, all sediment proposed for use in the pilot project would be tested for contaminants and reviewed and approved by the multi-agency Dredged Material Management Office (DMMO). The sediment would be transported across the Bay via dredge scows, that are lightly loaded with approximately 900 cy of clean, fine grain sediment (mud, silts, and clay), which would be bottom dumped into approximately 9 to 12 feet deep Bay water. The thickness of the sediment placed in the subtidal area is anticipated to be between 0.33 feet and 1 foot. The scows must be light loaded to navigate safely into shallow water. The placement is anticipated to take between 19 and 56 days, using the flood tides, and making approximately 112 trips to the placement site. Use of the flood tide is necessary for safe navigation, but also to use the tidal energy to push sediment towards the mudflat and marsh.

Figure 2. Strategic Sediment Placement footprint, approximately 138 acres, shown in light blue. Sediment transport target Whales Tail Marsh (shown in pink) and adjacent target mudflats, show in white, south of the San Mateo Bridge, with Eden Landing shown in green.

Once sediment is deposited, it is anticipated that the tides and currents will begin reworking the sediment, transporting it toward the marsh and other areas of the Bay. The USACE has computer-modeled how the pilot project sediment would disperse for two months after placement, providing the project team with an understanding of the likely sediment transport and deposition areas and amounts. Based on the modeling effort, the USACE anticipates approximately 8% of the sediment would be transported to the mudflats adjacent to Whale's Tail Marsh, and 1% of the sediment transported to Whale's Tail Marsh or areas of Eden Landing generally. At the end of the modeling simulation, 20% of the sediment remained in the placement footprint, and 22% moved toward the marsh below MLLW, 18% dispersed to the South Bay (Figure 3). The remainder, approximately 31% would move to other areas of the Bay, including other shallow subtidal areas outside of the Eden Landing area.

Figure 3. Modeling results depicting areas to which the deposited sediment would be transported during the 2-month modeling run.



The US Geological Survey, in cooperation with the USACE, will monitor the placement site, Whale's Tail marsh, and adjacent mudflats for sedimentation levels prior to the placement, and increased sedimentation immediately following sediment placement. The proposed monitoring plan includes the following activities in the subtidal areas: repeat bathymetric surveys of the Bay floor to assess the rate of sediment dispersal; time series data collection on wave energy, tides, currents, and suspended sediment levels to understand sediment transport drivers; shallow sediment samples to understand sediment deposition and erodibility; sediment core sample examination for invertebrates and physical parameters; eelgrass monitoring for effects of increased turbidity (light reducing sediment in the water); and a tracer study to assist in understanding sediment transport pathways. Proposed monitoring in the marsh includes sediment deposition using two methods, and support for the sediment tracer study. The draft monitoring plan includes various periods of monitoring from a period of three months to 1 year.

Bay Fill

The proposed project would result in approximately 100,000 cy of Bay fill over 138 acres of subtidal habitat. Because the fill is sediment dredged from the Redwood City federal navigation channel, the project results in no net fill.

Subtidal and Intertidal Habitat Impacts

As described above, a significant subtidal area would be filled, potentially temporarily, causing the burial of the benthic community and a forage area for native and listed species of fish. An adjacent small eelgrass patch, located approximately 1.5 miles from the placement site, may be affected by turbidity created by placing the sediment over three months.

The USACE proposes to monitor these impacts such that the pilot project can be assessed and the benefits weighed against the impacts. Because the modeling simulated only a two-month period, it is not clear if the sediment placed by the dredge scows will fully dissipate or if some will remain as a feature of the subtidal area.

The placement of the dredged sediment is anticipated to bury most of the invertebrates that inhabit the area, though some may be able dig out, depending on the thickness of the sediment placed. Further, the sediment placed may be a different grain size or composition than the existing Bay bottom, which is mud and shell hash. This may represent a conversion of subtidal habitat type such that the benthic or pelagic community may shift in this area. The monitoring is intended to capture the initial impacts but may not be sufficient to observe whether the community fully re-establishes and whether the potential impacts are temporary or permanent.

The potential impacts to Whale's Tail Marsh and adjacent mudflats are expected to be minimal based on the modeling and expected sediment deposition of 1-2 millimeters in the initial period and dissipating over time as the augmented sediment supply from the pilot project decreases.

Sea Level Rise Adaptation

This pilot project is the first of its kind in San Francisco Bay in that it seeks to evaluate the use of in-water placement of dredged sediment in a subtidal area to augment adjacent mudflats and Whale's Tail Marsh. The pilot seeks to test the ability of the tides, currents, and wind waves to move sediment landward, onto the marsh and mudflats, potentially augmenting the natural sediment supply. The question being tested is whether sufficient sediment could be directed landward to aid marshes adaptation to sea level rise at a rate sufficient to keep pace with projected sea level rise. If this technique proves successful and econmically viable, it could be used in other appropriate areas as a sea level rise adapation tool.

Whale's Tail Marsh is currently high in the tidal prism, such that only the highest tides inundate the marsh, and is not drowning. It does have an erosive scarp that is likely driven by the strong wind wave climate of the south eastern portion of the Bay. The natural sediment supply in this area of the Bay provides 1-2 millimeters of sediment to the marsh and mudflat annually, however as sea level rises, the rate of sediment accretion is not predicted to keep pace baywide.

The modeling conducted indicates that a portion of the sediment (6%) would likely be deposited on the mudflats adjacent to Whale's Tail Marsh and a portion may deposit on the marsh itself or in the restoration site landward of the marsh. The modeling predicts the remaining sediment would be dispersed through other subtidal areas of the south and central Bay.

Environmental Justice and Social Equity

The pilot project would place sediment approximately two miles offshore, and approximately five and a half to six miles from any residential community. The offshore placement site is separated from Union City and Hayward by the Eden Landing Ecological Reserve and the Eden Landing Phase II restoration project, and therefore is not anticipated to directly effect these communities. There is a potential impact to recreational and subsistence fishing that may occur in the area due to the increase in turbidity (increase in sediment in the water column) that may cause some fish to leave the area, while others may be attracted to the area. The increase in turbidity is likely to occur during and for a limited period after placement of sediment in the subtidal areas.

While the proposed pilot project is not anticipated to directly affect vulnerable communities, the USACE did conduct some public engagement. They did this primarily thorugh the Californa Environmental Quality Act and Nation Environmental Policy Act processes, but also including meetings with the East Bay Dischargers Authority, the City of Hayward, the Alameda Flood Control and Water Sanitation District, and Union City. The project team also presented an early stage of the project to the Oakland Shoreline Leadership Academy, which trains local change-makers of all ages from communities living on or near the Oakland shoreline. The team conducted a site visit with the Confederated *Villages of Lisjan*, and shared with the public, tabling at the Hayward Street Fair. According to the USACE, the comments overall were positive, particularly regarding the potenital to address future rising seas.

Public Access

This project has no proposed public access.

Schedule and Cost

The dredging of Redwood City federal navigation channel would begin in September 2023 and placement of the sediment in subtidal waters would occur in the early phase of the dredging project and conclude by November 2023. Monitoring of the site is proposed and would occur before, during, and between three months and one year following placement of the sediment.

The estimated total project cost is approximately $3.6 million.

Issues Raised

The staff believes the primary issues raised by the proposed project are:

(1) Whether the proposed pilot project is considered the minimum fill necessary for the project under the McAteer Petris Act;

(2) Whether it is consistent with the Commission's policies, including Fish, Other Aquatic Organisms and Wildlife, Tidal Marsh and Tidal Flats, Water Quality, Subtidal Areas and Dredging regarding pilot projects, and sufficient monitoring periods; and

(3) Whether the project is consistent with the Climate Change policies regarding adaptation of natural areas.

Staff Notes

The staff notes the following considerations for the Commission:

- **Pilot Project Scale.** The project team considered and modeled different volumes of sediment placement for the pilot project. Modeling predicted that 100,000 cy of sediment placement was optimal for the pilot. The volume placed needs to be sufficient to both be mobilized by the local hydrology and sufficient to be measurable by the monitoring techniques currently available. Commission staff notes that the monitoring techniques are also considered a pilot project because the sediment likely to be deposited in the target area is within the measurable range, but has significant uncertainty associated with it. Modeling of larger sediment volumes did not appear to increase the certainty of monitoring success or deposition.
- **Review Boards.** The proposed project was not reviewed by the Design Review Board or the Engineering Criteria Review Board, as the project did not raise significant public access design issues and the project did not involve safety of fills concerns.

Applicable Laws and Policies

The following laws and policies are applicable in the Commission's review of the proposed project:

- Coastal Zone Management Act of 1972, as Amended and the San Francisco Bay Coastal Zone Management Program
- McAteer-Petris Act: Sections 66605 (Allowable Bay Fill) and 66632 (Permit for Fill, Extraction of Materials, or Substantial Change in Use).
- San Francisco Bay Plan policies on: Fish, Other Aquatic Organisms, and Wildlife; Water Quality; Tidal Marshes and Tidal Flats; Subtidal Areas; Environmental and Social Equity; Climate Change; Dredging; and Mitigation.