US Army Corps of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A:

Environmental Compliance

US Army Corps of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

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APPENDIX A-1:

Endangered Species Act (ESA)/Magnuson-Stevens Fishery Conservation Management Act

DRAFT Biological Assessment

Oakland Harbor Turning Basins Widening

Biological Assessment

Administrative Draft

October 2021

PORT OF OAKLAND

Oakland Harbor Turning Basins Widening

Biological Assessment

Administrative Draft

Port of Oakland

U.S. Army Corps of Engineers

October 2021

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ACRONYMS

BA	Biological Assessment
bgs	below ground surface
BMP	best management practices
CCC	Central California Coast
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CY	cubic yard
dB	decibel
Delta	Sacramento-San Joaquin Delta
DMMO	Dredged Material Management Office
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Federal Endangered Species Act
ESU	evolutionarily significant unit
IHTB	Inner Harbor Channel and Inner Harbor Turning Basin
LTMS	Long-Term Management Strategy
mg/L	milligram per liter
MHEA	Middle Harbor Enhancement Area
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
OBM/MS	Old Bay Mud/Merritt Sand
OHTB	Outer Harbor Turning Basin
PCB	polychlorinated biphenyl
PCE	primary constituent element
Port	Port of Oakland
RWQCB	Regional Water Quality Control Board
SPCC	Spill Prevention Control and Countermeasure
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service

Chapter 1. Introduction

This Biological Assessment (BA) will support consultation with United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as required by Section 7 of the federal Endangered Species Act (ESA), Public Law 93-205, 18 United States Code (USC) Section 1536, as amended, and Title 50, Code of Federal Regulations (CFR), Part 402. Section 7(a) of the ESA of 1973, as amended, requires federal agencies to consult with USFWS and NMFS to ensure that any action authorized, funded, or conducted by such agency is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat of such species. Section 7(c) of the ESA requires federal agencies to prepare a BA for the purpose of complying with Section 7(a) by identifying any threatened or endangered species, designated critical habitat, or species or habitat proposed as such that are likely to be affected by the Proposed Action (the Oakland Harbor Turning Basins Widening).

This BA presents technical information about the Proposed Action in sufficient detail to determine to what extent associated activities may affect any of the federally threatened, endangered, or candidate species, and designated or proposed critical habitats identified in the Action Area (the Action Area for the Proposed Action is defined in Section 3). This BA is prepared in accordance with legal requirements set forth under regulations implementing Section 7 of the ESA (50 CFR 402; 16 USC 1536 (c)).

The document is organized as follows:

- **Chapter 1: Introduction.** This section describes the federal action and regulatory environment pertaining to the Oakland Harbor Turning Basins Widening project. The project location and background are also described.
- **Chapter 2: Description of the Proposed Action.** This section provides a detailed description of the Proposed Action including construction and operations. This section also identifies avoidance and minimization measures integrated into the Proposed Action to avoid potential adverse effects to the environment.
- **Chapter 3. Action Area.** This section describes the "Action Area," defined as the extent of all areas that may be affected directly or indirectly by the federal action(s) and not merely the immediate area involved in the action.
- **Chapter 4. ESA-Listed Species and Resources.** This section identifies federal ESA threatened, endangered, and candidate species identified as having the potential to occur in the vicinity of the Proposed Action, as well as critical habitat in the Action Area.
- **Chapter 5. Environmental Baseline Conditions.** This section identifies baseline conditions for habitats in the Action Area, as well as the presence or potential presence of federal ESA–listed species and critical habitat in the Action Area.
- **Chapter 6. Effects of the Proposed Action.** This section provides a description of effects to federal ESA–listed species and critical habitat, as well as the effects determination and conclusions.

- **Chapter 7. Conclusion and Determination of Effects Summary.** This section summarizes the conclusions and determinations of effects to federal ESA–listed species and critical habitat.

A separate Essential Fish Habitat (EFH) Assessment has been prepared for the Proposed Action in accordance with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act for EFH and Habitat Areas of Particular Concern.

1.1. Project Location and Background

The Oakland Harbor is on the eastern side of San Francisco Bay (Figure 1-1). It includes the Entrance Channel, the Outer Harbor Channel and Outer Harbor Turning Basin (OHTB), and the Inner Harbor Channel and Inner Harbor Turning Basin (IHTB). The Outer Harbor Channel is immediately south of the San Francisco-Oakland Bay Bridge and is maintained to a depth of -50 feet mean lower low water (MLLW). The Outer Harbor Channel and OHTB serve the existing TraPac and Ben E. Nutter terminals. The Inner Harbor Channel is also maintained to -50 feet MLLW through the Howard Terminal, which is approximately 2.5 miles from the Inner Harbor entrance. The Inner Harbor Channel and IHTB serve the existing Oakland International Container Terminal, Matson Terminal, and Schnitzer Steel Terminal. Berth 10, at the eastern of end of the Outer Harbor, serves as a dredged material rehandling facility.

The existing federal navigation channel was designed for a ship with a capacity of 6,500 20-foot equivalent units, with a 1,139-foot length overall, 140-foot beam, and 48-foot draft, as part of the Oakland Harbor Navigation Improvement (-50-Foot) Project Study. The Proposed Action involves the expansion of the IHTB and OHTB in the Oakland Harbor. The need for this expansion arises from inefficiencies currently experienced by vessels in harbor, specifically in the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-Foot Oakland Harbor Navigation Project. These inefficiencies are projected to continue in the future because vessel sizes are expected to increase.

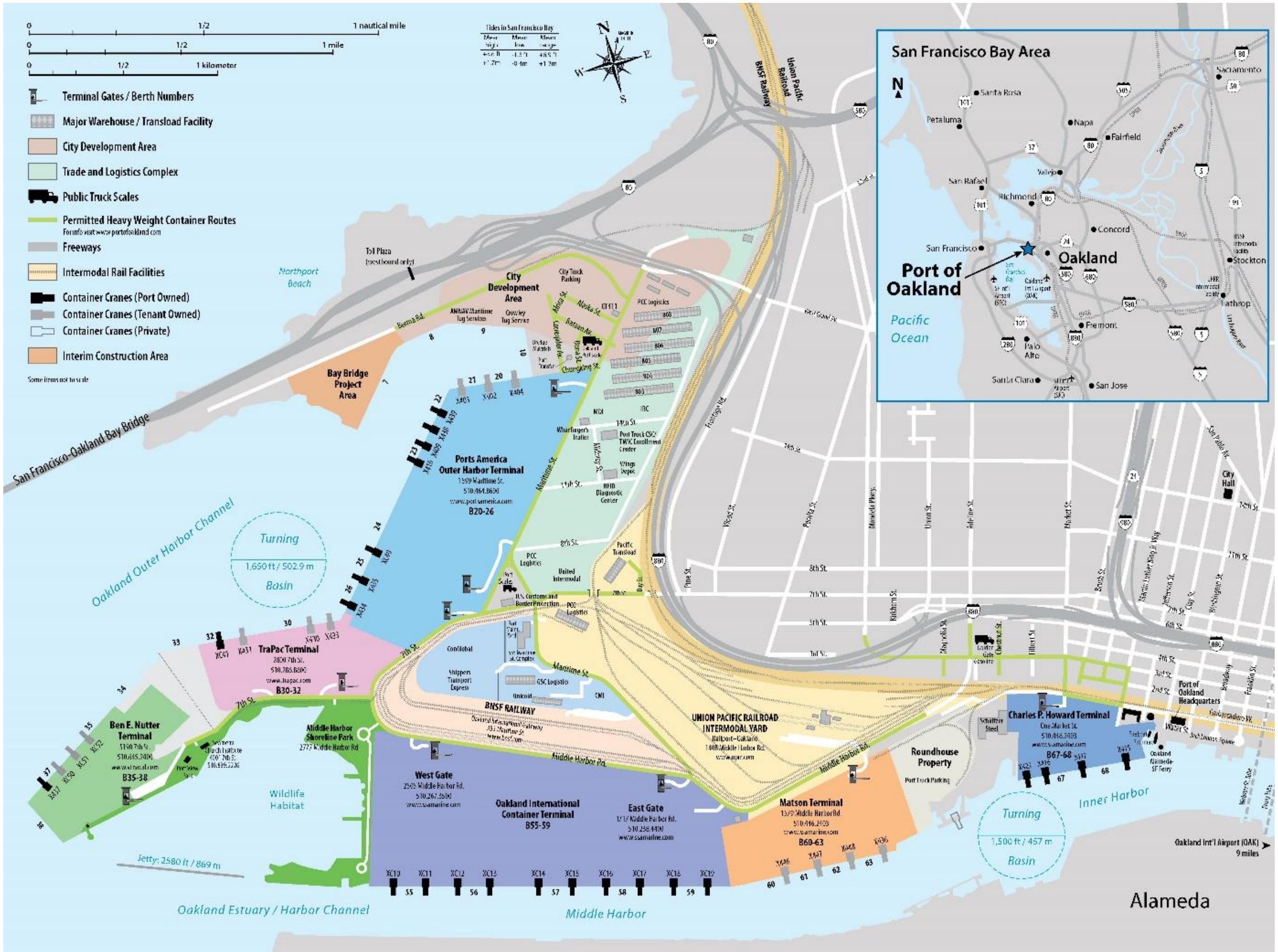

Figure 1-1 Current Port of Oakland Navigation Features

Chapter 2. Description of Proposed Action

The Proposed Action entails expansion of both the IHTB and OHTB. The proposed improvements and construction methods for each turning basin are described under Sections 2.1 and 2.2 below. Expansion of the turning basins would improve the efficiency of vessels entering and exiting the Port; however, the project would not change the projected overall volumes of freight that would come into the Port.

2.1. Expansion of Inner Harbor Turning Basin

The Expansion of Inner Harbor Turning Basin consists of widening the existing IHTB from 1,500 feet to 1,834 feet with a depth of -50 feet MLLW consistent with the existing IHTB. In addition to in-water work to widen the IHTB, land would be impacted in three locations: Schnitzer Steel, Howard Terminal, and private property located along the Alameda shoreline (Figure 1-2).

At Schnitzer Steel (in the northwestern corner of the widened IHTB in Figure 1-2), approximately 10,800 square feet (0.25 acre) of concrete pavement would be removed. Approximately 310 linear feet of new bulkhead would be installed landside, and approximately 13,710 CY of landside soil would be excavated between the new and existing bulkhead. Subsequently, 700 linear feet of new anchor/tie back (i.e., the lateral support structure for a bulkhead) would be installed, about 320 linear feet of existing bulkhead would be demolished, and an additional approximately 9,260 CY of material would be dredged.

Similar construction activities would occur at Howard Terminal (in the northeastern corner of the widened IHTB in Figure 1-2), including approximately 115,020 square feet (2.65 acres) of asphalt and concrete pavement removal, landside installation of 650 linear feet of new bulkhead, removal of 300 125-foot-long piles (approximately 4,360 CY), and excavation of 72,410 CY of landside soil between the new and existing bulkhead. Subsequently, 1,300 linear feet of anchor/tie-back would be installed, 900 linear feet of existing bulkhead would be removed, and an additional approximate 191,670 CY of material would be dredged.

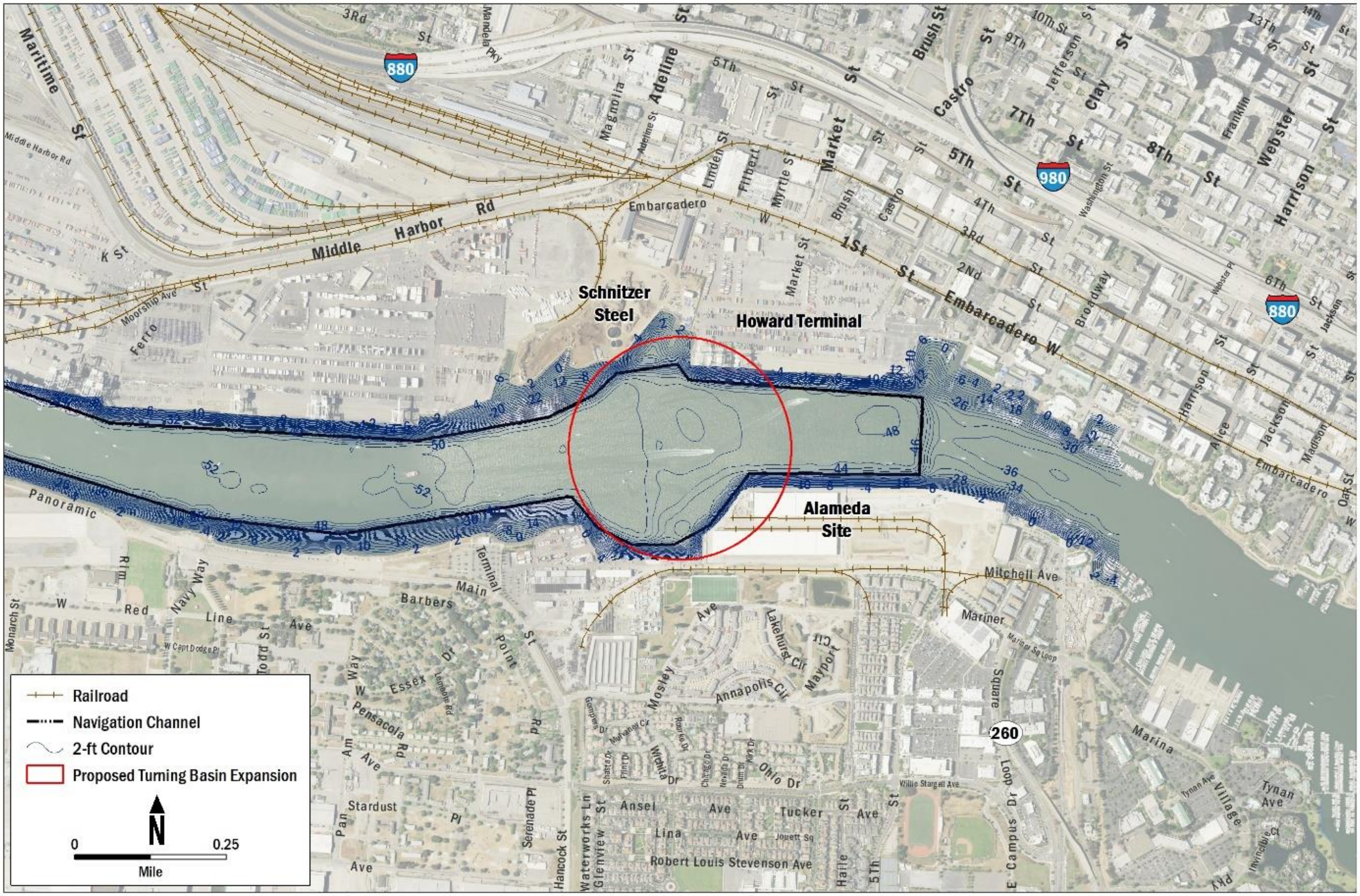

Figure 1-2: Proposed Expansion of IHTB

Expansion at the Alameda site (in the southeastern portion of the widened IHTB in Figure 1-2) would require partial demolition of two existing warehouses (an estimated maximum of 260,000 square feet of demolition). Similar to the Schnitzer Steel and Howard Terminal sites, additional Alameda improvements include 216,000 square feet (5 acres) of asphalt and concrete pavement removal, landside installation of 1,050 linear feet of new bulkhead, removal of 2,300 65-foot long piles (approximately 17,390 CY), excavation of 135,370 CY of landside soil between the new and existing bulkhead, installation of 2,100 linear feet of anchor/ tie-back, removal of 1,250 linear feet of existing bulkhead, and dredging of approximately 358,330 CY of material from the Alameda site.

For the Howard Terminal and Alameda sites, landside excavation of soils would occur to a depth of approximately -5 feet MLLW, which is approximately 17 feet below existing ground surface elevations. At Schnitzer Steel, landside excavation of soils would occur to a depth of approximately -25 feet MLLW, which is approximately 37 feet below existing ground surface elevation. Due to the historical industrial use of these sites and the documented presence of contaminants underlying portions of the Schnitzer Steel and Howard Terminal properties, for the purpose of this study it is assumed that landside excavated materials would be disposed at a Class I or Class II landfill. Material below the limits of landside excavation at each site would be dredged following removal of the existing bulkhead; for the purpose of this study, it is assumed that all dredged material would be suitable for beneficial reuse. In addition, for all three sites, the depth of sheet pile/bulkhead installation and removal is assumed to be 65 feet below ground surface. Dredging of approximately 320,000 CY of existing Inner Harbor sediments would also be required. Volumes of material to be excavated landside or dredged for IHTB expansion are summarized in the table below.

Landside Excavation and Dredging Quantities for IHTB Expansion

Location	Landside Soil Excavation (cubic yards)	Sediment Dredging (cubic yards)
Schnitzer Steel	13,710	9,260
Howard Terminal	72,410	191,670
Alameda	135,370	358,330
Non-land areas		320,000

Construction staging, including a construction trailer, equipment and construction materials storage, and soil stockpiles, would occur at Howard Terminal and the Alameda property immediately adjacent to the excavation areas; no staging would occur at Schnitzer Steel.

Construction is expected to last approximately 2 years and 4 months, beginning in July 2027. Construction, excluding dredging, would occur Monday through Friday between the hours of 7 a.m. and 7 p.m. During the first year of construction, the land-based activities would be completed at Howard Terminal and Schnitzer Steel (concurrent construction would occur at these locations for approximately 3 months). Marine-based construction (sheet pile/bulkhead removal) and dredging is anticipated to be conducted at Howard Terminal and Schnitzer Steel during the 2027 and 2028 in-water work windows. Land-based construction at the Alameda property is expected to commence in May 2028 and take approximately 1 year to complete. Marine-based construction (sheet pile/bulkhead removal) and dredging at the Alameda property and dredging of sediments in the Inner Harbor Channel would be conducted during the 2029 in-water work window. Sheet pile for the new bulkheads would be installed landside.

Equipment for pavement removal, landside excavation, warehouse demolition, pile removal, sheet pile/bulkhead removal and installation, and anchor/tie-back installation would include backhoes/front loaders, concrete saws, cranes, bulldozers, excavators, dump trucks, drilling rigs, barges, dive vessels, pile drivers, vibratory hammers, tugboats, compressors, and generators. Depending on the concurrent activities occurring over the course of construction, the number of construction workers at any given time would range from approximately eight to 40 (excluding dredging operations described below).

Excavated landside material, removed piles, and debris from warehouse demolition at the Schnitzer Steel, Howard Terminal and Alameda sites would be hauled off site for disposal at a Class I or Class II landfill. Approximately 15,600 CY of excavated landside material from the three sites would require disposal at a Class I landfill. Assuming each truck would haul 10 CY of material, this would require approximately 1,560 truck trips for transport. Approximately 198,500 CY of excavated landside material from the three sites would require disposal at a Class II landfill, along with the removed piles and warehouse demolition debris, requiring approximately 23,380 truck trips for transport.

Dredging would be conducted with an electric-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport for beneficial reuse or to Berth 10 for rehandling prior to transport via truck to a landfill. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site or to Berth 10, and tugboats for positioning the barge and towing the scows. Approximately 63,700 CY of dredged Inner Harbor sediments would require disposal at a Class II landfill. Assuming each truck would haul 10 CY of material, this would require approximately 6,370 truck trips for transport from Berth 10. Approximately 26 workers would be required for the dredging operation and approximately 28 workers would be required for rehandling operations at Berth 10. Dredging would be conducted 24 hours per day on weekdays (Monday through Friday), and may be conducted on weekends, if necessary. Silt curtains would be used during dredging to minimize impacts to the aquatic environment.

2.2. Expansion of Outer Harbor Turning Basin

The Expansion of Outer Harbor Turning Basin consists of widening the existing OHTB from 1,650 to 1,965 feet. The proposed expanded OHTB relative to the current limits of the navigation channel is shown in Figure 1-3. There are no land impacts under the proposed footprint of the expanded OHTB. This alternative involves dredging 862,000 CY of material to widen the basin to a depth of -50 feet MLLW.

Dredging would be conducted with an electric-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport to a beneficial reuse site. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site, and tugboats for positioning of the barge and towing the scows to the reuse site. Approximately 26 workers would be required for the dredging operation. Dredging is expected to be conducted during the 2028 in-water work window (June 1through November 30). Dredging would be conducted 24 hours per day on weekdays (Monday through Friday) and on weekends, if necessary, over a 6-month period (the entire in-water work window). Silt curtains would be used during dredging to minimize impacts to the aquatic environment. Construction staging would occur at Berth 10, at the eastern end of the Outer Harbor.

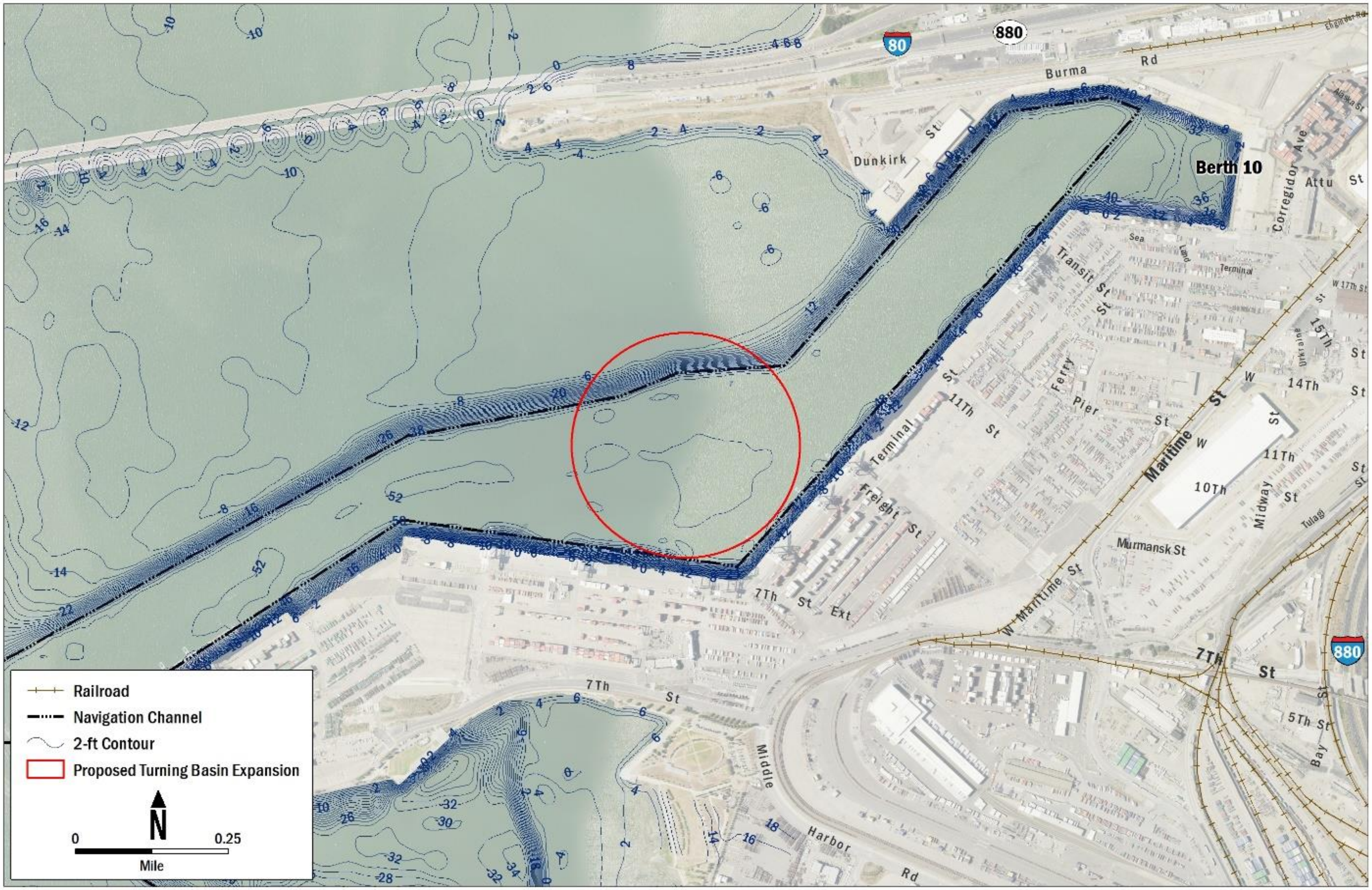

Figure 1-3: Proposed Expansion of OHTB

2.3. Avoidance and Minimization Measures

Environmental protection measures have been integrated into the Proposed Action to avoid potential adverse effects to the environment. These measures are considered an integral part of the Proposed Action and would be implemented by the United States Army Corps of Engineers (USACE), the Port, or their contractors during, prior to, or after the execution of the Proposed Action.

2.3.1. General Measures

- Marine-based construction and dredging is proposed to occur during the in-water work window (June 1 through November 30) for salmonids established by the Long Term Management Strategy (LTMS) for placement of dredge material from operation and maintenance dredging in San Francisco Bay. However, dredging is proposed to occur outside of the California least tern construction window (August 1 through March 15) established by the LTMS. This BA is intended to be the bases for USACE consultation with USFWS for proposed dredging outside of the California least tern construction window. If in-water work is later determined to need to occur at times other than those described herein, the = USACE and the Port would re-consult with NMFS, USFWS, and the California department of Fish and Wildlife (CDFW), as necessary, to address potential impacts on special-status aquatic species.
- A worker education program would be implemented for listed fish and shorebirds that could be adversely impacted by in-water construction activities. The program would include a presentation to all workers on biology, general behavior, distribution, habitat needs, sensitivity to human activities, legal protection status, and project-specific protective measures for each listed species. Workers would also be provided with written materials containing this information.
- Standard best management practices (BMPs) would be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during the course of the project would be fueled and serviced in a manner that would not affect the aquatic environment.
- A Spill Prevention Control and Countermeasure (SPCC) plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. The SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements.
- Silt curtains would be used where specific site conditions demonstrate that they would be practicable and effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions, or contain contaminants at levels in excess of applicable regulatory thresholds. Prior to in-water construction, a silt curtain would be deployed from the water’s edge and pushed out to the deployed location to avoid entrapping aquatic wildlife species.
- Prior to construction, a sampling and analysis plan would be developed and implemented to characterize soils and sediments to be removed or exposed. In addition, a dredge

operations plan would be submitted to all regulatory agencies before the start of dredge operations.

- Piles would be removed by vibratory means (or direct pull if necessary), to the fullest extent where possible; piles that cannot be removed would, at a minimum, be cut 2 feet below the future mudline for sloped areas and 2 feet below the future over-depth dredge elevation for areas in the navigable waterway, to the extent feasible.
- No pilings or other wood structures that have been pressure-treated with creosote would be installed.

2.3.2. Dredging Measures

- Dredging would be conducted with a barge-mounted clamshell/excavator dredge; there would be no hydraulic dredging.
- No overflow or decant water would be allowed to be discharged from any barge, with the exception of spillage incidental to mechanical dredge operations, unless monitoring or relevant studies show the effects of such discharge are negligible.
- Multiple horizontal dredge cuts would be taken where a thick horizontal volume needs to be dredged to avoid overfilling the bucket and causing spillage.
- The load line on disposal barges used for mechanical dredging would be predetermined, and the barge would not be filled above this predetermined level. Before each disposal barge is transported to a placement site, the dredging contractor and a site inspector would certify that it is filled correctly.
- The cycle time would be increased as needed to reduce the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket.
- Floating debris would be removed from the water and disposed of properly.

2.3.3. Pile-Driving and Removal Measures

- All pile installation is expected to occur on land, in the dry. An impact pile driver would only be used for land based pile-driving where necessary to complete installation of landside piles.
- All pilings in water piles would be removed by vibratory means.

Chapter 3. Action Area

The "Action Area" is defined as the extent of all areas that may be affected directly or indirectly by the federal action(s) and not merely the immediate area involved in the action [50 CFR 402.02]. For the purposes of the analysis, the Action Area extends beyond the direct project footprint described in the Description of the Proposed Action (Chapter 2).

To account for all areas that may be directly or indirectly affected by the Proposed Action, the Action Area includes the Proposed Action's construction footprint and a 250-meter in-water buffer surrounding the dredge boundary. The 250-meter buffer accounts for potential dredge plume effects on the aquatic environment, consistent with LTMS guidance. The Action Area is shown in Figure 3-1.

The Proposed Action is not anticipated to generate underwater noise effects to special-status species or habitats beyond the project footprint and 250-meter in-water buffer given the use of vibratory pile removal and landside installation of any new piles. Airborne noise from construction of the Proposed Action may extend outside of the Action Area, but would not affect sensitive terrestrial habitats (i.e., nesting or breeding habitat for California least tern described in Section 5.3.1).

3.1. Aquatic Habitats

3.1.1. General Characteristics and History

The Port of Oakland is situated on the eastern shoreline of central San Francisco Bay, often referred to as the Oakland-Alameda Estuary. The estuary was originally a shallow tidal slough but was partially dredged in the mid- to late-1800s to create a viable port and shipping channel. The shipping channel is now dredged annually to a design depth of -50 feet MLLW to support shipping operations in the Port. Freshwater inflow to the Oakland-Alameda Estuary is provided from natural creeks, human-made stormwater drainage facilities, and direct surface runoff. Tidal and wind-driven currents also influence the estuary. Sediment to the Oakland-Alameda Estuary is contributed from other portions of the San Francisco Bay Estuary, as well as vicinity shorelines and creeks, which cause siltation of the existing turning basins and shipping channels, necessitating annual maintenance dredging. Dredged material from Oakland Harbor has typically been less than 80 percent sand.

Aquatic habitat throughout the Action Area is likely affected by vessel traffic, industrial activity, and maintenance dredging activities. The entirety of the aquatic habitat in the Action Area occurs in or adjacent to areas serviced by shipping vessels. Existing waterfront facilities at the Inner Harbor include Howard Terminal and Schnitzer Steel, while the Outer Harbor is adjacent to the Outer Harbor Terminal and the TraPac Terminal. Several of the facilities surrounding Action Area waters serve industrial or commercial activities. Maintenance dredging in the existing ITHB and OHTB and navigation channels occurs annually.

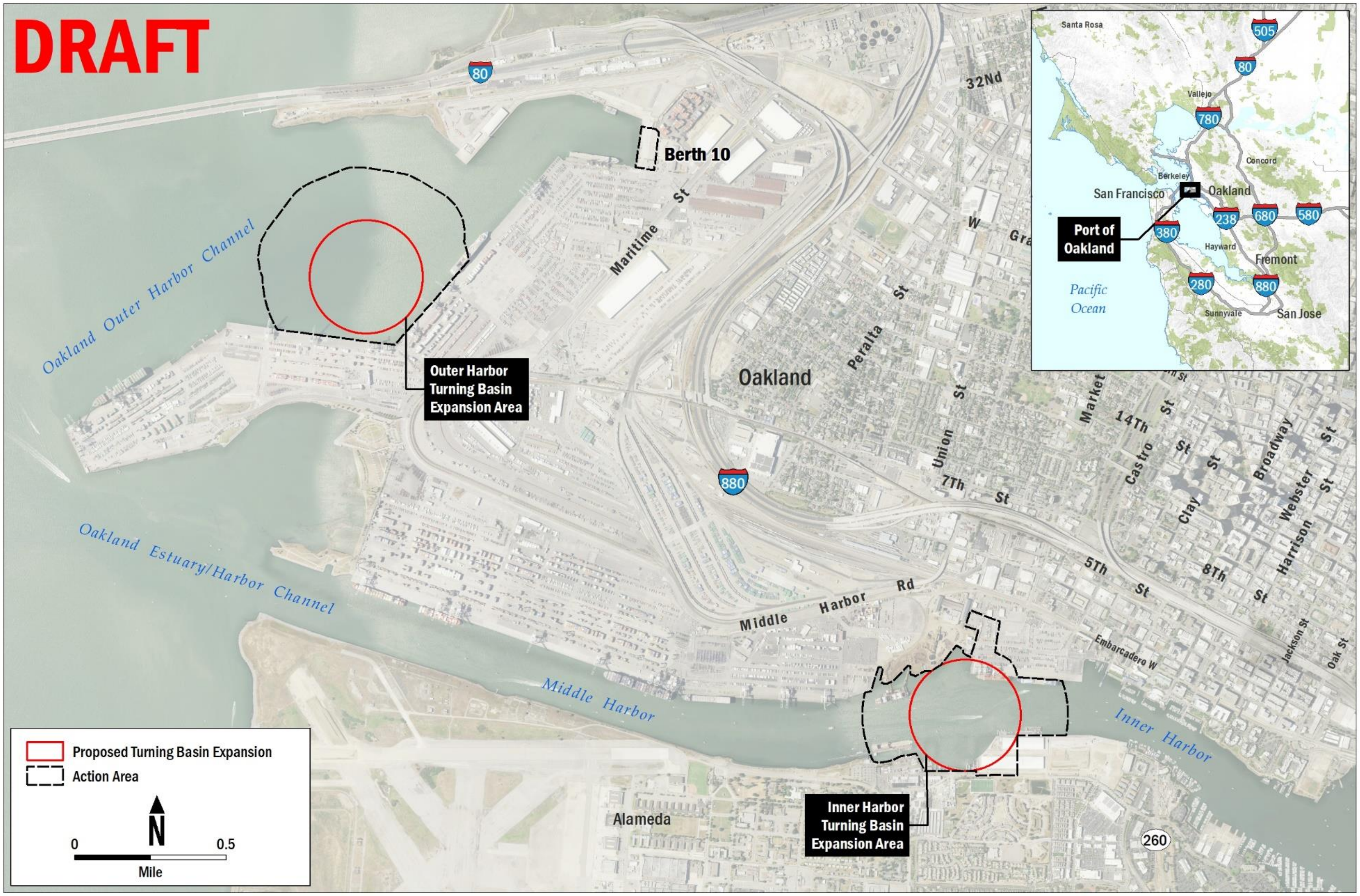

Figure 3-1 Action Area

The Action Area aquatic habitat falls within the "San Francisco, Central" waterbody as included in the 2018 California 303(d) list of water quality limited segments (State Water Resource Control Board 2018a). San Francisco Bay, Central, is a Category 5 waterbody, which includes water segments where standards are not met for one or more pollutants, and a Total Maximum Daily Load is required but not yet completed. Pollutants identified for the San Francisco Bay, Central include the following:

- Chlordane
- DDT
- Dieldrin
- Dioxin compounds
- Furan compounds
- Invasive species
- Mercury
- Polychlorinated biphenyls (PCBs)
- Selenium
- Trash

The Oakland Inner Harbor area also includes indicator bacteria as a pollutant source (State Water Resource Control Board 2018b).

Background turbidity in San Francisco Bay is naturally high, with total suspended solids levels ranging up to more than 200 milligrams per liter (mg/L) (Rich 2010), and typically varying from 10 mg/L to more than 100 mg/L (SFEI 2011). Waters in the navigation channels and turning basins are naturally turbid because of the resuspension of sediments from wind, waves, and tides.

Aquatic habitat in the Action Area can be divided among pelagic open water, intertidal, and benthic habitats. Each of these aquatic habitat types is described in the following sections. The Action Area does not include wetlands or non-San Francisco Bay water features.

3.1.2. Pelagic Open Water

Pelagic (open water) habitat includes waters between the water's surface and the seafloor in the Action Area. The physical conditions of the open-water environment change constantly with tidal flow and season. As a result, San Francisco Bay waters vary in temperature, salinity, dissolved oxygen, and turbidity depending on water depth, location, and season. Pelagic habitat in San Francisco Bay is predominantly inhabited by planktonic organisms, fish, and marine mammals.

The Goals Report (Goals Project 1999) subdivides the open bay habitats into two habitat subunits: deep bay and shallow bay. Deep bay habitat is defined as those portions of San Francisco Bay deeper than 18 feet below MLLW, including the deepest portions of San Francisco Bay and the largest tidally influenced channels. The regularly dredged navigation channels throughout San Francisco Bay, such as the IHTB, OHTB, and navigation channels, also meet this definition. Shallow bay is defined as that portion of San Francisco Bay above 18 feet below MLLW, which comprises most of San Francisco Bay.

The majority of the Action Area occurs in the navigation channels where channel depths are maintained to the design elevation of -50 feet MLLW, thereby meeting the Goals Project definition of deep open bay habitat. Shallower open water areas are present in the Action Area at the margins of the navigation channels. Deep and shallow estuarine pelagic habitats are discussed in the following subsections.

Deep Estuarine Pelagic

Deep estuarine pelagic waters may provide habitat to free-swimming invertebrates such as California Bay shrimp (*Crangon franciscorum*), and fishes such as Brown Rockfish (*Sebastes auriculatus*), halibut (*Hippoglossus* sp.), and sturgeon (*Acipenser* sp.). Deepwater habitat may also serve as a migratory pathway for anadromous fish such as Chinook Salmon (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*). Waterbirds such as surf scoter (*Melanitta perspicillata*), scaups (*Aythya* spp.), brown pelican (*Pelecanus occidentalis*), and terns (*Sterna* spp.) may roost or loaf in these open waters, particularly in areas protected from strong winds and waves. Marine mammals may also frequent deep estuarine pelagic waters, such as Pacific harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and harbor porpoise (*Phocoena phocoena*).

Shallow Estuarine Pelagic

Shallow open bay habitat may function as a feeding area for Pacific Herring (*Clupea pallasii*), northern anchovy (*Engraulis mordax*), bat ray (*Myliobatis californica*), and jacksmelt (*Atherinopsis californiensis*), as well as at least 40 other species of fish, crabs, and shrimp. Spawning habitat for Pacific Herring occurs on hard substrates and eelgrass (*Zostera marina*) along the shallow margins of the Central Bay. Shallow bay habitat is also a nursery area for juvenile halibut and sanddabs (*Citharichthys stigmaeus*), shiner perch (*Cymatogaster aggregata*), herring, and other fishes. Similar to deep estuarine pelagic waters, anadromous fish may use shallow open bay waters as migratory pathways. Shallower waters also provide important avian foraging habitat for diving bird species. Marine mammals may also be present, such as Pacific harbor seals. Some shallow water areas are also suitable habitat for eelgrass, a seagrass species that provides spawning habitat for Pacific Herring and foraging habitat for the California least tern (*Sterna antillarum browni*).

3.1.3. Intertidal Habitat

Intertidal habitats are the regions of the Action Area that lie between low and high tides. There is very limited intertidal habitat in the Action Area, consisting of seawalls, piles, and rock riprap. In the Outer Harbor portion of the Action Area, intertidal habitat is limited to portions of the existing seawall that are exposed and inundated during tidal cycles. Intertidal habitat in the Inner Harbor portion of the Action Area is also predominantly seawall surfaces, but may also include piles that support above-water structures. The Inner Harbor portion of the Action Area also includes short lengths of rock-riprapped shoreline in the intertidal zone, occurring at the Schnitzer Steel site and adjacent to the Alameda Main Street Ferry Terminal.

Invertebrate taxa associated with intertidal habitat in the San Francisco Bay shoreline include balanoid barnacles (*Balanidae* spp.) in the high and middle intertidal zones; and limpets, mussels (*Mytilus* spp.), and Olympia oysters (*Ostrea lurida*) in the lower middle and low intertidal zones. Common intertidal algae species in the Central Bay include sea lettuce (*Ulva* spp.), rockweed (*Fucus gardneri*), red algae species (*Polyneura latissima* and *Gigartina* spp.) and nonnative brown algae species (*Sargassum muticum*; NOAA 2007). Typically, the high intertidal zone is dominated by sea lettuce; the middle intertidal zone is dominated by sea lettuce, rockweed, and red algae; and the low intertidal zone is dominated by brown algae (NOAA 2007). When inundated, intertidal areas may also be frequented by fish and other aquatic species.

3.1.4. Benthic Habitat

Benthic habitat includes the channel bottom and associated biota in and adjacent to the navigation channels and turning basins. In subtidal areas, the predominant benthic habitat in the Central San Francisco Bay is composed of unconsolidated soft sediment with a mixture of mud, silt, and clay; and lesser quantities of sand, pebbles, and shell fragments (NOAA 2007). Sediment in the Oakland Harbor is predominately fine-grained (USACE 2019). Areas outside of the turning basins and navigation channels, where annual dredging does not occur, are typical of San Francisco Bay waters and have primarily silty mud and sand substrates that are naturally no more than 25 feet deep (City of Oakland 2021). Benthic habitat also less commonly includes hard substrates such as piers, breakwaters, and riprap.

Benthic communities in the harbor and channel areas of the Central Bay are affected by increased water flow and sedimentation. Relatively high numbers of subsurface deposit feeding polychaetes and oligochaetes inhabit these areas, including *Tubificidae* spp., *Mediomastus* spp., *Heteromastus filiformis*, and *Sabaco elongatus*. Community complexity and abundance also supports relatively high abundances of three carnivorous polychaete species: *Exogone lourei*, *Harmothoe imbricata*, and *Glycinde armigera* (City of Oakland 2021). Other commonly occurring benthic species in the Central Bay include the obligate amphipod filter-feeder *Ampelisca abdita*, the tube dwelling polychaete *Euchone limnicola* (City of Oakland 2021), clams (including the overbite clam, *C. Amurensis* or *Corbula*), amphipods such as *Monocorophium* and *Ampelisca*, polychaete worms, and bay mussels (SFEP 1992). Larger mobile benthic invertebrate organisms are also present in the Central Bay, such as blackspotted shrimp (*Crangon nigromaculata*), the bay shrimp (*Crangon franciscorum*), Dungeness crab (*Metacarcinus magister*), and the slender rock crab (*Cancer gracilis*; City of Oakland 2021).

Benthic hard substrates such as piers, breakwaters, and riprap provide colonization habitat for benthic invertebrates. Common species include algae, barnacles (*Balanus glandula* and *Chthamalus fissus*), mussels, tunicates, bryozoans, cnidarians, and crabs.

Several common benthic species in Central Bay were accidentally or intentionally introduced, such as the eastern oyster (*Crassostrea virginica*), the Japanese littleneck clam (*Tapes philippinarum*), and the soft-shelled clam. Some of these nonindigenous species serve ecological functions similar to those of the native species that they have displaced, while other species have reduced phytoplankton populations, and consequently impacted the zooplankton populations and organisms that depend on them.

Benthic biota provide an important food source for carnivorous fishes, marine mammals, and birds in San Francisco Bay's food web. Communities of benthic organisms also play a vital role in maintaining sediment and water quality and are important indicators of environmental stress, because they are particularly sensitive to pollutant exposure.

3.1.5. Sediment Quality

Dredging may resuspend constituents of concern in the water column if they are present in the surface sediments, and sediment quality in the Action Area is therefore relevant to this BA and considered an element of the Action Area.

Landside excavation of soils at Howard Terminal, Schnitzer Steel, and the Alameda Gateway sites would occur to a depth of approximately -5 feet MLLW, which is approximately 17 feet bgs; additional landside excavation may be required at Schnitzer Steel to remove potentially contaminated soils below 17 feet bgs, if determined to be present. At all three sites, material below the depth excavated from land would be dredged following removal of the existing bulkhead.

Howard Terminal Dredging Footprint. Ongoing data collections by the Port indicate low levels of hydrocarbons in the fill at or near the range of groundwater tidal movement (ENGEO 2019). In addition, metals have been detected in soils from the ground surface to the groundwater interface; however, they are present at concentrations consistent with Merritt/Posey formation sands that were likely mined for fill (Apex 2021). Old Bay Mud, Merritt Sand, and Posey Formations (OBM/MS) material are likely present in fills below the -8-foot bgs groundwater elevation, including in the proposed dredging footprint that occurs below -17 feet bgs. There are no specific data regarding the fill quality between groundwater at approximate Elevation -8 feet bgs and beyond, and the underlying OBM/MS interface where dredging would occur. Because the fill is marine-derived and the overlying soil and groundwater are relatively clean, it is unlikely that the deeper fill is contaminated, and would likely be suitable for beneficial reuse. There is no mechanism for contaminants to be transported to depths between -10 feet bgs and -60 feet bgs (Apex 2021).

Schnitzer Steel Dredging Footprint. This site is currently under a Cleanup and Abatement Order issued by the California Department of Toxic Substances Control. A variety of contaminants has been detected at various levels on the site, including dioxin, hydrocarbons, PCBs, and heavy metals (Apex 2021). OBM/MS Formation material is likely present in fills below the -10-foot bgs groundwater elevation, including in the proposed dredging footprint that occurs below -17 feet bgs. Similar to Howard Terminal, there is little or no information available regarding the soil and sediment quality of the material below groundwater at Schnitzer Steel. Regulators who have required testing at the site do not see a mechanism for the contaminants to be transported below groundwater (Apex 2021). It is anticipated that the native material (OBM/MS), which begins at -10 feet bgs, would be suitable for beneficial reuse (Apex 2021).

Alameda Dredging Footprint. The -50-Foot Project previously removed a corner of the Alameda Gateway property to expand the IHTB to its current dimensions. The material that would be removed for this project is adjacent to the material removed for the -50-Foot Project and has no additional or new sources of contamination, and therefore should be similar to the material removed for the -50-Foot Project. Based on the previous testing results, it is unlikely that the material below groundwater would contain any contaminants to prevent beneficial reuse (Apex 2021).

Inner Harbor Turning Basin Expansion Area Open Water Dredging Footprint. There are two areas in the proposed IHTB expansion area that are subtidal: the basin between Howard Terminal and Schnitzer Steel, and a portion of the current Port of Oakland Berth 67. With project implementation, both of these areas would require dredging to a depth of -50 feet MLLW.

During the -50-Foot Project, Berth 67 was tested to allow deepening from the currently maintained depth of -42 feet MLLW with 2 feet of overdepth allowance, to -50 feet MLLW with 2 feet of overdepth allowance; however, the dredging was not completed by the Port. The material tested to support Berth 67 dredging was approved by the Dredged Material Management Office (DMMO) agencies for beneficial reuse as wetland noncover (USACE 1998). Because the deepening material has not been exposed to any new contaminant sources since the testing was completed, it can be assumed that the material from Berth 67 would still be suitable for wetland noncover (Apex 2021).

There is a lack of site-specific information about the quality of the sediment in the basin between Howard Terminal and Schnitzer Steel. However, a few things can be assumed from the site history and the stratigraphy. First, as with other areas, the OBM/MS formation underlying the basin should be free of contaminants and suitable for any beneficial reuse. This was true even in areas that contained significant contamination in the overlying areas such as the Drydock Pits on the Alameda side of the channel, which had a similar use to the Oakland side Moore Shipyard, and that were removed for the -50-Foot Project. Further, Schnitzer Steel was required to perform cleaning of the Howard Terminal to remove light fibrous material. It is likely that the material also settled into the basin, impacting the sediment. Although testing would be needed to confirm the condition of these sediments, this material may contain contaminants that would preclude beneficial reuse and may require landfill disposal in a Class II landfill (Apex 2021).

Outer Harbor Turning Basin Expansion Area Open Water Dredging Footprint. The OHTB expansion area is divided into two definable units: a Young Bay Mud layer, and an underlying OBM/MS layer. Data from samples collected for the -50-Foot Project close to the proposed OHTB expansion area suggest that the Young Bay Mud layer sediments would be suitable for habitat creation, noncover; and the OBM/MS strata should be considered clean and suitable for any disposal or reuse (Apex 2021).

3.1.6. Eelgrass

Small patches of eelgrass have been observed in both the Inner and Outer Harbors, as shown in Appendix A. Eelgrass does not occur in the Action Area, which includes the dredge footprint and a 250-meter in-water buffer to account for dredge plume effects. The nearest patches occurs approximately 500 meters from the proposed IHTB expansion area and more than 250 meters from the proposed OHTB expansion area (Merkel and Associates 2021).

3.1.7. Oakland Middle Harbor Enhancement Area

Situated outside of the Action Area, the 180-acre Middle Harbor Enhancement Area (MHEA) is adjacent to Middle Harbor Shoreline Park. The MHEA is approximately 1,500 feet south of the proposed OHTB expansion footprint and 10,500 feet northwest of the proposed IHTB expansion footprint. The MHEA restoration project filled a former naval harbor with 5.5 million CY of sediment to create shallow, subtidal habitat.

3.2. Terrestrial Habitats

Terrestrial habitat in the Action Area includes the industrialized shoreline of the IHTB. Project activities for the OHTB expansion are limited to in-water dredging and upland staging and material rehandling in the existing Berth 10 dredged material rehandling facility.

Upland industrial and maritime support facilities in the immediate IHTB expansion area include Schnitzer Steel, Howard Terminal, and Alameda Gateway. The facility shorelines consist of seawalls or pile-supported hardscaping, with limited areas of rock-riprapped shoreline. Inland facility areas are characterized by offloading equipment, concrete or asphalt staging and parking areas, shipping containers, material stockpiles, tanks, warehouses, dry docks, and roadways.

Upland vegetation is very limited, composed of ruderal vegetation and isolated ornamental shrubs and trees. Operations at facilities in the vicinity of the IHTB include metal recycling at Schnitzer Steel; Port logistical operations such as vessel berthing and truck and container parking at Howard Terminal; and a variety of services such as warehousing, vessel docking, ferry operations, and commercial retail on the Alameda shoreline.

Approximately half of the 4.4-acre Berth 10 facility is constructed on a pile-supported concrete wharf, and the remaining half is on asphalt-covered land. The facility is enclosed by a system of gravel and earthen berms topped with concrete "K" rail. The "K" rail also divides the facility into two sections (SFRWQCB 2013). Vegetation at the facility is extremely limited, consisting only of ruderal vegetation occurring in earthen areas at the margin of concrete and asphalt-covered land.

Developed, landscaped, and ruderal areas can provide cover, foraging, and nesting habitat for a variety of birds, as well as some reptiles and small mammals, especially those that are tolerant of disturbance and human presence. Habitat quality is, however, limited in the project area as compared to natural habitat. Developed upland areas are unlikely to provide habitat to federally listed terrestrial species potentially occurring in the Action Area vicinity.

Avian species common to highly develop urban areas have potential to nest in ruderal shrubs, street trees, or building roofs in the Action Area. Potentially present species include the nonnative house sparrow (*Passer domesticus*), rock pigeon (*Columba livia*), and European starling (*Sturnus vulgaris*); and native species such as house finch (*Haemorhous mexicanus*), American goldfinch (*Spinus tristis*), white-crowned sparrow (*Zonotrichia leucophrys*), Brewer's blackbird (*Euphagus cyanocephalus*), and mourning dove (*Zenaida macroura*). The Oakland-Alameda Estuary also supports loafing gulls; recent surveys at the Howard Terminal recorded presence of ring-billed, California, and western gulls (*Larus californicus, L. delawarensis, L. occidentalis*; City of Oakland 2021). Osprey (*Pandion haliaetus*) are also regularly seen at the Port terminals.

Small mammals may also occur in industrial and maritime support facilities in the Action Area. Species common to developed areas include striped skunk (*Mephitis mephitis*) and raccoon (*Procyon lotor*), and nonnatives such as Virginia opossum (*Didelphis virginiana*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), and feral cat (*Felis silvestris catus*). Bat roosting may occur in vacant or infrequently used buildings in the Action Area, potentially including the common Mexican free-tailed bat (*Tadarida brasiliensis*; City of Oakland 2021).

The Former Alameda Naval Air Station is outside of the Action Area, approximately 4,000 feet southwest of the IHTB and 5,500 feet south of the OHTB. This site has hosted a breeding colony of California least terns since at least 1976, though it may have been used for breeding and rearing young prior to documentation (H.T. Harvey and Associates 2012).

Chapter 4. ESA-Listed Species and Resources

This chapter identifies federal ESA threatened, endangered, and candidate species identified as having the potential to occur in the vicinity of the Proposed Action, as well as critical habitat in the Action Area. Data sources reviewed to identify resources occurring in the Action Area include the following:

- USFWS Information for Planning and Consultation report search of Oakland Harbor navigation channels, turning basins, and shoreline (USFWS 2021)
- CDFW California Natural Diversity Database search of Oakland Harbor navigation channels, turning basins, and shoreline (CDFW 2021)
- Waterfront Ballpark District at Howard Terminal Draft Environmental Impact Report (ESA 2020)
- Biological Assessment/EHF Assessment for the San Francisco Bay to Stockton, California Navigation Improvement Study (USACE 2019)
- Final Environmental Assessment/Environmental Impact Report for Maintenance Dredging of the Federal Navigation Channels in the San Francisco Bay Fiscal Years 2015-2024 (USACE and RWQCB 2015)

Review of these data sources showed that several species could be eliminated from the analysis in this BA because they are considered not present, or habitat does not exist in the Action Area. Appendix B provides a comprehensive list of species identified as potentially present in the region, including species not carried forward for analysis in this BA. As listed in Table 4-1, there are seven federal ESA–listed species known or considered to have the potential to occur in the Action Area, and potential effects to all seven species are assessed in this BA.

Table 4-1 Federally Listed Species Occurring or Potentially Occurring in the Action Area

Species	
Birds	
California least tern (*Sternula antillarum browni*)	FE
Fish	
Southern Population of North American Green Sturgeon DPS (*Acipenser medirostris*)	FT/CH
Steelhead, Central California Coast DPS (*Oncorhynchus mykiss*)	FT/CH
Steelhead, Central Valley DPS (*Oncorhynchus mykiss*)	FT
Chinook Salmon, Sacramento winter-run ESU (*Oncorhynchus tshawytscha*)	FE
Chinook Salmon, Central Valley spring-run ESU (*Oncorhynchus tshawytscha*)	FT
Longfin Smelt (*Spirinchus thaleichthys*)	FC

Notes:

1. Status: Federal status (determined by USFWS): CH = Critical Habitat; FC – Federal Candidate Species for Listing; FE = Federally Listed Endangered; FT = Federally Listed Threatened

Designated critical habitat has been established in the Action Area for two aquatic species: North American Green Sturgeon Southern Distinct Population Segment (DPS) and Steelhead Central California Coast (CCC) DPS. There is no designated critical habitat for terrestrial species in the Action Area.

4.1. Aquatic Species

This section provides a description of the life history, threats, and critical habitat (if applicable) for federal ESA–listed aquatic species identified as potentially present in the Action Area. A description of each species' likely occurrence in the Action Area is provided in Section 5.2.

4.1.1. North American Green Sturgeon Southern DPS

Life History

Green Sturgeon are the most widely distributed members of the sturgeon family and the most marine-oriented of the sturgeon species, entering rivers only to spawn. Juveniles rear in freshwater for as long as 2 years before migrating to sea. Green Sturgeon are thought to spawn every 3 to 5 years in deep pools with turbulent water velocities; they prefer cobble substrates, but may use substrates ranging from clean sand to bedrock. Females produce 60,000 to 140,000 eggs that are broadcast to settle into the spaces between cobbles. Adult Green Sturgeon migrate into freshwater beginning in late February, with spawning occurring in the Sacramento River in late spring and early summer (March through July), with peak activity in April and June. After spawning, juveniles remain in fresh and estuarine waters for 1 to 4 years and then begin to migrate out to sea (Moyle et al. 1995). The upper Sacramento River has been identified as the only known spawning habitat for Green Sturgeon in the southern DPS (Moyle 2002). According to studies, Green Sturgeon adults begin moving upstream through San Francisco Bay during winter (Kelly et al. 2003). Adults in the Sacramento-San Joaquin Delta (Delta) are reported to feed on benthic invertebrates, including shrimp, amphipods, and occasionally small fish (Moyle et al. 1995), while juveniles have been reported to feed on opossum shrimp (*Acanthomysis* sp. and *Neomysis mercedis*) and amphipods. In the bays and estuaries, sufficient water flow is required to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds.

Sub-adult and adult Green Sturgeon occupy a diversity of depths in bays and estuaries for feeding and migration. Tagged adults and sub-adults in San Francisco Bay and the Delta have been observed occupying waters with shallow depths of less than -33 feet MLLW, either swimming near the surface or foraging along the bottom. Sturgeon tagged in the Sacramento River have been reported captured in coastal and estuarine waters to the north of San Francisco Bay (Miller and Kaplan 2001). During periods of migration, adults occur throughout San Francisco Bay and the Delta, while juveniles are present in southern San Francisco Bay year-round, mostly south of the Dumbarton Bridge (NMFS 2015).

Juvenile distribution and habitat use are still largely unknown, and juveniles are presumed present year-round in all parts of the San Francisco Bay Estuary (Israel and Klimley 2008) but in low densities. Juvenile rearing habitats for Green Sturgeon include spawning areas and migration corridors. Rearing habitat use varies depending on seasonal flows and temperatures, and juvenile Green Sturgeon are strong swimmers with the ability to select or avoid habitats.

Threats

A primary factor for the decline of the Green Sturgeon is the restriction of spawning habitat to a limited area below Keswick Dam. Insufficient flow velocities to initiate the upstream spawning migration also contribute to this decline (Kohlhorst et al. 1991 as cited in CDFG 2002; NMFS 2008). Reduced flows have been identified as a factor in weakened year class recruitment in the white sturgeon population and are believed to have the same effect on Green Sturgeon recruitment. In addition, numerous agricultural water diversions exist in the Delta along the migratory route of larval and juvenile sturgeon. Entrainment and impingement in water pumps and screens are considered serious threats to sturgeon during their downstream migration. Sturgeon are also susceptible to uptake of contaminants from contaminated sediments through both dermal contact and incidental ingestion of sediments while feeding. Bioaccumulation is also a concern due to their long lives. All of the above threats were identified by the NMFS Biological Review Team as potentially affecting the continued existence of the Southern DPS Green Sturgeon (70 Fed. Reg. 17386).

Critical Habitat

Critical habitat for the Green Sturgeon includes the Sacramento River, the Delta, and Suisun and San Pablo Bays along with all of San Francisco Bay below the higher high-water elevation (NMFS 2009). This includes the Action Area.

Primary constituent elements (PCEs) essential to the conservation of Green Sturgeon include various components of freshwater, estuarine, and nearshore marine habitats. Components include food resources, substrate for spawning, water flow, water and sediment quality, water depth, and migratory corridor. Green Sturgeon PCEs are described below.

- **Freshwater Systems***:* The lower Sacramento River, from I Street Bridge to the downstream side of the Red Bluff Diversion Dam gates, is considered a PCE because this area supports egg incubation, larval and juvenile rearing, feeding and migration, and adult and subadult holding and migration. This PCE does not occur in the Action Area, and therefore would not be affected by the Proposed Action.
- **Nearshore Coastal Marine Areas***:* Green Sturgeon require nearshore coastal marine areas with adequate migratory corridors, water quality, and food resources. This PCE does not occur in the Action Area, and therefore would not be affected by the Proposed Action.
- **Estuarine Habitats***:* Estuarine habitat provides food resources, migratory corridors, juvenile rearing, and adult and subadult holding habitat for Green Sturgeon. Of the various habitat types that compose Green Sturgeon PCEs, estuarine habitat is the only habitat type that occurs in the Action Area and could be affected by the Proposed Action. Components of the PCE include:
    - **Food resources:** Green Sturgeon require abundant prey items in estuarine habitats and benthic substrate for juvenile, adult, and subadult life stages. Adult and subadults prey on ghost shrimp (*Palaemonetes paludosus*), amphipods, clams, juvenile Dungeness crab, anchovies, sand lances, ling cod (*Ophiodon elongatus*), and other unidentified fish. Juveniles feed on shrimp (*Artemia* spp.), amphipods, isopods, clams, annelid worms, and unidentified crabs and fishes.

- **Water flow***:* Sufficient water flow into San Francisco Bay and the Delta is required to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds.
- **Water quality*:*** Water quality includes temperature, salinity, oxygen content, and other chemical characteristics necessary for normal behavior, growth, and viability of all life stages. Adults and subadults occur across the entire temperature (11.9 to 21.9 degrees Celsius [°C]) and salinity range (8.8 to 32.1 parts per thousand), and a wide range of dissolved oxygen (6.54 to 8.89 mg/L).
- **Migratory corridor***:* The migratory corridor should allow for safe and timely passage of sturgeon in estuarine habitats and between estuarine and riverine or marine habitats. Adults enter the San Francisco Bay Estuary in late February and quickly migrate to spawning grounds. After spawning, they either reside over the summer in deep holding pools—deeper than 5 meters (16.4 feet), or they migrate downstream. Tagged Green Sturgeon were present in holding pools in the Sacramento River through November and December before migrating downstream. They appear to migrate in shallow waters, swimming near the surface, but foraging on the bottom.
- **Depth***:* Green Sturgeon require a diversity of depths for shelter, foraging, and migrating. Juveniles are present year-round in San Francisco Bay and the Delta in shallow depths ranging from 1 to 3 meters (3.3 to 9.8 feet). Tagged adults and subadults appear to stay in shallow depths less than 10 meters (32.8 feet).
- **Sediment quality***:* Sediment quality is necessary for normal behavior, growth, and viability of all life stages.

4.1.2. Steelhead, Central California Coast DPS

Life History

Steelhead are anadromous and nearly indistinguishable from resident rainbow trout that also reside in the same streams in which they spawn, except for steelhead being larger when hatched (Moyle 2002). Winter-run steelhead are at or near sexual maturity when they enter freshwater during late fall and winter, and spawn from late December through April, with the peak between January and March. Juvenile steelhead typically rear in freshwater for a longer period than other salmonids, ranging from 1 to 3 years. However, the actual time is highly variable with the individual. Throughout their range, steelhead typically remain at sea for one to four growing seasons before returning to freshwater to spawn (Burgner et al. 1992).

Steelhead typically enter San Francisco Bay in early winter, using the main channels in San Francisco Bay and the Delta to migrate to upstream spawning habitat, as opposed to small tributaries. However, migrating steelhead may be seen in San Francisco Bay and Suisun Marsh as early as August (Leidy 2000). Migrating fish require deep holding pools with cover such as underwater ledges and caverns. Coarse gravel beds in riffle areas are used for egg laying and yolk sac fry habitat once eggs have hatched. Because juvenile steelhead remain in the creeks year-round for several years while rearing, adequate flows, suitable water temperatures, and an abundant food supply are necessary to sustain steelhead populations. The most critical period is in summer and early fall when these conditions become limiting. Additionally, steelhead require cool, clean, well-oxygenated water, and appropriate gravel for spawning. Spawning habitat condition is strongly affected by water flow and quality, especially temperature, dissolved oxygen, shade, and silt load; these condition effects can greatly affect the survival of eggs and larvae (NMFS 2006).

Little is known about transit times and migratory pathways of steelhead in San Francisco Bay. A 2008 to 2009 study on the migration and distribution of juvenile hatchery-raised steelhead released in the lower Sacramento River show that steelhead spend an average of 2.5 days in transit in the San Pablo and San Francisco Bays (Klimley et al. 2009). The study concluded that transit time was greater in the upper San Francisco Bay Estuary than in the lower estuary (San Francisco Bay). This could be due to the lower salinity in the upper estuary that serves as a transition zone between freshwater and saltwater, allowing steelhead to transition from freshwater to saltwater. Once steelhead reach San Francisco Bay, salinities are similar to ocean water, which may lead steelhead to spend less time in this portion of the estuary. Studies conducted by NMFS (NMFS 2001) and CDFW (Baxter et al. 1999) indicate that the primary migration corridor is through the northern reaches of the Central Bay (Raccoon Straight, which is between Angel Island and the Tiburon Peninsula of mainland Marin County, and north of Yerba Buena Island). CCC steelhead have small spawning runs in multiple San Francisco Bay tributaries including San Leandro Creek, approximately 5 miles southeast of the Action Area (Goals Project 2000).

Steelhead are primarily drift feeders and may forage in open water of estuarine subtidal and riverine tidal wetland habitats (Leidy 2000). The diet of juvenile steelhead includes emergent aquatic insects, aquatic insect larvae, snails, amphipods, opossum shrimp, and small fish (Moyle 1976). Adults may also feed on newly emergent fry (Leidy 2000). Steelhead usually do not eat when migrating upstream and often lose body weight (Pauley and Bortz 1986).

Distribution of steelhead includes coastal river basins from the Russian River south to the Soquel and Aptos Creeks, California (inclusive), and the drainages of San Francisco and San Pablo Bays, including the Napa River. They are also known to migrate to the South Bay, where they spawn in the Guadalupe River, Coyote Creek, and San Francisquito Creek. Also included are adjacent riparian zones, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay from San Pablo Bay to the Golden Gate Bridge.

Threats

Particular threats to CCC steelhead include ongoing impacts from urbanization and diversion facilities (including small diversions as well as large dams) which continue to impair habitat and limit species viability; ongoing threats associated with urban expansion and illegal marijuana cultivation; and climate change (NMFS 2016b). Depletion and storage of natural flows have altered natural hydrological cycles in several California rivers and streams, altering important water quality parameters, such as temperature, dissolved oxygen, and nutrient loads, resulting in injury or mortality of some individuals. Reduced flows also degrade and diminish viable fish habitat by increasing deposition of fine sediments in spawning gravels, which decreases recruitment of new spawning gravels and promotes encroachment of riparian vegetation into spawning and rearing areas (65 Federal Register 36075; USACE 2019). Other threats to steelhead include agricultural operations, forestry operations, gravel extraction, illegal harvest, streambed alteration, unscreened or substandard fish screens on diversions, suction dredging, urbanization, water pollution, wetland loss, potential genetic modification in hatchery stocks resulting from domestication selection, incidental mortality from catch-and-release hooking, and climatic variation leading to drought, flooding, variable ocean conditions, and predation (NMFS 2007; USACE 2019).

Critical Habitat

Critical habitat includes all natal spawning and rearing waters, migration corridors, and estuarine areas that serve as rearing areas accessible to listed steelhead in coastal river basins, from the Russian River to Aptos Creek (inclusive), and the drainages of San Francisco and San Pablo Bays. Also included are adjacent riparian zones, all waters of San Pablo Bay west of the Carquinez Bridge, and all waters of San Francisco Bay to the Golden Gate Bridge (USFWS 2000). This includes the Action Area.

PCEs essential to the conservation of the CCC Steelhead DPS include:

- Freshwater spawning sites with water quality and substrate conditions that can support spawning, incubation, and larval development.
- Freshwater rearing sites with water quality and floodplain connectivity to support juvenile growth, mobility, foraging, and development.
- Aquatic habitat with natural cover, such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction and excessive predation with water quality conditions and natural cover to support juvenile and adult mobility and survival.
- Estuarine areas free of obstruction and excessive predation.
- Water-quality conditions that support juvenile and adult physiological transitions between fresh-and saltwater, natural cover, and foraging.

4.1.3. Steelhead, Central Valley DPS

Life History

Central Valley DPS Steelhead have a similar life history as CCC Steelhead, as described in Section 4.1.2. Distribution of this species historically occurred throughout the Sacramento and San Joaquin River systems: from the upper Sacramento/Pit River systems south to the Kings and possibly Kern River systems in wet years (Yoshiyama et al. 1996). Currently, the Central Valley Steelhead DPS includes steelhead in all river reaches accessible to the Sacramento and San Joaquin rivers and their tributaries in California (NMFS 2000). Also included are river reaches and estuarine areas of the Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco–Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas of the San Joaquin River upstream of the Merced River confluence and areas above specific dams identified, or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years; NMFS 2000).

Unlike CCC Steelhead, Central Valley Steelhead rearing is not known to occur at San Leandro Creek. The primary migration corridor for Central Valley Steelhead is similar to that used by migrating salmon in San Francisco Bay, and occurs through Raccoon Straight north of Angel Island.

Threats

Major threats to Central Valley DPS Steelhead include loss of historical spawning habitat and degradation of remaining habitat, including flow diversions. Despite completion of several fish passage and habitat restoration projects, these habitat losses remain a major threat to this DPS. Genetic threats from the stocking program are a continuing major threat to the Central Valley DPS of steelhead; per the NMFS 2016 5-year review for this species, information released since the preceding 2011 review suggests a loss of genetic diversity and population structure over time. Further, recent drought conditions will likely contribute to reduced abundance and productivity of this DPS (NMFS 2016c).

Critical Habitat

Critical habitat for the Central Valley DPS Steelhead was designated throughout the Central Valley (NMFS 2005a). Critical habitat for the species is divided into multiple hydrologic units by watersheds in the Central Valley; none occur in San Francisco Bay or the Action Area.

4.1.4. Chinook Salmon, Sacramento Winter-Run ESU

Life History

The Chinook Salmon is the largest and least abundant species of Pacific salmon. Like all salmonids, the Chinook Salmon is anadromous; but unlike steelhead, Chinook Salmon are semelparous (i.e., they die following a single spawning event). The Sacramento River winter-run Chinook Salmon evolutionarily significant unit (ESU) was listed as an endangered species on January 4, 1994, and includes all populations of winter-run Chinook Salmon in the Sacramento River and its tributaries in California (NMFS 1993).

Chinook Salmon feed on aquatic and terrestrial invertebrates and salmon eggs in freshwater. In intertidal areas, Chinook Salmon feed on amphipods, insects, and fish larvae. During the oceanic life stage, Chinook Salmon feed on fish, large crustaceans, and squid (Hallock and Fisher 1985). Chinook Salmon, like other salmonids, typically minimize foraging energy cost by feeding on drift species via sit-and-wait predation. When sit–and–wait habitats are sparse, salmonids tend to select benthic invertebrates as prey (Orgon 2015).

Sacramento River winter-run Chinook Salmon enter San Francisco Bay between November and May or June. Their migration into the Sacramento River begins in December and continues through early August, with the majority of the run occurring between January and May and peaking in mid-March (Hallock and Fisher 1985). Adults enter freshwater in an immature reproductive state, similar to spring-run Chinook Salmon. However, winter-run Chinook Salmon move upstream much more quickly, and then hold in the cool waters below Keswick Dam for an extended period before spawning.

Adults use the coastal waters of California, migrating through the Golden Gate, Central Bay, North Bay, San Pablo Bay, and Suisun Bay and into the Sacramento River. Out-migrating juveniles follow the same path in reverse. Studies conducted by NMFS (2001) and CDFW (Baxter et al. 1999) indicate that the primary migration corridor is through the northern reaches of the Central Bay (Raccoon Straight and north of Yerba Buena Island).

In general, winter-run Chinook spawn in the area from Redding downstream to Tehama from mid-April through August. At present, winter-run Chinook Salmon occur only in the Sacramento River below Keswick Dam. Fry and smolts emigrate downstream from July through March through the Sacramento River, reaching the Delta from September through June.

Threats

According to the most recent 2016 NMFS 5-year review, factors responsible for this ESU's decline include blockage of access to historic habitat, other passage impediments, degradation of remaining available habitat, unscreened water diversions, heavy metal pollution from mine runoff, disposal of contaminated dredge sediments in San Francisco Bay, ocean harvest, predation, drought effects, losses of juveniles at the Central Valley Project and State Water Project Sacramento-San Joaquin Delta pumping facilities, and elevated water temperatures at the spawning grounds (NMFS 2016a).

Some threats to this ESU have increased since the preceding 2011 review, and despite actions to address threats, the ESU continues to decline in abundance. Impacts from factors such as drought, diseases, and poor survival conditions have increased since the 2011 review, and most likely have contributed substantially to the declining abundance of the ESU. Regulatory and other actions have been implemented since 2011 to address declines, which include controlling water temperatures with cold water releases, augmenting annual spawning gravel, stabilizing mainstem flows, removing impeded fish passages, restricting harvests, and reducing Delta export pumping.

Critical Habitat

Critical habitat for the winter-run Chinook Salmon includes the Sacramento River from Keswick Dam; Shasta County (River Mile 302) to Chipps Island (River Mile 0) at the westward margin of the Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco–Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (NMFS 1993). This does not include the Action Area.

4.1.5. Chinook Salmon, Central Valley Spring-Run ESU

Life History

The spring-run Chinook Salmon has a similar life history to the winter-run salmon as discussed above, but begins its spawning migration to the Delta in late winter to spring. Adults occur in San Francisco Bay during the migratory period in the spring, and juveniles have the potential to inhabit San Francisco Bay in the fall, winter, and spring. As with other Chinook Salmon in San Francisco Bay, telemetry studies tracking the movement of juvenile salmonids suggest that the primary migration corridor is through the northern reaches of Central Bay (Raccoon Straight and north of Yerba Buena Island; NMFS 2001, Baxter et al. 1999), and no spawning or rearing habitat for listed runs of Chinook Salmon exist in close proximity to the Action Area.

Threats

As part of its 5-year reviews for this ESU, NMFS completed a five-factor analysis of species threats from the following: 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 2) over-utilization for commercial, recreational, scientific, or education purposes; 3) disease or predation; 4) inadequacy of existing regulatory mechanisms; or 5) other natural or human-made factors affecting its continued existence. The most recent 5-year review for this ESU from 2016 builds on and cites the findings from previous reviews, including the preceding 2011 review. According to these sources, major threats to the Central Valley spring-run ESU of Chinook Salmon include loss of historical spawning habitat, degradation of habitat, and genetic threats from hatchery influences (NMFS 2011, 2016a).

Other threats pertaining to the five-factor analysis remain applicable to this ESU, but are not identified as major threats. Issues pertaining to ocean harvest, disease, or predation, and inadequacy of existing regulatory mechanisms remain unchanged since the 2011 review. Drought conditions from 2012 to 2015 likely reduced the abundance of brood during those years, which likely impacted the abundance of returning adults in 2015 through 2018.

Critical Habitat

Critical habitat for the spring-run Chinook Salmon includes all river reaches accessible in the Sacramento River and its tributaries in California; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco–Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (NMFS 2005b). This does not include the Action Area.

4.1.6. Longfin Smelt

Life History

Longfin Smelt, a small anadromous fish that was historically among the most abundant fish in the San Francisco Bay estuary and the Delta, is a federal candidate species. Although this species is not expected to be listed in the immediate future, if it were, it would likely be managed by USFWS. Significant declines in Longfin Smelt abundance have occurred throughout its range during the past quarter century. Longfin Smelt are distinguished by their long pectoral fins, which reach or nearly reach the base of their pelvic fins. They reach a maximum size of about 150 millimeters (total length) and reach maturity near the end of their second year. As they mature in the fall, adults found throughout San Francisco Bay migrate to brackish or freshwater in Suisun Bay, Montezuma Slough, and the lower reaches of the Sacramento and San Joaquin Rivers. Spawning occurs primarily from January through March, after which most adults die (CDFG 2009a). In April and May, juveniles are believed to migrate downstream to San Pablo Bay. Juvenile Longfin Smelt are collected throughout San Francisco Bay during the late spring, summer, and fall, and occasionally venture offshore as far as the Gulf of the Farallones. Juveniles typically inhabit the middle and lower portions of the water column. Longfin Smelt are most likely to occur in the Central Bay during the late summer months before migrating upstream in fall and winter. Adult Longfin Smelt prey primarily on opossum shrimp in the San Francisco Bay-Delta estuary. In addition, copepods and other crustaceans make up a significant component of the Longfin Smelt's diet, and may be of particular importance to juvenile fish (LSA 2012).

Threats

The annual abundance of Longfin Smelt is significantly and positively correlated with the amount of freshwater flow during spawning and larval periods (Stevens and Miller 1983; Hieb and Baxter 1993; Jassby et al. 1995; Baxter 1999). The following three factors have been identified as potentially responsible for this significant correlation: 1) a reduction in predation during high flows; 2) increased habitat availability that may improve survival by reducing intraspecies competition; and 3) an increase in nutrients stimulating the base of the food chain (Stevens and Miller 1983). However, the relationship changed to substantially lower Longfin Smelt abundance after the introduction of the invasive Amur River clam (*Corbula amurensis*) in the late 1980s. This corresponded with a decline in phytoplankton and zooplankton abundance due to grazing by the Amur River clam (Bennett et al. 2002). Other introduced species such as striped bass and inland silversides have had an impact on Longfin Smelt populations due to predation (CDFG 2009b). In 2004, numbers of Longfin Smelt (along with other pelagic species, including Delta Smelt, striped bass, and threadfin shad) exhibited a sharp decline in abundance that continues to the present. The pelagic organism decline phenomenon is currently under investigation to better understand how stock-recruitment effects, declines in habitat quality, increased mortality rates, and reduced food availability due to invasive species may be working separately or together to contribute to the declining abundance of Longfin Smelt and other pelagic species.

4.2. Terrestrial Species

4.2.1. California Least Tern

Life History

The California least tern (*Sterna antillarum*) is the smallest member of the subfamily Sternidae (family Laridae), measuring about nine inches long with a 20-inch wingspread. The California least tern has gray upper plumage, white under plumage, a distinctive black cap, and black stripes from the cap across the eyes to the beak. Least terns typically feed in shallow estuaries or lagoons where small fish are abundant. Its most common prey species include jacksmelt (*Atherinopsis californiensis*, topsmelt (*Atherinops affinis*) and northern anchovy (*Engraulis mordax*; Elliott et al. 2007). When looking for prey, they hover above the water and plunge to its surface when fish are spotted. Eelgrass is particularly important to the California least tern, which can forage on small fishes associated with the eelgrass.

The least tern breeds in California from mid-May to August. California least terns create scrape nests in the sand or among shell fragments at established breeding colonies. After mating, females lay their eggs in shallow depressions on barren to sparsely vegetated sites near water, usually on sandy or gravelly substrate. The California least tern typically departs California in August and winters in Latin America.

California least tern breeding colonies are at the former Alameda Naval Air Station on Alameda Island, approximately 1.5 miles southwest of the IHTB. The Naval Air Station on Alameda Point has hosted a breeding colony since at least 1976, and possibly earlier (H.T. Harvey and Associates 2012). Least terns have been observed to forage primarily along the breakwaters and shallows of the southern shoreline of the former Naval Air Station Alameda and in Ballena Bay from May through August (USACE and RWQCB 2015). California least terns are known to use the MHEA for foraging and roosting (USACE and RWQCB 2015).

Threats

Threats to the California least tern include loss and degradation of habitat, expansion of urban development, and disturbances due to human activities (e.g., people and/or their pets disturbing nesting areas, motorized vessels in foraging areas). Other threats to California least tern include effects from climate change, disturbances due to altered hydrological conditions, and an increasing predator population, both native and introduced, which can cause a significant level of loss to a nesting colony from brief disturbance (Scott et al. 2005; Scott and Goble 2006; USFWS 2006).

Chapter 5. Environmental Baseline Conditions

5.1. Action Area Habitats

Aquatic and terrestrial habitats in the Action Area are described in detail in Chapter 3. Aquatic habitats include deep pelagic open waters in the existing turning basins and navigation channels; shallower pelagic open waters at the margins of the turning basins and navigation channels; limited intertidal habitat consisting of seawalls, piles, and rock riprap; benthic habitat composed of deposited sediment in the turning basins and navigation channels, silty mud and sand substrates in areas less than 25 feet deep (areas that are not maintenance dredged), and in lesser quantities on hard substrates such as piers, breakwaters, and riprap. Terrestrial habitats include the industrialized shoreline of the IHTB and the Berth 10 dredged material rehandling facility, which contain very limited vegetation. Each of these habitat types is substantially affected by existing and historic operations at the Port and other industrial or marine support facilities. Upland habitats in the Action Area are unlikely to provide substantial habitat to any ESA-listed species.

Chapter 3 provides additional discussion of habitats outside of the Action Area, including the MHEA and former Alameda Naval Air Station on Alameda Island. Although these areas would be unaffected by the Proposed Action, these areas provide habitat for California least tern, and are therefore described to provide context to the impact analysis.

5.2. Aquatic Special-Status Species in the Action Area

This section describes the potential presence of federal ESA–listed aquatic species in the Action Area. Potential species presence has been determined based on species habitat requirements and distribution trends, and recorded occurrences in or near the Action Area.

Fish species occurrence data are available from CDFW studies and surveys, including trawl surveys. Most CDFW surveys occur in the Delta and terminate in Suisun or San Pablo Bay, outside of the Action Area. Only the San Francisco Bay Study (Bay Study; CDFW 2018) includes the entirety of San Francisco Bay, including the Action Area.

The Bay Study was established in 1980 to determine the effects of freshwater outflow on the abundance and distribution of fish and mobile crustaceans in the San Francisco Estuary, primarily downstream of the Delta. The Bay Study uses a 42-foot stern trawler to sample with two trawl nets at each open water station. The otter trawl samples demersal fishes, shrimp, and crabs. The midwater trawl samples pelagic fishes. The Bay Study observation stations nearest the Action Area are just south of Yerba Buena Island (Station 110) and near Alameda Island (Station 142). Although these locations are 2 miles or more from the Action Area, observation data at Stations 110 and 142 are the best available for the Proposed Action.

As noted, the Central Bay is poorly represented in trawl survey data, and the Bay Study provides limited data. Comparisons of multiple trawl surveys throughout San Francisco Bay demonstrate the need for multiple surveys to provide accurate findings, including population trends (Stompe et al. 2020). Therefore, conclusions on potential species presence provided herein cannot be made conclusively using Bay Study data.

5.2.1. North American Green Sturgeon Southern DPS

Green Sturgeon are potentially present throughout all marine portions of the Action Area at any time of the year. However, their preferred migration routes do not traverse the Action Area; adult Green Sturgeon typically take the more direct migratory route from San Pablo Bay, past the Raccoon Strait adjacent to Angel Island, and out to the Golden Gate Bridge (Kelly et al. 2003). Sub-adult and adult Green Sturgeon occupy a diversity of depths in bays and estuaries for feeding and migration, although most of the Action Area waters are maintained to depths that exceed observed benthic foraging depths for this species (i.e., -33 feet MLLW; Miller and Kaplan 2001). No spawning or rearing habitat for Green Sturgeon exists in or near the Action Area.

No Green Sturgeon have been observed during Bay Study trawl surveys, although these findings do not preclude their presence from the Action Area.

5.2.2. Steelhead, Central California Coast DPS

Steelhead are primarily present during in-migration and out-migration periods. They are suspected to forage in the shallow water areas of the Central Bay (less than 30 feet deep) during in-migration and out-migration transits. Fish migrating to and from these spawning grounds may occur in Action Area waters, including the Oakland-Alameda Estuary. Juvenile steelhead travel episodically from natal streams during fall, winter, and spring high flows, with peak migration occurring in April and May (Fukushima and Lesh 1998). Adult CCC steelhead are most likely to be present during the winter, while juveniles may be present year-round. No spawning or rearing habitat for steelhead exists in the Action Area; however, CCC steelhead have small spawning runs in multiple San Francisco Bay tributaries, including San Leandro Creek, approximately 5 miles southeast of the project footprint (Goals Project 2000). Construction would occur during the established June 1 to November 30 in-water work window for CCC steelhead and other salmonids.

The Bay Study Survey did not observe any steelhead at stations nearest the Action Area, or in the Central Bay. Steelhead were only observed in 2000 and 2003, in Suisun Bay and the Sacramento River.

5.2.3. Steelhead, Central Valley DPS

Central Valley DPS Steelhead are primarily present during in-migration and out-migration periods. They are suspected to forage in the Central Bay shallow water areas (less than 30 feet deep) during in-migration and out-migration transits. Adult Central Valley DPS Steelhead are most likely to be present in the Action Area during the winter, while juveniles may be present year-round. No spawning or rearing habitat for Central Valley DPS Steelhead exists in or near the Action Area. Construction would occur during the established June 1 to November 30 in-water work window for Central Valley DPS Steelhead and other salmonids.

The Bay Study Survey did not observe any steelhead at stations nearest the Action Area, or in the Central Bay. Steelhead were only observed in 2000 and 2003, in Suisun Bay and the Sacramento River.

5.2.4. Chinook Salmon, Sacramento Winter-Run ESU

Winter-run Chinook Salmon are primarily present during in-migration and out-migration periods. They are suspected to forage in Central Bay shallow water areas (less than 30 feet deep) during in-migration and out-migration transits. However, telemetry studies tracking the movement of juvenile salmonids suggest that the primary migration corridor is through the northern reaches of the Central Bay (Raccoon Straight and north of Yerba Buena Island; NMFS 2001; Baxter et al. 1999; Jahn 2011). No spawning or rearing habitat for listed runs of Chinook Salmon exists near the Action Area. Construction would occur during the established June 1 to November 30 in-water work window for Chinook Salmon and other salmonids.

The Bay Study did not observe any Chinook Salmon at stations nearest the Action Area, or in the Central Bay. Most Chinook Salmon observations during the Bay Study Survey were made in the lower reaches of the Sacramento and San Joaquin Rivers and east of Suisun Bay, with a single recorded occurrence in San Pablo Bay in 2006.

5.2.5. Chinook Salmon, Central Valley Spring-Run ESU

The spring-run Chinook Salmon are primarily present during in-migration and out-migration periods and are known to forage in Central Bay shallow water areas. As noted for Sacramento winter-run ESU Chinook, telemetry studies tracking the movement of juvenile salmonids suggest that the primary migration corridor is through Raccoon Straight and north of Yerba Buena Island (Jahn 2011). No spawning or rearing habitat for listed runs of Chinook Salmon exist near the Action Area. Construction would occur during the established June 1 to November 30 in-water work window for Chinook Salmon and other salmonids.

As noted for the Chinook Salmon winter-run ESU, the Bay Study did not observe any Chinook Salmon at stations nearest the Action Area or in the Central Bay, and the nearest observation of Chinook Salmon was recorded in San Pablo Bay in 2006.

5.2.6. Longfin Smelt

Longfin Smelt are most likely to occur in the Central San Francisco Bay during the late summer months before migrating upstream in fall and winter. Since about 2000, the abundance of Longfin Smelt in San Francisco Bay and the Delta has steadily declined (Hobbs et al. 2017; Baxter 2018; USACE 2019). Only adult and juvenile Longfin Smelt have the potential to be present in the Action Area. Unlike larvae, juveniles and adults are capable of active swimming and have the ability to avoid stressors, and therefore would unlikely to be directly impacted by in-water work along the waterfront (ESA 2015).

During Bay Surveys, Longfin Smelt have been predominantly observed in observation stations in or upstream of San Pablo and Suisun Bays. At stations nearest the Action Area (Stations 110 and 142), Longfin Smelt were last observed in 2007, with additional observations in 2001, 2000, 1988, 1987, and 1985. Between 2014 and 2018 (the most recent survey year), no Longfin Smelt were recorded south of San Pablo Bay. Based on these findings and Longfin Smelt population trends, there is a low likelihood of Longfin Smelt occurrence in the Action Area.

5.3. Terrestrial Special-Status Species in the Action Area

5.3.1. California Least Tern

The Action Area may provide some foraging habitat for California least terns on an infrequent basis, due to the proximity of their breeding colony at the former Alameda Naval Air Station, approximately 0.75 mile east of the IHTB Action Area and 1 mile south of the OHTB Action Area. However, the species forages most actively in San Francisco Bay waters in the marina near Alameda Point (USFWS 2013) and is generally described as preferring shallow foraging habitat. Terns are also known to use the MHEA restoration site for foraging and roosting (USACE and RWQCB 2015). California least terns are not expected to breed in the Action Area due to existing operations at Schnitzer Steel, Howard Terminal, the Alameda properties, and other shoreline industrial and marine support facilities. Presence of breeding populations in the Action Area is likely further precluded given the close proximity of preferred habitat conditions and the established breeding colony on Alameda Point.

Chapter 6. Effects of the Proposed Action

This section discusses the direct, indirect, temporary, and permanent effects of the Proposed Action on special-status species and habitats present or potentially present in the Action Area. Direct effects are the direct or immediate effects of the Proposed Action on listed species or habitats, such as physical damage to an individual, physical loss of a spawning or foraging habitat, a blocked migration corridor, or harassment of an animal species to the point where it abandons part of its normal range. Indirect effects are those that are caused by—or would result from—the Proposed Action, but occur later in time and are reasonably certain to occur. These include ecosystem-type changes that primarily affect food web dynamics or habitat suitability as would occur with decreased suitability of foraging habitat. The Action Area described in Chapter 3 is inclusive of areas where direct and indirect effects to federal ESA-listed species are likely to occur.

6.1. Aquatic Special-Status Species and Resource Effects

Aquatic species potentially present in the Action Area may experience temporary construction-related impacts related to entrainment during dredging, altered water quality, turbidity and sediment suspension, mobilization of chemicals of concern, temporary benthic habitat disturbance, underwater noise, impediments to localized movement and migration, and invasive species. Permanent habitat alteration would occur, including conversion of uplands to aquatic habitat and deepening of existing aquatic habitat. A general description of these impacts and their effects on aquatic species is provided in Section 6.1.1. Impact determinations for individual species and critical habitat are provided in Sections 6.1.2 through 6.2.2, and summarized in Chapter 7. These determinations were made in consideration of the respective characteristics of the potentially present species and habitats, including seasonal presence in the Action Area during construction.

6.1.1. Effects Common to All Aquatic Species

Entrainment During Dredging

All forms of dredging have the potential to incidentally remove organisms from the environment along with the dredge material, a process referred to as entrainment. Entrained fish are likely to suffer mechanical injury or suffocation during dredging, resulting in mortality. Although individual fish have the potential to be struck or entrained by a clamshell bucket as it falls through the water column to the channel bottom, the falling bucket would generate a pressure wave around it that would force small fish away from the falling bucket. As a result of the pressure wave, mechanical clamshell dredging has a very low risk of entraining fishes (Reine and Clarke 1998, USACE 2019). Therefore, the use of a clamshell dredge minimizes the risk of fish entrainment for all fishes. Mechanical dredging is also generally accepted to entrain far fewer fish than hydraulic dredging, because less water is removed along with the sediment and no suction is involved.

In consideration of the construction methods and avoidance and minimization measures, the potential to entrain or physically injure or kill federally listed aquatic species is very low. General disturbance from construction vessels is expected to be minimal, because fish avoid the areas where active dredging is occurring. Dredging and in-water construction associated with the Proposed Action would be conducted in accordance with standard practices, including measures to reduce the potential for entrainment, as discussed in Section 2.3. This includes dredging during the in-water work window between June 1 and November 30, when salmonids are less likely to be present.

Accidental Discharges

Construction activities have the potential to result in accidental discharge of contaminants into San Francisco Bay. Various contaminants, such as fuel oils, grease, and other petroleum products used in construction activities, could be introduced into the system directly during dredging and nearshore construction. Shoreline construction, including demolition, excavation, and sheet pile installation, could also result in increased surface run-off and contaminant loading to San Francisco Bay waters. Compliance with National Pollutant Discharge Elimination System (NPDES) Construction General Permit conditions, including implementation of a Stormwater Pollution Prevention Plan and measures to prevent accidental spills of hazardous materials, would prevent contaminants and disturbed sediments from reaching storm drains and subsequently San Francisco Bay waters, or from being directly discharged into Bay waters. The implementation of standard BMPs and other measures identified in Section 2.3 would further reduce the potential for accidental discharges during construction to adversely affect aquatic species and habitat.

Stormwater Management

There would be minor long-term alterations to upland drainage patterns at Howard Terminal, Schnitzer Steel, and Alameda Gateway because of IHTB expansion, which are unlikely to result in adverse water quality impacts. This may include removal, replacement, or redesign of drainage infrastructure such as curbs and gutters resulting from upland excavation and reconfiguration of the facility shorelines. Any such alterations would occur in compliance with NPDES post-construction runoff requirements for new development and redevelopment, including treatment measures and other appropriate source control and site design features to reduce the pollutant load in stormwater discharges and to manage runoff flows. With adherence to these requirements, upland drainage changes are unlikely to substantially affect water quality or biological resources.

Turbidity and Suspended Sediment

During any type of dredging operations, the interaction of the dredge equipment with the dredged material resuspends sediment into the water column. The mechanisms by which mechanical dredging causes increased suspended sediment concentrations include the impact and withdrawal of the bucket from the substrate, the washing of material out of the bucket as it moves through the water column, and the loss of water as the sediment is loaded onto the barge (Nightingale and Simenstad 2001).

Pile removal may also temporarily disturb benthic sediments and increase turbidity and suspended sediment levels in the immediate vicinity of the Action Area during construction. Increases in turbidity and suspended sediment levels from these activities would be substantially less significant than similar effects from dredging. Movement of the dredge and other construction vessels would not be expected to increase turbidity above ambient ranges generated by natural hydrologic processes, weather, and existing vessel traffic.

Effects on turbidity and suspended sediment levels from new dredging to expand the IHTB are anticipated to be like those from existing annual maintenance dredging. Dredging typically results in suspended sediment levels of less than 700 mg/L at the surface, and less than 1,100 mg/L at the bottom adjacent to a dredge source (within approximately 300 feet) (LaSalle 1988). This concentration would decrease rapidly with distance due to settling and mixing. Although concentrations of this magnitude could occur at locations with fine silt or clay substrates, much lower concentrations (50 to 150 mg/L at 150 feet) are expected at locations with coarser sediment; sediment in the Oakland Harbor is predominately fine-grained (USACE 2019), although there is evidence that coarser sand substrates may be present in areas 25 feet deep or shallower (City of Oakland 2021). The degree of sediment re-suspension depends on the physical composition of the material, with fine-grained material remaining in suspension longer, and sandy material falling through the water column and resettling much faster. In addition, the movement of water associated with tides, river outflow, wind, and waves also determines turbidity plumes, all of which can disperse suspended particles and turbidity plumes around San Francisco Bay (USACE 2019).

Turbidity plumes were measured during clamshell dredging in the Oakland Harbor during USACE monitoring in 2016 and 2017 (USACE 2019). The San Francisco Bay navigation channel maintenance dredging water quality certification requires that increased turbidity be less than 50 Nephelometric Turbidity Units (NTUs), or no greater than 10 percent if the baseline NTU is greater than 50 at the point of compliance (i.e., 500 feet downstream of dredging). During USACE monitoring in the Oakland Harbor, exceedances of the water quality turbidity standards at the point of compliance occurred only periodically.

Temporary turbidity plumes from dredging would be localized and would affect a relatively small area in relation to surrounding areas of similar habitat. In the naturally turbid San Francisco Bay, turbidity plumes would be quickly diluted to near or within background particulate concentrations (USACE and RWQCB 2015). Furthermore, silt curtains would be used where specific site conditions demonstrate that they would be practicable, and effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions or contain contaminants at levels in excess of applicable regulatory thresholds.

Dredging, pile removal, and other in-water construction activities would result in increased turbidity from suspended sediments. Suspended sediments have been shown to affect fish behavior, including avoidance responses, territoriality, feeding, and homing behavior. Wilber and Clarke found that suspended sediments result in cough reflexes, changes in swimming activity, and gill flaring. Suspended sediments can have other impacts, including abrasion to the body and gill clogging (Wilber and Clarke 2001). The effect of dredging on fish can vary with life stage; early life stages tend to be more sensitive than adults.

The life stages of federal ESA–listed fish species potentially present in the Action Area are likely less susceptible to adverse direct effects from increased turbidity. The eggs or larval life stages of steelhead, Chinook Salmon, Green Sturgeon, and Longfin Smelt are not expected to be present in the Action Area. Large adult and juvenile fish (including steelhead, Chinook, and Green Sturgeon) would be motile enough to avoid areas of high-turbidity plumes caused by dredging. The USACE Waterways Experiment Station Technical Report DS-78-5 (Effects of Dredging on Aquatic Organisms) reports that: "Most organisms tested are very resistant to the effects of sediment suspensions in the water, and aside from natural systems requiring clear water such as coral reefs and some aquatic plant beds, dredging-induced turbidity is not a major ecological concern" (Hirsch et al. 1978).

Dredging associated with the Proposed Action would be conducted in accordance with standard practices, including measures to reduce the potential for causing turbid conditions that could affect listed species and their habitat, as discussed in Section 2.3. This includes, but is not limited to, use of silt curtains, avoiding spillage, increasing cycle times as needed, and dredging during the established in-water work window for salmonids. In addition, dredging would be conducted in compliance with any conditions associated with regulatory permits obtained for the action.

In consideration of the potential fish life stages present, the brief duration and relatively small area of effect, background turbidity levels in San Francisco Bay, and with implementation of proposed avoidance and minimization measures, the Proposed Action is unlikely to substantially affect federal ESA–listed fish species from increased turbidity.

Mobilization of Contaminants of Concern

Dredging or other bottom-disturbing activities can disturb aquatic habitats by resuspending sediments, thereby recirculating toxic metals, hydrocarbons, pesticides, pathogens, and nutrients into the water column. Any toxic metals and organics, pathogens, and viruses, absorbed or adsorbed to fine-grained particulates in the sediment may become biologically available to organisms either in the water column or through food-chain processes.

Most available studies suggest that there is no significant transfer of metal concentrations into the dissolved phase during dredging, even though release of total metals associated with the suspended matter may be large (Jabusch et al. 2008). Organic contaminants such as pesticides, PCBs, and polyaromatic hydrocarbons are generally not very soluble in water, and direct toxicity by exposure to dissolved concentrations in the water column is not very likely (Jabusch et al. 2008; USACE and RWQCB 2015).

Under direction of the LTMS agencies, a study on the short-term water quality impacts of dredging and dredged material placement on sensitive fish species in San Francisco Bay was completed by the San Francisco Estuary Institute (Jabusch et al. 2008). The review considered five fish species: Chinook Salmon, Coho Salmon, Delta Smelt, steelhead trout, and Green Sturgeon. Water quality impacts of concern include dissolved oxygen reduction, pH decrease, and releases of toxic components such as heavy metals, hydrogen sulfide, ammonia, and organic contaminants (including polyaromatic hydrocarbons, PCBs, and pesticides). Potential short-term effects include acute toxicity, subacute toxicity, and biological and other such as avoidance. The study concluded that direct short-term effects on sensitive fish by contaminants associated with dredging plumes are minor. The study identified a need to better study the potential of ammonia releases during dredging in San Francisco Bay. However, ammonia has not been identified as a contaminant of concern for the Action Area, and the amount of ammonia released by maintenance dredging is expected to be minimal, and the consequent effects short term and minor. Mobile organisms, such as fish, are likely to relocate outside of the dredge material plume, rather than be exposed to potential harm. The dredge material plume would only occupy a small percentage of the habitat available to fish species in the vicinity of the Action Area at any given time.

Existing upland areas surrounding the proposed IHTB expansion area are known to contain several contaminants; however, excavation and offsite disposal of these materials to a depth of -17 feet bgs would occur prior to dredging as part of the Proposed Action. Although there are no specific data regarding the fill quality below groundwater at the upland areas in the proposed IHTB expansion area, or in the subtidal areas in the IHTB expansion footprint, most of these areas are not expected to contain elevated constituents of concern that would preclude beneficial reuse (see Section 3.1.5 for details). The exception is the basin between Howard Terminal and Schnitzer Steel, where sediment may be contaminated with heavy metals requiring landfill disposal in a Class II landfill, which would occur as needed. As detailed in Section 3.1.1, the Central Bay is a Category 5 waterbody for several pollutants, which may also be present in sediments in the Action Area.

Sediments would be tested prior to dredging, and the results would be reviewed by DMMO prior to dredging and placement, including evaluation of the potential for water quality impacts. This process would identify contaminated sediments and appropriate placement site options for dredged materials based on the characteristics of the sediment and criteria for each placement site. Additionally, the action would adhere to any water quality protection measures included as conditions to project permits and regulatory approvals.

In consideration of the low likelihood for aquatic organisms to be exposed to toxins during dredging and other in-water construction; avoidance and minimization measures described in Section 2.3; and in consideration of DMMO procedures, the Proposed Action is unlikely to result in substantial adverse impacts to special-status fish species from mobilization of contaminants of concern.

Temporary Benthic Habitat Disturbance

Dredging would directly impact benthic communities through physical disruption and direct removal of benthic organisms, resulting in the potential loss of most, if not all, organisms in the dredged area. Organisms immediately adjacent to the navigation channels and turning basins may be also be lost because of smothering or burial from sediments resuspended in the water column during dredging (USACE 2019). These effects may also occur as a result of other bottom-disturbing activities, such as pile driving, although to a lesser degree. Benthic habitat in the federal channel and turning basins, and their margins, is regularly disturbed under baseline conditions because of maintenance dredging and the propeller wash of ship traffic.

Studies have indicated that even relatively large areas disturbed by dredging activities are usually recolonized by benthic invertebrates within 1 month to 1 year, with original levels of biomass and abundance developing within a few months to between 1 and 3 years (Newell et al. 1998). Recovery in deep water channels may be slower. Following dredging, disturbed areas are recolonized, beginning with mobile and opportunistic species (Oliver et al. 1977, Lenihan and Oliver 1995). Colonizing species composition may be different than prior to dredging, and recolonizing species would likely include nonindigenous species common to San Francisco Bay (USACE and RWQCB 2015).

Benthic habitat can provide important foraging areas for special-status fish species, especially for Green Sturgeon and Longfin Smelt, which primarily forage in the benthos. Steelhead and Chinook Salmon are primarily drift feeders, but also forage in the benthos. Steelhead and Chinook Salmon typically forage in waters less than 30 feet deep, while Green Sturgeon have been observed foraging at depths up to 33 feet.

Benthic habitat in the Action Area is likely of marginal foraging value given existing and historic uses in the navigation channel and adjoining shoreline. Benthos in the Action Area are in a constant state of disruption from large vessel movement and annual maintenance dredging. Regular disturbance is reduced outside of the navigation channel and existing turning basins, although still present. The Proposed Action would result in temporary impacts to benthic communities in the enlarged turning basin areas. These effects would be similar to those caused by maintenance dredging in the existing navigating channels and turning basins, and dredged areas in the proposed expanded turning basins are expected to recolonize with benthic organisms.

Permanent impacts to benthic habitat would occur from widening the turning basins, which may affect fish foraging. These impacts are discussed in the Habitat Alteration section below.

Underwater Noise

Project construction would result in underwater sound pressure waves, due to noise generated by mechanical dredging and from shoreline construction at the IHTB. The scientific knowledge of the effects of underwater noise and sound waves on fishes is limited, and varies depending on the species. Effects may include behavioral changes, neurological stress, and temporary shifts in hearing thresholds, depending on the intensity and characteristics of the noise. Studies on the effects of noise on anadromous Pacific coast fishes are primarily related to pile-driving activities.

Mechanical hydraulic dredges produce a complex combination of repetitive sounds that may be intense enough to cause adverse effects on fish. In addition, the intensity, periodicity, and spectra of emitted sounds differ among dredge types and the substrate being dredged. Clamshell dredges generate a repetitive sequence of sounds from winches, bucket impact with the substrate, closing and opening the bucket, and dumping the dredged material into the barge. The most intense sound impacts are produced during the bucket's impact with the substrate, with peak SPLs of 124 dB measured 150 meters from the bucket strike location (Dickerson et al. 2001; Reine et al. 2002). Existing ambient underwater noise at the IHTB and OHTB include levels of 1,600 to 180 dB produced by small boats and ships at 1 meter (MALSF 2009), and 180 to 189 dB produced by commercial shipping at 1 meter (Reine and Dickerson 2014). The Oakland Outer Harbor is identified as having ambient sound levels of 120 to 155 dB (peak), which exceeds NMFS behavioral thresholds for fish (Caltrans 2020).

Sheet pile removal would also generate underwater noise that may affect marine biota. Sheet piles are generally removed using vibratory hammers. There are no established injury criteria for fish for vibration pile removal, and resource agencies are less concerned that vibration pile removal would result in injury or other adverse effects on fish (Caltrans 2020).

Underwater noise is not anticipated to substantially affect federal ESA–listed fish due to their mobility, existing activity at the harbor, and the anticipated intensity of sound produced by construction. Fish are anticipated to avoid the dredging areas during construction. Proposed construction activities are not anticipated to substantially exceed ambient noise levels present in the Action Area, and associated with vessel traffic. The Proposed Action includes avoidance and minimization measures pertaining to underwater noise, including exclusive use of vibratory hammers for sheet pile removal. In-water construction would also be limited to the established June 1 through November 30 construction window, when salmonids are less likely to be present.

In consideration of this analysis, injury to fishes from peak noise (e.g., rupture of swim bladder) or accumulated noise (temporary threshold shifts) is not expected to occur, but behavioral effects (e.g., changes in feeding behavior, fleeing, and startle responses) could occur. Behavioral effects, however, would likely be similar to those experienced under existing conditions.

Impediments to Localized Movement and Migration

The noise and in-water disturbance associated with proposed improvements could cause fish and wildlife species to temporarily avoid the immediate work area when work is being conducted. The Proposed Action does not include any in-water structures that would impede movement or migration, and permanent adverse impacts are therefore not anticipated.

As noted for impacts associated with turbidity and underwater noise, fish species are anticipated to avoid the construction area during dredging and in-water construction. Federal ESA–listed fish species may be temporarily displaced from areas with elevated turbidity during dredging. Underwater noise generated by construction is expected to be comparable to ambient noise levels in the harbor, and noise effects on localized movement and migration are therefore anticipated to be minimal.

The dredge plume area is generally considered to include a 250-meter buffer from the dredge barge, although it may be smaller for the Proposed Action because silt curtains would be employed as warranted to contain and minimize turbidity. The Central Bay serves as a migration corridor for special-status anadromous fish between the Pacific Ocean and spawning habitat, primarily in the Sacramento and San Joaquin River watersheds, but also in a handful of tributaries to San Francisco Bay. Those that use San Francisco Bay as a migration corridor to the Central Valley watersheds rarely stray south of the San Francisco Bay Bridge, although CCC steelhead have been known to spawn in San Leandro Creek, approximately 5 miles southeast of the Action Area (Goals Project 2000). Construction of the Proposed Action would occur during the in-water work window, when migrating salmonids are unlikely to be present. In addition, studies using volcanic ash to simulate suspended sediment levels demonstrated that adult male Chinook Salmon were still able to detect natal waters through olfaction even when subjected to 7 days of total suspended sediment levels of 650 mg/L (Whitman and Miller 1982).

In consideration of the Proposed Action avoidance and minimization measures, existing ambient underwater noise levels, and demonstrated salmonid tolerance of high suspended sediment levels during migration, the Proposed Action is not anticipated to result in substantial adverse effects to federal ESA–listed fish species related to localized movement and migration.

Invasive Species

Dredging vessels may come from outside of the Bay Area. There is the potential that nonnative species could be introduced into the Action Area. Invasive species most commonly arrive in larval forms transported to San Francisco Bay and released in ballast water. The United States Coast Guard and State of California have mandatory regulations in effect that require ships carrying ballast water to have a ballast water management and reporting program in place; and without jeopardizing the safety of the crew, must exchange ballast water with mid-ocean water or use an approved form of ballast water treatment prior to releasing any ballast water in a port in the United States. Dredge equipment or other construction vessels would comply with these regulations, as applicable. In consideration of these regulations, project activities would not be expected to substantially increase the spread of invasive nonnative aquatic species.

Habitat Alteration

The proposed project would permanently deepen subtidal waters in the IHTB and OHTB expansion areas. Expansion of the IHTB would also permanently convert approximately 7 acres of terrestrial land into intertidal or subtidal habitat.

Creation of additional of subtidal and intertidal waters from enlarging the IHTB is anticipated to result in a long-term benefit to aquatic species and habitats by expanding the area of available aquatic habitat. This includes habitat for a wide variety of aquatic species, including species associated with the benthos (e.g., annelids, mollusks, and crustaceans), phytoplankton and zooplankton, common fish species, special-status fish species, and marine mammals. Newly created waters would be comparable in quality to existing habitat in the IHTB and navigation channel.

Expanding the IHTB and OHTB would permanently convert shallow water to deeper water, which may adversely affect habitat for ESA–listed fish species. Green Sturgeon and Longfin Smelt predominantly forage in the benthos, at observed depths up to 33 feet for Green Sturgeon. Proposed deepening to expand the turning basins may affect Green Sturgeon and Longfin Smelt foraging, although there is little or no available data pertaining to foraging by these species at depths of -50 feet MLLW. Salmonids show preference for sit-and-wait foraging in the water column, and foraging effects from permanent deepening are therefore anticipated to be minimal. Benthic habitat quality in the Action Area is likely marginal, given regular disturbance associated with large-vessel traffic and maintenance dredging.

Effects of permanent channel deepening on federal ESA-listed fish species are anticipated to be minimal when considering the relative low value of benthic foraging habitat impacted, and the benefits provided by converting upland industrial habitat to subtidal and intertidal habitat.

6.1.2. North American Green Sturgeon Southern DPS

There is no established in-water work window for Green Sturgeon. This species is assumed present in the Action Area during construction, and therefore may be subject to the temporary effects described in Section 7.1.1, including effects related to entrainment during dredging, increases in turbidity and suspended sediment, mobilization of contaminants of concern, temporary benthic habitat disturbance, underwater noise, and impediments to localized movement and migration. Potential impacts to Green Sturgeon and other aquatic organisms from accidental discharges, upland stormwater management alterations, and invasive species would be avoided through adherence to applicable regulations and federal, state, and local oversight.

Direct take of Green Sturgeon through entrainment is unlikely to occur. There is no spawning or rearing habitat for Green Sturgeon in the Action Area. It is anticipated that juvenile and adult Green Sturgeon, if present, would be motile enough to avoid entrainment during dredging.

As with other fish species, Green Sturgeon may be temporarily affected by increased turbidity and underwater noise, if present. These impacts would be short-term and minor, and comparable to conditions associated with existing activity at the Inner and Outer Harbors. The Proposed Action would involve landside pile-driving and in-water vibratory removal of piles which would not be expected to produce noise exceeding the 187 dB threshold for fish species impacts , and other construction noise levels would likely be similar or less than background noise from large vessel use in the harbor. Turbidity impacts to fish are generally not regarded as major, and dredging BMPs would be implemented to minimize increases in turbidity.

Green Sturgeon could experience temporary foraging impacts from benthic habitat disturbance during dredging and in-water construction, because Green Sturgeon are reported to feed on benthic invertebrates, including shrimp, amphipods, and occasionally small fish. However, benthic habitat in the Action Area is likely of marginal value to Green Sturgeon and other species that forage in the benthos, because aquatic areas proposed for new dredging occur at the margins of the existing navigation channels and turning basins, which are regularly disturbed by maintenance dredging and deep-draft vessel traffic.

Green Sturgeon could be affected by mobilization of chemicals of concern during dredging; however, these effects would likely be minimal and limited to the duration of construction. As detailed in Section 6.1.1, LTMS-directed studies demonstrated that short-term effects on sensitive fish by contaminants associated with dredging plumes are minor. Sediments would be tested prior to dredging, and the results would be reviewed by the DMMO prior to dredging and placement, including evaluation of the potential for water quality impacts. In consideration of the low likelihood for exposure to toxins during dredging; avoidance and minimization measures described in Section 2.3 to protect water quality; and in consideration of DMMO procedures, the Proposed Action is unlikely to result in substantial adverse impacts to Green Sturgeon from mobilization of contaminants of concern. Furthermore, removal of sediments potentially containing contaminants of concern would result in a long-term benefit to the aquatic environment.

Permanent Green Sturgeon foraging effects may also occur from deepening the expanded turning basin area and from converting upland terrestrial habitat to intertidal and subtidal waters. Tagged adults and sub-adults in San Francisco Bay and the Delta have been observed occupying waters with shallow depths of less than -33 feet MLLW, either swimming near the surface or foraging along the bottom. Deepening existing waters to -50 feet MLLW may therefore reduce suitability for Green Sturgeon foraging. However, as noted for temporary benthic habitat disturbance, high levels of existing vessel activity in the Inner and Outer Harbors likely reduces the suitability for Green Sturgeon foraging under existing and proposed conditions. Converting approximately 7 acres of uplands to open water habitat would have a beneficial effect on Green Sturgeon by increasing the area of available habitat, including foraging habitat at the margins of the IHTB expansion area or along seawalls where depths of -50 feet MLLW may not be achieved.

Impediments to Green Sturgeon localized migration and movement would be minimal when considering the mobility of these species and the Proposed Action avoidance and minimization measures. Displacement from turbid areas would be short-term. Conversion of uplands to open water habitat would have a long-term benefit on localized movement of Green Sturgeon, which would further compensate for any potential temporary displacement.

In summary, although Green Sturgeon are presumed to be present year round, construction-related impacts to this species are anticipated to be minimal when considering the quality of habitat in the Action Area; implementation of avoidance and minimization measures; and the mobility of Green Sturgeon life stages likely to be present. Long-term adverse impacts from loss of benthic foraging habitat are likely to be minimal, given the quality of habitat in the Action Area, and in consideration of long-term benefits from habitat creation associated with converting upland habitat in the IHTB to open water. Therefore, the Proposed Action *may affect, but is unlikely to adversely affect* Green Sturgeon.

6.1.3. Salmonids (Steelhead, CCC DPS; Steelhead, Central Valley DPS; Chinook Salmon, Sacramento Winter-Run ESU; and Chinook Salmon, Central Valley Spring-Run ESU)

Dredging and in-water construction would occur during the established June 1 to November 30 work window for salmonids, including federally listed steelhead and Chinook Salmon potentially present in the Action Area. The Chinook Salmon preferred migratory pathway through Raccoon Straight and north of Yerba Buena Island further precludes their likely presence. By complying with this existing work window, salmonid impacts from construction would likely be avoided. Long-term effects would occur as a result of deepening waters in the proposed expanded turning basin areas, although minimal adverse effects from deepening would be offset by converting approximately 7 acres of upland terrestrial habitat to open water.

In the unlikely event of special-status salmonid presence in the Action Area during construction, direct take through entrainment is unlikely to occur. No rearing habitat occurs in the Action Area, and there is no potential for presence of salmonid fry or smolts in the Action Area. Juvenile and adult salmonids would be likely be motile enough to avoid entrainment.

As with other fish species, special-status salmonids (if present) may be temporarily affected by increased turbidity and underwater noise. These impacts would be short-term and minor, and comparable to conditions associated with existing activity at the Inner and Outer Harbors. The Proposed Action would involve landside pile-driving and in-water vibratory removal of piles which would not be expected to produce noise exceeding the 187 dB threshold for fish species impacts, and other construction noise levels would likely be similar to or less than background noise from existing large vessel use in the Action Area. Turbidity impacts to fish are generally not regarded as major, and dredging BMPs would be implemented to minimize increases in turbidity, including, but not limited to, use of silt curtains and water quality monitoring.

If present, special-status salmonids could experience temporary foraging impacts from benthic disturbance during dredging and in-water construction, although these species are primarily drift feeders, and would generally avoid the dredge and in-water construction areas if present.

Salmonids could be affected by mobilization of chemicals of concern during dredging; however, these effects would likely be minimal and would be limited to the in-water construction window when salmonids are unlikely to be present. As detailed in Section 6.1.1, LTMS direct studies demonstrated that short-term effects on sensitive fish by contaminants associated with dredging plumes are minor. Sediments would be tested prior to dredging, and the results would be reviewed by DMMO prior to dredging and placement, including evaluation of the potential for water quality impacts. In consideration of the low likelihood for exposure to toxins during dredging; avoidance and minimization measures described in Section 2.3 to protect water quality; dredging during the in-water work window; and in consideration of DMMO procedures, the Proposed Action is unlikely to result in substantial adverse impacts to salmonids from mobilization of contaminants of concern.

Permanent special-status salmonid effects may occur from deepening the expanded turning basin area and from converting approximately 7 acres of upland terrestrial habitat to intertidal and subtidal waters. Salmonids are suspected to forage in Central Bay shallow water areas (less than 30 feet deep) during in-migration and out-migration transit, and deepening existing waters to -50 feet MLLW may therefore reduce their suitability for salmonid foraging. However, high levels of existing vessel activity in the Inner and Outer Harbors likely reduces the suitability for salmonid foraging under existing and proposed conditions. Conversion of uplands to open water habitat would have a beneficial effect on salmonids by increasing the area of available habitat, including foraging habitat at the margins of the expansion areas or along seawalls where depths of -50 feet MLLW may not be achieved.

Impediments to salmonid localized migration and movement would be minimal when considering the mobility of these species and the Proposed Action avoidance and minimization measures. These impacts would primarily be avoided by adhering to the June 1 through November 30 in-water work window, when special-status salmonids are unlikely to be present. Conversion of uplands to open water habitat would have a long-term benefit on localized movement of salmonids, which would further compensate for any potential temporary displacement.

In summary, the Proposed Action would principally avoid temporary construction impacts to federally listed salmonids through adherence to the established June 1 through November 30 construction window, and would likely result in net permanent benefits through conversion of uplands to open water habitat. In consideration of the analysis detailed above, temporary effects in the unlikely event of salmonid presence during construction would be minimal and unlikely to result in adverse effects. Therefore, the Proposed Action *may affect, but is unlikely to adversely affect,* steelhead (CCC and Central Valley DPS) or Chinook Salmon (Sacramento winter-run and Central Valley spring-run).

6.1.4. Longfin Smelt

Longfin Smelt may occur in the Central Bay during spring and summer months, but are unlikely to be present during the fall and winter period. The abundance of Longfin Smelt in San Francisco Bay and the Delta has steadily declined since about 2000, and Longfin Smelt have been predominantly observed in observation stations in or upstream of San Pablo and Suisun Bays during Bay Surveys. Although an in-water work window for Longfin Smelt has not been established, these trends and observations suggest a low potential for this species to occur in the Action Area during construction.

Similar to Green Sturgeon, Longfin Smelt are presumed present, and therefore may be subject to the temporary adverse effects described in Section 6.1.1, including effects related to entrainment during dredging, increases in turbidity and suspended sediment, mobilization of contaminants of concern, temporary benthic habitat disturbance, underwater noise, and impediments to localized movement and migration. Potential impacts to Longfin Smelt from accidental discharges, upland stormwater management alterations, and invasive species would be avoided through adherence to applicable regulations and federal, state, and local oversight.

Direct take of Longfin Smelt through entrainment is unlikely to occur. As described in Section 6.2.1, spawning adults congregate at the upper end of Suisun Bay and in the lower and middle Delta, especially in the Sacramento River channel and adjacent sloughs, and Central Bay occurrence of Longfin Smelt is likely limited to juvenile and adult life stages. It is anticipated that juvenile and adult Longfin Smelt, if present, would be motile enough to avoid entrainment during dredging.

As with other fish species, Longfin Smelt may be temporarily affected by increased turbidity and underwater noise, if present. These impacts would be short-term and minor, and comparable to conditions associated with existing activity at the Inner and Outer Harbors. The Proposed Action would involve landside pile-driving and in-water vibratory removal of piles which would not be expected to produce noise exceeding the 187 dB threshold for fish species impacts, and other construction noise levels would likely be similar or less than background noise from large vessel use in the harbor. Turbidity impacts to fish are generally not regarded as major, and dredging BMPs would be implemented to minimize increases in turbidity.

Longfin Smelt could experience temporary foraging impacts from benthic disturbance during dredging and in-water construction, because they mostly prey on species that inhabit the benthos, primarily opossum shrimp, copepods, and other crustaceans. However, benthic habitat in the Action Area is likely of marginal value to Longfin Smelt and other species that forage in the benthos; benthic habitat proposed for new dredging occurs at the margins of the existing navigation channel and turning basins, and is regularly disturbed by maintenance dredging and deep-draft vessel traffic. Furthermore, adult Longfin Smelt's primary prey, opossum shrimp, is not known to occur in the Action Area.

Longfin Smelt could be affected by mobilization of chemicals of concern during dredging; however, these effects would likely be minimal and would be limited to the in-water construction window. As detailed in Section 6.1.1, LTMS directed studies demonstrated that short-term effects on sensitive fish by contaminants associated with dredging plumes are minor. Sediments would be tested prior to dredging, and the results would be reviewed by the DMMO prior to dredging and placement, including evaluation of the potential for water quality impacts. In consideration of the low likelihood for exposure to toxins during dredging; avoidance and minimization measures described in Section 2.3; and in consideration of DMMO procedures, the Proposed Action is unlikely to result in substantial adverse impacts to Longfin Smelt from mobilization of contaminants of concern. Furthermore, removal of sediments and upland fills potentially containing contaminants of concern would result in a long-term benefit to the aquatic environment.

Permanent Longfin Smelt foraging effects may also occur from deepening the expanded turning basin area and from converting approximately 7 acres of upland terrestrial habitat to intertidal and subtidal waters. Although there is little available evidence on the depth of Longfin Smelt foraging, this species is primarily associated with the middle and lower portion of the water column. Therefore, deepening existing waters to -50 feet MLLW could affect suitability for Longfin Smelt foraging. However, as noted for temporary benthic habitat disturbance, high levels of existing vessel activity in the Inner and Outer Harbors likely reduces the suitability for Longfin Smelt foraging under existing and proposed conditions. Conversion of uplands to open water habitat would have a beneficial effect on Longfin Smelt by increasing the area of available habitat, including foraging habitat and lower and middle water column habitat.

Temporary impediments to Longfin Smelt localized migration and movement during construction would be minimal when considering the mobility of these species and the Proposed Action avoidance and minimization measures. Conversion of uplands to open water habitat would have a long-term benefit on localized movement of Longfin Smelt, which would further compensate for any potential temporary displacement.

In summary, although there is low potential for Longfin Smelt to be present in the Action Area, construction-related impacts to this species are anticipated to be minimal when considering the quality of habitat in the Action Area; implementation of proposed avoidance and minimization measures; and the mobility of Longfin Smelt life stages that could be present. Long-term adverse impacts from loss of benthic foraging habitat are likely to be minimal, given the quality of habitat in the Action Area, and in consideration of long-term benefits from habitat creation associated with converting upland habitat in the IHTB to open water.

6.2. Critical Habitat

6.2.1. North American Green Sturgeon Critical Habitat

The Proposed Action may affect Green Sturgeon estuarine PCEs. This includes PCEs related to food resources, water quality, and depths. The Action Area does not include any freshwater systems or nearshore coastal marine areas, and those PCEs for Green Sturgeon would therefore be unaffected. The Proposed Action would not impede migration, because impediments to movement would only be temporary and confined to the dredging area.

Temporary disturbance of benthic foraging habitat could reduce prey resources important for Green Sturgeon, and permanent foraging impacts could occur from deepening waters to -50 feet MLLW to construct the IHTB and OHTB expansions. As described in Section 6.1.2, benthic habitat in the Action Area is likely of low value to Green Sturgeon, given its location at the margins of the existing channels and turning basins, where regular disturbance maintenance dredging and deep-draft vessel traffic occurs. Impacts to marginal foraging habitat would be offset through converting approximately 7 acres of existing upland habitat to open water habitat through IHTB expansion. This would potentially include suitable Green Sturgeon foraging habitat at the margins of the IHTB expansion area, where depths would be shallower than -50 feet MLLW.

Water quality would be temporarily affected by dredging activities. Water quality surrounding dredging activities would experience increased concentrations of turbidity resulting from re-suspension of sediments. Additionally, there is a potential for constituents of concern to be released from sediment particles during resuspension. These impacts would be temporary, persisting only during dredging operations. It is expected that these impacts would be offset by the creation of new open water habitat in the IHTB expansion area. Temporary impacts would also be minimized through implementation of avoidance and minimization measures described in Section 2.3. Therefore, the Proposed Action *may affect, but is not likely to adversely modify*, the capability of designated critical habitat in the Action Area North American Green Sturgeon to support the survival and recovery of this species.

6.2.2. Steelhead, CCC DPS Critical Habitat

Construction would temporarily affect estuarine habitat for steelhead, including through obstructions in the navigation channel from dredging equipment, increased turbidity, and possibly noise. However, adult and juvenile salmonids are expected to generally avoid sediment plumes during construction, using clearer open waters adjacent to the plumes. Following construction, these obstructions would be eliminated. There would be no long-term impacts to PCEs for steelhead, although creation of new open water habitat in the IHTB expansion area would likely improve the quality of critical habitat for steelhead.

The Proposed Action would not affect any freshwater habitat, and would have little or no effect on salinity intrusion. Studies have shown that placement of dredged material from clamshell-bucket dredges into the water column does not cause substantial short- or long-term changes in temperature, salinity, or pH (USACE 1976a, 1976b). A USACE study (USACE 1976a) found that changes in these parameters were localized and short in duration during all types of dredging (hydraulic and mechanical); ambient concentrations of these parameters were usually regained within 10 minutes following material release (USACE 1998).

Therefore, the Proposed Action *may affect, but is not likely to adversely modify*, the capability of designated critical habitat in the Action Area for CCC DPS Steelhead to support the survival and recovery of this species.

6.3. Terrestrial Special-Status Species and Resource Effects

Terrestrial special-status species potentially present in the Action Area include the California least tern. Potential impacts to California least tern would be limited to temporary foraging impacts during construction resulting from water quality impacts (e.g., suspended sediments and turbidity), airborne noise, and reduced availability of prey species. Upland habitat permanently altered by project construction is not used for California least tern foraging, nesting, or breeding, and permanent alteration of these areas (i.e., converting uplands to open water) would therefore not adversely impact this species. Proposed deepening to expand the IHTB and OHTB would mostly affect moderately deep waters, whereas the California least tern is generally described as preferring shallow waters for foraging. Deepening would occur to -50 feet MLLW, which is within the 60-foot depth range expected to be suitable for California least tern foraging. Therefore, deepening in the ITHB and OHTB expansion areas is not anticipated to substantially affect this species. There may be a nominal long-term benefit to California least tern foraging by converting a portion of the existing hardened shoreline at the inner harbor turning basin into intertidal and subtidal aquatic habitat where foraging could occur.

6.3.1. California Least Tern

Dredging or other construction noise may potentially cause avoidance of foraging locations and can interfere with vocalizations between individuals during group foraging (ESA 2017). However, the noise associated with construction of the Proposed Action would not be expected to substantially impact California least terns, due to the ambient noise levels associated with the activity at the Port of Oakland (H.T. Harvey and Associates 2012).

Dredging and shoreline construction can temporarily increase turbidity, which can also affect California least tern foraging. Increased turbidity may decrease foraging success by decreasing prey abundance or making it more difficult for birds to detect prey. Increased turbidity during dredging is generally expected to occur within a 250-meter radius of active dredging, and use of silt curtains would likely further limit this distance. Turbidity impacts would be mostly confined to existing moderately deep waters or shoreline areas currently occupied by marine structures proposed for removal. Impacts to shallow water habitat would be limited, and would not occur in waters adjacent to known California least tern colonies at the former Alameda Naval Air Station or known foraging and roosting habitat in the MHEA. Mapped eelgrass areas (which provide favored tern foraging habitat) are also greater than 250 meters from the proposed dredge footprints.

Adverse water quality impacts such as accidental spills of contaminants or mobilization of chemicals of concern could adversely affect fish, and thereby affect California least tern foraging. As described for aquatic special-status species, the potential for these water quality impacts is considered minimal, given federal, state, and local oversight, and the Proposed Action avoidance and minimization measures.

Noise from construction activities would not substantially disrupt foraging activities of California least tern. Birds currently residing in the vicinity are accustomed to varying levels of ambient noise emanating from existing human activities in the project area, including truck and train traffic, ferry operations, heavy metal recycling activities at the Schnitzer Steel site, and Port of Oakland shipping operations that occur throughout the day. Bird disruption from visual or noise disturbance varies, but typically, birds will avoid disturbance areas and move to more preferable environments; the species would be able to forage in similar shoreline waters elsewhere in the Oakland-Alameda Estuary distanced from construction activities.

Temporary construction effects may discourage prey fish from entering the Oakland-Alameda Estuary from San Francisco Bay, thereby decreasing the supply of available fish during dredging and construction activities. This includes effects to water quality, turbidity, and suspended sediments, underwater noise, and other effects. As detailed in Section 6.1, these effects to fish are anticipated to be temporary and minimal, and therefore are unlikely to substantially affect California least tern foraging. Therefore, the Proposed Action *may affect, but is unlikely to adversely affect*, California least tern.

Chapter 7. Conclusion and Determination of Effects Summary

This section summarizes the BA conclusions formulated using the preceding discussion of species presence, habitat conditions, and effects of the Proposed Action. As described in Chapter 6, avoidance and minimization measures are proposed that would avoid and minimize, to the maximum extent practicable, the Proposed Action's potential impacts to federal ESA–listed species and critical habitat. The Proposed Action also includes creation of new open water habitat in the IHTB expansion area, and would beneficially reuse suitable dredged material. With the implementation of these measures, and in consideration of Proposed Action habitat benefits, the following determinations for ESA threatened or endangered species and critical habitats were made:

- The Proposed Action ***may affect, but is not likely to adversely affect,*** steelhead (Central Valley DPS and CCC DPS), Chinook Salmon (Sacramento River winter-run and Central Valley spring-run), and North American Green Sturgeon.
- The Proposed Action would not appreciably diminish the value of designated critical habitat, and ***may affect, but is not likely to adversely modify***, the capability of designated critical habitat in the Action Area for CCC DPS Steelhead and North American Green Sturgeon to support the survival and recovery of these species.
- The Proposed Action ***may affect, but is not likely to adversely affect,*** California least tern.

Longfin Smelt remains an ESA candidate species. Although this species is not expected to be listed in the immediate future, if it were, impact conclusions would likely be similar to those for Green Sturgeon and salmonids.

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Appendix A. Oakland Harbor FY 2021 Maintenance Dredging Pre-Dredge Eelgrass Survey

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May 18, 2021
M&A #20-095-01

Mr. Joseph Viola, A-E Services Unit (CESPN-ECE-C)
U.S. Army Corps of Engineers, San Francisco District
450 Golden Gate Ave, 4th Floor
San Francisco, CA 94102

Re: Oakland Harbor FY 2021 Maintenance Dredging
Pre-dredge Eelgrass Survey Results Transmittal

Dear Mr. Viola,

This letter serves to transmit information regarding the pre-dredge eelgrass (*Zostera marina*) survey conducted for the U.S. Army Corps of Engineers, San Francisco District Oakland Harbor Fiscal Year (FY) 2021 Maintenance Dredging Project, Oakland, California. Dredging of Oakland Harbor is anticipated to begin on June 1, 2021..

PURPOSE AND INTRODUCTION

Merkel & Associates Inc. (M&A) was retained to conduct a pre-dredge eelgrass survey in support of the U.S. Army Corps of Engineers, San Francisco District Oakland Harbor FY 2021 Maintenance Dredging Project. The purpose of the survey is to provide a quantitative pre-dredge baseline assessment of the distribution and density of eelgrass communities within the Area of Potential Effect (APE) of the dredging as determined by the project dredging limits plus a 200-foot buffer. In some instances, surveys were expanded outward from this buffer to fully depict other nearby eelgrass. In addition, reference sites located well away from dredging areas were also surveyed to provide a control for natural variability in the bed performance.

Following completion of dredging, the pre-dredge survey will be compared to the post-dredge survey to determine if there has been a change in eelgrass beds in association with dredging activities when also compared against changes in eelgrass beds within the unaffected reference sites.

PROJECT LOCATION AND SURVEY AREA

The Oakland Inner and Outer Harbor is located in the City of Oakland in Alameda County, California. The survey covered all habitats of a reasonably suitable depth to support eelgrass that were located within proximity to the proposed dredge boundary and within reference sites selected in the vicinity (Figure 1).

M&A# 20-095-01

Project Vicinity Map

U.S. Army Corps of Engineers Oakland Harbor
FY 2021 Maintenance Dredging

Figure 1

Merkel & Associates, Inc.

SURVEY METHODOLOGY

M&A conducted the pre-construction eelgrass survey on April 27, 2021. The survey consisted of eelgrass areal coverage and density investigations within the project survey and reference areas. Coverage data were collected using interferometric sidescan sonar, which provided an acoustic backscatter image of the seafloor within the project area. Interpretation of the backscatter data allowed for an assessment of the distribution of eelgrass. Sidescan backscatter data were acquired at a frequency of 468 kHz scanning out 31 meters on both the starboard and port channels for a 62-m wide swath. The rigid hull mounted interferometric sidescan system integrates motion sensors to control for heave pitch, and roll as well as a dual antenna positioning system and electronic compass to control for vessel position and yaw. This rigid integration of the interferometric sidescan transducers within the positioning sensors provides significantly increased precision and accuracy over conventional towfish sidescan sonar equipment.

The survey was conducted by running parallel transects that were spaced to allow for overlap between adjoining sidescan swaths. Survey swaths were navigated until the entirety of the survey area was captured in the survey report. All data were collected in latitude and longitude using the North American Datum of 1983 (NAD 83), converted to the Universal Transverse Mercator system in meters (UTM), and plotted on a geo-rectified aerial image of the project site.

Following the sidescan survey, the sonar data were then ground-truthed using a remotely operated vehicle (ROV). The ROV was operated from the surface with a computer and an operator held control unit. A color camera on board the ROV sent video images to the computer where images were interpreted in real time. Eelgrass density data were collected within the project and reference areas to assess the density and health of eelgrass. Data were collected by lowering the ROV to the seafloor in areas where eelgrass occurred and navigating the ROV through the beds. Once on the bottom, the ROV's video camera was focused on an attached 1/16th square meter quadrat. Eelgrass leaf-shoot densities were calculated by counting the number of leaf shoots within the sampled quadrats.

Following completion of the survey, sidescan sonar traces were joined together and geographically registered. Eelgrass was then digitized as a theme over an aerial image of the project site to calculate the amount of eelgrass coverage and show its distribution. This method of eelgrass distribution calculation allows for monitoring eelgrass trends at the project site with a substantial degree of accuracy and repeatability over time.

The reported metrics for eelgrass are as follows:

- **Vegetated Cover –** Vegetated cover is the tight boundary extent of eelgrass plants on the seafloor, prior to application of CEMP eelgrass bed definitions. The discrete mapping of plant boundaries is the basic building block for determining CEMP spatial metrics.
- **Areal Extent –** The eelgrass habitat areal extent is the quantified extent of the spatial distribution of the beds comprised of unvegetated and vegetated areas of the bed. The *vegetated areal extent* is defined as areas within the spatial distribution that support at least 1 turion per square meter of bottom. This is determined by performing

a tight margin mapping of eelgrass plants present within the survey area and then buffering outward from the vegetated cover of plants by a distance of 0.5 meter such that any plant within 1 meter of another plant would be captured within the same contiguous vegetated areal extent boundary. The *unvegetated areal extent* is defined as the remainder of the spatial distribution that is not included in the vegetated areal extent.

- **Spatial Distribution –** The spatial distribution of eelgrass habitat was delineated by a contiguous boundary around all areas of vegetated eelgrass cover extending outward from the margins of plants by a distance of 5 meters. The resultant spatial distribution boundary of the eelgrass habitat was then clipped to remove areas that were determined to be unsuited to supporting eelgrass based on depth, substrate, or existing structures.
- **Percent Vegetated Cover -** The percent bottom cover within eelgrass habitat is determined by totaling the area of vegetated areal extent and dividing this by the total areal extent of the bed.
- **Turion (Shoot) Density -** Turion density is the mean number of eelgrass leaf shoots per square meter within mapped eelgrass vegetated cover. Turion density should be reported as a mean ± the standard deviation of replicate measurements. The number of replicate measurements (n) is reported along with the mean and deviation. Turion densities are determined only within vegetated areas of eelgrass habitat; and therefore, it is not possible to measure a turion density equal to zero.

The spatial distribution of eelgrass habitat was then determined by extending a consistent 5-meter (16-foot) buffer outward from all mapped eelgrass and then refining the buffered area to exclude areas where existing shoreline infrastructure, unsuitable depths, steep slopes, or substrate conditions would naturally preclude eelgrass establishment. The methods applied in this manner result in eelgrass distribution calculation allows for monitoring eelgrass trends at the project site with a substantial degree of accuracy and repeatability over time.

SURVEY RESULTS

Pre-construction eelgrass bed spatial and density metrics are summarized in Table 1. These data will be used to facilitate interpretation of any change in eelgrass beds between pre-dredge and post-dredge investigations.

Table 1. Oakland Harbor Eelgrass Bed Metrics as defined under the CEMP (April 2021).

Eelgrass Beds	Reach	Vegetated Cover (m^2)	Eelgrass Vegetated Areal Extent (m^2)	Spatial Distribution (m^2)	Percent Vegetated Cover (VAE/SD * 100)	Density (turions/m^2) (# of replicates)
Inner Harbor Entrance (north)*	2	257 m^2	383 m^2	1,259 m^2	30.4%	49.6±17.6 (n=10)
Inner Harbor Entrance (south)*	2	671 m^2	826 m^2	2,083 m^2	39.7%	40.0±17.3 (n=10)
NAS Alameda Shoreline	3	131 m^2	229 m^2	1,663 m^2	13.8%	62.4±17.3 (n=10)
Barber's Point Beach*	4	2,795 m^2	3,781 m^2	9,940 m^2	38.0%	54.4±13.5 (n=10)
Outer Harbor (northeast)*	10	178 m^2	216 m^2	592 m^2	36.5%	
Reference Eelgrass Beds	**Reach**	**Vegetated Cover (m^2)**	**Eelgrass Areal Extent (m^2)**	**Spatial Distribution (m^2)**	**Percent Vegetated Cover**	**Density (turions/m^2) (# of replicates)**
Outer Oakland Harbor	REF-1	390 m^2	683 m^2	3,469 m^2	19.7%	33.6±19.2 (n=10)
NAS Alameda West Shoreline	REF-2	6,262 m^2	7,269 m^2	13,757 m^2	52.8%	40.0±22.9 (n=10)

**all or part of the eelgrass is located out of APE*

Eelgrass distribution from the survey is illustrated in enlargement figures including the detected beds (Figure 2a-e). Eelgrass was found to be present just outside of the Outer Harbor dredging Reach 10 (Figure 2a) and at the end of the Union Pacific (UP) Mole near the temporary submerged jetty at the eastern entrance to MHEA just outside of Reach 2 (Figure 2b). Within the APE, eelgrass was determined to be present at three locations along the Inner Harbor dredging Reaches 2-4. These included: 1) eelgrass across the channel from the terminus of the UP Mole in a small sandy cove at the northwestern corner of the former NAS Alameda shoreline adjacent to Reach 2 (Figure 2b); 2) along the southern shoreline of the Inner Harbor Channel fringing the NAS Alameda shoreline adjacent to the westerly and central portions of Reach 3 (Figure 2d); and 3) along the Barber's Point shoreline near the NAS Alameda front gate (Figure 2e). These beds continue to be

Pre-construction Eelgrass Distribution
U.S. Army Corps of Engineers Oakland Harbor
FY 2021 Maintenance Dredging

Figure 2a

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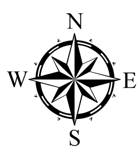
Pre-construction Eelgrass Distribution

U.S. Army Corps of Engineers Oakland Harbor

FY 2021 Maintenance Dredging

Figure 2b



Pre-construction Eelgrass Distribution
U.S. Army Corps of Engineers Oakland Harbor
FY 2021 Maintenance Dredging

Figure 2c

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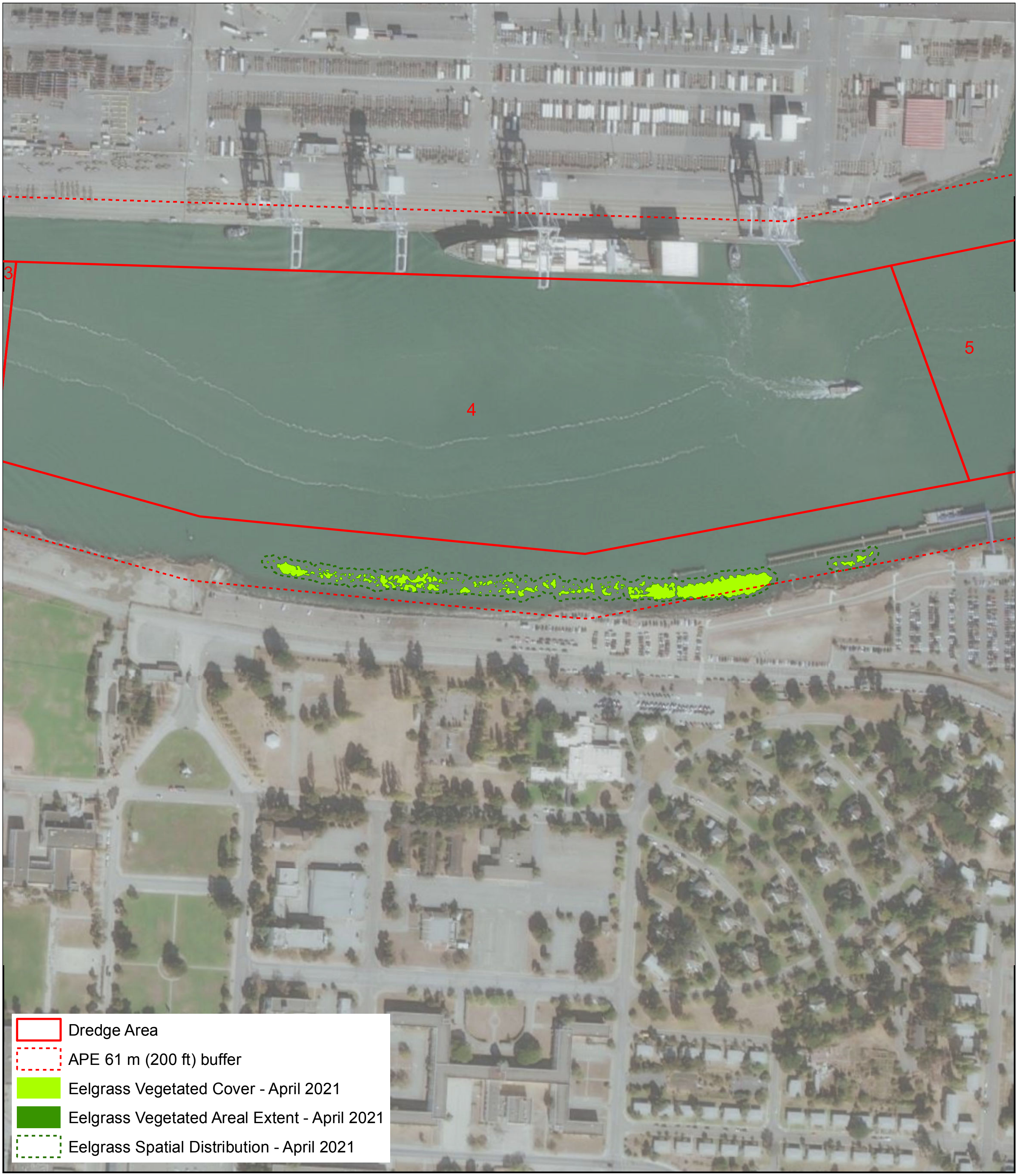
Pre-construction Eelgrass Distribution

U.S. Army Corps of Engineers Oakland Harbor
FY 2021 Maintenance Dredging

Figure 2d

M&A# 20-095-01



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Pre-construction Eelgrass Distribution
U.S. Army Corps of Engineers Oakland Harbor
FY 2021 Maintenance Dredging

Figure 2e

Merkel & Associates, Inc.

fairly consistent in positional distribution to beds that have been previously recorded from past eelgrass surveys in these areas.

Reference beds were defined within the Oakland Outer Harbor north of Reach 10 (Figure 2a). This bed was designated as OAKHARB REF-1. This area supported both shoreward fringing eelgrass beds, as well as eelgrass located on slightly elevated mounds on the flat bay bottom outside of the dredged outer harbor channel area. This reference bed would have served as a reference for any eelgrass occurring within the Outer Harbor APEs. However, eelgrass in Outer Harbor was mapped just outside of the APE previously determined to be 200 feet beyond the limits of work. For the Inner Harbor Channel, the reference bed established for this area was located along the westerly Alameda shoreline. This bed was designated OAKHARB REF-2.

Eelgrass in all areas was determined to be healthy and exhibited no signs of disease, except for OAKHARB REF-2, where a small amount of wasting disease was evident in the beds. Epiphytic loading and sedimentation were noted within all surveyed beds. The leaf canopy extended from 0.4 to 1.5 meters off the bottom within the APE sites and 0.6 to 1.5 meters off the bottom of the reference sites.

This project memorandum serves to transmit the pre-dredge eelgrass survey results. Following completion of dredging, a post-dredge survey will be completed and a formal report of findings prepared.

Sincerely,

Keith W. Merkel
Principal Consultant

REFERENCES

National Oceanic and Atmospheric Administration (NOAA) 2014. California Eelgrass Mitigation Policy and Implementing Guidelines.

Appendix B. Federally Listed Wildlife Species that May Occur in the Action Area

Table B-1
Federally Listed Wildlife Species that May Occur in the Action Area

Species	Federal	State	Habitat Association	Potential to Occur
Invertebrates				
Monarch (*Danaus plexippus*)	C	—	Closed-cone coniferous forest, needs nectar and water sources	No potential to occur. Habitat not present.
Amphibians				
California tiger salamander (*Ambystoma californiense*)	T	T	Cismontane woodland; meadow and seep; riparian woodland; valley and foothill grassland	No potential to occur. Habitat not present.
California red-legged frog (*Rana draytonii*)	T	—	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation	No potential to occur. Habitat not present.
Birds				
California least tern (*Sternula antillarum browni*)	E	E	Alkali playa, wetland, sand beaches, landfills, or paved areas	Known to occur at Former Alameda Naval Air Station on Alameda Island and at Oakland Middle Harbor Enhancement Area; may forage in Action Area.
California Ridgway's rail (*Rallus obsoletus obsoletus*)	E	E	Saltwater and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay	No potential to occur. Habitat not present.
Western snowy plover (*Charadrius nivosus nivosus*)	T	SSC	Sandy beaches, salt pond levees, and shores of large alkali lakes	No potential to occur. Habitat not present.
Mammals				
Salt-marsh harvest mouse (*Reithrodontomys raviventris)*	E	E	Dense pickleweed salt marsh in and west of Suisun Bay	No potential to occur. Habitat not present.
Fish				
Green Sturgeon – Southern DPS (*Acipenser medirostris*)	E	—	Aquatic; estuary	Moderate potential to occur.
Delta Smelt (*Hypomesus transpacificus*)	T	E	Aquatic; estuary	No potential to occur. Habitat not present.
Steelhead – Central California Coast DPS (*Oncorhynchus mykiss irideus*)	T	—	Aquatic; Sacramento/San Joaquin flowing waters	Moderate potential to occur; very low potential to occur during in-water construction work window.
Steelhead – Central Valley DPS (*Oncorhynchus mykiss irideus*)	T	—	Aquatic; Sacramento/San Joaquin flowing waters	Moderate potential to occur; very low potential to occur during in-water construction work window.

Species	Federal	State	Habitat Association	Potential to Occur
Chinook Salmon – Central Valley spring-run ESU (*Oncorhynchus tshawytscha*)	T	—	Aquatic; estuary	Moderate potential to occur; very low potential to occur during in-water construction work window.
Chinook Salmon – Sacramento winter-run (*Oncorhynchus tshawytscha)*	E	E	Aquatic; estuary	Moderate potential to occur; very low potential to occur during in-water construction work window.
Longfin Smelt (*Spirinchus thaleichthys*)	C	T; SSC	Aquatic; estuary	Low to moderate potential to occur.
Tidewater Goby (*Eucyclogobius newberryi*)	E	—	Brackish water habitats, shallow lagoons, lower stream reaches	No potential to occur. Habitat not present.
Reptiles				
Alameda whipsnake (*Masticophis lateral euryxanthus*)	T	T	Typically found in chaparral and scrub habitats, but will also use adjacent grassland, oak savanna and woodland habitats	No potential to occur. Habitat not present.
Green sea turtle (*Chelonia mydas*)	T	—	Marine, needs adequate supply of seagrasses and algae	No potential to occur. Habitat not present.
Plants				
Beach Layia (*Layia carnosa*)	E	E; 1B.1	Coastal dunes, coastal scrub	No potential to occur. Habitat not present.
California seablite (*Suaeda californica*)	E	1B.1	Marshes and swamps	No potential to occur. Habitat not present.
Robust spineflower (*Chorizanthe robusta var. robusta*)	E	1B.1	Cismontane woodland, coastal dunes, coastal scrub, chaparral	No potential to occur. Habitat not present.
Santa Cruz tarplant (*Holocarpha macradenia*)	T	E; 1B.1	Coastal prairie, coastal scrub, valley and foothill grassland	No potential to occur. Habitat not present.

Notes:

C: candidate
E: endangered
T: threatened
SSC: state species of special concern
DPS: Distinct Population Segment
ESU: Evolutionary Significant Unit
Rare Plant Rank 1B.1 – rare, threatened, or endangered in California and elsewhere; seriously threatened in California (more than 80 percent of occurrences threatened/high degree and immediacy of threat)

Sources: California Natural Diversity Database Rarefind 5 search of Oakland Harbor navigation channel, turning basins, and shoreline; USFWS Information for Planning and Consultation (IPaC) report search of Oakland Harbor navigation channel, turning basins, and shoreline.

Essential Fish Habitat Assessment

Oakland Harbor Turning Basins Widening

Essential Fish Habitat Assessment

Administrative Draft

October 2021

PORT OF OAKLAND

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Port of Oakland

U.S. Army Corps of Engineers

October 2021

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ACRONYMS

bgs	below ground surface
BMPs	Best Management Practices
°C	degrees Celsius
Central Bay	Central San Francisco Bay
CFR	Code of Federal Regulations
CY	Cubic yards
DMMO	Dredged Material Management Office
EFH	Essential Fish Habitat
EPA	United States Environmental Protection Agency
-50-Foot Project	Oakland Harbor Navigation Improvement Project Study
FMP	Fishery Management Plan
HAPCs	Habitat Areas of Particular Concern
IHTB	Inner Harbor Channel and Inner Harbor Turning Basin
LTMS	Long Term Management Strategy
mg/L	milligrams per liter
MLLW	Mean Lower Low Water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NTUs	nephelometric turbidity units
OBM/MS	Old Bay Mud/Merritt Sand
OHTB	Outer Harbor Channel and Outer Harbor Turning Basin
PCB	polychlorinated biphenyl
Port	Port of Oakland
PSUs	practical salinity units
RWQCB	Regional Water Quality Control Board
SAP	Sediment Analysis Plan
SPL	sound pressure levels
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

Chapter 1. Introduction

This Essential Fish Habitat (EFH) Assessment is intended to comply with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) for EFH and Habitat Areas of Particular Concern (HAPCs). This EFH Assessment will support consultation with National Marine Fisheries Service (NMFS) for effects to EFH, including HAPCs from the Oakland Harbor Turning Basins Widening Project, as required under Section 305(b) of the MSA. The MSA is designed to protect waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

The document is organized as follows:

- **Chapter 1: Introduction.** This section provides the project location and background.
- **Chapter 2: Description of the Proposed Action.** This section provides a detailed description of the Proposed Action, including construction and operations. This section also identifies avoidance and minimization measures integrated into the Proposed Action to avoid potential adverse effects to the environment.
- **Chapter 3: Essential Fish Habitat in the Action Area.** This section identifies EFH in the Action Area and provides their respective descriptions. Habitat types in the Action Area are also described.
- **Chapter 4. Effects Assessment.** This section provides a description of effects to EFH and HAPCs from the Proposed Action.
- **Chapter 5. Conclusion and Determination of Effects Summary.** This section summarizes the conclusions and determinations of effects to EFH, including HAPCs.

1.1. Location and Background

The Oakland Harbor is on the eastern side of San Francisco Bay (Figure 1-1). It includes the Entrance Channel, the Outer Harbor Channel and Outer Harbor Turning Basin (OHTB), and the Inner Harbor Channel and Inner Harbor Turning Basin (IHTB). The Outer Harbor Channel is immediately south of the San Francisco-Oakland Bay Bridge and is maintained to a depth of -50 feet mean lower low water (MLLW). The Outer Harbor Channel and OHTB serve the existing TraPac and Ben E. Nutter terminals. The Inner Harbor Channel is also maintained to -50 feet MLLW through the Howard Terminal, which is approximately 2.5 miles from the Inner Harbor entrance. The Inner Harbor Channel and IHTB serve the existing Oakland International Container Terminal, Matson Terminal, and Schnitzer Steel Terminal.

The existing federal navigation channel was designed for a ship with a capacity of 6,500 20-foot equivalent units, with a 1,139-foot length overall, 140-foot beam, and 48-foot draft, as part of the Oakland Harbor Navigation Improvement (-50-Foot) Project Study. The Proposed Action involves the expansion of the IHTB and OHTB in the Oakland Harbor. The need for this expansion arises from inefficiencies currently experienced by vessels in harbor, specifically in the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-Foot Oakland Harbor Navigation Project. These inefficiencies are projected to continue in the future because vessel sizes are expected to increase.

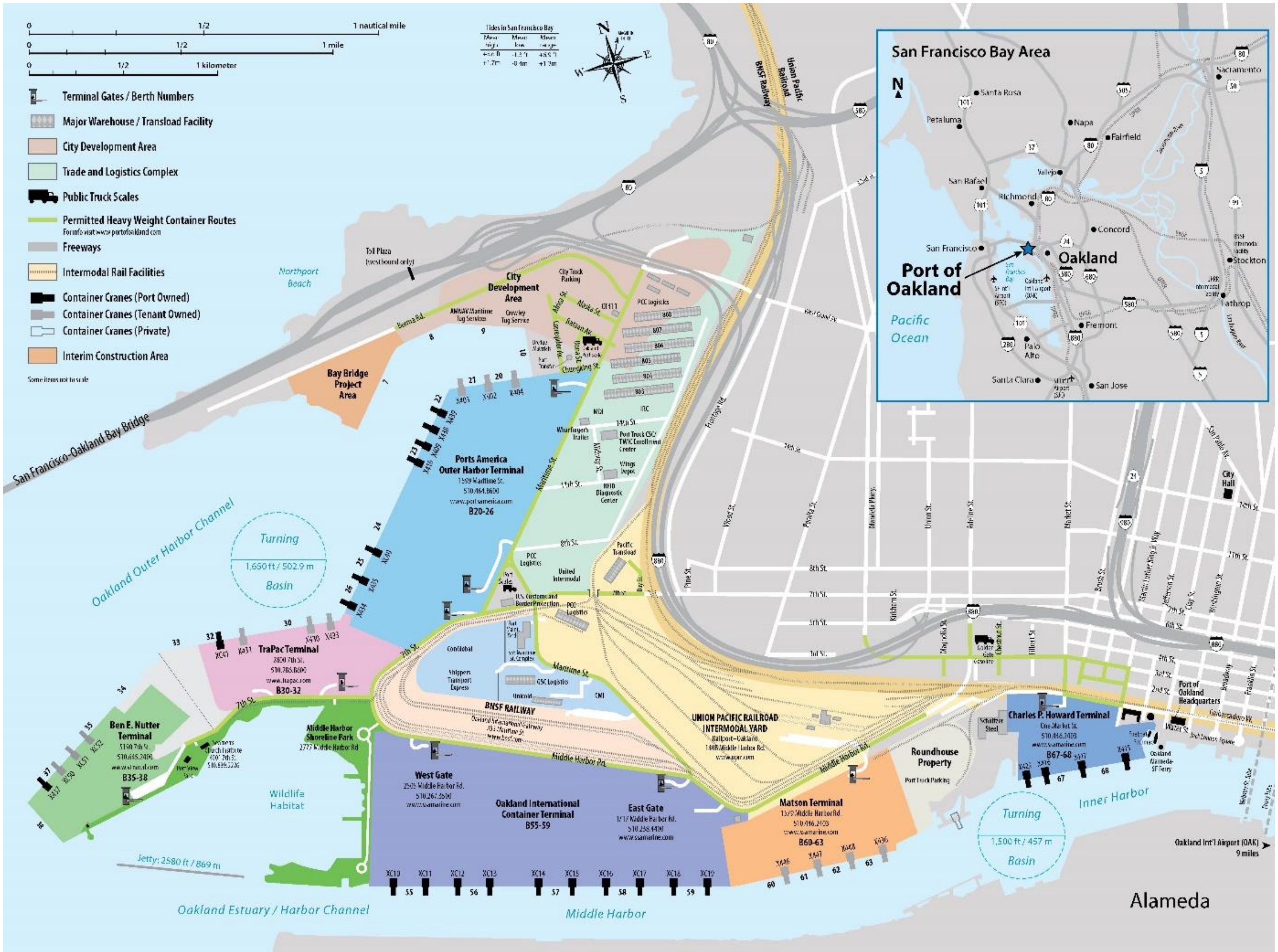

Figure 1-1 Current Port of Oakland Navigation Features

Chapter 2. Description of Proposed Action

The Proposed Action entails expansion of both the IHTB and OHTB. The proposed improvements and construction methods for each turning basin are described under Sections 2.1 and 2.2 below. Expansion of the turning basins would improve the efficiency of vessels entering and exiting the Port; however, the project would not change the projected overall volumes of freight that would come into the Port.

2.1. Expansion of Inner Harbor Turning Basin

The Expansion of Inner Harbor Turning Basin consists of widening the existing IHTB from 1,500 feet to 1,834 feet with a depth of -50 feet MLLW consistent with the existing IHTB. In addition to in-water work to widen the IHTB, land would be impacted in three locations: Schnitzer Steel, Howard Terminal, and private property located along the Alameda shoreline (Figure 1-2).

At Schnitzer Steel (in the northwestern corner of the widened IHTB in Figure 1-2), approximately 10,800 square feet (0.25 acre) of concrete pavement would be removed. Approximately 310 linear feet of new bulkhead would be installed landside, and approximately 13,710 CY of landside soil would be excavated between the new and existing bulkhead. Subsequently, 700 linear feet of new anchor/tie back (i.e., the lateral support structure for a bulkhead) would be installed, about 320 linear feet of existing bulkhead would be demolished, and an additional approximately 9,260 CY of material would be dredged.

Similar construction activities would occur at Howard Terminal (in the northeastern corner of the widened IHTB in Figure 1-2), including approximately 115,020 square feet (2.65 acres) of asphalt and concrete pavement removal, landside installation of 650 linear feet of new bulkhead, removal of 300 125-foot-long piles (approximately 4,360 CY), and excavation of 72,410 CY of landside soil between the new and existing bulkhead. Subsequently, 1,300 linear feet of anchor/ tie-back would be installed, 900 linear feet of existing bulkhead would be removed, and an additional approximate 191,670 CY of material would be dredged

Expansion at the Alameda site (in the southeastern portion of the widened IHTB in Figure 1-2) would require partial demolition of two existing warehouses (an estimated maximum of 260,000 square feet of demolition). Similar to the Schnitzer Steel and Howard Terminal sites, additional Alameda improvements include 216,000 square feet (5 acres) of asphalt and concrete pavement removal, landside installation of 1,050 linear feet of new bulkhead, removal of 2,300 65-foot long piles (approximately 17,390 CY), excavation of 135,370 CY of landside soil between the new and existing bulkhead, installation of 2,100 linear feet of anchor/ tie-back, removal of 1,250 linear feet of existing bulkhead, and dredging of approximately 358,330 CY of material from the Alameda site.

For all three sites, landside excavation of soils would occur to a depth of approximately -5 feet MLLW, which is approximately 17 feet below ground surface (bgs). Due to the historical industrial use of these sites and the documented presence of contaminants underlying portions of the Schnitzer Steel and Howard Terminal properties, for the purpose of this study, it is assumed that landside excavated materials would be disposed at a Class I or Class II landfill. Material below -5 feet MLLW would be dredged following removal of the existing bulkhead; for the purpose of this study, it is assumed that all dredged material would be suitable for beneficial reuse. In addition, for all three sites, the depth of sheet pile/bulkhead installation and removal would be 65 feet bgs.

Construction staging would occur at Howard Terminal and the Alameda property; no staging would occur at Schnitzer Steel.

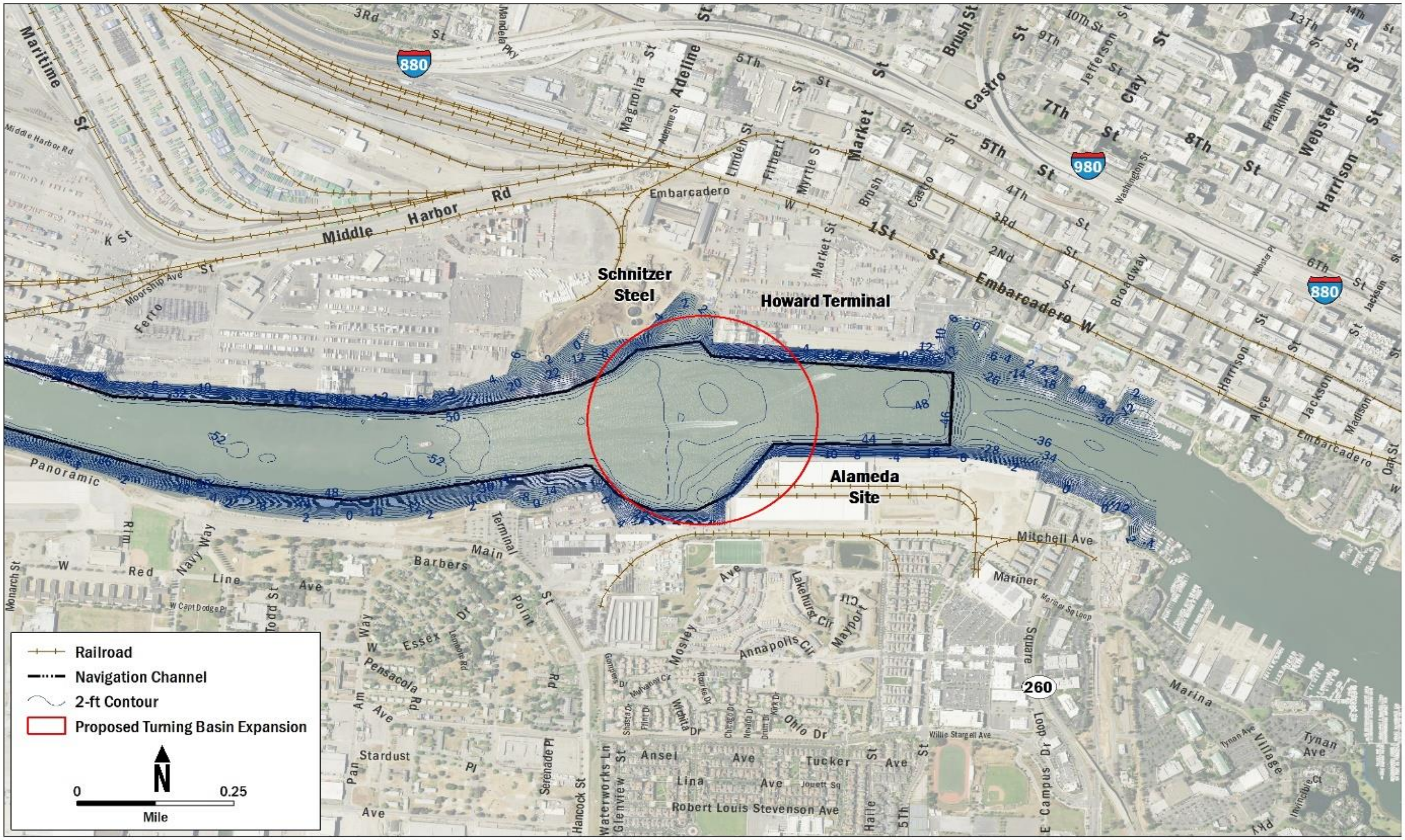

Figure 1-2: Proposed Expansion of IHTB

Construction would span 2 years and 4 months, beginning in July 2027. During the first 10 months of construction, the land-based activities would be completed at Howard Terminal and Schnitzer Steel (concurrent construction would occur at these locations for approximately 4 months). Sheet pile installation at Howard Terminal, Schnitzer Steel and Alameda would not require in-water work. Marine-based construction (sheet pile/bulkhead removal) and dredging would be conducted at Howard Terminal and Schnitzer Steel during the 2028 in-water work window. Land-based construction at the Alameda property would commence in May 2028 and take approximately 1 year to complete. Marine-based construction (sheet pile/bulkhead removal) and dredging at the Alameda property and dredging of sediments in the Inner Harbor Channel would be conducted during the 2029 in-water work window.

Equipment for concrete pavement removal, landside excavation, warehouse demolition, pile removal, sheet pile/bulkhead removal and installation, and anchor/tie-back installation would include a backhoe/front loader, concrete saws, crane, bulldozer, excavators, dump trucks, drilling rig, barge, dive vessel, pile driver, vibratory hammer, tugboats, compressor, and generator. Depending on the concurrent activities occurring over the course of construction, the number of construction workers would range from approximately eight to 40 (excluding dredging operations, described below).

Excavated landside material, removed piles, and waste from warehouse demolition would be hauled off site for disposal at a Class I or Class II landfill. Approximately 15,600 CY of excavated landside material would require disposal at a Class I landfill, requiring approximately 1,560 truck trips for transport. Approximately 198,500 CY of excavated landside material would require disposal at a Class II landfill, along with the removed piles and warehouse demolition debris, requiring approximately 23,380 truck trips for transport.

Dredging would be conducted with an electric powered barge-mounted excavator dredge. All suitable dredged material would be beneficially used at a site that would be identified at a later date. Dredge equipment includes a barge-mounted clamshell/excavator dredge, tugboats for positioning of the barge, and scows for dredged material transport to the beneficial reuse site or to Berth 10 for rehandling prior to transport via truck to a landfill. Approximately 26 workers would be required. Dredging would be conducted 24 hours per day on weekdays (Monday through Friday), and may be conducted on weekends, if necessary.

2.2. Expansion of Outer Harbor Turning Basin

The Expansion of Outer Harbor Turning Basin consists of widening the existing OHTB from 1,650 to 1,965 feet. The proposed expanded OHTB relative to the current limits of the navigation channel is shown in Figure 1-3. There are no land impacts under the proposed footprint of the expanded OHTB. This alternative involves dredging 862,000 CY of material to widen the basin to a depth of -50 feet MLLW.

Dredging would be conducted with an electric-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport to a beneficial reuse site. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site, and tugboats for positioning of the barge and towing the scows to the reuse site. Approximately 26 workers would be required for the dredging operation. Dredging is expected to be conducted during the 2028 in-water work window (June 1through November 30). Dredging would be conducted 24 hours per day on weekdays (Monday through Friday) and on weekends, if necessary, over a 6-month period (the entire in-water work window). Silt curtains would be used during dredging to minimize impacts to the aquatic environment. Construction staging would occur at Berth 10, at the eastern end of the Outer Harbor.

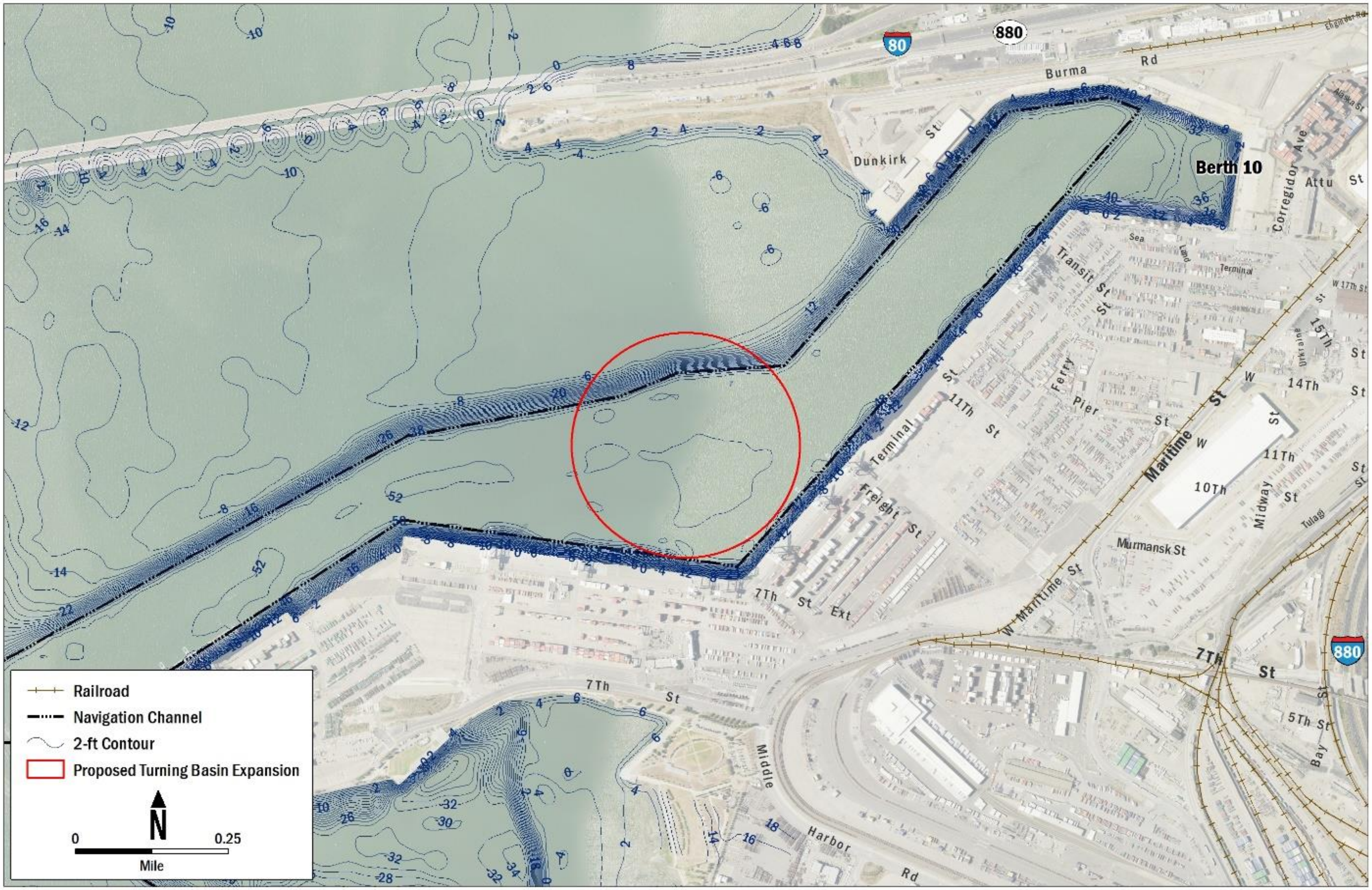

Figure 1-3: Proposed Expansion of OHTB

2.3. Avoidance and Minimization Measures

Environmental protection measures have been integrated into the Proposed Action to avoid potential adverse effects to the environment. These measures are considered an integral part of the Proposed Action, and would be implemented by USACE, the Port, or their contractors during, prior to, or after the execution of the Proposed Action.

2.3.1. General Measures

- Marine-based construction and dredging is proposed to occur during the in-water work window (June 1 through November 30) for salmonids established by the Long Term Management Strategy (LTMS) for placement of dredge material from operation and maintenance dredging in San Francisco Bay. If in-water work must occur at times other than the proposed work window, the Port and USACE would consult with NMFS, the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife, as necessary, to address potential impacts on special-status aquatic species..
- A worker education program would be implemented for listed fish and shorebirds that could be adversely impacted by in-water construction activities. The program would include a presentation to all workers on biology, general behavior, distribution, habitat needs, sensitivity to human activities, legal protection status, and project-specific protective measures for each listed species. Workers would also be provided with written materials containing this information.
- Standard best management practices (BMPs) would be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during the course of the project would be fueled and serviced in a manner that would not affect the aquatic environment.
- A Spill Prevention Control and Countermeasure (SPCC) plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. The SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements.
- Silt curtains would be used where specific site conditions demonstrate that they would be practicable and would effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions, or contain contaminants at levels in excess of applicable regulatory thresholds. Prior to in-water construction, a silt curtain would be deployed from the water’s edge and pushed out to the deployed location to avoid entrapping aquatic species.
- Prior to construction, a sampling and analysis plan would be developed and implemented to characterize soils and sediments to be removed or exposed. In addition, a dredge operations plan would need to be submitted to all regulatory agencies before the start of dredge operations.
- Piles would be removed by vibratory means (or direct pull if necessary), to the fullest extent where possible; piles that cannot be pulled would, at a minimum, be cut 2 feet

below the future mudline for sloped areas, and 2 feet below the future over-depth dredge elevation for areas in the navigable waterway, to the extent feasible.

- No pilings or other wood structures that have been pressure-treated with creosote would be installed.

2.3.2. Dredging Measures

- Dredging would be conducted with a barge-mounted clamshell/excavator dredge; there would be no hydraulic dredging.
- No overflow or decant water would be allowed to be discharged from any barge, with the exception of spillage incidental to mechanical dredge operations, unless monitoring or relevant studies show the effects of such discharge are negligible.
- Multiple horizontal dredge cuts would be taken where a thick horizontal volume needs to be dredged to avoid overfilling the bucket and causing spillage.
- The load line on disposal barges used for mechanical dredging would be predetermined, and the barge would not be filled above this predetermined level. Before each disposal barge is transported to a placement site, the dredging contractor and a site inspector would certify that it is filled correctly.
- The cycle time would be increased as needed to reduce the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket.
- Floating debris would be removed from the water and disposed of properly.

2.3.3. Pile Driving Measures

- All pile installation is expected to occur on land, in the dry. An impact pile driver would only be used for land based pile-driving where necessary to complete installation of landside piles.
- All pilings in water piles would be removed by vibratory means.

Chapter 3. Essential Fish Habitat in the Action Area

3.1. Introduction and Overview

The MSA was enacted to maintain healthy populations of commercially important fish species. Under the MSA, eight regional Fishery Management Councils are responsible for developing Fishery Management Plans (FMPs) to manage these species. The 1996 amendments to the MSA included protecting the habitats of species for which there is an FMP; these habitats are designated as EFH.

EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 United States Code 1802.10). EFH can consist of both the water column and the underlying surface (e.g., seafloor) of a particular area, and it includes those habitats that support the different life stages of each managed species. A single species may use many different habitats throughout its life to support breeding, spawning, nursery, feeding, and protection functions. The Central San Francisco Bay (Central Bay), including the Action Area, is designated EFH for assorted fish species managed under the following FMPs:

- Pacific Coast Groundfish
- Coastal Pelagic Species
- Pacific Salmon

In the San Francisco Bay-Delta region, NMFS has designated three HAPCs. HAPCs are a subset of EFH; these areas are rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. They include:

- Eelgrass beds (*Zostera marina*)
- Olympia oyster beds (*Ostrea lurida*)
- Pacific Groundfish FMP estuary

Small patches of eelgrass are present in both the Inner and Outer Harbor, as shown on Figures 1 and 2 of Appendix A. The nearest patch at the Outer Harbor is more than 250 meters northeast of the proposed OHTB expansion footprint. The nearest patch in the Inner Harbor occurs approximately 500 meters west of the proposed IHTB expansion area, adjacent to the Alameda Island shoreline (Merkel and Associates 2021).

The Olympia oyster (*Ostrea lurida*), also known as the "native oyster," is native to most of western North America, and it was a key component of the San Francisco Bay marine ecosystem prior to overharvesting and increased siltation from hydraulic mining in the mid-nineteenth century (NOAA 2008). Thought to have gone extinct in San Francisco Bay, Olympia oysters have been observed slowly reestablishing their presence in San Francisco Bay. In their natural state, Olympia oysters form sparse to dense beds in coastal bays and estuaries, and in drought conditions will move up into channels and sloughs, dying off when wetter conditions return. Individual oysters are expected in rocky intertidal, subtidal habitats of the Action Area such as piles beneath the IHTB expansion area, although not in dense quantities that would qualify as oyster beds. Native oyster beds are not known or expected to occur in the IHTB or OHTB expansion area footprints, or in nearshore waters. Native oyster beds would therefore not be affected by the Proposed Action and are not discussed further.

Although the Pacific Groundfish FMP designates the San Francisco Bay as estuary HAPC (NMFS 2010), the Action Area does not provide estuarine habitat as usually recognized because freshwater inflows are limited to temporary runoff from the developed surroundings. Salinity averages in the Outer Harbor can vary during the summer between approximately 27 practical salinity units[1] (PSUs) and 28 PSUs during weekly cycles, with less variance and a typical salinity level closer to 26 PSU in the Inner Harbor (NOAA 2021). The definition of estuary HAPC for groundfish includes areas where ocean-derived salts measure less than 0.5 part per thousand during the period of average annual low flow (NMFS 2021). Because

[1] Salinity values in practical salinity units and parts per thousand are nearly equivalent.

salinity in the Action Area is well above that defined for estuary HAPC for groundfish, this HAPC is not discussed further.

3.2. Fishery Management Plans

3.2.1. Pacific Coast Groundfish

The Pacific Coast Groundfish FMP covers the groundfish fishery in California, Oregon, and Washington, and protects habitat for dozens of species of sharks and skates, roundfish, rockfish, and flatfish. The extent of Pacific Coast Groundfish EFH includes all waters and substrates with depths less than or equal to 3,500 meters to MHHW level, or the upriver extent of saltwater intrusion in estuaries (defined as upstream and landward to where ocean-derived salts measure less than 0.5 part per thousand during the period of average annual low flow). Areas designated as HAPCs for Pacific Coast Groundfish include estuaries, canopy kelp and seagrass habitats, rocky reefs, and all seamounts, including Gumdrop, Pioneer, Guide, Taney, Davidson, and San Juan seamounts; Mendocino Ridge; Cordell Bank; Monterey Canyon; specific areas in the federal waters of the Channel Islands National Marine Sanctuary; and specific areas of the Cowcod Conservation Area. The entirety of the San Francisco Bay Estuary below MHHW is designated as EFH for Pacific Coast Groundfish.

The Pacific Coast Groundfish FMP manages at least 89 species over a large, ecologically diverse area covering the entire West Coast of the continental United States. Although groundfish are those fish considered demersal (fish that live on or near the seabed), they occupy diverse habitats at all stages in their life histories. Pacific Coast Groundfish FMP species rarity in all or parts of the Central Bay makes it unlikely that most FMP species would occur in the Action Area. Fifteen species managed under this FMP have species distributions in the Central Bay, as identified in Table 3-1 (NMFS 2001).

Table 3-1 Pacific Coast Groundfish FMP Species Occurring in the Central Bay

Common Name	Scientific Name
English Sole	*Parophrys vetulus*
Starry Flounder	*Platichthys stellatus*
Brown Rockfish	*Sebastes auriculatus*
Pacific Sanddab	*Citharichthys sordidus*
Lingcod	*Ophiodon elongatus*
Sand Sole	*Psettichthys melanostictus*
Leopard Shark	*Triakis semifasciata*
Spiny Dogfish	*Squalus acanthias*
Big Skate	*Raja* ssp.
Pacific Whiting (hake)	*Merluccius productus*

Kelp Greenling	*Hexagrammos decagrammus*
Soupfin Shark	*Galeorhinus galeus*
Curlfin Sole	*Pleuronichthys decurrens*
Bocaccio	*Sebastes paucispinis*
Cabezon	*Scorpaenichthys marmoratus*

Source: NMFS 2001

3.2.2. Coastal Pelagic Species FMP

The Coastal Pelagic FMP protects and manages four species of fish, one species of squid, and all krill species that occur in the West Coast exclusive economic zone.[2] Coastal Pelagic Species EFH includes all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington; offshore to the limits of the exclusive economic zone; and above the thermocline, where sea surface temperatures range between 10 and 26 degrees Celsius (°C). The southern boundary is the United States-Mexico maritime boundary, and the northern boundary is the position of the 10°C isotherm, which varies both seasonally and annually due to the seasonal cooling of the sea surface temperature. Within that area, several estuaries, including San Francisco Bay, are designated as EFH. The entirety of the San Francisco Bay Estuary below MHHW is designated as EFH for Coastal Pelagic Species.

Pelagic species can generally be found anywhere in the water column from the surface to a depth of 3,300 feet. The Coastal Pelagic Species FMP includes four finfish (Pacific sardine, Pacific [chub] mackerel, northern anchovy, and jack mackerel) and the invertebrate market squid. All except for Pacific mackerel and market squid are likely to occur in the Central Bay (NMFS 2001), as listed in Table 3-2.

Table 3-2 Coastal Pelagic Species FMP Species Occurring in the Central Bay

Common Name	Scientific Name
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
Pacific Sardine	*Sardinops sagax*

Source: NMFS 2001

3.2.3. Pacific Salmon FMP

The Pacific Coast Salmon FMP guides the management of commercial and recreational Salmon fisheries off the coasts of Washington, Oregon, and California, and includes Chinook Salmon (*Oncorhynchus tshawytscha*) and Coho Salmon (*Oncorhynchus kisutch*). Pacific Coast Salmon freshwater EFH includes all rivers or creek currently or historically occupied by Chinook Salmon or Coho Salmon. Estuarine and marine areas such as San Francisco Bay are also included in this EFH designation. Areas upstream of impassible dams are excluded from Pacific

[2] The U.S. exclusive economic zone extends 200 nautical miles offshore, encompassing diverse ecosystems and vast natural resources, such as fisheries and energy and other mineral resources.

Coast Salmon EFH. In estuarine and marine areas, Pacific Coast Salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of California, north of Point Conception. The Pacific Coast Salmon FMP also defines five HAPCs for the Pacific Coast Salmon EFH: complex channels and floodplain habitats, thermal refugia, spawning habitat, estuaries, and marine and estuarine submerged aquatic vegetation.

Among the Pacific Salmon FMP species, only Chinook Salmon have the potential to occur in the Action Area. Coho Salmon have been classified as species extirpated from San Francisco Bay by NMFS. The population of Chinook Salmon in San Francisco Bay is composed of three distinct races: winter-run, spring-run, and fall/late fall-run. These races are distinguished by the seasonal differences in adult upstream migration, spawning, and juvenile downstream migration. Chinook Salmon are anadromous fish, spending 3 to 5 years at sea before returning to fresh water to spawn. These fish pass through San Francisco Bay waters to reach their upstream spawning grounds in the upper reaches of the Sacramento and San Joaquin Rivers. In the Action Area, an in-water work window of June 1 through November 30 has been established for Chinook Salmon; in-water project activities would occur during this period.

3.3. Habitat Areas of Particular Concern

3.3.1. Eelgrass

Eelgrass is designated as EFH for various federally managed fish species in the Pacific Coast Groundfish and Pacific Coast Salmon FMPs. Eelgrass is also considered an HAPC for various species in the Pacific Coast Groundfish FMP. As noted, HAPCs are a subset of EFH; these areas are rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. Eelgrass colonies provide an important and highly productive habitat in San Francisco Bay, and serve as important nursery and feeding grounds to many species of wildlife that inhabit the estuary.

In the vicinity of the IHTB and OHTB, there are some small patches of eelgrass. The nearest patch at the Outer Harbor is more than 250 meters northeast of the proposed OHTB expansion area. The nearest patch in the Inner Harbor occurs approximately 500 meters west of the proposed IHTB expansion area, adjacent to the Alameda Island shoreline (Merkel and Associates 2021). These conditions were documented during the most recent eelgrass survey, conducted in April of 2021(Appendix A). Due to the climate and depths of light penetration in the Bay, eelgrass beds in San Francisco Bay are generally limited to a depth range of approximately +1 to -6 feet MLLW (USACE, EPA, and LTMS, 2009).

3.4. Existing Conditions in the Action Area

The "Action Area" is defined as the extent of all areas that may be affected directly or indirectly by the federal action(s) and not merely the immediate area involved in the action (50 Code of Federal Regulations [CFR] Section 402.02). For the purposes of the analysis, the Action Area extends beyond the direct project footprint provided in the Description of the Proposed Action (Chapter 2).

To account for all areas that may be directly or indirectly be affected by the Proposed Action, the Action Area includes the Proposed Action's construction footprint and a 250-meter in-water buffer surrounding the dredge boundary. The 250-meter buffer accounts for potential dredge plume effects on the aquatic environment, consistent with LTMS guidance. The Action Area is shown in Figure 3-1.

The Proposed Action is not anticipated to generate underwater noise effects to specials-status aquatic species or habitats beyond the project footprint and 250-meter in-water buffer. The Proposed Action includes avoidance and minimization measures to ensure that underwater noise thresholds for injury to fish greater than 2 grams are not exceeded (see Section 2.3).

3.4.1. General Characteristics and History

The Port of Oakland is situated on the eastern shoreline of central San Francisco Bay, often referred to as the Oakland-Alameda Estuary. The estuary was originally a shallow tidal slough, but was partially dredged in the mid- to late-1800s to create a viable port and shipping channel. The shipping channel is now dredged annually to a design depth of -50 feet MLLW to support shipping operations in the Port. Freshwater inflow to the Oakland-Alameda Estuary is provided from natural creeks, human-made stormwater drainage facilities, and direct surface runoff. Tidal and wind-driven currents also influence the estuary. Sediment to the Oakland-Alameda Estuary is contributed from other portions of the San Francisco Bay Estuary, as well as vicinity shorelines and creeks, which cause siltation of the existing turning basins and shipping channels, necessitating annual maintenance dredging. Dredged material from Oakland Harbor has typically been less than 80 percent sand.

Aquatic habitat throughout the Action Area is likely affected by vessel traffic, industrial activity, and maintenance dredging activities. The entirety of the aquatic habitat in the Action Area occurs in or adjacent to areas serviced by shipping vessels. Existing waterfront facilities at the Inner Harbor include Howard Terminal and Schnitzer Steel, while the Outer Harbor is adjacent to the Outer Harbor Terminal and the TraPac Terminal. Several of the facilities surrounding Action Area waters serve industrial or commercial activities. Maintenance dredging in the existing ITHB and OHTB and navigation channels occurs annually.

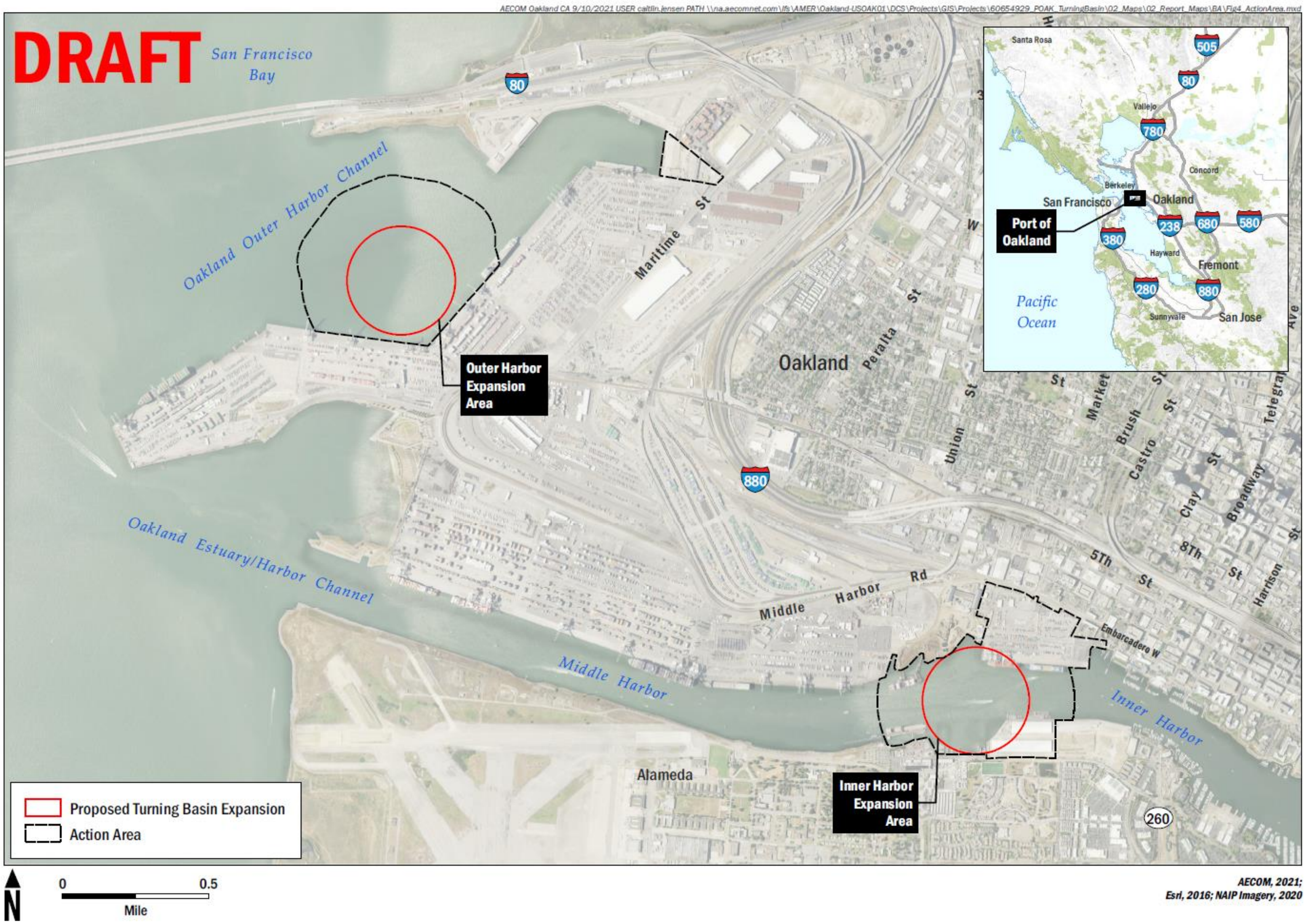

Figure 3-1 Action Area

The Action Area aquatic habitat falls within the "San Francisco, Central" waterbody as included in the 2018 California 303(d) list of water quality limited segments (State Water Resource Control Board 2018a). San Francisco Bay, Central, is a Category 5 waterbody, which includes water segments where standards are not met for one or more pollutants, and a Total Maximum Daily Load is required, but not yet completed. Pollutants identified for the San Francisco Bay, Central include the following:

- Chlordane
- DDT
- Dieldrin
- Dioxin compounds
- Furan compounds
- Invasive species
- Mercury
- Polychlorinated biphenyls (PCBs)
- Selenium
- Trash

The Oakland Inner Harbor area also includes indicator bacteria as a pollutant source (State Water Resource Control Board 2018b).

Background turbidity in San Francisco Bay is naturally high, with total suspended solids levels ranging up to more than 200 milligrams per liter (mg/L) (Rich 2010), and typically varying from 10 mg/L to more than 100 mg/L (SFEI 2011). Waters in the navigation channels and turning basins are naturally turbid because of the resuspension of sediments from wind, waves, and tides.

Aquatic habitat in the Action Area can be divided among pelagic open water, intertidal, and benthic habitats. Each of these aquatic habitat types is described in the following sections. The Action Area does not include wetlands or non-San Francisco Bay water features.

3.4.2. Pelagic Open Water

Pelagic (open water) habitat includes waters between the water's surface and the seafloor in the Action Area. The physical conditions of the open-water environment change constantly with tidal flow and season. As a result, San Francisco Bay waters vary in temperature, salinity, dissolved oxygen, and turbidity depending on water depth, location, and season. Pelagic habitat in San Francisco Bay is predominantly inhabited by planktonic organisms, fish, and marine mammals.

The Goals Report (Goals Project 1999) subdivides the open bay habitats into two habitat subunits: deep bay and shallow bay. Deep bay habitat is defined as those portions of San Francisco Bay deeper than 18 feet below MLLW, including the deepest portions of San Francisco Bay and the largest tidally influenced channels. The regularly dredged navigation channels throughout San Francisco Bay, such as the IHTB, OHTB, and navigation channels, also meet this definition. Shallow bay is defined as that portion of San Francisco Bay above 18 feet below MLLW, which comprises most of San Francisco Bay.

The majority of the Action Area occurs in the navigation channels where channel depths are maintained to the design elevation of -50 feet MLLW, thereby meeting the Goals Project definition of deep open bay habitat. Shallower open water areas are present in the Action Area at the margins of the navigation channels. Deep and shallow estuarine pelagic habitats are discussed in the following subsections.

Deep Estuarine Pelagic

Deep estuarine pelagic waters may provide habitat to free-swimming invertebrates such as California Bay shrimp (*Crangon franciscorum*), and fishes such as Brown Rockfish (*Sebastes auriculatus*), halibut (*Hippoglossus* sp.), and sturgeon (*Acipenser* sp.). Deepwater habitat may also serve as a migratory pathway for anadromous fish such as Chinook Salmon (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*). Waterbirds such as surf scoter (*Melanitta perspicillata*), scaups (*Aythya* spp.), brown pelican (*Pelecanus occidentali*s), and terns (*Sterna* spp.) may roost or loaf in these open waters, particularly in areas protected from strong winds and waves. Marine mammals may also frequent deep estuarine pelagic waters, such as Pacific harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and harbor porpoise (*Phocoena phocoena*).

Shallow Estuarine Pelagic

Shallow open bay habitat may function as a feeding area for Pacific Herring (*Clupea pallasii*), northern anchovy (*Engraulis mordax*), bat ray (*Myliobatis californica*), and jacksmelt (*Atherinopsis californiensis*), as well as at least 40 other species of fish, crabs, and shrimp. Spawning habitat for Pacific Herring occurs on hard substrates and eelgrass (*Zostera marina*) along the shallow margins of the Central Bay. Shallow bay habitat is also a nursery area for juvenile halibut and sanddabs (*Citharichthys stigmaeus*), shiner perch (*Cymatogaster aggregata*), herring, and other fishes. Similar to deep estuarine pelagic waters, anadromous fish may use shallow open bay waters as migratory pathways. Shallower waters also provide important avian foraging habitat for diving bird species. Marine mammals may also be present, such as Pacific harbor seals. Some shallow water areas are also suitable habitat for eelgrass, a seagrass species that provides spawning habitat for Pacific Herring and foraging habitat for the California least tern (*Sterna antillarum browni*).

3.4.3. Intertidal Habitat

Intertidal habitats are the regions of the Action Area that lie between low and high tides. There is very limited intertidal habitat in the Action Area, consisting of seawalls, piles, and rock riprap. In the Outer Harbor portion of the Action Area, intertidal habitat is limited to portions of the existing seawall that are exposed and inundated during tidal cycles. Intertidal habitat in the Inner Harbor portion of the Action Area is also predominantly seawall surfaces, but may also include piles that support above-water structures. The Inner Harbor portion of the Action Area also includes short lengths of rock-riprapped shoreline in the intertidal zone, occurring at the Schnitzer Steel site and adjacent to the Alameda Main Street Ferry Terminal.

Invertebrate taxa associated with intertidal habitat in the San Francisco Bay shoreline include balanoid barnacles (*Balanidae* spp.) in the high and middle intertidal zones; and limpets, mussels (*Mytilus* spp.), and Olympia oysters (*Ostrea lurida*) in the lower middle and low intertidal zones. Common intertidal algae species in the Central Bay include sea lettuce (*Ulva* spp.), rockweed (*Fucus gardneri*), red algae species (*Polyneura latissima* and *Gigartina* spp.) and nonnative brown algae species (*Sargassum muticum*; NOAA 2007). Typically, the high intertidal zone is dominated by sea lettuce; the middle intertidal zone is dominated by sea lettuce, rockweed, and red algae; and the low intertidal zone is dominated by brown algae (NOAA 2007). When inundated, intertidal areas may also be frequented by fish and other aquatic species.

3.4.4. Benthic Habitat

Benthic habitat includes the channel bottom and associated biota in and adjacent to the navigation channels and turning basins. In subtidal areas, the predominant benthic habitat in the Central Bay is composed of unconsolidated soft sediment with a mixture of mud, silt, and clay; and lesser quantities of sand, pebbles, and shell fragments (NOAA 2007). Sediment in the Oakland Harbor is predominately fine-grained (USACE 2019). Areas outside of the turning basins and navigation channels, where annual dredging does not occur, are typical of San Francisco Bay waters and have primarily silty mud and sand substrates that are naturally no more than 25 feet deep (City of Oakland 2021). Benthic habitat also less commonly includes hard substrates such as piers, breakwaters, and riprap.

Benthic communities in the harbor and channel areas of the Central Bay are affected by increased water flow and sedimentation. Relatively high numbers of subsurface deposit feeding polychaetes and oligochaetes inhabit these areas, including *Tubificidae* spp., *Mediomastus* spp., *Heteromastus filiformis*, and *Sabaco elongatus*. Community complexity and abundance also supports relatively high abundances of three carnivorous polychaete species: *Exogone lourei*, *Harmothoe imbricata*, and *Glycinde armigera* (City of Oakland 2021). Other commonly occurring benthic species in the Central Bay include the obligate amphipod filter-feeder *Ampelisca abdita*, the tube-dwelling polychaete *Euchone limnicola* (City of Oakland 2021), clams (including the overbite clam, *C. Amurensis* or *Corbula*), amphipods such as *Monocorophium* and *Ampelisca*, polychaete worms, and bay mussels (SFEP 1992). Larger mobile benthic invertebrate organisms are also present in the Central Bay, such as blackspotted shrimp (*Crangon nigromaculata*), the bay shrimp (*Crangon franciscorum*), Dungeness crab (*Metacarcinus magister*), and the slender rock crab (*Cancer gracilis*; City of Oakland 2021).

Benthic hard substrates such as piers, breakwaters, and riprap provide colonization habitat for benthic invertebrates. Common species include algae, barnacles (*Balanus glandula* and *Chthamalus fissus*), mussels, tunicates, bryozoans, cnidarians, and crabs.

Several common benthic species in Central Bay were accidentally or intentionally introduced, such as the eastern oyster (*Crassostrea virginica*), the Japanese littleneck clam (*Tapes philippinarum*), and the soft-shelled clam. Some of these nonindigenous species serve ecological functions similar to those of the native species that they have displaced, while other species have reduced phytoplankton populations, and consequently impacted the zooplankton populations and organisms that depend on them.

Benthic biota provide an important food source for carnivorous fishes, marine mammals, and birds in San Francisco Bay's food web. Communities of benthic organisms also play a vital role in maintaining sediment and water quality and are important indicators of environmental stress, because they are particularly sensitive to pollutant exposure.

3.4.5. Sediment Quality

Dredging may resuspend constituents of concern in the water column if they are present in the surface sediments, and sediment quality in the Action Area is therefore relevant to this EFH assessment, and considered an element of the Action Area.

Landside excavation of soils at Howard Terminal, Schnitzer Steel, and the Alameda Gateway sites would occur to a depth of approximately -5 feet MLLW, which is approximately 17 feet bgs; additional landside excavation may be required at Schnitzer Steel to remove potentially contaminated soils below 17 feet bgs, if determined to be present. At all three sites, material below the depth excavated from land would be dredged following removal of the existing bulkhead.

Howard Terminal Dredging Footprint. Ongoing data collections by the Port indicate low levels of hydrocarbons in the fill at or near the range of groundwater tidal movement (ENGEO 2019). In addition, metals have been detected in soils from the ground surface to the groundwater interface; however, they are present at concentrations consistent with Merritt/Posey formation sands that were likely mined for fill (Apex 2021). Old Bay Mud/Merritt Sand (OBM/MS) and Posey Formations material are likely present in fills below the -8-foot bgs groundwater elevation, including in the proposed dredging footprint that occurs below -17 feet bgs. There are no specific data regarding the fill quality between groundwater at approximate Elevation -8 feet bgs and beyond, and the underlying OBM/MS interface where dredging would occur. Because the fill is marine-derived and the overlying soil and groundwater are relatively clean, it is unlikely that the deeper fill is contaminated, and would likely be suitable for beneficial reuse. There is no mechanism for contaminants to be transported to depths between -10 feet bgs and -60 feet bgs (Apex 2021).

Schnitzer Steel Dredging Footprint. This site is currently under a Cleanup and Abatement Order issued by the California Department of Toxic Substances Control. A variety of contaminants has been detected at various levels on the site, including dioxin, hydrocarbons, PCBs, and heavy metals (Apex 2021). OBM/MS Formation material is likely present in fills below the -10-foot bgs groundwater elevation, including in the proposed dredging footprint that occurs below -17 feet bgs. Similar to Howard Terminal, there is little or no information available regarding the soil and sediment quality of the material below groundwater at Schnitzer Steel. Regulators who have required testing at the site do not see a mechanism for the contaminants to be transported below groundwater (Apex 2021). It is anticipated that the native material (OBM/MS), which begins at -10 feet bgs, would be suitable for beneficial reuse (Apex 2021).

Alameda Dredging Footprint. The -50-Foot Project previously removed a corner of the Alameda Gateway property to expand the IHTB to its current dimensions. The material that would be removed for this project is adjacent to the material removed for the -50-Foot Project and has no additional or new sources of contamination, and therefore should be similar to the material removed for the -50-Foot Project. Based on the previous testing results, it is unlikely that the material below groundwater would contain any contaminants to prevent beneficial reuse (Apex 2021).

Inner Harbor Turning Basin Expansion Area Open Water Dredging Footprint. There are two areas in the proposed IHTB expansion area that are subtidal: the basin between Howard Terminal and Schnitzer Steel, and a portion of the current Port of Oakland Berth 67. With project implementation, both of these areas would require dredging to a depth of -50 feet MLLW.

During the -50-Foot Project, Berth 67 was tested to allow deepening from the currently maintained depth of -42 feet MLLW with 2 feet of overdepth allowance, to -50 feet MLLW with 2 feet of overdepth allowance; however, the dredging was not completed by the Port. The material tested to support Berth 67 dredging was approved by the Dredged Material Management

Office (DMMO) agencies for beneficial reuse as wetland noncover (USACE 1998). Because the deepening material has not been exposed to any new contaminant sources since the testing was completed, it can be assumed that the material from Berth 67 would still be suitable for wetland noncover (Apex 2021).

There is a lack of site-specific information about the sediment quality in the basin between Howard Terminal and Schnitzer Steel. However, a few things can be assumed from the site history and the stratigraphy. First, as with other areas, the OBM/MS formation underlying the basin should be free of contaminants and suitable for any beneficial reuse. This was true even in areas that contained significant contamination in the overlying areas such as the Drydock Pits on the Alameda side of the channel, which had a similar use to the Oakland side Moore Shipyard, and that were removed for the -50-Foot Project. Further, Schnitzer Steel was required to perform cleaning of the Howard Terminal to remove light fibrous material. It is likely that the material also settled into the basin, impacting the sediment. Although testing would be needed to confirm the condition of these sediments, this material may contain contaminants that would preclude beneficial reuse, and may require landfill disposal in a Class II landfill (Apex 2021).

Outer Harbor Turning Basin Expansion Area Open Water Dredging Footprint. The OHTB expansion area is divided into two definable units: a Young Bay Mud layer, and an underlying OBM/MS layer. Data from samples collected for the -50-Foot Project close to the proposed OHTB expansion area suggest that the Young Bay Mud layer sediments would be suitable for habitat creation, noncover; and the OBM/MS strata should be considered clean and suitable for any disposal or reuse (Apex 2021).

3.4.6. Eelgrass

As described in Section 3.3.1, there are some small patches of eelgrass in the vicinity of the IHTB and OHTB. The nearest patch at the Outer Harbor is more than 250 meters northeast of the proposed OHTB expansion area. The nearest patch in the Inner Harbor occurs approximately 500 meters west of the proposed IHTB expansion area, adjacent to the Alameda Island Shoreline (Merkel and Associates 2021).

Chapter 4. Effects Assessment

This section discusses the direct, indirect, temporary, and permanent effects of the Proposed Action on aquatic species and habitats present or potentially present in the Action Area, including EFH and associated species. Direct effects are the direct or immediate effects of the Proposed Action on listed species or habitats, such as physical damage to an individual, physical loss of a spawning or foraging habitat, a blocked migration corridor, or harassment of an animal species to the point where it abandons part of its normal range. Indirect effects are those that are caused by—or would result from—the Proposed Action, but occur later in time and are reasonably certain to occur. These include ecosystem-type changes that primarily affect food web dynamics or habitat suitability, as would occur with decreased suitability of foraging habitat. The Action Area described in Section 3.4 is inclusive of areas where direct and indirect effects to EFH are likely to occur.

4.1. Aquatic Species and Habitat Effects

Aquatic species and habitats present or potentially present in the Action Area may experience temporary construction impacts related to entrainment during dredging, altered water quality, turbidity and sediment suspension, mobilization of chemicals of concern, temporary benthic habitat disturbance, underwater noise, impediments to localized movement and migration, and invasive species. Permanent habitat alteration would occur, including conversion of uplands to aquatic habitat and deepening of existing aquatic habitat. A general description of these impacts and their effects on aquatic species and habitats is provided in this section. Conclusions and determination of effects on EFH present in the Action Area is provided in Chapter 5.

4.1.1. Entrainment During Dredging

All forms of dredging have the potential to incidentally remove organisms from the environment along with the dredge material, a process referred to as entrainment. Entrained fish are likely to suffer mechanical injury or suffocation during dredging, resulting in mortality. Although individual fish have the potential to be struck or entrained by a clamshell bucket as it falls through the water column to the channel bottom, the falling bucket would generate a pressure wave around it that would force small fish away from the falling bucket. As a result of the pressure wave, mechanical clamshell dredging has a very low risk of entraining fishes (Reine and Clarke 1998, USACE 2019). Therefore, the use of a clamshell dredge minimizes the risk of fish entrainment for all fishes. Mechanical dredging is also generally accepted to entrain far fewer fish than hydraulic dredging because less water is removed along with the sediment, and no suction is involved.

In consideration of the construction methods and avoidance and minimization measures, the potential to entrain or physically injure or kill FMP managed fish species is low. General disturbance from construction vessels is expected to be minimal because fish avoid the areas where active dredging is occurring. Dredging and in-water construction associated with the Proposed Action would be conducted in accordance with standard practices, including measures to reduce the potential for entrainment, as discussed in Section 2.3. This includes dredging during the in-water work window between June 1 and November 30, when salmonids are less likely to be present.

Direct removal of eelgrass is not anticipated to occur as a result of the Proposed Action, because eelgrass is not present or likely to be present with the expanded dredge footprints at IHTB and OHTB. Mapped eelgrass occurs more than 250 meters from the proposed IHTB and OHTB expansion areas.

4.1.2. Accidental Discharges

Construction activities have the potential to result in accidental discharge of contaminants into San Francisco Bay. Various contaminants, such as fuel oils, grease, and other petroleum products used in construction activities, could be introduced into the system directly during dredging and nearshore construction. Shoreline construction, including demolition, excavation, and sheet pile installation, could also result in increased surface run-off and contaminant loading to San Francisco Bay waters. Compliance with National Pollutant Discharge Elimination System (NPDES) Construction General Permit conditions, including implementation of a Stormwater Pollution Prevention Plan and measures to prevent accidental spills of hazardous materials, would prevent contaminants and disturbed sediments from reaching storm drains, and subsequently San Francisco Bay waters, or from being directly discharged into Bay waters. The implementation of standard BMPs and other measures identified in Section 2.3 would further reduce the potential accidental discharges during construction to adversely affect aquatic species and habitat.

4.1.3. Stormwater Management

There would be minor long-term alterations to upland drainage patterns at Howard Terminal, Schnitzer Steel, and Alameda Gateway because of IHTB expansion, which are unlikely to result in adverse water quality impacts. This may include removal, replacement, or redesign of drainage infrastructure such as curbs and gutters resulting from upland excavation and reconfiguration of the facility shorelines. Any such alterations would occur in compliance with NPDES post-construction runoff requirements for new development and redevelopment, including treatment measures and other appropriate source control and site design features to reduce the pollutant load in stormwater discharges and to manage runoff flows. With adherence to these requirements, upland drainage changes are unlikely to substantially affect water quality or biological resources, including EFH.

4.1.4. Turbidity and Suspended Sediment

During any type of dredging operations, the interaction of the dredge equipment with the dredged material resuspends sediment into the water column. The mechanisms by which mechanical dredging causes increased suspended sediment concentrations include the impact and withdrawal of the bucket from the substrate, the washing of material out of the bucket as it moves through the water column, and the loss of water as the sediment is loaded onto the barge (Nightingale and Simenstad 2001).

Pile removal may also temporarily disturb benthic sediments and increase turbidity and suspended sediment levels in the immediate vicinity of the Action Area during construction. Increases in turbidity and suspended sediment levels from pile removal would be substantially less significant than similar effects from dredging. Movement of the dredge and other construction vessels would not be expected to increase turbidity above ambient ranges generated by natural hydrologic processes, weather, and existing vessel traffic.

Effects on turbidity and suspended sediment levels from new dredging to expand the IHTB are anticipated to be like those from existing annual maintenance dredging. Dredging typically results in suspended sediment levels of less than 700 mg/L at the surface, and less than 1,100 mg/L at the bottom adjacent to a dredge source (within approximately 300 feet) (LaSalle 1988). This concentration would decrease rapidly with distance due to settling and mixing. Although concentrations of this magnitude could occur at locations with fine silt or clay substrates, much lower concentrations (50 to 150 mg/L at 150 feet) are expected at locations with coarser sediment; sediment in the Oakland Harbor is predominately fine-grained (USACE 2019), although there is evidence that coarser sand substrates may be present in areas 25 feet deep or shallower (City of Oakland 2021). The degree of sediment re-suspension depends on the physical composition of the material, with fine-grained material remaining in suspension longer, and sandy material falling through the water column and resettling much faster. In addition, the movement of water associated with tides, river outflow, wind, and waves also determines turbidity plumes, all of which can disperse suspended particles and turbidity plumes around San Francisco Bay (USACE 2019).

Turbidity plumes were measured during clamshell dredging in the Oakland Harbor during USACE monitoring in 2016 and 2017 (USACE 2019). The San Francisco Bay navigation channel maintenance dredging water quality certification requires that increased turbidity be less than 50 Nephelometric Turbidity Units (NTUs), or no greater than 10 percent if the baseline NTU is greater than 50 at the point of compliance (i.e., 500 feet downstream of dredging). During USACE monitoring in the Oakland Harbor, exceedances of the water quality turbidity standards at the point of compliance occurred only periodically.

Temporary turbidity plumes from dredging would be localized, and would affect a relatively small area in relation to surrounding areas of similar habitat. In the naturally turbid San Francisco Bay, turbidity plumes would be quickly diluted to near or within background particulate concentrations (USACE and RWQCB 2015). Furthermore, silt curtains would be used where specific site conditions demonstrate that they would be practicable, and effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions, or contain contaminants at levels in excess of applicable regulatory thresholds.

Dredging, pile removal, and other in-water construction activities would result in increased turbidity from suspended sediments. Suspended sediments have been shown to affect fish behavior, including avoidance responses, territoriality, feeding, and homing behavior. Wilber and Clarke found that suspended sediments result in cough reflexes, changes in swimming activity, and gill flaring. Suspended sediments can have other impacts, including abrasion to the body and gill clogging (Wilber and Clarke 2001). The effect of dredging on fish can vary with life stage; early life stages tend to be more sensitive than adults.

Decreases in levels of light penetration and dissolved oxygen would occur only within a few hundred feet of the dredging site and would end several hours after cessation of dredging activities, making a permanent decline in aquatic primary productivity unlikely (NAVFAC 2020). Mapped eelgrass occurs more than 250 meters from the proposed IHTB and OHTB expansion areas. Dredging guidance from the USACE indicates that when dredging occurs more the 250 meters from eelgrass, potential impacts from dredge-induced turbidity would be minimal, and no turbidity monitoring at the eelgrass patch would be needed (USACE, EPA, and LTMS 2009).

Dredging associated with the Proposed Action would be conducted in accordance with standard practices, including measures to reduce the potential for causing turbid conditions that could affect listed species and their habitat, as discussed in Section 2.3. This includes, but is not limited to, use of silt curtains, avoiding spillage, increasing cycle times as needed, and dredging during the established in-water work window. In addition, dredging would be conducted in compliance with any conditions associated with regulatory permits obtained for the action..

In consideration of the potential fish life stages present, distance from eelgrass, depths within the dredging areas, the brief duration and relatively small area of effect, background turbidity levels in San Francisco Bay, and with implementation of avoidance and minimization measures, the Proposed Action is unlikely to substantially affect EFH from increased turbidity.

4.1.5. Mobilization of Contaminants of Concern

Dredging or other bottom-disturbing activities can disturb aquatic habitats by resuspending sediments, thereby recirculating toxic metals, hydrocarbons, pesticides, pathogens, and nutrients into the water column. Any toxic metals and organics, pathogens, and viruses, absorbed or adsorbed to fine-grained particulates in the sediment may become biologically available to organisms either in the water column or through food-chain processes.

Most available studies suggest that there is no significant transfer of metal concentrations into the dissolved phase during dredging, even though release of total metals associated with the suspended matter may be large (Jabusch et al. 2008). Organic contaminants such as pesticides, PCBs, and polyaromatic hydrocarbons are generally not very soluble in water, and direct toxicity by exposure to dissolved concentrations in the water column is not very likely (Jabusch et al. 2008; USACE and RWQCB 2015).

Under direction of the LTMS agencies, a study on the short-term water quality impacts of dredging and dredged material placement on sensitive fish species in San Francisco Bay was completed by the San Francisco Estuary Institute (Jabusch et al. 2008). The review considered five fish species: Chinook Salmon, Coho Salmon, Delta Smelt, steelhead trout, and Green Sturgeon. Water quality impacts of concern include dissolved oxygen reduction, pH decrease, and releases of toxic components such as heavy metals, hydrogen sulfide, ammonia, and organic contaminants (including polyaromatic hydrocarbons, PCBs, and pesticides). Potential short-term effects include acute toxicity, subacute toxicity, and biological and other such as avoidance. The study concluded that direct short-term effects on sensitive fish by contaminants associated with dredging plumes are minor. The study identified a need to better study the potential of ammonia releases during dredging in San Francisco Bay. However, ammonia has not been identified as a contaminant of concern for the Action Area, and the amount of ammonia released by maintenance dredging is expected to be minimal, and the consequent effects short term and minor. Mobile organisms, such as fish, are likely to relocate outside of the dredge material plume, rather than be exposed to potential harm. The dredge material plume would only occupy a small percentage of the habitat available to fish species in the vicinity of the Action Area at any given time.

Existing upland areas surrounding the proposed IHTB expansion area are known to contain several contaminants; however, excavation and offsite disposal of these materials to a depth of -17 feet bgs would occur prior to dredging as part of the Proposed Action. Although there are no specific data regarding the fill quality below groundwater at the upland areas in the proposed

IHTB expansion area, or in the subtidal areas in the IHTB expansion footprint, most of these areas are not expected to contain elevated constituents of concern that would preclude beneficial reuse (see Section 3.4.5 for details). The exception is the basin between Howard Terminal and Schnitzer Steel, where sediment may be contaminated with heavy metals requiring landfill disposal in a Class II landfill, which would occur as needed. As detailed in Section 3.4.1, the Central Bay is a Category 5 waterbody for several pollutants, which may also be present in sediments in the Action Area.

Sediments would be tested prior to dredging, and the results would be reviewed by DMMO prior to dredging and placement, including evaluation of the potential for water quality impacts. This process would identify contaminated sediments and appropriate placement site options for dredged materials based on the characteristics of the sediment and criteria for each placement site. Additionally, water quality protection measures would be included as conditions to the project permits and regulatory approvals.

In consideration of the low likelihood for aquatic organisms to be exposed to toxins during dredging and other in-water construction; avoidance and minimization measures described in Section 2.3; and in consideration of DMMO procedures, the Proposed Action is unlikely to result in substantial adverse impacts to EFH from mobilization of contaminants of concern.

4.1.6. Temporary Benthic Habitat Disturbance

Dredging would directly impact benthic communities through physical disruption and direct removal of benthic organisms, resulting in the potential loss of most, if not all, organisms in the dredged area. Organisms immediately adjacent to the navigation channels and turning basins may be also be lost because of smothering or burial from sediments resuspended in the water column during dredging (USACE 2019). These effects may also occur as a result of other bottom-disturbing activities, such as pile removal, although to a lesser degree. Benthic habitat in the federal channel and turning basins, and their margins, is regularly disturbed under baseline conditions because of maintenance dredging and the propeller wash of ship traffic.

Studies have indicated that even relatively large areas disturbed by dredging activities are usually recolonized by benthic invertebrates within 1 month to 1 year, with original levels of biomass and abundance developing within a few months to between 1 and 3 years (Newell et al. 1998). Recovery in deep-water channels may be slower. Following dredging, disturbed areas are recolonized, beginning with mobile and opportunistic species (Oliver et al. 1977, Lenihan and Oliver 1995). Colonizing species composition may be different than prior to dredging, and recolonizing species would likely include nonindigenous species common to San Francisco Bay (USACE and RWQCB 2015).

Benthic habitat can provide important foraging areas for special-status species, especially for groundfish species, which are primarily associated with the benthos. Chinook Salmon are primarily drift feeders, but also forage in the benthos, typically in waters less than 30 feet deep. Northern anchovy and Pacific sardine typically feed on floating plankton (NOAA n.d. [a], n.d. [b]), while jack mackerel primarily feed on large zooplankton, juvenile squid, and anchovy (UC San Diego 2017).

Benthic habitat in the Action Area is likely of marginal foraging value, given existing and historic uses in the navigation channel and adjoining shoreline. Benthos in the Action Area are in a constant state of disruption from large vessel movement and annual maintenance dredging.

Regular disturbance is reduced outside of the navigation channel and existing turning basins, although still present. The Proposed Action would result in temporary impacts to benthic communities in the enlarged turning basin areas. These effects would be similar to those caused by maintenance dredging in the existing navigating channels and turning basins, and dredged areas in the proposed expanded turning basins are expected to recolonize with benthic organisms.

Permanent impacts to benthic habitat would occur from deepening the proposed turning basin expansion area, which may affect fish foraging and suitability for eelgrass. These impacts are discussed in the Habitat Alteration section.

4.1.7. Underwater Noise

Project construction would result in underwater sound pressure waves, due to noise generated by mechanical dredging and from shoreline construction at the IHTB. The scientific knowledge of the effects of underwater noise and sound waves on fishes is limited, and varies depending on the species. Effects may include behavioral changes, neurological stress, and temporary shifts in hearing thresholds, depending on the intensity and characteristics of the noise. Studies on the effects of noise on anadromous Pacific coast fishes are primarily related to pile-driving activities.

Mechanical dredges produce a complex combination of repetitive sounds that may be intense enough to cause adverse effects on fish. In addition, the intensity, periodicity, and spectra of emitted sounds differ among dredge types and the substrate being dredged. Clamshell dredges generate a repetitive sequence of sounds from winches, bucket impact with the substrate, closing and opening the bucket, and dumping the dredged material into the barge. The most intense sound impacts are produced during the bucket's impact with the substrate, with peak SPLs of 124 dB measured 150 meters from the bucket strike location (Dickerson et al. 2001; Reine et al. 2002). Existing ambient underwater noise at the IHTB and OHTB include levels of 160 to 180 dB produced by small boats and ships at 1 meter (MALSF 2009), and 180 to 189 dB produced by commercial shipping at 1 meter (Reine and Dickerson 2014). The Oakland Outer Harbor is identified as having ambient sound levels of 120 to 155 dB (peak), which exceeds NMFS behavioral thresholds for fish (Caltrans 2020).

Sheet pile removal would also generate underwater noise that may affect marine biota. Sheet piles are generally fully removed using vibratory hammers. There are no established injury criteria for fish for vibration pile removal, and resource agencies are less concerned that vibration pile removal would result in injury or other adverse effects on fish (Caltrans 2020).

Underwater noise is not anticipated to substantially affect federal ESA–listed fish due to their mobility, existing activity at the harbor, and the anticipated intensity of sound produced by construction. Proposed construction activities are not anticipated to substantially exceed ambient noise levels present in the Action Area and associated with vessel traffic. The Proposed Action includes avoidance and minimization measures pertaining to underwater noise, including exclusive use of vibratory means for sheet pile removal and landside installation of piles in the dry. In-water construction would also be limited to the LTMS established June 1 through November 30 construction window, when salmonids are less likely to be present.

In consideration of this analysis, injury to FMP managed fishes from peak noise (e.g., rupture of swim bladder) or accumulated noise (temporary threshold shifts) is not expected to occur, but behavioral effects (e.g., changes in feeding behavior, fleeing, and startle responses) could occur.

Behavioral effects, however, would likely be similar to those experienced under existing conditions.

4.1.8. Impediments to Localized Movement and Migration

The noise and in-water disturbance associated with proposed improvements could cause fish species to temporarily avoid the immediate work area when work is being conducted. The Proposed Action does not include any in-water structures that would impede movement or migration, and permanent adverse impacts are therefore not anticipated.

As noted for impacts associated with turbidity and underwater noise, fish species are anticipated to avoid the construction area during dredging and in-water construction. Federal ESA–listed fish species may be temporarily displaced from areas with elevated turbidity during dredging. Underwater noise generated by construction is expected to be comparable to ambient noise levels in the harbor, and noise effects on localized movement and migration are therefore anticipated to be minimal.

The dredge plume area is generally considered to include a 250-meter buffer from the dredge barge, although it may be smaller for the Proposed Action because silt curtains would be employed as warranted to contain and minimize turbidity. The Central Bay serves as a migration corridor for special-status anadromous fish between the Pacific Ocean and spawning habitat, primarily in the Sacramento and San Joaquin River watersheds, but also in a handful of tributaries to San Francisco Bay. Those that use San Francisco Bay as a migration corridor to the Central Valley watersheds rarely stray south of the San Francisco Bay Bridge (Goals Project 2000). Construction of the Proposed Action would occur during the in-water work window, when migrating salmonids are unlikely to be present. In addition, studies using volcanic ash to simulate suspended sediment levels demonstrated that adult male Chinook Salmon were still able to detect natal waters through olfaction even when subjected to 7 days of total suspended sediment levels of 650 mg/L (Whitman and Miller 1982).

In consideration of the Proposed Action avoidance and minimization measures, existing ambient underwater noise levels, and demonstrated salmonid tolerance of high suspended sediment levels during migration, the Proposed Action is not anticipated to result in substantial adverse effects to localized movement and migration to fish species associated with EFH present in the Action Area.

4.1.9. Invasive Species

Dredging vessels may come from outside of the Bay Area. There is the potential that nonnative species could be introduced into the Action Area. Invasive species most commonly arrive in larval forms transported to San Francisco Bay and released in ballast water. The United States Coast Guard and State of California have mandatory regulations in effect that require ships carrying ballast water to have a ballast water management and reporting program in place; and without jeopardizing the safety of the crew, must exchange ballast water with mid-ocean water or use an approved form of ballast water treatment prior to releasing any ballast water in a port in the United States. Dredge equipment or other construction vessels would comply with these regulations, as applicable. In consideration of these regulations, project activities would not be expected to substantially increase the spread of invasive nonnative aquatic species.

4.1.10. Habitat Alteration

The Proposed Action would permanently deepen subtidal waters in the IHTB and OHTB expansion areas. Expansion of the IHTB would also permanently convert approximately 7 acres of terrestrial land into intertidal or subtidal habitat.

Creation of additional of subtidal and intertidal waters from enlarging the IHTB is anticipated to result in a long-term benefit to aquatic species and habitats by expanding the area of available aquatic habitat. This includes habitat for a wide variety of aquatic species, including species associated with the benthos (e.g., annelids, mollusks, and crustaceans), phytoplankton and zooplankton, common fish species, special-status fish species, and marine mammals. Newly created waters would be comparable in quality to existing habitat in the IHTB and navigation channel.

Expanding the IHTB and OHTB would permanently convert shallow water to deeper water, which may marginally affect Chinook Salmon foraging, but is unlikely to affect other EFH species. Salmonids show preference for sit-and-wait foraging in the water column, observed to occur at depths shallower than -30 feet. Deepening therefore may impact the potential for Action Area waters to provide Chinook Salmon foraging habitat. However, foraging habitat in the Action Area is likely marginal, given regular disturbance associated with large vessel traffic and maintenance dredging. Groundfish inhabit a variety of depths, ranging from intertidal and nearshore to waters as deep as 3,500 meters (NOAA n.d. [c]), and Coastal Pelagic species most likely present in the Action Area are associated with a variety of depths, including several hundred meters deep. Therefore, species associated with these FMPs are unlikely to be affected by deepening.

Effects of permanent channel deepening on fish species associated with EFH present in the Action Area are anticipated to be minimal when considering the relative low value of habitat impacted, the general use of pelagic and deep-water habitats by fish species associated with EFH present in the Action Area, and when considering the benefits provided by converting upland industrial habitat to subtidal and intertidal habitat.

Expansion of the OHTB and IHTB would deepen some areas where water depths may be suitable for eelgrass (+1 to -6 feet MLLW). This deepening would occur in areas where eelgrass has not been mapped as occurring, and in habitat that is likely marginally suitable for submerged vegetation, given the existing levels of vessel traffic and effects of maintenance dredging in adjoining areas. In consideration of the lack of eelgrass in the proposed IHTB and OHTB expansion footprints and the relative quality of potential habitat affected, eelgrass is unlikely to be adversely affected by permanent habitat alteration.

Chapter 5. Conclusion and Determination of Effects

Adverse effect under the MSA "means any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH" (50 CFR Section 600.810).

5.1. Pacific Coast Groundfish EFH

The Proposed Action is likely to result in *adverse effect to Pacific Groundfish EFH that is not substantial*. This would occur due to the removal of sediment and benthic organisms with a clamshell dredge, which is unavoidable. Although essentially all of the effects of the Proposed Action may be considered temporary, the recolonization of disturbed areas by benthic invertebrates is thought to require several months at a minimum. Other effects such as underwater noise or turbidity plumes would cease immediately or within minutes or hours of when active in-water construction stops, and may be avoided or minimized by fish (including prey fishes) exhibiting avoidance behavior.

The disturbance of soft-bottom habitat and removal of sediment containing benthic invertebrates from dredging may be partially offset from the conversion of approximately 7 acres of terrestrial land into intertidal or subtidal habitat.

5.2. Coastal Pelagic Species EFH

During construction, the Proposed Action has the potential to temporarily increase noise and suspended sediment in the surrounding water column. However, these impacts would be localized and would not permanently affect Coastal Pelagic Species EFH. Permanent deepening and loss of benthic habitat following dredging and during recolonization would not substantially affect Coastal Pelagic Species, because these species primarily forage in the water column and are associated with a wide range of water depths. Coastal Pelagic Species EFH would incur a long-term benefit through converting approximately 7 acres of terrestrial land into intertidal or subtidal habitat. Therefore, the Proposed Action is likely to result in *no adverse effect on Coastal Pelagic Species EFH*.

5.3. Pacific Salmon EFH

The Proposed Action would temporarily affect water quality, benthic habitat, and pelagic habitat during dredging and other in-water construction activities (e.g., sheet pile installation). Construction impacts to Chinook Salmon would largely be avoided by adhering to the established June 1 through November 30 in-water work window. If present, Chinook Salmon are likely to exhibit avoidance behavior from the construction area. Furthermore, underwater noise or turbidity plumes would cease immediately or within minutes or hours of when in-water construction stops, and may be avoided or minimized by fish (including prey fishes) exhibiting avoidance behavior.

Permanent effects on migration by Chinook Salmon would be minimal given the relatively small size of the IHTB and OHTB expansion areas, and given the preferred migratory routes of this species outside of the Action Area. Deepening may marginally affect the suitability of habitat for Chinook Salmon foraging, although existing activity in the Action Area likely precludes substantial foraging activity. These minimal effects to Pacific Salmon EFH would be offset by converting approximately 7 acres of terrestrial land into intertidal or subtidal habitat.

In consideration of this analysis, the Proposed Action is likely to result in *no adverse effect on Pacific Salmon EFH.*

5.4. Eelgrass HAPC

The Proposed Action would not directly remove any mapped eelgrass areas, and the dredge plume is not anticipated to result in turbidity or other water quality impacts that would affect eelgrass. The ITHB and OHTB expansion areas are predominantly in waters that are too deep to support eelgrass. Although some areas with depths potentially suitable for eelgrass would be deepened to -50 feet MLLW, these areas have not been colonized by eelgrass, and habitat suitability is likely minimal, given existing vessel traffic and maintenance dredging disturbance in the adjoining navigation channel. Therefore, the Proposed Action is likely to result in *no adverse effect on eelgrass HAPC*.

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US Army Corps of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A-2:

Fish and Wildlife Coordination Act

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay Delta Fish and Wildlife Office
650 Capitol Mall 8th floor 8-300
Sacramento, California 95814

In Reply Refer to:
08-FBDT00-
2022-CPA-0001

Thomas Kendall
Chief of Planning
U.S. Army Corps of Engineers
San Francisco District
1455 Market Street
San Francisco, California 94103-1398

Dear Sir:

We have enclosed our draft Fish and Wildlife Coordination Act report for the U.S. Army Corps of Engineers' proposed Oakland Harbor Turning Basins Widening Project for your review and comment. We request that you provide comments by March 22, 2022.

If you have questions on this draft report, please contact Steven Schoenberg of my staff at (916) 930-5672, or at Steven_Schoenberg@fws.gov.

Sincerely,

Donald Ratcliff
Field Supervisor

Enclosure
cc:
Eric Jolliffe, Corps of Engineers, San Francisco, California
Tessa Beach, Corps of Engineers, San Francisco, California
Brian Ross, EPA, San Francisco, California
Sara Azat, NOAA Fisheries, Santa Rosa, California
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UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT FOR THE OAKLAND HARBOR TURNING BASINS WIDENING PROJECT

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PREPARED FOR:

U.S. Army Corps of Engineers
San Francisco District
San Francisco, California

November 2021

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SUMMARY

The U.S. Army Corps of Engineers' preferred alternative for the Oakland Harbor Turning Basins Widening Project would involve dredging and associated land-based excavation to widen the Inner Harbor turning basin from 1,500 to 1,830 feet, and widen the Outer Harbor turning basin from 1,650 to 1,965 feet, both to -50 feet below Mean Lower Low Water. Approximately 21 acres of subtidal benthos would be permanently deepened and maintained to this depth in the future. The project would greatly improve navigation efficiency and safety for increasingly large container ships that call at the Port of Oakland. All suitable material (1.67 of 1.98 million cubic yards) would be beneficially used for habitat restoration by placement at available permitted sites, with the remainder disposed at class I and II landfills. Beneficial re-use of dredged material for habitat restoration would mitigate impacts of dredging on benthic habitats. Increased navigation efficiency from the proposed project is anticipated to reduce environmental impacts from emissions due to economies of scale of large ships, and reduce risks of groundings and associated release of oil or other contaminants that could otherwise harm fish and wildlife resources. Accordingly, we recommend that the project be constructed as proposed.

INTRODUCTION

This document represents the United States Fish and Wildlife Service's (Service) draft Fish and Wildlife Coordination Act (FWCA) report on the U.S. Army Corps of Engineers' (Corps) Oakland Harbor Turning Basins Widening Project (project). Oakland Harbor, operated by the Port of Oakland (Port), is located just south of the Bay Bridge in the Jack London Square community of the City of Oakland, and is an active and important port of call for container ships traveling between Asia and the Americas. The current configuration of Oakland Harbor, completed in 2009, has 50-foot-deep channels, with inner/outer turning basin diameters of 1,500/1,650 feet that were designed for ships no greater than an overall length (LOA) of 1,139 feet with a capacity of 6,500 twenty-foot equivalent units (TEU). The Port expects shipping volume to double from 2.5 to 5 million TEU annually. Since construction of the 50 foot deepening project, ship size and capacity of vessels calling to the Port has increased, with many more post panamax generation 2 and 3 vessels and a few generation 4 vessels. Nearly 60% of ships using the Port now exceed 15,000 TEU capacity, and the largest ships are longer (LOAs up to 1,300 feet) and have an even greater capacity (up to 23,000 TEU). These ships can enter the Port and be serviced by the existing cranes, but are faced with significant restrictions in timing (daylight, slackwater movement only), requirements for extra tugboats and pilots, and other measures that reduce shipping efficiency and have residual environmental risks of grounding and greater emissions. The Corps' proposed project, involving widening of both inner and outer harbors, would best alleviate these restrictions and accommodate future shipping needs, as well as maximize beneficial re-use of dredged material from the project for habitat restoration.

The current 50-foot-deep channels and turning basins, as well as associated beneficial re-use for habitat restoration at sites receiving dredged material, are navigation improvements that are a federal project for which we issued a final FWCA report in 1999 (USFWS 1999). The Service has continued to participate intermittently after construction regarding monitoring and development at one of those re-use sites, Middle Harbor Enhancement Area. Coordination for the current turning basin widening project included participation by the Service and other State and federal resource agencies at a kickoff meeting (October 2020), a sediment quality discussion (November 2020), and a plan formulation meeting (May 2021) in which an array of preliminary alternatives were discussed. The Corps also provided the Service with a variety of other preliminary information to assist in preparation of this report, including: slide decks from the coordination meetings; a memorandum on sediment disposal options, including beneficial re-use sites (Apex 2021); a memorandum on sediment suitability assumptions (Port 2021); internal draft project descriptions for an upcoming Feasibility Report/Environmental Impact Statement; figures showing work boundaries; and a spreadsheet of updated dredged and excavated material quantities (Jolliffe 2021). Finally, we reviewed and incorporated or updated information on candidate beneficial re-use sites under consideration for this project, which were previously evaluated in FWCA reports on other recently proposed dredging projects (USFWS 2015, 2017, 2019)

DREDGING ALTERNATIVES

Three alternatives are under consideration, in addition to no action: widening the Inner Harbor Turning Basin (IHTB) only, widening the Outer Harbor Turning Basin (OHTB) only, and widening both Inner and Outer Harbor Turning Basins, the tentatively selected plan (TSP) or preferred alternative. All action alternatives would deepen the widened areas to -50 feet Mean Lower Low Water (MLLW).

IHTB widening only: The turning basin diameter would be widened from 1,500 to 1,830 feet, necessitating removal of material in water and on land within the perimeter of the new turning basin (Figure 1). Dredging in water would remove 0.32 million cubic yards (mcy) of material, affecting about 10.1 acres (ac) of subtidal benthic habitat, of which 7.5 ac would be actively dredged, and the remainder is a basin buffer that would be affected by the slumping of adjacent undredged areas to about a 3:1 sideslope. On land, at Schnitzer Steel, Howard Terminal, and Alameda property, there would be additional work consisting of landside excavation down to -5 feet MLLW followed by further deepening with a dredge, including removal of concrete, removal of existing and installation of new sheetpile/bulkhead and anchor/tie-back and, for Howard Terminal, partial demolition of warehouses. Staging would occur on developed areas at Howard Terminal and Alameda property. This landside work would convert about 7.9 ac of existing developed land into subtidal benthic habitat with overlying open water. Overall, this alternative would generate about 1.12 mcy of material, of which 0.81 mcy is estimated to be suitable for beneficial re-use in habitat restoration (mostly non-cover) with the remaining 0.31 mcy, generally the excavated landside material, piles, concrete, and warehouse demolition waste, to be disposed at local Class I and II landfills. The suitable material would be transported to a permitted habitat restoration site.

Construction would take 2 years and 4 months, beginning in July 2027. In-water work (dredging, bulkheads, etc.) would be subject to a June 1-November 30 work window. Landfill-destined material would be rehandled at a designated facility at Berth 10 (located on the east side of Outer Harbor), and transported by truck to the landfills. The land based work would involve heavy equipment including bulldozers, excavators, dump trucks, vibratory hammer, drilling rigs, as well as vessels such as tugboats, barges, and a dive vessel, as well as other equipment. Dredging would be accomplished by a barge-mounted clamshell excavator dredge that would place material into scows for transport to a placement site. Silt curtains would be used to limit aquatic impacts.

OHTB widening only: The turning basin diameter would be widened from 1,650 to 1,965 feet, and involve in water dredging only within the perimeter of the new turning basin to a depth of -50 feet MLLW, entirely to the north of the existing turning basin and navigation channel (Figure 2). This dredging would remove 0.86 mcy of material, affecting 15 ac of subtidal benthic habitat, of which 10.5 ac is dredged and 4.5 ac is a basin buffer that would be affected by the slumping of adjacent undredged areas to about a 3:1 sideslope. All of the material from this alternative is assumed suitable for beneficial re-use in habitat restoration as non-cover and would be placed at a permitted site.

Construction would take 6 months of continuous work throughout the entire 2027 in-water work window (June 1 - November 30). Dredging equipment and silt curtains would be employed the same as described above for water based work in the IHTB description. Staging and any sediment rehandling would occur at Berth 10.

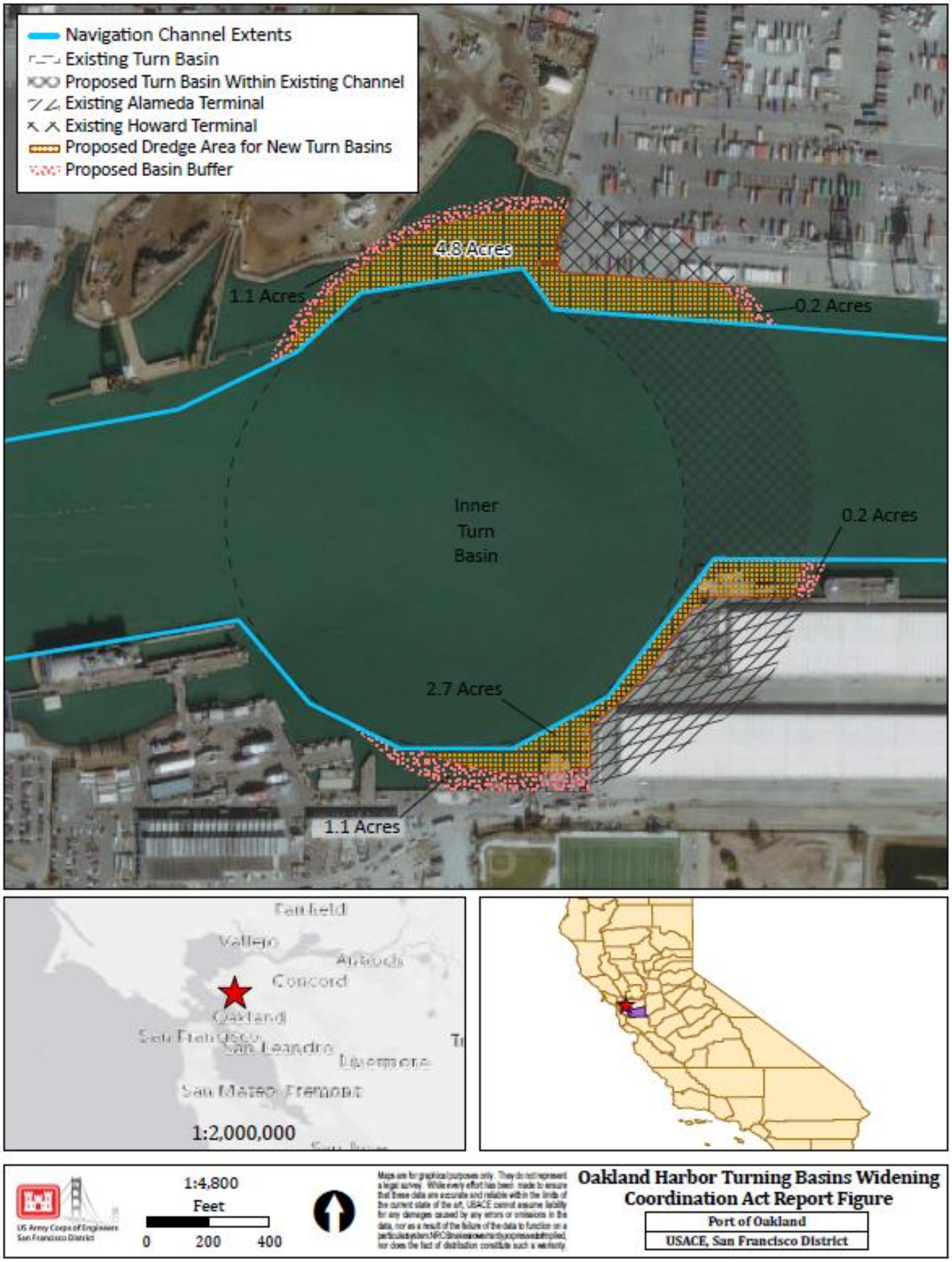

Figure 1. Inner Harbor Turning Basin widening footprint.

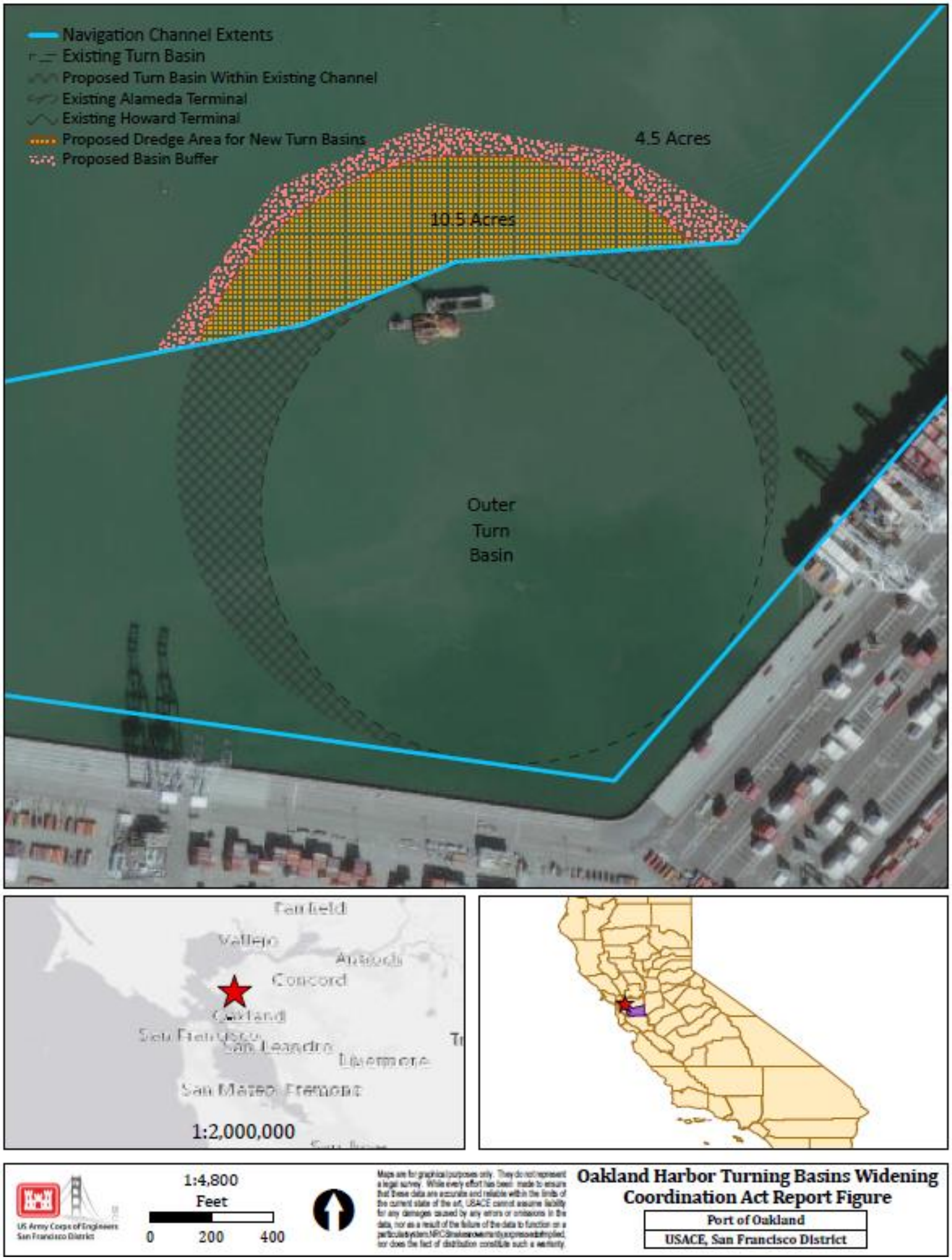

Figure 2. Outer Harbor Turning Basin widening footprint.

IHTB and OHTB widening: Both turning basins would be widened in the same manner as described above for the individual basin widening alternatives. The work would take 2 years and 4 months, beginning in July 2027 with the IHTB. Widening of the OHTB would follow during the 2028 in-water work window. The material amounts and placement would be the sum of the individual basins, namely, 1.98 mcy total dredged material generated, of which 1.67 mcy would be suitable for beneficial re-use for habitat restoration as cover (0.19 mcy) or non-cover (1.48 mcy) and transported to a permitted site for this purpose, and 0.31 mcy would be disposed at Class I and II landfills.

PLACEMENT OF DREDGED MATERIAL AND UPLAND SOILS

The widening project will generate both marine-derived sediments from dredging, and upland soils and other materials removed from land-based excavation. Information available at the time of this draft report had not specified locations, however, these can be reasonably inferred based on distance to the nearest location and permit limitations on the type of material accepted. Class I material (~15,583 cubic yards, or cy) would be trucked to the nearest such landfill 203 miles away, Kettleman Hills. Class II material (~291,350 cy) would be trucked to Keller Canyon, 31 miles away. Montezuma Wetlands, one of a number of current and anticipated locations which could use dredged material for habitat restoration, is the only currently-permitted site which accepts non-cover quality material, the predominant material expected to be generated by the proposed project (1.48 mcy). Cullinan Ranch is another permitted wetland restoration site that accepts cover quality material, a minor portion of which would be generated by the proposed project (0.19 mcy). Below, we describe these permitted and other potential sites.

Montezuma Wetlands: This site is a privately owned, permitted, and operated wetland restoration project site located on about 2,400 ac of moderately subsided, diked baylands at the eastern edge of Suisun Marsh. The location is such that it would provide benefits to native fishes in the low salinity region of the Sacramento San Joaquin Delta (Delta), including longfin smelt (*Spirinchus thaleichthys*) and federally threatened delta smelt (*Hypomesus transpacificus*). Dredged material from various projects is transported and used here to raise elevations of the site so it can be opened up to tidal action to restore tidal marshlands, and the owner charges for receipt of this material. This site can accept both wetland cover ("non-foundation") and non-cover ("foundation") quality materials. All offloading and pump facilities are currently in place and fully operational, sufficient to accept full-sized barges (~10,000 cy capacity). The site is divided into four phases, of which the first phase has been under construction since late 2003, is now filled and was breached in October 2020. Phase I received 8 mcy of dredged material and is expected to restore 600+ ac of all wetland habitat. Phase II, which is likely to be available to receive material from the proposed project when it is constructed, has an approximate capacity to receive about 4.5 mcy. When complete, phase II will yield about 400 ac of restored tidal wetland. The Montezuma Wetlands site is about 55 miles from Oakland Harbor. Material would be transported from the port by scow to an offloader at Montezuma Wetlands, which would pump the material from the barge for use on the site.

Cullinan Ranch: Cullinan Ranch is a tidal restoration project site on about 1,500 ac located on the north side of San Pablo Bay just west of the Napa River between State Highway 37 and

Dutchman Slough. It is within the San Pablo Bay National Wildlife Refuge. It is currently subsided diked bayland, which was acquired with the intent to restore it to tidal marsh. Restoring the site to tidal action would have general tidal ecosystem benefits in a location that would specifically assist the recovery of federally endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) and Ridgway's rail (*Rallus obsoletus*). The restoration project is a permitted action with a capacity to receive at least 3 mcy of dredged material on the easternmost 290 ac of the site, which has been isolated from the rest of the site and subdivided into 5 cells for placement of material when it is available. The current plan is to complete dredged material import before opening this area to tidal action. About 1 mcy of the original capacity remains currently, but this is expected to be increased to 3 mcy to address sea level rise concerns. About 0.1 to 0.3 mcy per year has been recently delivered to Cullinan Ranch. Only cover quality sediment is accepted at this site. The travel distance from Oakland Harbor to Cullinan Ranch is about 35 miles. Clamshell dredged material would be barged there to a land-based offloader at Dutchman Slough and then pumped onto the site.

Other sites: Various other tidal restoration sites might accept dredged material in the amounts and timeframe for the proposed project. Eden Landing is about 12-15 miles south of Oakland Harbor on the east side of South San Francisco Bay. It is isolated by shallow water and therefore would require investment in a system to offload and transport dredged material onto the site that arrived by barge. Placement of dredged material could speed restoration of tidal marsh at this site. Bel Marin Keys is approximately 20-25 miles north of Oakland Harbor on the west side of San Pablo Bay. A levee has been constructed there to protect an adjacent housing development from tidal waters when the site is restored and opened to tidal action, which is expected to take many years. It is planned to accept about 13.8 mcy of cover quality dredged material. An offloader is also planned, but not yet present at the site. There are also a number of projects ongoing and planned in ponds in the south bay as part of the Corps' Shoreline project that need large volumes of material for levees, ecotone, or other types of fill. These sites are also a considerable distance from Oakland Harbor and isolated by shallow water, which makes transport and placement of large quantities of dredged material problematic. The Liberty offloader currently dedicated to the Montezuma Wetlands site is not used full time there and, with planning, could potentially be moved when idle to other locations that receive dredged material.

BIOLOGICAL RESOURCES

Dredging Location (see Figures 1-2): The depth range of the dredge locations in IHTB is -21 to -42 feet MLLW and is maintained by annual local dredging. Dredging locations north of the navigation channel for the OHTB widening are much shallower, on the order of minus 3-5 feet MLLW, and are not currently dredged. Eelgrass (*Zostera marina*) occurs in the -3 to -9 feet MLLW depth range and small isolated patches have been recently mapped in the vicinity as near as 820 feet to the northeast of the proposed OHTB footprint (Merkel and Associates 2021). Eelgrass has been seen in modest patches around the bay, where it provides additional cover for juvenile fish, substrate for epiphytic organisms and fish spawning, and forage for wading birds. The typical benthic community of unvegetated subtidal areas in the dredging footprint would include both native and non-native species of marine worms, amphipods, mollusks, and crustaceans. The pelagic waters would also have marine zooplankton dominated by calanoid copepods, phytoplankton, and fish species. Recreational species such as halibut (*Paralichthys californicus*), sturgeon (*Acipenser spp.*), striped bass (*Morone saxatilis*), and leopard shark (*Triakis semifasciata*), are known to occur in this location. Other smaller forage species would also be expected, with shiner perch (*Cymatogaster aggregata*) and surfperches (Embiotocidae) more abundant, as well as bay goby (*Lepidogobius lepidus*), white croaker (*Genyonemus lineatus*), speckled sanddab (*Citharichthys stigmaeus*) and, seasonally, Pacific herring (*Clupea pallasii*), which lay eggs on various natural vegetation such as eelgrass, if present, or constructed submerged surfaces (including piers and jetties) present on bay margins and shallow waters including the turning basins.

Montezuma Wetlands: This site is diked, subsided up to 11 feet, and was formerly characterized as grazing land with some bare areas and wetlands in the form of ditches, saline basins, and seasonally flooded areas (Levine-Fricke 1995). Phase I of the Montezuma Wetlands project has reached its capacity of 9 mcy of fill material and was recently breached in October 2020. Phase I is currently being used by fish and wildlife as it develops marsh vegetation. The status of the rest of the site not yet in development is presumed to remain as predominantly upland vegetation. Within these uplands, seasonally flooded areas probably receive some winter use by wading birds and waterfowl during periods of high precipitation and extreme tides, and the site supports significant use by California least tern and tule elk. Otherwise, the primary wildlife use of the area would be by common upland species.

Cullinan Ranch: This site, located on the north shore of San Pablo Bay just west of the Napa River, is a former diked bayland, subsided about 6 feet, and until recently had been farmed for oats and hay for the last century. Sometime after it was acquired by the Service in 1991, the pumping used to keep it in this agricultural state ceased, and it became a complex of non-tidal seasonal and perennial wetlands with some open water and a small amount of upland. This type of habitat mosaic is often used by wading birds. In the last few years there has been considerable disturbance of this site to develop the elements needed to open it up to tidal action. In 2015, most of the site was opened to tidal action, and that area is now primarily open water. Post breach surveys show the site is used by many species of waterfowl during fall and spring migration periods, particularly dabbling and diving ducks (Washburn 2018). However, the 280 ac of the site reserved for dredged material placement remain as a combination of fallow fields, which provide some residual seasonal and some perennial wetlands value (unfilled cells), together with the areas disturbed by material placement with low value (filled cells).

Special status species: A special status species refers to any species which is listed or a candidate for listing under the state or federal Endangered Species Act. There are a variety of listed species that could occur within the action area of the proposed project, but some are more likely in the disposal alternatives that are not part of the TSP. Threatened green sturgeon (*Acipenser medirostris*), threatened steelhead trout (*Oncorhynchus mykiss*), endangered coho salmon (*Oncorhynchus kisutch*), endangered winter-run Chinook salmon (*Oncorhynchus tshawytscha*), and candidate for listing longfin smelt can occur in open waters throughout the bay, which includes Oakland Harbor. The threatened delta smelt, endangered salt marsh harvest mouse, and endangered California least tern (*Sterna antillarum browni*), have been confirmed to be present at Montezuma Wetlands.

RESOURCE CATEGORIES AND MITIGATION GOALS

The Service's Mitigation Policy (Policy) (FR 46:15 January 23, 1981) provides general guidance in making recommendations to conserve fish and wildlife resources. Under the Policy, resources are assigned to one of four Resource Categories, with a mitigation goal consistent with the values provided to fish and wildlife and the rarity of that habitat (cover-type). A mitigation goal is assigned ranging from "no loss of existing habitat value" (Resource Category 1) for the most valuable kinds of habitat to "minimize loss of habitat value" (Resource Category 4) for the less valuable and most common kinds of habitat. Application of the Policy involves designating cover-types which may be affected and assigning evaluation species based on the sensitivity of those species to the project action, their role in the ecosystem, or association with Service-wide resource management issues such as conservation of anadromous fish and migratory birds. We then state the Resource Category, the rationale for that selection, and the corresponding mitigation goal.

For this project area, we have designated seven basic cover-types within the project area and adjacent areas affected by the project. Due to differences in water depth and/or salinity in tidal and non-tidal ponds, there may be several more specific habitats within these cover-types, as noted below.

Open water (bay): This cover type is considered those waters within San Francisco Bay which are permanently inundated, deeper than MLLW and usually more than -18 feet MLLW, although the actually dredging footprint has depths -4 to -23 feet MLLW. Areas affected by the project include the portions of the enlarged turning basin footprints that require dredging, adjacent waters affected by turbidity, and any sediment offloading facilities constructed in deep waters. Pelagic plankton, fish, and macroinvertebrates reside in these waters and are prey organisms for larger recreational fish, some seabirds and waterfowl. An appropriate evaluation species would be juvenile fishes. Such open waters are relatively abundant in the planning area and are not expected to be lost or permanently degraded by the proposed action. They are designated Resource Category 4, with a mitigation planning goal to minimize loss of habitat value.

Subtidal benthic (bay): This cover type includes permanently inundated, unvegetated bottom substrate deeper than MLLW, such as the channels to be dredged, and any new sediment offloading facilities constructed in deep waters. This cover type supports food organisms like shrimp, benthic fish, and other macroinvertebrates. Bottom dwelling fishes such as sturgeon, flatfishes such as juvenile halibut, and rays, would be appropriate evaluation species. The subtidal benthic habitat affected by the proposed project is either not previously dredged (OHTB) or, as with IHTB, previously dredged but not a maintained navigation channel. Some additional subtidal benthic habitat will be created by excavation of fast lands in Inner Harbor. The shallower undredged areas likely support a greater diversity and productivity of benthic organisms than dredged areas. This cover type is relatively abundant, but a longer lasting effect will result from project construction and maintenance than for open waters. Due to the regional abundance, regular disturbance, and medium value of this cover type to the evaluation species, it is designated Resource Category 4, with a mitigation planning goal to minimize loss of habitat value.

Non-tidal pond waters: This cover-type includes permanently inundated, unvegetated waters separated from tidal action, and is represented by any ponds within Montezuma Wetlands or Cullinan Ranch which could receive dredged material from the proposed project. These ponds vary in depth, circulation, and water chemistry depending on management. They support some species of saltwater or freshwater fish, and benthic or pelagic macroinvertebrates that can provide forage. They may be used by waterfowl, or other bird groups, depending on salinity. For the lower salinity ponds, we would select a duck such as the northern shoveler as an evaluation species. For higher salinities, the American avocet would be an appropriate evaluation species. Non-tidal ponds are moderately abundant and are used for foraging and roosting by the evaluation species. We designate these as Resource Category 3, with a mitigation goal of no net loss of habitat value while minimizing loss of in-kind habitat value.

Tidal emergent marsh: This cover-type includes areas which are vegetated, generally between Mean Higher High and Mean Low Water that are subject to unrestricted tidal inundation and drained by slightly deeper, unvegetated channels. For this project, it includes areas which could become vegetated in the future through placement of dredged material and exposure to tidal action at Montezuma Wetlands or Cullinan Ranch, as well as vegetated margins of sloughs which may be affected locally by offloading facilities and pipes needed to transport dredged material. Species composition varies with salinity and elevation with respect to mean tide level. It provides habitat for mammals including the salt marsh harvest mouse, tidal marsh birds such as Ridgway's Rail, macroinvertebrates, and juvenile fishes. Tidal marshes also produce and export organic matter that support the food web throughout estuaries and bays. Evaluation species would be a marsh specialist like the marsh wren. The unvegetated tidal channel component of tidal marsh is considered to be an important breeding and nursery area for fishes, and foraging area for shorebirds. Most historical tidal marsh in the Bay area has been lost due to industrial salt production or coastal development and fill. Due to this regional scarcity, importance to the ecosystem, and very high value to the evaluation species, we designate tidal emergent marsh as Resource Category 2, with a goal of no net loss of in-kind habitat value.

Mudflat: Mudflats are unvegetated tidal areas between Mean Low Water and MLLW that are exposed during low tide. A limited amount of mudflat could be locally disturbed at least temporarily by construction and operation of an offloader and/or pipeline needed to deliver sediment to Cullinan Ranch. Depending on initial elevation and subsequent revegetation rate, some expanses of mudflat could form initially at either Cullinan Ranch or Montezuma Wetlands. Mudflats produce diatoms, worms, and shellfish, which provide forage for numerous shorebirds, gulls, terns, and larger wading birds. During higher tide stages, fish enter the mudflats and forage. Shorebird species which specialize on exposed mud such as the western sandpiper would be an appropriate evaluation species. Although there has been some loss of mudflat due to development and fill, it remains moderately abundant in the Bay. Due to this abundance and high importance to the evaluation species, mudflat is designated Resource Category 2, with a goal of no net loss of in-kind habitat value.

Seasonal Wetland: Seasonal wetlands include low areas of Cullinan Ranch or Montezuma Wetlands that regularly pond during the winter. The more open wetlands can support vernal pool crustaceans, while the vegetated areas include some pickleweed and salt grass known to support the salt marsh harvest mouse. An evaluation species would be a marsh specialist like the marsh wren. This particular cover-type is largely a consequence of historical diking, and is of low-to-moderate abundance and value to the evaluation species. Restoration actions would result in eventual replacement with tidal emergent marsh that is considered of greater value. Due to the moderate abundance and importance, relative to the restored cover-types, seasonal wetland is designated Resource Category 2, with a goal of no net loss of in-kind habitat value.

Upland: Upland in the project area occurs mostly as non-native annual grassland habitat on dike slopes surrounding the Montezuma Wetlands placement site. Limited portions could be temporarily affected by construction of offloading facilities or pipelines needed to deliver dredged material. Larger areas of upland on Montezuma Wetlands would be disturbed, then later restored to tidal wetlands. Upland supports common small mammals and passerine birds, some of which are non-native. The uplands at Montezuma Wetlands also contain some seasonal wetlands, where California least tern has been documented foraging since 2005. A native species like the California vole would be an appropriate evaluation species. A modest area of upland adjacent to tidal emergent marsh does have value as roosting habitat for birds during high tides, and as refugium for the listed salt marsh harvest mouse during tidal flood events. Considering both the regional abundance as well as the importance of preserving some uplands near tidal habitats, we designate upland as Resource Category 4, with a mitigation goal to minimize loss of habitat value.

FUTURE WITHOUT THE PROJECT

Without the project, the shallower depths of the footprints of the turning basin would remain more or less as current. No significant net shoaling or erosion is anticipated in the currently shallow OHTB dredge locations. Maintenance dredging would continue in the IHTB dredge locations by local authorities, to maintain them at the current depths. Shipping would continue with mostly smaller ships, and an increasing number of larger ones, that would be subject to restrictions and delays. This will result in increased emissions and increased risk of groundings with potential environmental risks such as oil spills and damage to natural resources.

Beneficial re-use sites that accept dredge material for wetland restoration would continue to receive dredged materials when available from projects other than the proposed project.

FUTURE WITH THE PROJECT

With the project, there would be an initial disturbance from project construction over the 2+ year construction period, followed by a modest incremental increase in annual maintenance dredging quantity on the order of 15,000 to 30,000 cy, commensurate with a similar increase in areas to be maintained owing to the enlarged turning basins. There are a variety of ways that biotic resources may be adversely affected by these dredging disturbances and the associated increase in turbidity when sediments are removed and placed in a scow. These mechanisms include temporary reduction in visibility, clogging of gills, burial, reduced foraging, removal of forage organisms in the substrate, displacement of mobile organisms such as fish and marine mammals to other locations, and a possibility of direct mortality through mechanical injury. The dredging activity would cause a somewhat more continuous localized disturbance of the benthic biotic community in the immediate vicinity of the dredge than just maintenance dredging alone. This could result in a temporary reduction in abundance of benthic organisms on the order of several months. The effects on fish would likely be limited to displacement during operations although there may be some adverse effect on fish exposed to turbidity plumes in the immediate vicinity of the dredge. There would be some level of permanent effect where shallower subtidal is dredged and maintained deeper, by virtue of regular disturbance from ship traffic and maintenance dredging and, possibly, an increment of lower benthic productivity. With the project complete, shipping volume would increase, but the ships would be larger and fewer than without the project. Shipping efficiency would increase, reducing emissions and the risk of groundings and associated environmental damage.

Construction of the project within the June 1 - November 30 dredging window is intended to avoid and minimize impacts to listed salmon, steelhead, and sturgeon. Any other necessary measures would be determined through formal consultation with National Marine Fisheries Service and U.S. Fish and Wildlife Service, if appropriate.

Depending on cost, dredged material characteristics, and placement site availability, both project construction and subsequent project maintenance would generate dredged material that would be placed at permitted tidal wetland restoration sites. The quality of the material, and availability of sites to accept material at the time of dredging will influence the placement location.

Cullinan Ranch: Placing the estimated 0.19 mcy volume of cover quality dredged material here would modestly accelerate completion of the site in terms of dredged material needs by about one season, based on the current rate of receipt of dredged material (0.1-0.3 mcy annual). This site is located and designed to specifically benefit the salt marsh harvest mouse in the near term. Revegetation would likely begin immediately after breaching, and 5-6 seasons of tidal action is expected to provide the veneer of natural sediment needed to optimize high marsh establishment. About 90% of the site is designed for high marsh that would benefit the federally listed salt marsh harvest mouse and Ridgway's rail as well as other high marsh wildlife species, with the other 10% of the area as channels and low marsh providing values to fish and fish-eating wildlife. The current upland and seasonal wetland habitat would be replaced by tidal marsh and channels. Wading birds may be displaced, however, the current value of the site is likely to be limited owing to recent earthwork in preparation of receipt of dredged material from other projects. Any displaced wading birds would likely relocate to nearby habitat just west of the site.

Montezuma Wetlands: Placement of the estimated 1.48 mcy volume of dredged material here would substantially contribute to the 4.5 mcy total needed to fill phase II of this project, which has just started, and could accelerate the rate of completion of this phase by 2 years or more. This restoration site would have relatively broad benefits, including to marsh wildlife such as salt marsh harvest mice, and native fish including delta smelt.

DISCUSSION

For the purpose of this report, we have limited our discussion to the no-project and Corps-preferred TSP of widening both Inner and Outer turning basins with disposal of all suitable material at beneficial re-use sites, and disposal of limited amounts at Class I and II landfills.

Widening will result in greater efficiency of shipping, with fewer, larger ships, and increased navigation safety, lessening the risk of future groundings, potential spills, and consequent effects on fish and wildlife resources. The extent of disturbance to benthic habitats needed to widen the turning basins is 10.5 ac of previously undredged, shallower subtidal benthic habitat for OHTB widening and 10.1 ac of previously dredged portions of Inner Harbor and excavation of adjacent fast lands for IHTB widening.

Evaluation of the suitability of dredged material for use at the alternative placement sites, at this time, has been approximated based on location and depth (Port 2021). There has been testing for other project and maintenance activities that supports this evaluation, and additional testing is planned prior to the proposed project. In general, young bay mud is deemed acceptable as wetland non-cover, and material at and below contact with old bay mud or Merritt sand is suitable for any re-use. But there are significant exceptions assumed for the upper 15 feet of materials on fast lands (Howard, Schnitzer, and Alameda) as well as in water in the basin area between Schnitzer and Howard Terminal that are all expected to require Class I or II landfill disposal. We support the plan to conduct further testing to verify these estimated quantities. We also recommend that the future increased increment of dredged material derived from maintenance of this project be considered for beneficial re-use in tidal restorations to the maximum extent practicable, and to the extent deemed suitable, such as at Eden Landing, Cullinan Ranch, Montezuma Wetlands, Alviso Ponds, or other re-use sites.

The placement sites have not yet been formally designated, but for purposes of illustration we will assume non-cover would be placed at Montezuma Wetlands (the only currently-permitted site that accepts non-cover) and cover would be placed at Cullinan Ranch. Placement of the dredged material from the project at these permitted restoration sites will contribute to meeting their habitat benefit goals. Prior testing done in the 1990s for the 50-foot deepening project and later testing for maintenance dredging suggests that most of the turning basin dredged material will at least meet state criteria for use as non-cover (foundation) material in wetland restoration and a modest amount will be suitable as cover in wetland restoration. The quantity of this benefit can be expressed in several ways - the benefit associated with the dredged material volume from the project as a fraction of the total volume needed for restoration, or the benefit associated with the acceleration of the restoration expressed as habitat value. These benefits were estimated using simplified Habitat Evaluation Procedures calculations (Appendix A).

The availability of the proposed project sediments is expected to accelerate completion of Cullinan Ranch and Montezuma Wetlands phase II modestly, which will result in a greater average habitat value over the period of analysis. Over the 52-year period of analysis (2 years construction, 50 year project life), we roughly estimate the effect of accelerated completion to be one year at Cullinan Ranch, resulting in an increase in habitat value of about 5.4 Average Annualized Habitat Units (AAHUs) (Appendix A). The likely volume intended for disposal at Montezuma Wetlands is more significant, about 1.48 mcy, and the effect of accelerating completion of phase II there is estimated to increase habitat value by 17.9 AAHUs. This benefit would increase slightly if all 1.67 mcy of material went to Montezuma Wetlands.

If all of the estimated 1.48 mcy of non-cover quality material were placed at Montezuma Wetlands phase II, and all of the estimated 0.19 mcy of cover quality material were placed at

Cullinan Ranch, the restored tidal areas attributable to these volumes would total 157.1 ac, and the associated habitat value would total 138.2 AAHUs (Appendix A). Similar quantitative benefits would accrue if all 1.67 mcy were placed at Montezuma Wetlands. This habitat area and value benefit is greater than that lost in the 25 ac of subtidal habitat degraded due to dredging and subsequent maintenance. Although restored tidal wetland is not the same kind of habitat as the subtidal benthic which is impacted, the benefit associated with the project meets the resource category 4 mitigation goal assigned to subtidal benthic habitat to minimize loss of habitat value. We also believe that habitat creation in these placement sites (Cullinan Ranch and Montezuma Wetlands) or other similar restorations has value to the ecoregion. This finding is based on our best judgement of a comparison of the gains and losses, the range of species affected, and information on the likelihood of benefit. In its ranking of 40 sites based on a variety of likely benefits, the Corps ranked Montezuma Wetlands #1 and Cullinan Ranch #10, with Montezuma Wetlands highest based on the benefits to listed species, particularly fishes, in the entrapment zone (Corps 2011). Cullinan Ranch will likely have the most benefits to listed marsh wildlife species not specifically recognized in Corps (2011). Further benefits are expected from the production and export of vascular plant and attached algae from restored marsh to bay waters, which we expect to enhance fishery resources over a broader area.

CONCLUSION

The proposed Oakland Harbor Turning Basins Widening Project will have localized temporary effects on fish and wildlife resources in and near the open bay water and subtidal benthic habitat of the dredging footprint and some permanent effects as a result of deepening a limited area of subtidal benthic habitat. The project is necessary to accommodate current and future ship size and traffic, improve shipping efficiency, and reduce the risk of ship groundings which could otherwise damage resources. Placement of material at permitted wetland restoration sites will contribute to their completion and provide habitat for multiple species of interest, mitigating for the impacts of the dredging on benthic habitat. Accordingly, we recommend the Corps implement the preferred alternative of deepening both inner and outer harbor turning basins as proposed, and consider future use of maintenance-generated dredged material for beneficial re-use.

RECOMMENDATIONS

We recommend that the Corps:

1. Implement the project as proposed (deepening both inner and outer harbor turning basins; maximize beneficial re-use by placement at permitted tidal marsh restoration sites);

2. Conduct sediment testing to confirm estimated quantities suitable for wetland restoration and landfill disposal;

3. Maximally use future maintenance dredged material beneficially for tidal marsh restoration at available permitted sites;

4. Conduct eelgrass surveys no earlier than 1 year prior to construction in the vicinity of the proposed project to confirm that the effect on this habitat is insignificant; and

5. Evaluate effects of the project on listed species, initiate consultation as appropriate with the Service and National Marine Fisheries Service, and implement any additional measures determined by such consultation to be needed to minimize or offset any effects.

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APPENDIX A. Worksheet showing calculation of benefit of restoration actions at Cullinan Ranch or Montezuma Wetlands phase II
and proportion of total benefit (area and habitat value) associated with material from the Oakland Harbor turning basin project

1. This part is a test calculation of benefits of habitat restoration acceleration due to availability of cover quality dredged material from the Oakland Harbor turning basin project at Cullinan Ranch

Scenario: this calculates benefits of placing 0.19 mcy dredged material from the turning basins, accelerates completion of Cullinan Ranch by 1 year
This is a rough calculation given the uncertainty about the capacity of Cullinan, which may be increased from 1 mcy to 3 mcy

TY	0	1	2	3	4	9	10	52	notes:
HSIw/o	0	0	0	0	0.1	0.8	1	1	year 4 breach, maximum value in year 10
HSI w/	0	0	0	0.1	0.2	1	1	1	year 3 breach Oakland material accelerates by 1 year
area w/o	280	280	280	280	280	280	280	280	reaches maximum value in year 9
area w/	280	280	280	280	280	280	280	280	
HUs w/o		0	0	0	14	630	252	11760	
HUs w/		0	0	14	42	840	280	11760	
AAHUs without								243.4	
AAHUs with								248.8	
change due to project								5.4	This value represents the benefit of turning basin material placement accelerating Cullinan Ranch completion by 1 year

Assumptions:
It takes 6 years after breaching to reach full tidal value, which assumes rapid revegetation due to filling near vegetation threshold elevation.
The restoration project has limited value the first year after breaching
The 0.19 mcy of material going from the turning basins to Cullinan Ranch would take 1 year to obtain from other sources without the turning basin project.
It would take 2 seasons to complete the turning basin dredging

2. This part is a test calculation of benefits of habitat restoration acceleration due to availability of dredged material from the Oakland turning basin project at Montezuma Wetlands

Scenario: this calculates benefits of placing 1.48 mcy dredged material from turning basins at Montezuma Wetlands, accelerates completion by 2 years

This is based on the recent (2012-2017) fill rate of that site; of 3.376 mcy over the last 6 years, or about 0.56 mcy/year (Acta 2018).

With .56 mcy/yr, it would take about 8 years from start (2022-2023) to fill phase II of that site and breach it.

At the time of dredging of the turning basins beginning 2027, Montezuma phase II is assumed to be half full.

Assume that if the turning basin material were to go to Montezuma, it would be completed in 2 fewer years (TY2), than without that material.

TY	0	1	2	3	4	12	14	52	notes:
HSIw/o	0	0	0	0	0.1	0.8	1	1	this scenario finishes Montezuma ph II in TY4, reaches max value by TY14
HSI w/	0	0	0.1	0.2	0.3	1	1	1	this scenario finishes Montezuma ph II in TY2, completed 2 yrs sooner with turning basin material
area w/o	424	424	424	424	424	424	424	424	
area w/	424	424	424	424	424	424	424	424	
HUs w/o		0	0	0	21.2	1526	763.2	16112	
HUs w/		0	21.2	63.6	106	2205	848	16112	
AAHUs without								354.3	
AAHUs with								372.2	
change due to project								17.9	

Assumptions:

It takes 10 years after breaching to reach full tidal habitat value, slower than Cullinan Ranch due to larger unit size, not filling as close to vegetative threshold elevation

The breached phase II has limited value the first year after breaching

The availability of the 1.45 mcy of material going from the turning basins to Montezuma would take 2 more years to obtain from other sources if no oakland project produced material were available.

3. This part estimates the restoration benefit, in area or value, associated with the volume of material coming from the turning basins as a fraction of the total benefit for disposal at Cullinan Ranch (CR) and Montezuma Wetlands (MZ)

Note: sediment volumes preliminary, not precisely known, actual dredged volume may vary

Note: assumes total placement volumes of 3 mcy (Cullinan Ranch) and 4.5 mcy (Montezuma ph II)

a) Proportion of restored AREA benefits under potential scenarios due to turning basin material:

Scenario: 0.19 mcy to CR, 1.48 mcy to MZ or scenario: 1.67 to MZ only

	AC	AC	AC	
volume assumed:	0.19 mcy	1.48 mcy	1.67 mcy	
	CR	MZ	MZ	
				note: calculated as turning basin volume/total placement site volume
associated restored ac:	17.7	139.4	157.4	* total placement site area
	17.7 + 139.4 = 157.1			

b) Proportion of HABITAT VALUE benefits for turning basin sediments to restoration sites under potential scenarios:

Scenario: 0.19 mcy to CR, 1.48 mcy to MZ or scenario: 1.57 to MZ only

	AAHUs	AAHUs	AAHUs
	As proposed, both		All to
	CR	MZ	MZ
estimated volume:	0.19	1.48	1.67
associated habitat value, AAHUs:	15.8	122.4	138.1
	15.8 + 122.4 = 138.2		

ACRONYMS:

AAHUs - Average Annualized Habitat Units

CR - Cullinan Ranch

HSI - Habitat Suitability Index

HU - Habitat Units

mcy - million cubic yards

MZ - Montezuma Wetlands

TY - Target Year

US Army Corps of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A-3:

Clean Water Act

Sec 404 – Dredge or Fill Material in Waters of the U.S.

Based on the current design and phasing, no fill in Waters of the U.S. is anticipated under the action alternatives. All dredge material will be placed at a permitted upland beneficial reuse site or landfill and no other aquatic fill is expected. Alternatives involving the Inner Harbor Turning Basin expansion would remove existing fill and result in expansion of open waters. Therefore a 404(b)(1) analysis is not included.

Sec 401 – Water Quality Certification

If applicable, compliance with Section 401 of the Clean Water Act will be completed after the Study Phase during the Pre-construction Engineering and Design Phase of the project.

US Army Corps
of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A-4:

Clean Air Act

ESA

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esassoc.com

memorandum

date November 11, 2021

to Kelly Bayer and Krystal McBride; AECOM

cc Justin Taschek; Port of Oakland
Eric Jolliffe; U.S. Army Corp of Engineers

from Tim Sturtz, Chris Easter, and Jyothi Iyer; ESA

subject General Conformity Emissions Analysis

The United States Army Corps of Engineers (USACE), as the federal lead agency, and the Port of Oakland (Port), as the non-federal sponsor, are conducting the Oakland Harbor Turning Basins Widening Navigation Study. The purpose of the study is to determine if there is a technically feasible, economically justifiable, and environmentally acceptable recommendation for federal participation in a navigation improvement project to the constructed -50-Foot Oakland Harbor Navigation Project. The existing federal navigation channel was designed for a 6,500 20-foot equivalent units capacity ship, with a 1,139-foot length overall, 140-foot beam, and 48-foot draft as part of the Oakland Harbor Navigation Improvement (-50-Foot) Project Study. The vessels routinely calling on the harbor today are longer, wider, and deeper than the design vessel from that study.

The Section 216 Initial Appraisal Report concluded the problems in Oakland Harbor are caused by length limitations in the turning basins, not by depth limitations or landside capacity. The need for this navigation study arises from inefficiencies currently experienced by vessels in harbor, specifically the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-Foot Oakland Harbor Navigation Project. These inefficiencies are projected to continue in the future because vessel sizes are expected to increase.

The purpose of this memorandum is to assess the impact of air emissions related to project construction on air quality in the region for use in National Environmental Policy Act (NEPA) documentation. The memorandum details the regulatory environment, the emission calculation methodologies, and summaries of the projected emissions for use in assessing general conformity applicability under NEPA.

Regulatory Environment

The regulatory framework for general conformity was promulgated by the United States Environmental Protection Agency (USEPA) in November of 1993 at 40 Code of Federal Regulations (CFR) Part 93 Subpart B, with final revised regulations published in April of 2010. General Conformity regulations apply to federal actions that occur within a nonattainment area or an area previously classified as nonattainment and operating under a maintenance program if annual emission totals exceed applicability thresholds known as *de minimis* levels. The EPA first promulgated the General Conformity Rule to implement the conformity provision of Title I, Section 176(c)(1) of the *Clean Air Act* and its 1990 amendments. The General Conformity Rule is designed to ensure that air emissions associated with federal actions do not contribute to air quality degradation or prevent achievement of state and federal air quality goals.[1] General Conformity refers to the process of evaluating federal plans, programs, and projects to determine and demonstrate that they meet the requirements of the *Clean Air Act* and the applicable State Implementation Plan (SIP). Nonattainment refers to an air basin that currently does not meet National Ambient Air Quality Standards (NAAQS) for regulated air pollutants as further defined below. The *de minimis* levels are established by the General Conformity Rule in Section 93.153 and the levels vary by severity of the nonattainment designation of the region. A region's nonattainment and severity are designated under section 107 of the Clean Air Act and described in 40 CFR Part 81. Emissions used for comparison to *de minimis* levels include both direct and indirect emissions that are reasonably foreseeable and those which the federal agency can control via the agency's continuing program responsibility.

Projects that are potentially subject to general conformity can follow a series of steps to determine the level of analysis that is required. The initial phase of this process includes an applicability analysis, as described in 40 CFR Part 93 Subpart B, which requires a comparison of pollutant-specific annual emissions to *de minimis* levels. If the applicability analysis demonstrates that general conformity does not apply to the project, then no additional analysis or documentation is required under the regulation.

If general conformity is applicable to the project, additional steps include a detailed evaluation for the applicable pollutants as described in the regulations, publication of a draft general conformity determination, consideration of public comments, and publication of a final general conformity determination. The methodology of the assessment for the determination is described in detail in the regulation and is specific to the pollutant or pollutants that are identified as applicable.

Standards and Attainment Status

The Clean Air Act is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Last amended in 1990, it requires the USEPA to set (NAAQS) for six principal pollutants (termed as "criteria" air pollutants) prevalent in the atmosphere and found to be harmful to public health and the environment. National standards have been established for six criteria air pollutants: ground-level ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (PM), and lead. Separate standards have been established for particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). As discussed above and defined within the 1990 Clean Air Act amendments, the USEPA classifies air basins (or portions thereof) as "attainment" or "nonattainment" for each criteria air pollutant, based on whether the NAAQS are currently being achieved. The current national ambient air quality standards for each pollutant as well as the attainment status of the San Francisco Bay Area Air Basin (SFBAAB or Bay Area) with respect to these standards is provided in **Table 1**.

The Clean Air Act requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The Clean Air Act amendments added requirements for states containing areas that

1 Revisions to the General Conformity Rule are codified in 40 CFR Parts 51 and 93, Subpart W, *Revisions to the General Conformity Regulations*, Final Rule (April 2010). The General Conformity Rule applies to all federal actions except highway and transit programs. The latter must comply with the conformity requirements for Transportation Plans in 40 CFR Part 93, Subpart A.

violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollutants that are in violation of the standards. Thus, the SIP is a living document that is periodically updated to reflect the latest emissions inventories, planning documents, rules and regulations of air basins as reported by the agencies with jurisdiction over them. The USEPA has responsibility to review all SIPs to determine if they meet federal requirements and will achieve air quality goals (i.e., attainment with the NAAQS) when implemented. If the USEPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

Table 1: Ambient Air Quality Standards

Pollutant	Averaging Time	National Standard	SFBAAB Attainment Status (National)
Ozone	8 Hour	0.070 ppm	Non-Attainment (Marginal)
Carbon Monoxide	8 Hour	9 ppm	Attainment
	1 Hour	35 ppm	Attainment
Nitrogen Dioxide	Annual Average	0.053 ppm	Attainment
	1 Hour	0.100 ppm	Unclassified
Sulfur Dioxide	Annual Average	0.030 ppm	Attainment
	24 Hour	0.14 ppm	Attainment
	1 Hour	0.075 ppm	Attainment
Respirable Particulate Matter (PM_{10})	24 Hour	150 $\mu g/m^3$	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12.0 $\mu g/m^3$	Unclassified/Attainment
	24 Hour	35 $\mu g/m^3$	Non-Attainment (Moderate)
Lead	Calendar Quarter	1.5 $\mu g/m^3$	Attainment
	3-Month Rolling Average	0.15 $\mu g/m^3$	Unclassified

NOTES:
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter

SOURCE: USEPA, Nonattainment Areas for Criteria Pollutants, last updated on August 31, 2021. Available: https://www.epa.gov/green-book.

Applicable *De Minimis* Rates

The San Francisco Bay Area Air Basin is classified as nonattainment with respect to the federal standards for ozone and $PM_{2.5}$. The severity of the nonattainment designation is marginal and moderate, respectively. For ozone nonattainment areas with a marginal classification, the *de minimis* level for ozone precursors (nitrogen oxides [NO_X] and volatile organic compounds [VOC]) is 100 tons per year. Similarly, the *de minimis* level for a region designated as moderate nonattainment with respect to the $PM_{2.5}$ standard is 100 tons per year.

The General Conformity regulations state that “If an action would result in emissions originating in more than one nonattainment or maintenance area, the conformity must be evaluated for each area separately.” Because the on-road emissions associated with disposal hauling travel through the San Joaquin Valley Air Basin (SJVAB), these emissions have also been assessed, but are tabulated separately.

The SJVAB is classified as nonattainment with respect to the federal standards for ozone and $PM_{2.5}$. The severity of the nonattainment designation is extreme and severe, respectively. For ozone nonattainment areas with an extreme classification the *de minimis* level for ozone precursors (NO_X and VOC) is 10 tons per year. The *de minimis* level for a region designated as severe nonattainment for $PM_{2.5}$ is 70 tons per year.

As discussed above, the *de minimis* level is used as a metric to determine whether the general conformity regulations apply to a project. If the emissions from the project do not exceed the *de minimis* levels identified above, no further analysis is required.

Air Emissions Calculations

The air emissions calculations are based on input information provided by the USACE and the Port. Information provided to ESA to-date includes background project details, construction schedule and phasing, and proposed construction equipment lists, activity levels, worker, and construction truck trips by phase. The USACE is also considering the use of electric dredging equipment as opposed to diesel equipment to help limit the emissions from the project. Construction equipment data have been aggregated to characterize the hours of activity by equipment and by year. Generally, the project schedule suggests that most of the Howard Terminal activity will occur in 2027, all the Schnitzer Steel activity will occur in 2028, and the Alameda-based activity is largely split between 2028 and 2029. The dredging activity for the Outer Harbor is scheduled to occur exclusively in 2028 and the Inner Harbor dredging is slated for 2029.

Equipment Characterization and Activity

Using the data provided by the USACE, ESA aggregated the number of operating hours for each piece of equipment. The summary of activity hours by-year as presented in **Table 2** are applied to the emission factors derived from California Air Resources Board’s OFFROAD model to derive emissions estimates.

Table 2. Equipment Operating Hours by Year

	Hours of Operation			
Equipment	**2027**	**2028**	**2029**	**Total**
Backhoe	1,367	2,710	40	4,117
Backhoe/Excavator	0	90	70	160
Barge Ship/Scow	333	7,860	7,343	15,536
Compressor	0	260	0	260
Concrete Saw	140	760	0	900
Crane	1,560	3,833	1,553	6,946
Crane w/ Clamshell	0	3,669	3,872	7,541
Diesel Hammer (Delmag D30)	1,227	2,470	40	3,737
Dive Compressor	333	1,363	1,513	3,209
Dive Vessel	333	793	2,090	3,217
Dozer	0	0	2,446	2,446
Dozer/Front Loader	140	240	0	380
Dredge	0	3,666	2,321	5,987
Drilling Rig	0	66	70	136
Excavator	580	7,078	5,619	13,277
Generator	333	1,363	1,513	3,209
Torch	0	1,313	813	2,126
Tugboat	0	3,111	1,973	5,084
Towboat/Pushboat	0	3,874	2,626	6,500
Vibrator	333	570	700	1,603

SOURCE: Table compiled by Environmental Science Associates in 2021.

The OFFROAD model provides emission factors for land-based construction equipment by horsepower and calendar year. In the absence of project equipment-specific horsepower information, California Emissions Estimator Model (CalEEMod) defaults were used. The CalEEMod defaults for equipment types, their horsepower, and engine loads are provided in **Table 3**.

Table 3. CalEEMod Default Equipment Horsepower and Engine Loads

Project Equipment	Equivalent Equipment in CalEEMod	Horsepower	Load Factor
Backhoe	Tractors/Loaders/Backhoes	97	0.37
Concrete Saw	Concrete/Industrial Saws	81	0.73
Dozer/Front Loader	Rubber Tired Dozers	247	0.4
Dump Truck	Dumpers/Tenders	16	0.38
Crane	Cranes	231	0.29
Diesel Hammer (Delmag D30)	Other Construction Equipment	172	0.42
Excavator	Excavators	158	0.38
Vibrator	Other Construction Equipment	172	0.42
Dozer	Rubber Tired Dozers	247	0.4
Dive Compressor	Air Compressors	78	0.48
Generator	Generator Sets	84	0.74
Drilling Rig	Bore/Drill Rigs	221	0.5
Backhoe/Excavator	Excavators	158	0.38
Torch	Welders	46	0.45
Crane w/ Clamshell	Cranes	231	0.29
Roll-off High Dumpster	Off-Highway Trucks	402	0.38
Demo Dump Truck	Off-Highway Trucks	402	0.38
Compressor	Air Compressors	78	0.48

SOURCE:Table 3.3 OFFROAD Default Horsepower and Load Factors, CalEEMod Users Guide Appendix D - Default Data Tables, CalEEMod Version 2020.4.0, May 2021.

Unlike the land-based construction emissions, the marine equipment specifications are largely based on equipment that have been identified as representative. **Tables 4 and 5** provide the specifications used for modeling the emissions from commercial harbor craft and dredge operations respectively.

Table 4. Harbor Craft Specifications

Name	Tier	Propulsion Power (hp)	Auxiliary Power (hp)	Propulsion Load[5]	Auxiliary Load[5]
Ocean Tug[1]	Tier 2	4000	382	0.5	0.43
Towboat/Pushboat[2]	Tier 3	800	187	0.68	0.43
Scow[3]	Tier 4	0	225	0	0.43
Work Boat[4]	Tier 3	622	464	0.45	0.43

Notes:
1 - Ocean tug is assumed to have installed power of 4,000 HP for propulsion, as discussed with the Port and the USACE, and auxiliary power is taken from the USEPA port guidance documentation
2 - Dredge tender specifications are modeled based on Dutra's Becky T. tug for both propulsion and auxiliary power
3 - Scows are assumed to have no propulsion power and installed auxiliary power of 225 HP, based on specifications of SCOW 5 of Dutra's fleet
4 - Default USEPA workboat specifications are used for the dive vessel emissions
5 - Engine loads are taken from the USEPA port guidance documentation

Table 5. Representative Dredge Specifications

Name[1]	Engine	Model Year	Power (hp)	Engine Load
DB 24	Main	2019	810	0.66
	Genset	2006	325	0.66
	Spud	2007	300	0.66
	Anchor	2007	300	0.66
DB Beaver	Main	2019	755	0.66
	Aux1	2017	225	0.66
	Aux2	2016	225	0.66

NOTES:
1. Engine specifications provided by the Port and used to characterize representative equipment specifications.
2. The representative vessels were modeled by assuming each dredge completed half of the proposed dredging activity.

SOURCE: Table developed based on data provided to ESA by the Port and the USACE

The emission factors for the off-road equipment and the dredging equipment were taken from California Air Resources Board's (CARB) OFFROAD model, that accounts project locality, fleet growth and scrappage, and regulatory programs that pertain to equipment activity and emission rates. The marine-based tugboats, dive boats, and barges were modeled using the USEPA's most recent guidance document and the tier-based emission factors for harbor craft.[2] The emission factors for the engine tiers used in this analysis are presented in Table 6.

Table 6. USEPA Tier-based Harbor Craft Emission Factors

Engine Tier	VOC (g/hp-hr)	NOx (g/hp-hr)	PM10 (g/hp-hr)	PM2.5 (g/hp-hr)
Tier 2	0.2204	4.2074	0.1104	0.1071
Tier 3	0.0931	3.5415	0.0619	0.0600
Tier 4	0.0931	0.9694	0.0224	0.0217

NOTES:

g/hp-hr = grams per horsepower hour

Emission Calculation Methodology

As referenced above, the air quality analysis will rely on emission factors, models, and tools developed by a variety of industry experts and agencies including the CARB, California Air Pollution Control Officers Association (CAPCOA), the Bay Area Air Quality Management District (BAAQMD), and the USEPA.

[2] Table H.7 of the USEPA's Port Emission Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emission, September 2020.

Existing Conditions and Project Baseline

The operational baseline is not expected to change because of this project, therefore the air quality changes from the proposed action would be limited to the construction activities. Emissions from existing conditions include criteria air pollutant and precursor emissions, including VOC, NO_X, PM_{10}, and $PM_{2.5}$ from a variety of emissions sources, including existing port-related operations (e.g., ocean-going vessels, commercial harbor craft, cargo handling equipment). The project is not expected to change the throughput of vessel cargo through the Port or significantly modify the activity level in the turning basins. As such, the existing conditions and the post-construction conditions are not expected to differ, thus the primary focus of this assessment is on the construction activities.

Construction Emissions

Fugitive dust emissions are typically generated during construction phases. Studies have shown that the application of best management practices (BMPs) at construction sites effectively controls fugitive dust. The BAAQMD recommends that analyses focus on implementation of dust control measures rather than comparing estimated levels of fugitive dust to a quantitative significance threshold[3]. Therefore, implementation of these BMPs (BAAQMD mitigation measures) provide the basis for determining the significance of air quality impacts from fugitive dust emissions. Emissions summaries include both exhaust and fugitive emissions (grading, bulldozing, and truck loading) in the PM_{10} and $PM_{2.5}$ totals.

Mass average daily and annual combustion emissions have been evaluated consistent with the methodology used by CalEEMod (version 2020.4.0.), an emissions estimation/evaluation model that was developed in collaboration with the air quality management districts of California. Off-road land-based construction equipment emissions have been estimated using the emission factors from CARB's OFFROAD 2011 model, and on-road construction emissions have been estimated using the emission factors from EMission FACtors 2021 (EMFAC2021) model.[4] However, the marine equipment (e.g., dredges, tugs, support vessels) was assessed according to the EPA's 2020 guidance document on estimating emissions from these source types.

The emission calculation follows the methodology shown in Equation 1.

$$E = EF \ x \ HP \ x \ LF \ x \ A \tag{1}$$

Where

$$\begin{aligned} E &= \text{Emissions (g)} \\ HP &= \text{Engine Power (hp)} \\ LF &= \text{Engine Load} \\ A &= \text{Activity Duration (hr)} \end{aligned}$$

The equation is applied separately for activity in each calendar year and by propulsion and auxiliary engines. This approach is consistent with the approach described in the USEPA's port-related guidance.

[3] BAAQMD, CEQA Air Quality Guidelines, May 2017.

[4] Notably, EMFAC2021 has been published but has not yet gained the approval by U.S. EPA that would allow it to be used for General Conformity analyses. As such, EMFAC2017 will be used for this assessment.

Emissions Summary

The emissions, with dredge equipment assumed to be fueled by diesel, were calculated per calendar year for use in comparing to the *de minimis* levels and for determining applicability of general conformity to the overall project. As part of this calculation, it is conservatively assumed that all sources are not exempt from general conformity (i.e., the federal agency can exert control on the emissions through its continuing program responsibility). The resulting estimated emissions, shown in **Table 7**, do not result in the emissions of ozone precursors or the emissions of $PM_{2.5}$ exceeding the corresponding *de minimis* levels for any calendar year. These results indicate that a conformity analysis is not required, and no general conformity determination will be produced.

Table 7. Total emissions with diesel dredge estimates by calendar year, with comparison to *de minimis* rates

Alternative	Construction Year	Tons per year				Fraction of *de minimis*		
		VOC	NOx	PM_{10}	$PM_{2.5}$	VOC	NOx	$PM_{2.5}$
Alt 1 - Inner Harbor	2027	0.1	1.4	0.1	0.1	0.1%	1.4%	0.1%
	2028	1.1	18.0	0.8	0.6	1.2%	18.0%	0.6%
	2029	3.5	45.3	2.4	1.9	4.0%	45.3%	1.9%
	Alt 1 Total	4.67	64.80	3.24	2.55	--	--	--
Alt 2 - Outer Harbor	2028	6.33	52.33	1.92	1.90	7.3%	52.3%	1.9%
	Alt 2 Total	6.33	52.33	1.92	1.90	--	--	--
Alt 3 - Inner & Outer Harbor	2027	0.1	1.4	0.1	0.1	0.1%	1.4%	0.1%
	2028	7.4	70.4	2.7	2.5	8.5%	70.4%	2.5%
	2029	3.5	45.3	2.4	1.9	4.0%	45.3%	1.9%
	Alt 3 Total	11.00	117.13	5.17	4.45	--	--	--

NOTE:
Alameda and San Francisco Counties are both considered marginal ozone nonattainment areas and moderate $PM_{2.5}$ nonattainment areas. These designations correspond to de minimis rates of 100 tons per calendar year for each pollutant (VOC, NOx, and $PM_{2.5}$).

PM_{10} and $PM_{2.5}$ values in table include both emissions from exhaust and fugitive sources.

SOURCE: Table compiled by Environmental Science Associates in 2021.

The USACE is also considering the use of electric dredge equipment, which would reduce the emissions shown in **Table 7** and would remain under the *de minimis* levels. However, for completeness, the emission estimates, and comparisons to *de minimis* levels for the electric dredge scenario are shown in **Table 8**.

Table 8. Total emissions with electric dredge estimates by calendar year, with comparison to *de minimis* rates

Alternative	Construction Year	Tons per year				Fraction of *de minimis*		
		VOC	NOx	PM_{10}	$PM_{2.5}$	VOC	NOx	$PM_{2.5}$
Alt 1 - Inner Harbor	2027	0.1	1.4	0.1	0.1	0.1%	1.4%	0.1%
	2028	0.7	14.8	0.7	0.5	0.8%	14.8%	0.5%
	2029	1.5	33.6	1.8	1.4	1.7%	33.6%	1.4%
	Alt 1 Total	2.28	49.93	2.62	1.93	--	--	--
Alt 2 - Outer Harbor	2028	1.34	33.52	0.83	0.80	1.5%	33.5%	0.8%
	Alt 2 Total	1.34	33.52	0.83	0.80	--	--	--
Alt 3 - Inner & Outer Harbor	2027	0.1	1.4	0.1	0.1	0.1%	1.4%	0.1%
	2028	2.0	48.4	1.5	1.3	2.3%	48.4%	1.3%
	2029	1.5	33.6	1.8	1.4	1.7%	33.6%	1.4%
	Alt 3 Total	3.63	83.45	3.44	2.73	--	--	--

NOTE:
Alameda and San Francisco Counties are both considered marginal ozone nonattainment areas and moderate $PM_{2.5}$ nonattainment areas. These designations correspond to de minimis rates of 100 tons per calendar year for each pollutant (VOC, NOx, and $PM_{2.5}$).

PM_{10} and $PM_{2.5}$ values in table include both emissions from exhaust and fugitive sources.

SOURCE: Table compiled by Environmental Science Associates in 2021.

Additionally, the resulting estimated emissions from haul truck travel through the SJVAB, shown in **Table 9**, do not result in the emissions of ozone precursors or the emissions of $PM_{2.5}$ exceeding the corresponding *de minimis* levels for any calendar year. These results indicate that a conformity analysis is not required, and no general conformity determination will be produced.

Table 9. SJVAB hauling emissions estimates by calendar year, with comparison to *de minimis* rates

Alternative	Construction Year	Tons per year				Fraction of *de minimis*		
		VOC	NOx	PM_{10}	$PM_{2.5}$	VOC	NOx	$PM_{2.5}$
Alt 1 - Inner Harbor	2027	0.0001	0.0142	0.0012	0.0005	0.001%	0.142%	0.001%
	2028	0.0061	0.7741	0.0651	0.0285	0.061%	7.741%	0.041%
	2029	0.0018	0.2339	0.0203	0.0089	0.018%	2.339%	0.013%
	Alt 1 Total	0.0080	1.0222	0.0866	0.0379	--	--	--
Alt 2 - Outer Harbor	2028	0.0	0.0	0.0	0.0	0%	0%	0%
	Alt 2 Total	0.0	0.0	0.0	0.0	--	--	--
Alt 3 - Inner & Outer Harbor	2027	0.0001	0.0142	0.0012	0.0005	0.001%	0.142%	0.001%
	2028	0.0061	0.7741	0.0651	0.0285	0.061%	7.741%	0.041%
	2029	0.0018	0.2339	0.0203	0.0089	0.018%	2.339%	0.013%
	Alt 3 Total	0.0080	1.0222	0.0866	0.0379	--	--	--

NOTE:
San Joaquin, Stanislaus, Merced, Fresno, and Kings Counties are considered extreme ozone nonattainment areas and serious $PM_{2.5}$ nonattainment areas. These designations correspond to de minimis rates of 10 tons per calendar year for VOC and NOx, and 70 tons per calendar year for $PM_{2.5}$.

SOURCE: Table compiled by Environmental Science Associates in 2021.

US Army Corps
of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A-5:

Coastal Zone Management Act

Oakland Harbor Turning Basins Widening Navigation Study

Coastal Zone Management Act Consistency Determination

Administrative Draft

October 2021

PORT OF OAKLAND

Oakland Harbor Turning Basins Widening

Coastal Zone Management Act Consistency Determination

Administrative Draft

Port of Oakland

U.S. Army Corps of Engineers

October 2021

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ACRONYMS

BCDC	San Francisco Bay Conservation and Development Commission
BMP	best management practice
CCC	Central California Coast
CD	Consistency Determination
CY	cubic yard
DMMO	Dredged Material Management Office
DPS	distinct population segment
DTSC	Department of Toxic Substances Control
EFH	essential fish habitat
ESA	Endangered Species Act
ESU	environmentally sensitive unit
IHTB	Inner Harbor Turning Basin
LTMS	Long-Term Management Strategy
LUC	land use covenant
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
NLAA	not likely to adversely affect
NMFS	National Marine Fisheries Service
OHTB	Outer Harbor Turning Basin
Port	Port of Oakland
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SPCC	Spill Prevention Control and Countermeasure
SWRCB	State Water Resources Control Board
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service

1. Introduction

The United States Army Corps of Engineers (USACE) and Port of Oakland (Port) are proposing to expand two turning basins in the Oakland Harbor (hereafter referred to as "Proposed Action" or "project"), which would allow larger vessels easier access to all existing Port terminals. The Proposed Action involves (1) demolition of existing landside structures and landside excavation to accommodate widening of the Inner Harbor Turning Basin (IHTB), (2) dredging to widen the IHTB and Outer Harbor Turning Basin (OHTB), and (3) installation of bulkhead and new piles in the IHTB. This Consistency Determination (CD) describes the activities associated with the Proposed Action and whether they are consistent to the maximum extent practicable with the applicable state coastal management program.

2. Authority

This CD was prepared in accordance with the Coastal Zone Management Act of 1972, as amended (16 United States Code [U.S.C.] Section 1451), and the implementing regulations entitled Federal Consistency with Approved Coastal Management Programs (15 Code of Federal Regulations Part 930). The program applicable to USACE projects in San Francisco Bay is the Bay Plan, which is administered by the San Francisco Bay Conservation and Development Commission (BCDC).

3. Determination

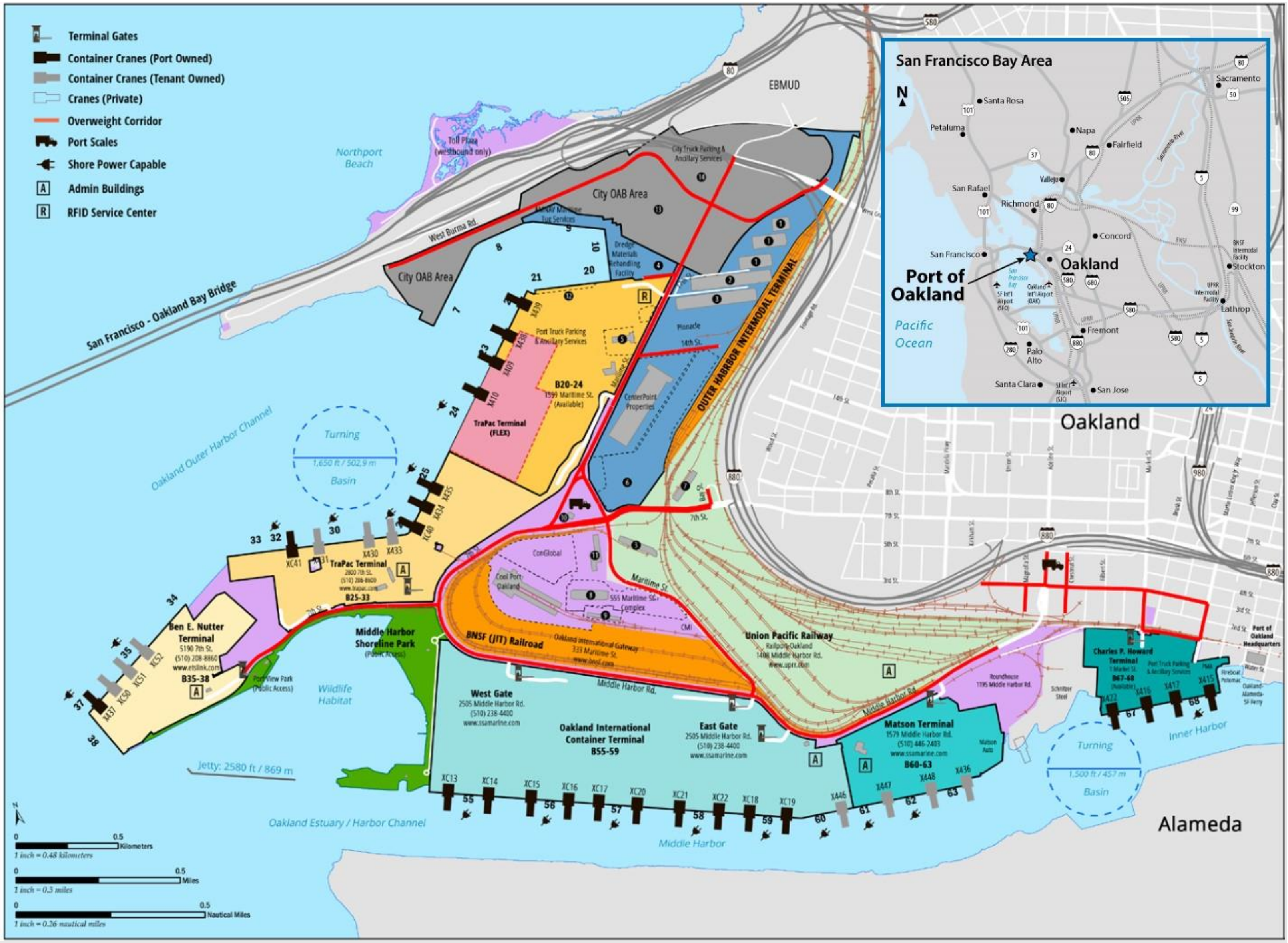
The Proposed Action involves the expansion of the IHTB and OHTB in the Oakland Harbor. The existing IHTB would be widened from 1,500 feet to 1,830 feet, and to a depth of -50 feet mean lower low water (MLLW). Demolition and pile removal work would be conducted both from land and from vessels floating on the water. Any reconstruction work is expected to occur from land, prior to removal of existing shoreline infrastructure. The OHTB would be widened from 1,650 feet to 1,965 feet. Under the Proposed Action, the OHTB would also be dredged to a depth of -50 feet MLLW; however, the OHTB expansion would involve no land impacts. The entire project footprint is in or adjacent to San Francisco Bay, and therefore the Proposed Action falls under BCDC's jurisdiction.

The need for this expansion arises from inefficiencies currently experienced by vessels in harbor, specifically in the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-Foot Oakland Harbor Navigation Project. These inefficiencies are projected to continue in the future because vessel sizes are expected to increase.

USACE has evaluated the Proposed Action and has determined that it is consistent, to the maximum extent practicable, with the San Francisco Bay Plan policies. A detailed assessment of this project's consistency with those policies are provided in Chapter 6.

4. Project Location and Existing Conditions

The Oakland Harbor is on the eastern side of San Francisco Bay (Figure 1-1). It includes the Entrance Channel, the Outer Harbor Channel and Outer Harbor Turning Basin (OHTB), and the Inner Harbor Channel and Inner Harbor Turning Basin (IHTB). The Outer Harbor Channel is immediately south of the San Francisco-Oakland Bay Bridge and is maintained to a depth of -50 feet mean lower low water (MLLW). The Outer Harbor Channel and OHTB serve the existing TraPac and Ben E. Nutter terminals. The Inner Harbor Channel is also maintained to -50 feet MLLW to Howard Terminal, which is approximately 2.5 miles from the Inner Harbor entrance. The Inner Harbor Channel and IHTB serve the existing Oakland International Container Terminal, Matson Terminal, and Schnitzer Steel Terminal. Berth 10, at the eastern of end of the Outer Harbor, serves as a dredged material rehandling facility.



Terminal Gates
Container Cranes (Port Owned)
Container Cranes (Tenant Owned)
Cranes (Private)
Overweight Corridor
Port Scales
Shore Power Capable
Admin Buildings
RFID Service Center
San Francisco Bay Area
Port of Oakland
Oakland
Pacific Ocean
San Francisco - Oakland Bay Bridge
EBMUD
Northport Beach
City OAB Area
West Burma Rd.
Oakland Outer Harbor Channel
Turning Basin
OUTER HARBOR INTERMODAL TERMINAL
TraPac Terminal
B25-33
B20-24
Ben E. Nutter Terminal
B35-38
Middle Harbor Shoreline Park
Wildlife Habitat
BNSF (JIT) Railroad
Union Pacific Railway
West Gate
East Gate
Oakland International Container Terminal
B55-59
Matson Terminal
B60-63
Charles P. Howard Terminal
B67-68
Inner Harbor
Alameda
Middle Harbor
Oakland Estuary / Harbor Channel
Jetty: 2580 ft / 869 m

5. Project Description

The construction activity required to expand the IHTB and OHTB would span 2 years and 4 months, beginning in July 2027, with dredging of the OHTB occurring in 2028. Operation of the expanded IHTB and OHTB would be substantially similar to operations under existing conditions. The proposed improvements and construction methods for each turning basin are described individually below.

5.1. Expansion of the Inner Harbor Turning Basin

The Expansion of Inner Harbor Turning Basin consists of widening the existing IHTB from 1,500 feet to 1,834 feet with a depth of -50 feet MLLW consistent with the existing IHTB. In addition to in-water work to widen the IHTB, land would be impacted in three locations: Schnitzer Steel, Howard Terminal, and private property located along the Alameda shoreline (Figure 1-2).

At Schnitzer Steel (in the northwestern corner of the widened IHTB in Figure 1-2), approximately 10,800 square feet (0.25 acre) of concrete pavement would be removed. Approximately 310 linear feet of new bulkhead would be installed landside, and approximately 13,710 CY of landside soil would be excavated between the new and existing bulkhead. Subsequently, 700 linear feet of new anchor/tie back (i.e., the lateral support structure for a bulkhead) would be installed, about 320 linear feet of existing bulkhead would be demolished, and an additional approximately 9,260 CY of material would be dredged.

Similar construction activities would occur at Howard Terminal (in the northeastern corner of the widened IHTB in Figure 1-2), including approximately 115,020 square feet (2.65 acres) of asphalt and concrete pavement removal, landside installation of 650 linear feet of new bulkhead, removal of 300 125-foot-long piles (approximately 4,360 CY), and excavation of 72,410 CY of landside soil between the new and existing bulkhead. Subsequently, 1,300 linear feet of anchor/tie-back would be installed, 900 linear feet of existing bulkhead would be removed, and an additional approximate 191,670 CY of material would be dredged

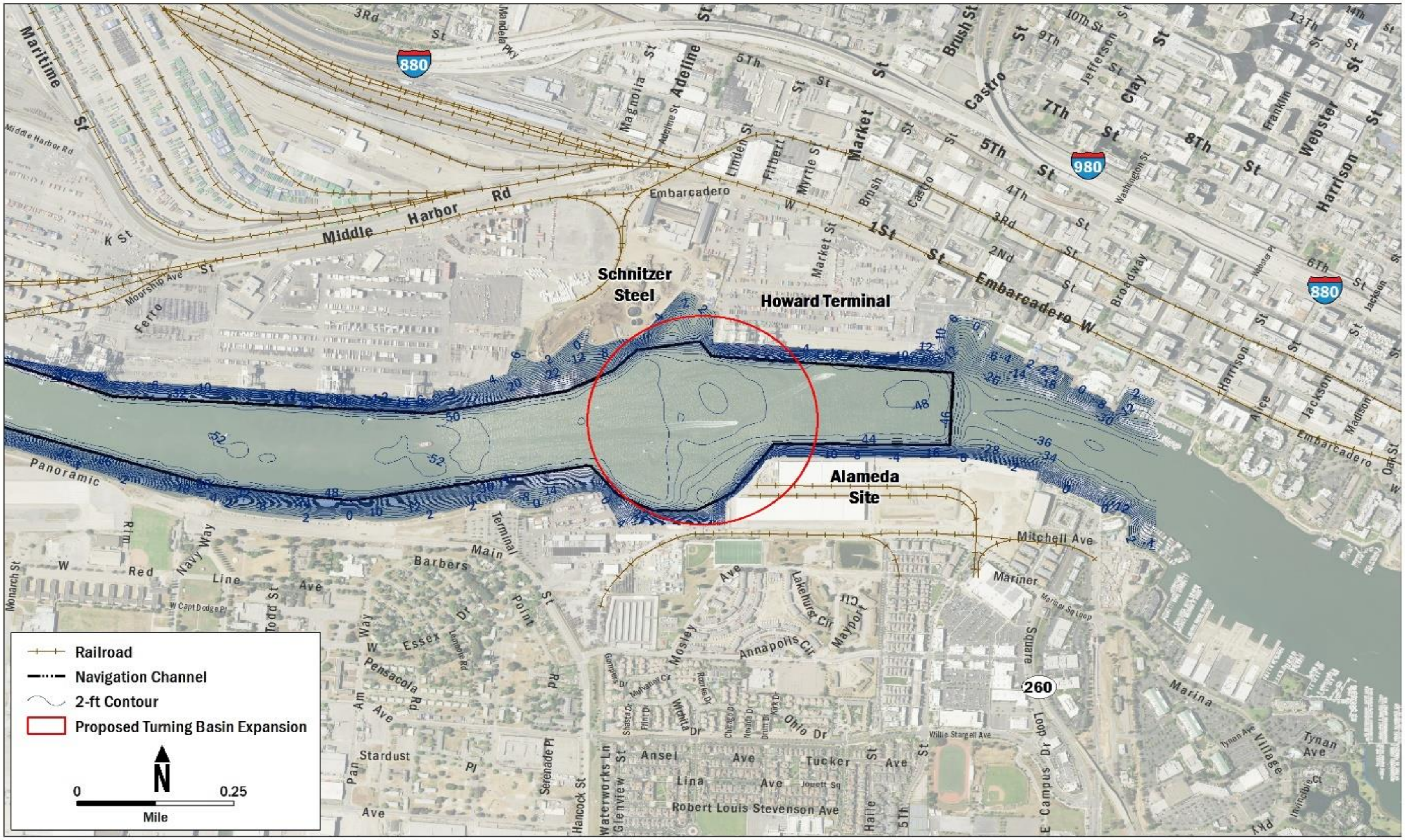


Figure 1-2: Proposed Expansion of IHTB

Expansion at the Alameda site (in the southeastern portion of the widened IHTB in Figure 1-2) would require partial demolition of two existing warehouses (an estimated maximum of 260,000 square feet of demolition). Similar to the Schnitzer Steel and Howard Terminal sites, additional Alameda improvements include 216,000 square feet (5 acres) of asphalt and concrete pavement removal, landside installation of 1,050 linear feet of new bulkhead, removal of 2,300 65-foot long piles (approximately 17,390 CY), excavation of 135,370 CY of landside soil between the new and existing bulkhead, installation of 2,100 linear feet of anchor/ tie-back, removal of 1,250 linear feet of existing bulkhead, and dredging of approximately 358,330 CY of material from the Alameda site.

For the Howard Terminal and Alameda sites, landside excavation of soils would occur to a depth of approximately -5 feet MLLW, which is approximately 17 feet below existing ground surface elevations. At Schnitzer Steel, landside excavation of soils would occur to a depth of approximately -25 feet MLLW, which is approximately 37 feet below existing ground surface elevation. Due to the historical industrial use of these sites and the documented presence of contaminants underlying portions of the Schnitzer Steel and Howard Terminal properties, for the purpose of this study it is assumed that landside excavated materials would be disposed at a Class I or Class II landfill. Material below the limits of landside excavation at each site would be dredged following removal of the existing bulkhead; for the purpose of this study, it is assumed that all dredged material would be suitable for beneficial reuse. In addition, for all three sites, the depth of sheet pile/bulkhead installation and removal is assumed to be 65 feet below ground surface. Dredging of approximately 320,000 CY of existing Inner Harbor sediments would also be required. Volumes of material to be excavated landside or dredged for IHTB expansion are summarized in the table below.

Landside Excavation and Dredging Quantities for IHTB Expansion

Location	Landside Soil Excavation (cubic yards)	Sediment Dredging (cubic yards)
Schnitzer Steel	13,710	9,260
Howard Terminal	72,410	191,670
Alameda	135,370	358,330
Non-land areas		320,000

Construction staging, including a construction trailer, equipment and construction materials storage, and soil stockpiles, would occur at Howard Terminal and the Alameda property immediately adjacent to the excavation areas; no staging would occur at Schnitzer Steel.

Construction is expected to last approximately 2 years and 4 months, beginning in July 2027. Construction, excluding dredging, would occur Monday through Friday between the hours of 7 a.m. and 7 p.m. During the first year of construction, the land-based activities would be completed at Howard Terminal and Schnitzer Steel (concurrent construction would occur at these locations for approximately 3 months). Marine-based construction (sheet pile/bulkhead removal) and dredging is anticipated to be conducted at Howard Terminal and Schnitzer Steel during the 2028 in-water work window. Land-based construction at the Alameda property is expected to commence in May 2028 and take approximately 1 year to complete. Marine-based construction (sheet pile/bulkhead removal) and dredging at the Alameda property and dredging of sediments in the Inner Harbor Channel would be conducted during the 2029 in-water work window. Sheet pile for the new bulkheads would be installed landside.

Equipment for pavement removal, landside excavation, warehouse demolition, pile removal, sheet pile/bulkhead removal and installation, and anchor/tie-back installation would include backhoes/front loaders, concrete saws, cranes, bulldozers, excavators, dump trucks, drilling rigs, barges, dive vessels, pile drivers, vibratory hammers, tugboats, compressors, and generators. Depending on the concurrent activities occurring over the course of construction, the number of construction workers at any given time would range from approximately eight to 40 (excluding dredging operations described below).

Excavated landside material, removed piles, and debris from warehouse demolition at the Schnitzer Steel, Howard Terminal and Alameda sites would be hauled off site for disposal at a Class I or Class II landfill. Approximately 15,600 CY of excavated landside material from the three sites would require disposal at a Class I landfill. Assuming each truck would haul 10 CY of material, this would require approximately 1,560 truck trips for transport. Approximately 198,500 CY of excavated landside material from the three sites would require disposal at a Class II landfill, along with the removed piles and warehouse demolition debris, requiring approximately 23,380 truck trips for transport.

Dredging would be conducted with an electric-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport for beneficial reuse or to Berth 10 for rehandling prior to transport via truck to a landfill. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site or to Berth 10, and tugboats for positioning the barge and towing the scows. Approximately 63,700 CY of dredged Inner Harbor sediments would require disposal at a Class II landfill. Assuming each truck would haul 10 CY of material, this would require approximately 6,370 truck trips for transport from Berth 10. Approximately 26 workers would be required for the dredging operation and approximately 28 workers would be required for rehandling operations at Berth 10. Dredging would be conducted 24 hours per day on weekdays (Monday through Friday), and may be conducted on weekends, if necessary.. Silt curtains would be used during dredging to minimize impacts to the aquatic environment.

5.2. Expansion of Outer Harbor Turning Basin

The Expansion of Outer Harbor Turning Basin consists of widening the existing OHTB from 1,650 to 1,965 feet. The proposed expanded OHTB relative to the current limits of the navigation channel is shown in Figure 1-3. There are no land impacts under the proposed footprint of the expanded OHTB. This alternative involves dredging 862,000 CY of material to widen the basin to a depth of -50 feet MLLW.

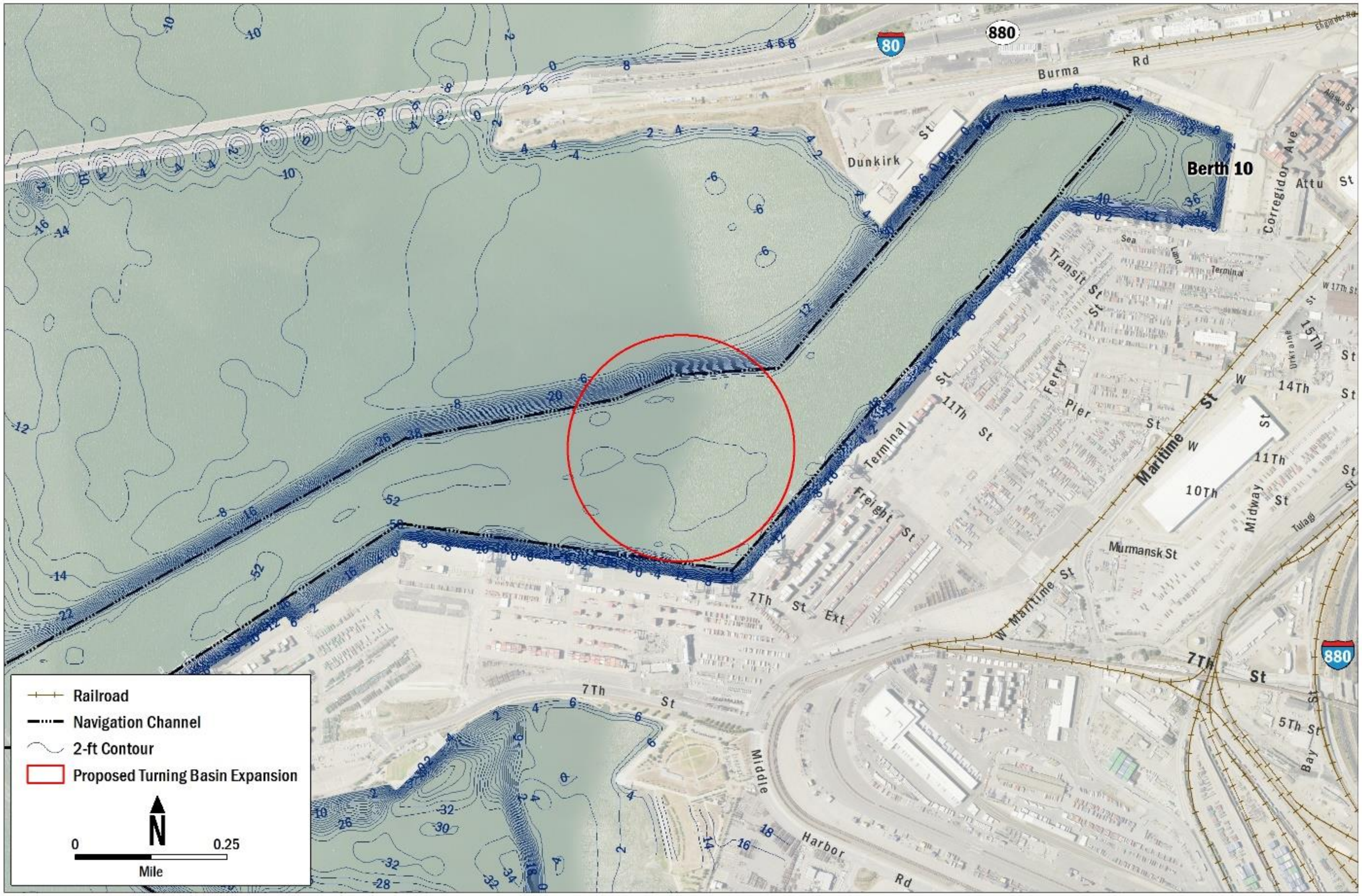


Figure 1-3: Proposed Expansion of OHTB

Dredging would be conducted with an electric-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport to a beneficial reuse site. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site, and tugboats for positioning of the barge and towing the scows to the reuse site. Approximately 26 workers would be required for the dredging operation. Dredging is expected to be conducted during the 2028 in-water work window (June 1through November 30). Dredging would be conducted 24 hours per day on weekdays (Monday through Friday) and on weekends, if necessary, over a 6-month period (the entire in-water work window). Silt curtains would be used during dredging to minimize impacts to the aquatic environment. Construction staging would occur at Berth 10, at the eastern end of the Outer Harbor.

5.3. Avoidance and Minimization Measures

Given the nature of the Proposed Action, USACE would implement as part of the project various avoidance and minimization measures, as well as construction best management practices (BMPs). The purpose of these measures is to reduce potential adverse environmental effects of the project. A detailed description of these measures is included as **Attachment A** of this CD.

6. Consistency with Applicable San Francisco Bay Plan Policies

This section presents analyses of the Proposed Action's consistency with applicable Bay Plan policies. The project area does not contain, and the project does not propose and would not result in impacts related to, the following Bay Plan policy topics: salt ponds, managed wetlands, areas of freshwater inflow, areas of shell deposits, shoreline protection, airports, and commercial fishing operations. Consequently, Bay Plan polices related to the identified topics are not applicable to the project and are not addressed further.

6.1. Fish, Other Aquatic Organisms, and Wildlife

Marine-based construction and dredging required for the project would occur during the in-water work window (June 1 through November 30) to minimize adverse effects on special-status aquatic species that have the potential to occur in the project area, including salmonids and Pacific Herring. To ensure that the expansion of the IHTB and OHTB are conducted in a manner that protects special-status species and their habitats in and around San Francisco Bay, USACE is consulting with the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) on the project, in accordance with Section 7(a)(2) of the Endangered Species Act (ESA) (16 U. S.C. 1536[c]); Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 104-297); and Section 101(a)(5) of the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1371(a)(5)), as applicable. USACE will consider any recommendations and ensure compliance with any requirements from these agencies that are applicable to the to avoid potential adverse effects on special-status species and their habitat.

6.1.1. Special-Status Fish Species and Essential Fish Habitat

The Port is situated on the eastern shore of central San Francisco Bay, often referred to as the Oakland-Alameda Estuary.

Table 1 identifies federal ESA and California Endangered Species Act-listed endangered and threatened species, California fully protected species, and marine mammals known to occur in or with potential to occur in the project area. USACE has reviewed the Proposed Action for its potential effects on federal ESA-listed threatened or endangered species and their designated critical habitats, and has determined that the project may affect, but is not likely to adversely affect (NLAA), such species or their critical habitats under the purview of NMFS or USFWS. USACE will submit NLAA determinations for the Proposed Action to NMFS and USFWS and request their concurrences and will submit a request for NMFS consultation on potential effects to essential fish habitat (EFH).

Table 1 Federal and State Endangered, Threatened, and Fully Protected Species and Marine Mammals Known to Occur or Potentially Occurring in the Project Area

Species	Federal Status	State Status
Birds		
California least tern (*Sternula antillarum browni*)	FE	SE
Fish		
Southern population of North American Green Sturgeon DPS (*Acipenser medirostris*)	FT/CH	—
Steelhead, Central California Coast DPS (*Oncorhynchus mykiss*)	FT/CH	—
Steelhead, Central Valley DPS (*Oncorhynchus mykiss*)	FT	—
Chinook Salmon, Sacramento winter-run ESU (*Oncorhynchus tshawytscha*)	FE	SE
Chinook Salmon, Central Valley spring-run ESU (*Oncorhynchus tshawytscha*)	FT	ST
Longfin Smelt (*Spirinchus thaleichthys*)	FC	ST
Marine Mammals		
Pacific harbor seal (*Phoca vitulina richardii*)	MMPA	—
California sea lion (*Zalophus californianus*)	MMPA	—
Harbor porpoise (*Phocoena phocoena*)	MMPA	—

Notes:

DPS = distinct population segment
ESU = environmentally sensitive unit

Federal Status:

CH = Critical Habitat;
FC – Federal Candidate Species for Listing;
FE = Federally Listed Endangered;
FT = Federally Listed Threatened;
MMPA = Marine Mammal Protection Act

State Status:

FP = Fully Protected
SE = State Listed Endangered;
ST = State Listed Threatened

Designated critical habitat has been established in the project area for two aquatic species: southern population of North American Green Sturgeon distinct population segment (DPS) and Steelhead Central California Coast (CCC) DPS. Green Sturgeon are potentially present throughout all marine portions of the project area at any time of the year. However, their preferred migration routes do not traverse the project area. The primary migration corridor for the CCC Steelhead DPS and the Central Valley Steelhead DPS is through the northern reaches of the Central Bay (Raccoon Straight, which is between Angel Island and the Tiburon Peninsula of mainland Marin County, and north of Yerba Buena Island) (NMFS 2001; Baxter et al. 1999). CCC DPS Steelhead has small spawning runs in multiple Bay tributaries, including San Leandro Creek, approximately 5 miles southeast of the project area (Goals Project 2000). Fish migrating to and from these spawning grounds may occur in the Oakland-Alameda Estuary. No spawning or rearing habitat for Steelhead exists in the project area.

Chinook Salmon are expected to forage in Central Bay shallow water areas (less than 30 feet deep) during in-migration and out-migration transits. Like Steelhead, the primary migration corridor for Chinook Salmon is through the northern reaches of Central San Francisco Bay (Raccoon Straight and north of Yerba Buena Island) (NMFS 2001; Baxter et al. 1999;, Jahn 2011). No spawning or quality rearing habitat for this species exists near the Port. Longfin Smelt are most likely to occur in Central San Francisco Bay during the late summer months, before migrating upstream in fall and winter; there is a low likelihood of Longfin Smelt occurring in the project area. Pacific Herring are known to breed on in-water structures and use this habitat along the Oakland-Alameda Estuary waterfront; however, herring spawning has not been observed along this portion of the waterfront in recent years.

In-water construction would result in underwater noise, including from mechanical dredging and from pile removal along the new shoreline of the IHTB. Underwater noise is not anticipated to substantially affect Chinook Salmon, Steelhead, and Green Sturgeon, due to their mobility, the existing activity at the harbor, and the low anticipated intensity of sound produced by construction relative to ambient conditions.

The loss of benthic invertebrates during dredging or other bottom-disturbing activities may decrease the forage value of benthic habitat in the project area. This impact would be localized, and would be negligible in the context of the forage habitat available in the Oakland-Alameda Estuary. Recolonization of disturbed areas by benthic invertebrates could require several months.

Dredging and other in-water construction activities would result in increased turbidity from suspended sediments. This could affect fish behavior, including avoidance responses, territoriality, feeding, and homing behavior. The eggs or larval life stages of Steelhead or Green Sturgeon are not expected to be present in the project area, because it does not serve as spawning habitat for these species. Large adult and juvenile fish (including Chinook Salmon, Steelhead, and Green Sturgeon) would be mobile enough to avoid areas of high-turbidity plumes caused by dredging. The dredge material plume would only occupy a small percentage of the habitat available to fish species at any given time.

As described above, in-water work associated with this project is proposed to occur within the environmental work windows for applicable special-status fish species that have the potential to occur in the footprint or in the project vicinity of the IHTB or OHTB. In addition, USACE would implement the avoidance and minimization measures identified in Attachment A. These include standard BMPs to protect against leaks and spills, silt curtains to reduce adverse effects caused by the mobilization of sediments, and equipment measures related to dredging and pile removal, all of which would be implemented to minimize sediment intrusion and potential noise impacts to critical habitat for special-status fish species, among others.

The entirety of the San Francisco Bay Estuary below mean higher high water is designated as EFH for Pacific Coast Groundfish. The Proposed Action may affect Pacific Groundfish EFH through sediment suspension, entrainment of fish and plankton during dredging, and removal of sediment and benthic organisms with a clamshell dredge. Implementation of the general and dredge-related measures described in Attachment A—such as the use of silt curtains and limitations on decant water are expected to reduce potential impacts to EFH during construction. As noted, the recolonization of disturbed areas by benthic invertebrates could require several months. Overall, expansion of the IHTB would result in an increase of open waters and soft-substrate bottom, increasing the extent of EFH in the project area.

The project would not directly remove any mapped eelgrass areas, and the dredge plume is not anticipated to result in turbidity or other water quality impacts that would affect eelgrass. The IHTB and OHTB expansion areas are predominantly in waters that are too deep to support eelgrass. Some areas with depths potentially suitable for eelgrass would be deepened to -50 feet MLLW. However, these areas have not been colonized by eelgrass, and habitat suitability is likely minimal, given existing vessel traffic and maintenance dredging disturbance in the adjoining navigation channel. There is one small patch of eelgrass approximately 250 meters (820 feet) northeast of the proposed OHTB expansion area; the nearest patch to the IHTB expansion area occurs approximately 500 meters (1,640 feet) to the west (Merkel and Associates 2021). No terrestrial, emergent, or submerged aquatic vegetation would be directly impacted by construction or operations of the expanded IHTB and OHTB.

6.1.2. Special-Status Bird Species

California least tern typically feeds in shallow estuaries or lagoons, where small fish are abundant. Least terns have been observed to forage primarily along the breakwaters and shallows of the southern shoreline of Naval Air Station Alameda, and in Ballena Bay. Least terns are also known to forage and roost in the nearby Middle Harbor Enhancement Area. Increased turbidity may decrease foraging success in the project area by decreasing prey abundance or by making it more difficult for least terns to detect prey. Turbidity impacts from the Proposed Action would be mostly confined to existing moderately deep waters or shoreline areas currently occupied by marine structures proposed for removal. Impacts to shallow-water habitat would be limited, and would not occur in waters adjacent to known California least tern colonies. Similarly, noise from construction activities would not substantially disrupt least tern foraging activities. Birds currently residing in the vicinity are accustomed to varying levels of ambient noise emanating from existing human activities in the project area; however, some may relocate to preferable environments elsewhere in the Oakland-Alameda Estuary during construction activities. The Long-Term Management Strategy (LTMS) program dredging work window for this species in the project vicinity is August 1 through March 15 each year. Because in-water construction would occur partially outside of this work window, USACE will consult with USFWS = to work outside this window. In addition, USACE would implement the avoidance and minimization measures identified in Attachment A, such as the use of silt curtains, limitations on decant water, and the use of vibratory means for in-water pile removal, which would reduce impacts on California least tern.

6.1.3. Protected Marine Mammals

Three marine mammal species protected under the MMPA are likely to be found in the vicinity of the project area: Pacific harbor seal (*Phoca vitulina richardii*), California sea lion (*Zalophus californianus*), and harbor porpoise (*Phocoena phocoena*). There are several other species of marine mammals that uncommonly occur in the central portion of the San Francisco Bay Estuary, such as northern elephant seal (*Mirounga angustirostris*), common bottlenose dolphin (*Tursiops truncatus*), and gray whale (*Eschrichtius robustus*). These species are not federally or state listed as threatened or endangered; however, all marine mammals are protected under the MMPA.

The marine mammal most likely to occur in the project area is the Pacific harbor seal, which hauls out in several locations in the central portion of the Bay and may forage in the project area; and to a lesser extent, California sea lions, which may forage in the project area. Harbor porpoise may also be infrequently present in the project area. Marine mammals would not be substantially affected by the turbidity generated during the dredging operations, because they forage over large areas of San Francisco Bay and the Pacific Ocean, and can avoid areas of temporarily increased turbidity and dredging disturbance.

Avoidance and minimization measures that would be implemented as part of the Proposed Action and these would be expected to reduce impacts on marine mammals (Attachment A). Measues include use of vibratory means for in-water pile removal and conducting any pile installation on land in the dry. With the implementation of these measures, no injury or permanent impacts to marine mammals are expected to occur.

For these reasons, this project is consistent to the maximum extent practicable with the Bay Plan's fish, other aquatic organisms, and wildlife policies.

6.2. Water Quality

The proposed dredging required for expansion of the IHTB and OHTB would not result in adverse effects to tidal marshes or tidal flats, nor would it affect the surface area, flow of water into the Bay, and volume of the Bay. The project does not involve sewage systems, bayside parking lots, or commercial fishing docks.

The replacement of the bulkhead and proposed dredging activity has the potential to resuspend sediment in the immediate vicinity of the turning basins, and to degrade water quality if eroded soils and construction-related wastes and runoff flow into waterways. The effects of dredging activities are expected to be of short duration and limited to the immediate dredging area.

USACE would implement BMPs throughout project construction to protect water quality and prevent the discharge of pollutants to the Bay. These include educational measures and structural measures, such as vehicle and equipment specifications and silt curtains (see Attachment A for additional measures).

Both the Howard Terminal and Schnitzer Steel portions of the proposed IHTB expansion area are in active Department of Toxic Substances Control (DTSC) or State Water Resources Control Board (SWRCB) cleanup sites, and ground-disturbing activities in these areas have the potential to adversely affect groundwater if improperly managed. Both sites are subject to ongoing monitoring, investigations, and other remedial actions. The Howard Terminal Site is also subject to a land use covenant (LUC) that prohibits any use that disturbs or interferes with the existing cap, and requires a DTSC approval for any cap disturbance. The remedial investigations and plans, and the Howard Terminal LUC, are expected to be replaced and consolidated before commencement of construction of the Proposed Action. The substantive requirements of these replacement documents would be similar to those in the existing documents but would be specifically tailored to ensure protections appropriate for the type of anticipated construction activity and the type of anticipated uses.

All ground-disturbing activities at Howard Terminal and Schnitzer Steel would occur in coordination with DTSC or the SWRCB, as applicable, to ensure that adverse groundwater impacts associated with existing contamination would be avoided. This would likely include developing plans specifying how the construction contractor(s) would remove, handle, transport, and dispose of all excavated materials and manage groundwater encountered during construction in a safe, appropriate, and lawful manner. Project plans would be developed to avoid impeding existing cleanup and abatement orders; this would likely include evaluating effects on existing monitoring wells in or near the project footprint, and implementing corrective measures as needed in coordination with DTSC or SWRCB. The proposed IHTB expansion would not affect the existing concrete quay wall and wood bulkhead at Howard Terminal, which has been shown to contain and prevent the movement of impacted groundwater to San Francisco Bay.

Although the proposed IHTB expansion does have the potential to disturb contaminated soils and affect existing remediation activities pertaining to groundwater, impacts to groundwater quality are expected to be minimized through adherence to applicable regulations and through coordination with DTSC and the SWRCB. This would include development of project design components and procedures to ensure that the project does not substantially exacerbate existing contamination issues or impede existing remediation efforts.

In addition, prior to construction and annual maintenance dredging activities, USACE would ensure that all required sediment testing and analysis is conducted (see Section 6.10 for additional discussion). The results of the sediment testing and analysis would be provided to BCDC, the Regional Water Quality Control Board, and the United States Environmental Protection Agency through the Dredged Material Management Office (DMMO). The DMMO would have the opportunity to review the results and recommend suitability for placement. USACE would beneficially use sediment determined suitable for reuse in accordance with the requirements of the placement site..

Operational effects associated with vessel traffic and maintenance dredging would be similar to those already occurring from current Port operations and annual maintenance dredging. The project would not change the projected overall volumes of freight that would transit through the Port. Expansion of both of the turning basins would incrementally increase the area of the maintained navigation channel; however, the nature of impacts from maintenance dredging would be similar to those occurring with existing maintenance dredging of Oakland Harbor.

With implementation of the BMPs and the avoidance and minimization measures described in Attachment A, and adherence to established regulatory requirements and processes, this project is consistent to the maximum extent practicable with the Bay Plan's water quality policies.

6.3. Water Surface and Volume

The proposed expansion of the IHTB and OHTB would remove fill material to widen the turning basins to a depth of -50 feet MLLW. Placement of dredged material to accommodate channel deepening would not reduce water surface area and would increase the volume of the Bay, which is consistent with the policy of increasing the volume of water in the Bay when possible. The project does not propose new fills, dikes, or piers or that would impact water circulation. This project is consistent to the maximum extent practicable with the Bay Plan's water surface area and volume policies.

6.4. Smog and Weather

As stated in Section 6.3, Water Surface Area and Volume, the Proposed Action would remove fill to expand the turning basins. The project would involve only the minimum fill necessary to ensure the future structural integrity and seismic safety of the portion of the bulkhead being replaced. The project would not reduce water surface area in the Bay and is not expected to affect the Bay's function as an environmental regulator of particulate and smog in the atmosphere of the Bay Area. For the reasons presented, this project is consistent to the maximum extent practicable with the Bay Plan's smog and weather policies.

6.5. Subtidal Areas

Dredge equipment would comply with United States Coast Guard regulations regarding ballast water treatment and management. Project dredging would remove sediment from the Bay and place it at approved placement sites in the region. Therefore, the project would not introduce or spread invasive species. The project dredging would be localized and is not expected to affect tidal hydrology. Dredging could affect sediment movement by dredging the turning basins to the authorized depth and moving it to placement sites. However, this would not result in significant changes to sediment movement or bathymetry. During dredging, some sediment would be resuspended in the water column and settle out in the channel and adjacent areas. Other than dredging sediment and transporting it to beneficial use sites for placement, the proposed dredging is not expected to substantially affect sediment transport in subtidal areas.

As described in Section 6.1, Fish, Aquatic Organisms, and Other Wildlife, dredging may affect fish, other aquatic organisms, and birds. Turbidity and noise generated from clamshell dredging could affect fish and other aquatic organisms at the dredge site. Additionally, fish could be directly injured by a clamshell dredge and associated equipment and vessels. These impacts would be limited to the immediate area around clamshell dredging activities. Potential effects of these activities would be reduced through implementation of the avoidance and minimization measures identified in Attachment A, such as the use of silt curtains. The project would not directly remove any mapped eelgrass areas in the Oakland Harbor.

Dredging would occur in existing, authorized turning basins, and there is no feasible alternative to dredging in these areas. Furthermore, the turning basins provide a substantial public benefit to commerce, not only to the region but also to California and the nation.

For these reasons, the project is consistent to the maximum extent practicable with the Bay Plan's subtidal areas policies.

6.6. Environmental Justice and Social Equity

The project area is predominantly characterized by maritime, industrial, and urban uses associated with the Port, whose industrial marine terminals surround the turning basins; the City of Oakland, which encompasses the Port and borders it to the north and east; and the City of Alameda, which borders the Inner Harbor Channel on the south. The United States Census Bureau's 2015-2019 American Community Survey was used to determine whether environmental justice communities (i.e., low-income communities and/or communities of color) occur in the project area. Based on census tract data, three environmental justice communities are within a 0.5-mile radius of the project area, and nine additional environmental justice communities are within a 1-mile radius of the project area. These include communities in West Oakland, Downtown Oakland, and West Alameda. West Oakland has a high cumulative air pollution exposure burden due to the combined air pollution effects resulting from freight, freeways, industry, and Port operations, and is identified by the State of California as an area with disproportionate impacts from air quality under the Community Air Protection Program (AB 617)

Bay Plan Environmental Justice Policy 3 states that equitable, culturally relevant community outreach and engagement should be conducted by project applicants to meaningfully involve potentially impacted communities in underrepresented and/or disadvantaged communities. A community engagement meeting was held on August 23, 2021. Attendees for this meeting included neighboring Port environmental justice community members and environmental groups. Additional meetings are planned for early 2022 to update the public and obtain additional input.

Bay Plan Environmental Justice Policy 4 states that if a project is proposed within an underrepresented and/or identified vulnerable and/or disadvantaged community, potential disproportionate impacts should be identified in collaboration with the potentially impacted communities. At the public meeting the main concerns voiced by the West Oakland Community were related to (a) continued sharing of project updates via email and website, (b) minimizing commercial business impacts during construction, (c) minimizing environmental impacts during construction, namely noise and air quality, and (d) local hiring for construction jobs. traffic and air quality impacts.

In accordance with requirements under the National Environmental Policy Act (NEPA) and Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), USACE evaluated the potential environmental effects of the project and whether the project would result in significant adverse human health or environmental resource impacts that disproportionately harm environmental justice communities. The NEPA analyses for all resource topics concluded that the project would not result in significant effects on the environment and there would not be disproportionate adverse impacts to the surrounding environmental justice communities. The Port of Oakland additionally prepared a health risk assessment evaluating the potential increase in health risks to nearby receptors from exposure to project construction emissions. The project includes the use of electric-powered dredges, which would reduce construction-related air-pollutant emissions and the health risk associated with such emissions compared to those that would result from the use of diesel-powered dredges under other project alternatives considered.

For these reasons, the project is consistent to the maximum extent practicable with the Bay Plan's Environmental justice and social equity policies.

6.7. Climate Change

The project does not involve planning shoreline areas or design of a large shoreline project, but rather widens a transportation facility that is necessary to serve existing development, consistent with Bay Plan Climate Change policies 3 and 7. The project would construct the new bulkhead at an elevation the same as or higher as the elevation of the bulkhead being replaced; would not add any new structures or facilities that would be vulnerable to sea level rise; and would not otherwise modify shoreline areas in such a way that the vulnerability or hazard risk of existing developments would be changed. The proposed turning basins expansion would not negatively impact the Bay and would not increase risks to public safety. The project is consistent to the maximum extent practicable with the Bay Plan's climate change policies.

6.8. Safety of Fills

The Proposed Action is not expected to involve in-water fill and would result in removal of existing fill from the Bay. New pile, sheetpile, and bulkhead construction is expected to occur landside in the dry prior to removal of the existing features in the expansion area. New shoreline infrastructure (piles, sheetpiles, etc.) would be the minimum necessary to ensure the future structural integrity and seismic safety of the portion of the bulkhead and piles being replaced and would tie into the remaining existing shoreline infrastructure. The project would be designed in accordance with USACE design specifications. Moreover, all plans and specifications for the project would be subject to review by the Commission's Engineering Criteria Review Board to ensure adequacy with adopted safety provisions related to Bay fills. This project is consistent to the maximum extent practicable with the Bay Plan's safety of fills policies.

6.9. Shoreline Protection

No new shoreline erosion control or protection infrastructure is proposed as part of the IHTB and OHTB expansion; therefore, these policies are not applicable. This project is consistent to the maximum extent practicable with the Bay Plan's shoreline protection policies.

6.10. Dredging

The project would widen the existing turning basins to a depth of -50 feet MLLW. The proposed deepening of the IHTB and OHTB channels is meant to allow safe passage of large marine vessels. All dredged material that is suitable as cover or non-cover wetland fill would be beneficially used at an approved site that would be identified in the pre-construction phase. Prior to construction, a sampling and analysis plan would be developed and implemented to characterize soils and sediments to be removed or exposed. The plan would be prepared in accordance with applicable guidance for sediment sampling and testing. The results would be presented to the DMMO for review. Upon review of the sediment testing results, the DMMO would make a determination of the suitability for dredged material placement at various locations. USACE complies with the DMMO's placement site suitability determinations. USACE would dispose of dredged material according to the LTMS work windows. For the reasons presented, this project is consistent to the maximum extent practicable with the Bay Plan's dredging policies.

6.11. Water Related Industry and Ports

The project does not propose changes to the uses or designations of sites reserved for water-related industry or Port uses. The project would remove approximately 2.9 acres (approximately 3.5 percent) of land area from the Schnitzer Steel and Howard Terminal sites, both of which are designated on the Bay Plan maps for Port priority uses. The project would not, however, preclude the continued use of these or other sites for water-related industrial or Port activities. The project would benefit water-related industry in general by allowing water-related and Port industry dependent on vessel transportation to continue and to keep pace with changes in shipping technology. The project is intended to improve the efficiency of vessels when transiting to and from marine terminals. For these reasons, the project is consistent to the maximum extent practicable with the Bay Plan's water-related industry and port policies.

6.12. Transportation

Although the project would facilitate continued maritime navigation in the Port, it is not considered a transportation project in the context of the Bay Plan policies. For example, the project proposes no new roads that would require Bay fill, no bridges or other routes across the Bay or shoreline, and no ferry terminals. Therefore, the Bay Plan's transportation policies are not applicable. The project would generally benefit marine vessel traffic through the Port by accommodating the expected growth in ship size and improved terminal productivity. Therefore, the project is consistent to the maximum extent practicable with the Bay Plan's transportation policies.

6.13. Recreation

Recreational activities in the project vicinity consist of boating,[1] fishing from private boats via trolling and from land, walking and bicycling along portions of the Bay Trail, and a variety of activities at several existing and planned landside public parks in Oakland and Alameda. The project sites do not contain recreational facilities. The expansion of the IHTB and OHTB would not permanently change the public's ability to recreate on and by the Bay. Direct effects during construction would occur from the presence of water-based construction equipment in the turning basins, necessitating that those areas of the channel be closed to public access. Indirect effects to recreational fisherman could also occur from temporary displacement of fish from the construction areas. However, during construction activity, there would remain ample room for recreational boaters to pass through both turning basins. Furthermore, all of the Inner Harbor and Outer Harbor Channels would remain open and available for use by recreational boaters and fishermen—an area encompassing more than 2 square miles.

Construction activities associated with the expanded IHTB and OHTB could potentially displace some users to other parks farther from the construction area due to increased noise and dust from construction. However, all landside parks, including Alameda's Estuary Park—the closest park in the project vicinity (60 feet from the IHTB and Alameda Staging Area)—would remain open to the public during project-related construction and operation. Other nearby parks within half a mile of the IHTB and OHTB vicinity, such as Estuary Park, Alameda Landing Park, Main Street

[1] Boats may not stop or anchor in the navigational channels or turning basins, or otherwise interfere with vessels, such as cargo ships, that are restricted in ability to maneuver and constrained by draft.

Dog Park, the Northwest Territories Regional Shoreline Park, Judge John Sutter Regional Shoreline Park, and Middle Harbor Shoreline Park, would be available for use. For the reasons presented, the project is consistent to the maximum extent practicable with the Bay Plan's recreation policies.

6.14. Public Access

The proposed expansion of the IHTB and OHTB is not a fill project that would warrant new public access, would not involve the creation of new public access and infrastructure, would not result in changes to any public access, and would be executed in a way that maintains maximum feasible public access during construction. Connections to existing public streets or offsite public pathways would not be altered by the proposed IHTB and OHTB expansion. The IHTB and OHTB do not provide public shoreline access, and there are no landside public access facilities that would be impacted by the use of the sites.

Although the presence of water-based construction equipment in the IHTB and OHTB necessitate that publicly accessible areas of the channel be closed off from public access, both turning basins and the Inner and Outer Harbor Channels are wide enough that recreational boaters would have ample room to traverse either the northern side or the southern side of the channels, respectively. This project is consistent to the maximum extent practicable with the Bay Plan's public access policies.

6.15. Appearance, Design, and Scenic Views

Both the Inner and Outer Harbor Channels and Turning Basins are characterized by land uses and activities consisting of industrial, light industrial, Port, and marine support activity. There are three major marine terminals along the Outer Harbor, two of them adjacent to the OHTB; the IHTB is bounded by the Port in the City of Oakland on the northern side and the City of Alameda on the southern side. Views of the project areas from publicly accessible landside areas are limited and generally distant. Publicly accessible nearfield views of the project areas are generally restricted to those from the Inner and Outer Harbor Channels. There are no scenic vistas identified on the Bay Plan maps from which project activities would be plainly visible.

The new bulkhead, anchor/tie-backs, and piling installed along the waterfront on both the northern and southern sides of the IHTB would be of a size, scale, mass, and color similar to those of existing facilities. Similarly, there is no landside work associated with the OHTB; only in-water work to remove sediment. Therefore, the expanded OHTB would appear visually similar to the existing conditions. The vertical structures proposed by the project (i.e., bulkhead) would be of a size and scale substantially similar to those it is replacing; therefore, the project does not include any vertical structures or facilities that would appreciably change the appearance, design, or scenic views of the shoreline.

During construction, barges and scows used for dredging; cranes, bulldozers, and trucks used for demolition of concrete pavement, bulkhead, and warehouses; and cranes, excavators, drill rigs, and barges used for installation of the new bulkhead, anchor/tie-back, and piling may be visible from public vantage points. The presence of such equipment would be visually consistent with existing heavy industrial/maritime uses of the area, and therefore their temporary visual presence would not diminish existing scenic views.

Nighttime lighting associated with the dredge would be comparable to that required on all boats in the Inner and Outer Harbors. The project's temporary addition of nighttime lighting in the dredge areas would be inconsequential in relation to the existing nighttime lighting in the area, which includes high-mast lighting on the northern and southern sides of the IHTB and along the landside of the OHTB, among other substantial light sources. For the reasons presented, the project is consistent to the maximum extent practicable with the Bay Plan's appearance, design, and scenic views policies.

6.16. Other Uses of the Bay and Shoreline

The Proposed Action would not involve any other uses of the Bay and shoreline as described in the Bay Plan; therefore, such policies are not applicable. The project is consistent to the maximum extent practicable with the Bay Plan's other uses of the Bay and shoreline policies.

6.17. Fills in Accord with the Bay Plan

As described in Section 6.8, Safety of Fills, the project would result in a reduction of Bay fill. Replacement of the existing bulkhead would occur in a manner that to ensures the future structural integrity and seismic safety of the portion of the bulkhead being replaced. Similarly, as discussed in Section 6.11, Water Related Industry and Ports, the action is in accordance with the Bay Plan policies regarding Bay-related purposes for port operations and water-related industry. The project is consistent to the maximum extent practicable with the Bay Plan's fills in accord with the Bay Plan policies.

6.18. Mitigation

To the maximum extent practicable, the Proposed Action has been designed to avoid or minimize adverse environmental impacts to San Francisco Bay, in accordance with Bay Plan policies. The project would result in a reduction of Bay fill. Avoidance and minimization measures would be in place to reduce potential effects resulting from construction and dredging activity (see Attachment A). Furthermore, the project would beneficially use dredged material from construction, which would contribute to restoration projects around the Bay. For these reasons, no compensatory mitigation is required, and the project is consistent to the maximum extent practicable with the Bay Plan's mitigation policies.

6.19. Public Trust

The Proposed Action would involve lands in San Francisco Bay that are subject to the public trust. This replacement action would increase the navigation safety of these public trust lands. This project is consistent to the maximum extent practicable with the Bay Plan's public trust policies.

6.20. Navigational Safety and Oil Spill Prevention

To ensure navigational safety and help prevent accidents that could spill hazardous material, a Spill Prevention Control and Countermeasure (SPCC) plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. As described in

Attachment A, the SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements.

This project is consistent to the maximum extent practicable with the Bay Plan's navigational safety and oil spill prevention policies.

7. References

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United States Army Corps of Engineers (USACE) and NMFS. 2018. Proposed Additional Procedures and Criteria for Permitting Projects under a Programmatic Determination of Not Likely to Adversely Affect Select Listed Species in California.

Attachment A.
Avoidance and Minimization Measures

Attachment A. Avoidance and Minimization Measures

1.1. Biological Resources Avoidance and Minimization Measures/Mitigation Measures

To reduce the potential impacts of the Proposed Action on biological resources, the following or equivalent measures would be incorporated into the project as avoidance and minimization measures.

1.1.1. General Measures

- Marine-based construction and dredging would occur during the in-water work window (June 1 through November 30). If in-water work must occur at times other than the approved work window, the Port of Oakland (Port) and United States Army Corps of Engineers (USACE) would consult with the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service, and the California Department of Fish and Wildlife (CDFW), as necessary, to address potential impacts on special-status aquatic species.
- Standard best management practices (BMPs) would be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during the course of the project would be fueled and serviced in a manner that would not affect the aquatic environment.
- A Spill Prevention Control and Countermeasure (SPCC) plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. The SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements.
- Silt curtains will be used where specific site conditions demonstrate that they will be practicable and will effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions, or contain contaminants at levels in excess of applicable regulatory thresholds. Prior to in-water construction, a silt curtain will be deployed from the water's edge and pushed out to the deployed location to avoid entrapping aquatic wildlife species.
- Prior to construction, a sampling and analysis plan would be developed and implemented to characterize soils and sediments to be removed or exposed.
- Piles would be removed by vibratory means or direct pull, where possible; piles that cannot be pulled would be cut 2 feet below the mudline, to the extent feasible.
- No pilings or other wood structures that have been pressure-treated with creosote would be installed.

1.1.2. Dredging-Related Measures

- Dredging would be conducted with a barge-mounted excavator dredge; there would be no hydraulic dredging.

- No overflow or decant water would be allowed to be discharged from any barge, with the exception of spillage incidental to mechanical dredge operations, unless monitoring or relevant studies show the effects of such discharge are negligible.
- Multiple horizontal dredge cuts would be taken where a thick horizontal volume needs to be dredged to avoid overfilling the bucket and causing spillage.
- The load line on disposal barges used for mechanical dredging would be predetermined, and the barge would not be filled above this predetermined level. Before each disposal barge is transported to a placement site, the dredging contractor and a site inspector would certify that it is filled correctly.
- The cycle time would be increased as needed to reduce the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket.
- Floating debris would be removed from the water and disposed of properly.

1.1.3. Pile-Driving–Related Measures

- To the extent feasible, landside pile driving shall not occur during the bird breeding season of February 1 through August 15. If such activities must occur during the bird breeding season, work areas plus an appropriate buffer area determined by a qualified biologist shall be surveyed by a qualified biologist to verify the presence or absence of nesting raptors or other birds. Pre-construction surveys shall be conducted within 15 days prior to the start of pile driving work during the bird breeding season. If the survey indicates the potential presence of nesting raptors or other nesting birds, the biologist shall determine an appropriately sized buffer around the nest in which no work will be allowed until the young have successfully fledged, so that nesting birds are not disturbed by the project activity. The size of the nest buffer will be determined by the biologist, in coordination with USFWS, and will be based to a large extent on the nesting species and its sensitivity to disturbance. In general, buffer sizes of 200 feet for raptors and 50 feet for other birds should suffice to prevent disturbance to birds nesting in the urban environment, but these buffers may be increased or decreased, as appropriate, depending on the bird species and the level of disturbance anticipated near the nest, as necessary to avoid disturbance of nesting birds.
- To the extent feasible, all pilings or similar in-water structures would be removed by vibratory means only.

1.2. Water Quality Avoidance and Minimization Measures/Mitigation Measures

To reduce the potential impacts of the Proposed Action on water quality, the following or equivalent measures would be incorporated into the project as avoidance and minimization measures, or identified as mitigation measures for the project to reduce the severity of impacts.

1.2.1. General Measures

- The contractor would be required to comply with National Pollutant Discharge Elimination System General Construction Permit. Temporary erosion control measures would be implemented as specified in the project-specific Storm Water Pollution Prevention Plan.

- Standard BMPs would be applied to protect surface and groundwater from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during the course of the project would be fueled and serviced in a manner that would not affect the water resources.
- A SPCC plan would be prepared to address the emergency cleanup of any hazardous material, and would be available on site. The SPCC plan would incorporate SPCC, hazardous waste, stormwater, and other emergency planning requirements.
- Silt curtains would be used where specific site conditions demonstrate that they would be practicable and would effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions, or contain contaminants at levels in excess of applicable regulatory thresholds.
- Prior to construction, a sampling and analysis plan would be developed and implemented to characterize soils and sediments to be removed or exposed.
- Piles would be removed by direct pull or vibratory hammer, where possible; piles that cannot be pulled would be cut 2 feet below the mudline, to the extent feasible.
- No pilings or other wood structures that have been pressure-treated with creosote would be installed.

1.2.2. Dredging-Related Measures

- Dredging would be conducted with a barge-mounted excavator dredge; there would be no hydraulic dredging.
- No overflow or decant water would be allowed to be discharged from any barge, with the exception of spillage incidental to mechanical dredge operations, unless monitoring or relevant studies show the effects of such discharge are negligible.
- Multiple horizontal dredge cuts would be taken where a thick horizontal volume needs to be dredged, to avoid overfilling the bucket and causing spillage.
- The load line on disposal barges used for mechanical dredging would be predetermined, and the barge would not be filled above this predetermined level. Before each disposal barge is transported to a placement site, the dredging contractor and a site inspector would certify that it is filled correctly.
- The cycle time would be increased as needed to reduce the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket.
- Floating debris would be removed from the water and disposed of properly.

US Army Corps of Engineers®

OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A-6:

Cultural Resources Coordination

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVE. 4TH FLOOR.
SAN FRANCISCO, CALIFORNIA 94101

OCTOBER 4, 2021

Ms. Julianne Polanco
State Historic Preservation Officer
1725 23rd Street, Suite 100
Sacramento, CA 95816

Dear Ms. Polanco,

The U.S. Army Corps of Engineers, San Francisco District (USACE) is consulting with you on the proposed Oakland Harbor Turning Basins Widening Navigation Project located in the Port of Oakland between Oakland and Alameda on the south east side of Oakland Harbor in Alameda County, California.

The USACE as the federal lead agency, and the Port of Oakland (Port), as the nonfederal sponsor, are studying the *Oakland Harbor Turning Basins Widening Navigation Project* to determine if there is a technically feasible, economically justifiable, and environmentally acceptable recommendation for federal participation in navigation improvements to the constructed -50-Foot Oakland Harbor Navigation Project.

We are initiating consultation for the undertaking pursuant to the National Historic Preservation Act (NHPA) and in accordance with the implementing regulations for Section 106 found at 36 CFR Part 800, we are seeking (**1**) your comments on our Area of Potential Effects (APE), **(2)** our *Level of Effort* identifying historic properties in the APE, and (**3**) your concurrence with our finding of: "*No Historic Properties Affected*", pursuant to 36 CFR Part 800.4(d)(1).

We are coordinating environmental compliance review with the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) and providing you with two detailed cultural resources reports prepared for this study, that are intended to support the preparation of National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) documentation by USACE and the Port, respectively.

(a) The *Oakland Harbor Turning Basins Widening Navigation Project Cultural Resources Inventory Report 2021* includes the project description; identification of the vertical and horizontal APE which encompasses all ground disturbing activities on land and submerged; and identification of all cultural resources (i.e., archaeological and historic architecture/built environment resources) present in the APE. Please see the enclosed Cultural Resources Inventory report for
- Results of CHRIS Records Search
- Previous Historic Properties Reports and National Register Eligibility
  - Oakland Harbor Todd Shipyard
  - Oakland Harbor Berth 55-58

    - Oakland Harbor -42 Foot Navigation Study
    - Oakland Harbor -50 Foot Navigation Study
- Results of Native American Heritage Commission Search
- Results of Native American Consultation
- Archaeological Coverage (Field-Survey) and Site Location Maps

(b) T*he Oakland Harbor Turning Basins Widening Navigation Project Cultural Resources Preliminary Assessment of National Register Eligibility and Determination of Adverse Effects Report* includes the eligibility determinations and findings of "*No Historic Properties Affected*" pursuant to 36 CFR Part 800.4(d)(1) for the proposed undertaking. No cultural resources eligible for the National Register were identified in the current APE.

Previous studies completed for undertakings within the APE determined no historic properties OR historic properties that are not eligible for listing on the National Register based upon the SHPO's consensus, and are not subject to management under Section 106.

In accordance with regulations implementing Section 106 of the National Historic Preservation Act (NHPA), as amended, the USACE and the Port of Oakland determined that no historic properties are within the APE for the proposed Oakland Turning Basins Widening Navigation Study and no historic properties will be affected. We are requesting your review of our APE, efforts to identify historic properties, and consensus with our determination of "no historic properties affected." If you have any questions regarding this project, or need additional information, please contact Kathleen Ungvarsky at 415-503-6842 or email Kathleen.ungvarsky@usace.army.mil.

Sincerely,

Julie Beagle,
Chief, Environmental Planning Section

Enclosures

Oakland Harbor Turning Basins Widening Navigation Study

Cultural Resources Inventory Report

Administrative Draft

September 2021

PORT OF OAKLAND

Oakland Harbor Turning Basins Widening

Cultural Resources Inventory Report

Administrative Draft

Port of Oakland

U.S. Army Corps of Engineers

September 2021

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ACRONYMS

ACHP	Advisory Council on Historic Preservation
APE	area of potential effects
bgs	below ground surface
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CRHR	California Register of Historic Resources
CY	cubic yard
FISC	Fleet Industrial Supply Center
IHTB	Inner Harbor Channel and Inner Harbor Turning Basin
JRP	JRP Historical Consulting
LSA	LSA Associates, Inc.
MLLW	mean lower low water
NAHC	Native American Heritage Commission
NAS	Naval Air Station
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
OHP	Office of Historic Preservation
OHTB	Outer Harbor Channel and Outer Harbor Turning Basin
Port	Port of Oakland
SLC	State Lands Commission
SLF	Sacred Lands File
USACE	United States Army Corps of Engineers
USC	United States Code
USGS	United States Geological Survey
YBM	Young Bay Mud

Chapter 1. Introduction

The United States Army Corps of Engineers (USACE), as the federal lead agency, and the Port of Oakland (Port), as the nonfederal sponsor, are conducting the Oakland Harbor Turning Basins Widening Navigation Study. The purpose of the study is to determine if there is a technically feasible, economically justifiable, and environmentally acceptable recommendation for federal participation in a navigation improvement project to the constructed -50-Foot Oakland Harbor Navigation Project. The existing federal navigation channel was designed for a 6,500 20-foot equivalent units capacity ship, with a 1,139-foot length overall, 140-foot beam, and 48-foot draft, as part of the Oakland Harbor Navigation Improvement (-50-Foot) Project Study. The vessels routinely calling on the harbor today are longer, wider, and deeper than the design vessel from that study.

The Section 216 Initial Appraisal Report concluded that the problems in Oakland Harbor are caused by length limitations in the turning basins, not by depth limitations or landside capacity. The need for this navigation study arises from inefficiencies currently experienced by vessels in harbor, specifically the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-Foot Oakland Harbor Navigation Project. These inefficiencies are projected to continue in the future because vessel sizes are expected to increase.

This Cultural Resources Inventory Report discusses cultural resources (i.e., archaeological and historic architecture/built environment resources) present in the project area and is intended to support the preparation of National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) documentation for the study by USACE and the Port, respectively.

1.1. Project Location

The Oakland Harbor is on the eastern side of San Francisco Bay (Figure 1-1). It includes the Entrance Channel, the Outer Harbor Channel and Outer Harbor Turning Basin (OHTB), and the Inner Harbor Channel and Inner Harbor Turning Basin (IHTB). The Outer Harbor Channel is immediately south of the San Francisco-Oakland Bay Bridge and is maintained to a depth of -50 feet mean lower low water (MLLW). The Outer Harbor Channel and OHTB serve the existing TraPac and Ben E. Nutter terminals. The Inner Harbor Channel is also maintained to -50 feet MLLW through the Howard Terminal, which is approximately 2.5 miles from the Inner Harbor entrance. The Inner Harbor Channel and IHTB serve the existing Oakland International Container Terminal, Matson Terminal, and Schnitzer Steel Terminal. Berth 10, at the eastern of end of the Outer Harbor, serves as a dredged material rehandling facility.

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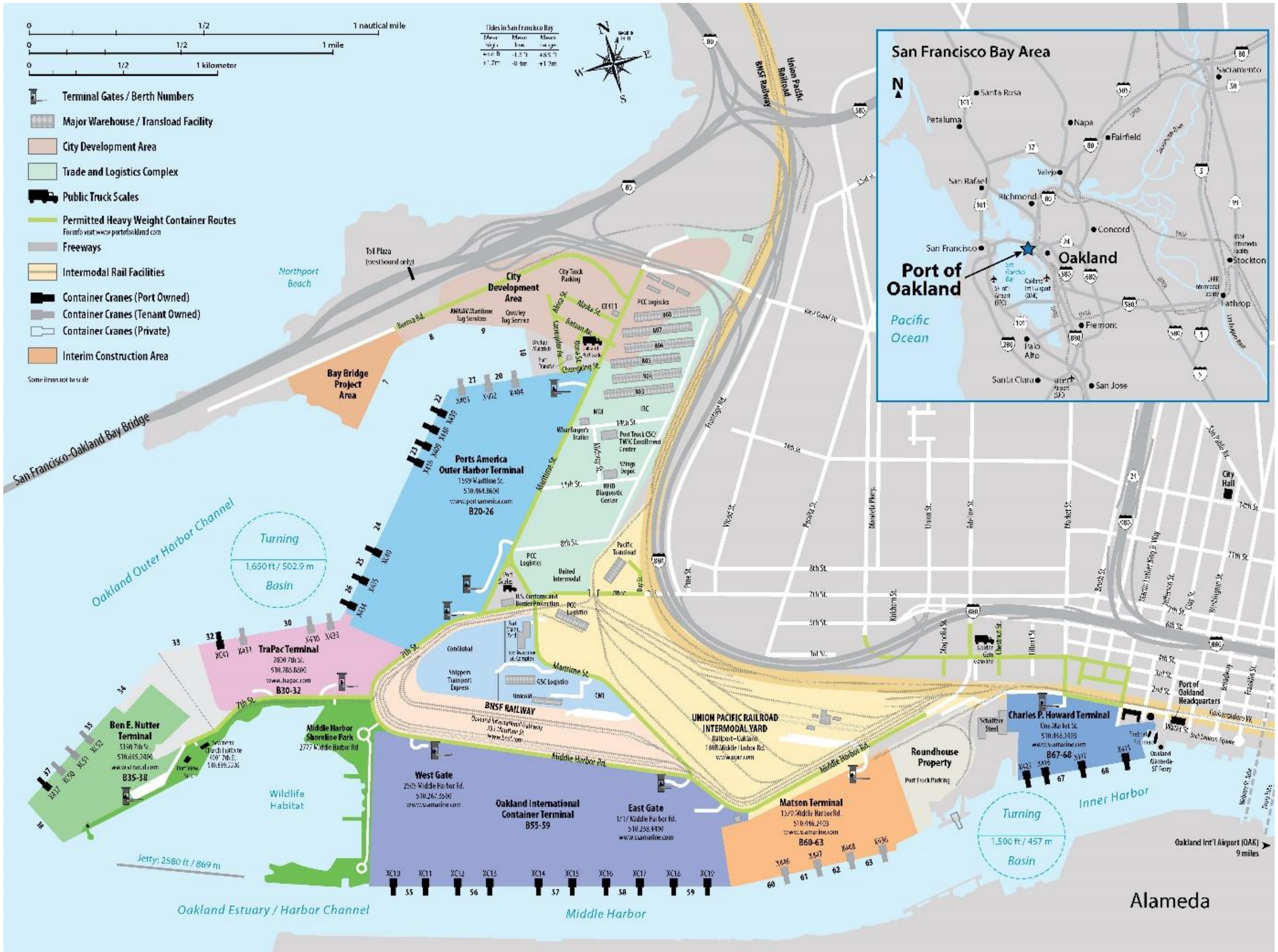

Figure 1-1 Current Port of Oakland Navigation Features

1.2. Description of Project Alternatives

Four project alternatives are under consideration:

1. Expansion of Inner Harbor Turning Basin Only
2. Expansion of Outer Harbor Turning Basin Only
3. Expansion of Inner and Outer Harbor Turning Basins
4. No Action/No Project

The Expansion of Inner and Outer Harbor Turning Basins Alternative is being considered with two variations: one in which diesel-powered dredges would be used for dredging, and the other in which electric-powered dredges would be used for dredging. The Expansion of Inner Harbor Turning Basin Only and Expansion of Outer Harbor Turning Basin Only Alternatives would use diesel-powered dredges.

Expansion of one or both turning basins would improve the efficiency and safety of vessels entering and exiting the Port; however, the project would not change the projected overall volumes of freight passing through the Port.

1.2.1. Expansion of Inner Harbor Turning Basin Only Alternative

The Expansion of Inner Harbor Turning Basin Only Alternative consists of widening the existing IHTB from 1,500 feet to 1,834 feet with a depth of -50 feet MLLW consistent with the existing IHTB. In addition to in-water work to widen the IHTB, land would be impacted in three locations: Schnitzer Steel, Howard Terminal, and private property located along the Alameda shoreline (Figure 1-2).

At Schnitzer Steel (in the northwestern corner of the widened IHTB in Figure 1-2), approximately 10,800 square feet (0.25 acre) of concrete pavement would be removed. Approximately 310 linear feet of new bulkhead would be installed landside, and approximately 13,710 CY of landside soil would be excavated between the new and existing bulkhead. Subsequently, 700 linear feet of new anchor/tie back (i.e., the lateral support structure for a bulkhead) would be installed, about 320 linear feet of existing bulkhead would be demolished, and an additional approximately 9,260 CY of material would be dredged.

Similar construction activities would occur at Howard Terminal (in the northeastern corner of the widened IHTB in Figure 1-2), including approximately 115,020 square feet (2.65 acres) of asphalt and concrete pavement removal, installation of 650 linear feet of new bulkhead, removal of 300 125-foot-long piles (approximately 4,360 CY), and excavation of 72,410 CY of landside soil between the new and existing bulkhead. Subsequently, 1,300 linear feet of anchor/ tie-back would be installed, 900 linear feet of existing bulkhead would be removed, and an additional approximate 191,670 CY of material would be dredged.

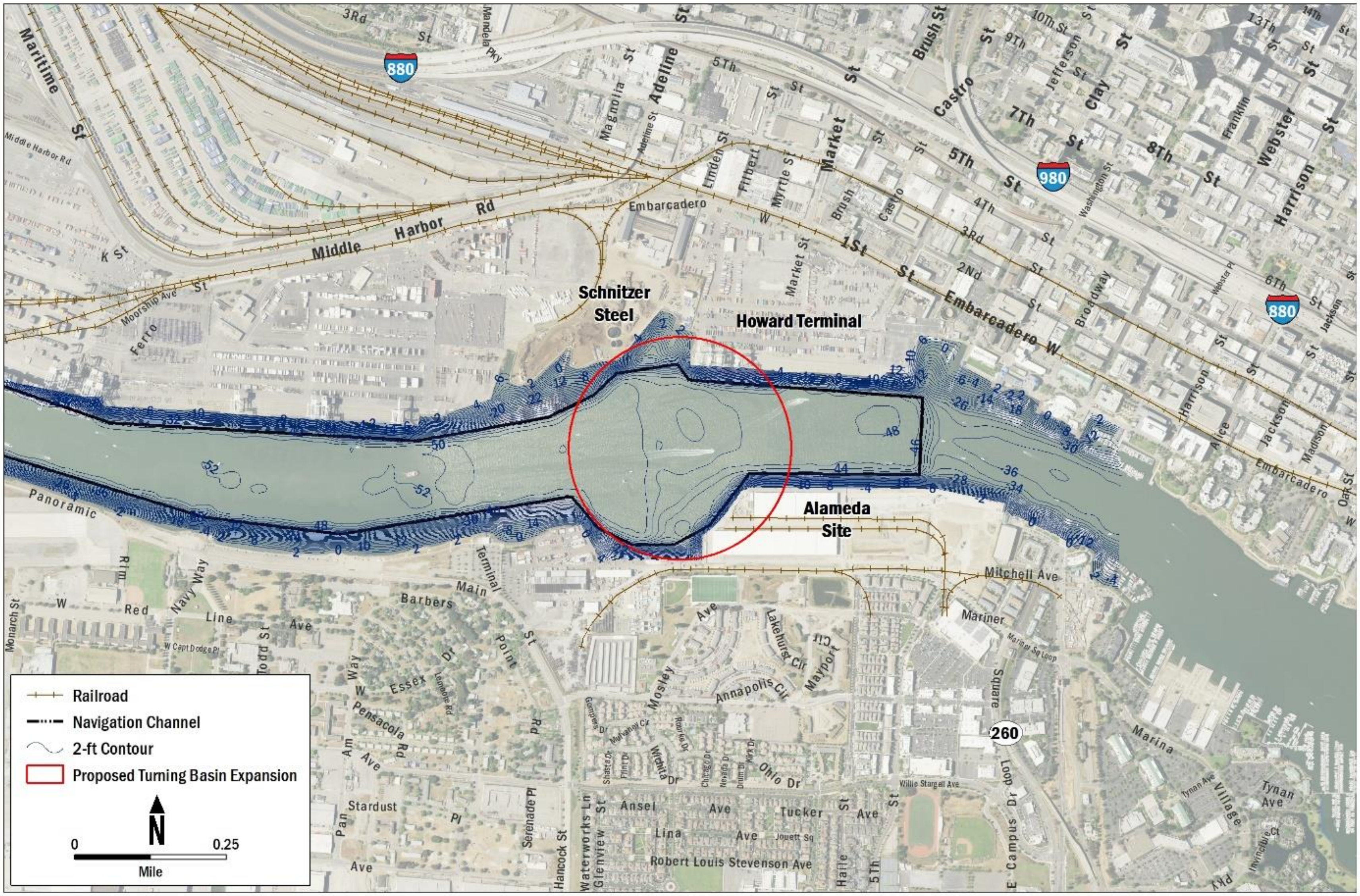

Figure 1-2: Proposed Expansion of IHTB

Expansion at the Alameda site (in the southeastern portion of the widened IHTB in Figure 1-2) would require partial demolition of two existing warehouses (an estimated maximum of 260,000 square feet of demolition). Similar to the Schnitzer Steel and Howard Terminal sites, additional Alameda improvements include 216,000 square feet (5 acres) of asphalt and concrete pavement removal, installation of 1,050 linear feet of new bulkhead, removal of 2,300 65-foot long piles (approximately 17,390 CY), excavation of 135,370 CY of landside soil between the new and existing bulkhead, installation of 2,100 linear feet of anchor/ tie-back, removal of 1,250 linear feet of existing bulkhead, and dredging of approximately 358,330 CY of material from the Alameda site.

For the Howard Terminal and Alameda sites, landside excavation of soils would occur to a depth of approximately -5 feet MLLW, which is approximately 17 feet below existing ground surface elevations. At Schnitzer Steel, landside excavation of soils would occur to a depth of approximately -25 feet MLLW, which is approximately 37 feet below existing ground surface elevation. Due to the historical industrial use of these sites and the documented presence of contaminants underlying portions of the Schnitzer Steel and Howard Terminal properties, for the purpose of this study it is assumed that landside excavated materials would be disposed at a Class I or Class II landfill. Material below the limits of landside excavation at each site would be dredged following removal of the existing bulkhead; for the purpose of this study, it is assumed that all dredged material would be suitable for beneficial reuse. In addition, for all three sites, the depth of sheet pile/bulkhead installation and removal is assumed to be 65 feet below ground surface. Dredging of approximately 320,000 CY of existing Inner Harbor sediments would also be required. Volumes of material to be excavated landside or dredged for IHTB expansion are summarized in the table below.

Landside Excavation and Dredging Quantities for IHTB Expansion

Location	Landside Soil Excavation (cubic yards)	Sediment Dredging (cubic yards)
Schnitzer Steel	13,710	9,260
Howard Terminal	72,410	191,670
Alameda	135,370	358,330
Non-land areas		320,000

Construction staging, including a construction trailer, equipment and construction materials storage, and soil stockpiles, would occur at Howard Terminal and the Alameda property immediately adjacent to the excavation areas; no staging would occur at Schnitzer Steel.

Construction is expected to last approximately 2 years and 4 months, beginning in July 2027. Construction, excluding dredging, would occur Monday through Friday between the hours of 7 a.m. and 7 p.m. During the first year of construction, the land-based activities would be completed at Howard Terminal and Schnitzer Steel (concurrent construction would occur at these locations for approximately 3 months). Marine-based construction (sheet pile/bulkhead removal) and dredging is anticipated to be conducted at Howard Terminal and Schnitzer Steel during the 2028 in-water work window. Land-based construction at the Alameda property is expected to commence in May 2028 and take approximately 1 year to complete. Marine-based construction (sheet pile/bulkhead removal) and dredging at the Alameda property and dredging of sediments in the Inner Harbor Channel would be conducted during the 2029 in-water work window. The sheet pile for the new bulkheads would be installed landside.. The schedule for the for the Expansion of Inner Harbor Turning Basin Only Alternative would be the same as that shown in Figure 1-4 for the Expansion of Inner and Outer Harbor Turning Basins Alternative, excluding the Outer Harbor Turning Basin component.

Equipment for pavement removal, landside excavation, warehouse demolition, pile removal, sheet pile/bulkhead removal and installation, and anchor/tie-back installation would include backhoes/front loaders, concrete saws, cranes, bulldozers, excavators, dump trucks, drilling rigs, barges, dive vessels, pile drivers, vibratory hammers, tugboats, compressors, and generators. Depending on the concurrent activities occurring over the course of construction, the number of construction workers at any given time would range from approximately eight to 40 (excluding dredging operations described below).

Excavated landside material, removed piles, and debris from warehouse demolition at the Schnitzer Steel, Howard Terminal and Alameda sites would be hauled off site for disposal at a Class I or Class II landfill. Approximately 15,600 CY of excavated landside material from the three sites would require disposal at a Class I landfill. Assuming each truck would haul 10 CY of material, this would require approximately 1,560 truck trips for transport. Approximately 198,500 CY of excavated landside material from the three sites would require disposal at a Class II landfill, along with the removed piles and warehouse demolition debris, requiring approximately 23,380 truck trips for transport.

Dredging would be conducted with a diesel-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport for beneficial reuse or to Berth 10 for rehandling prior to transport via truck to a landfill. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site or to Berth 10, and tugboats for positioning the barge and towing the scows. Approximately 63,700 CY of dredged Inner Harbor sediments would require disposal at a Class II landfill. Assuming each truck would haul 10 CY of material, this would require approximately 6,370 truck trips for transport from Berth 10. Approximately 26 workers would be required for the dredging operation and approximately 28 workers would be required for rehandling operations at Berth 10. Dredging would be conducted 24 hours per day on weekdays (Monday through Friday) and may be conducted on weekends, if necessary.. Silt curtains would be used during dredging to minimize impacts to the aquatic environment.

1.2.2. Expansion of Outer Harbor Turning Basin Only Alternative

The Expansion of Outer Harbor Turning Basin Only Alternative consists of widening the existing OHTB from 1,650 to 1,965 feet. The proposed expanded OHTB relative to the current limits of the navigation channel is shown in Figure 1-3. There are no land impacts under the proposed footprint of the expanded OHTB. This alternative involves dredging 862,000 CY of material to widen the basin to a depth of -50 feet MLLW.

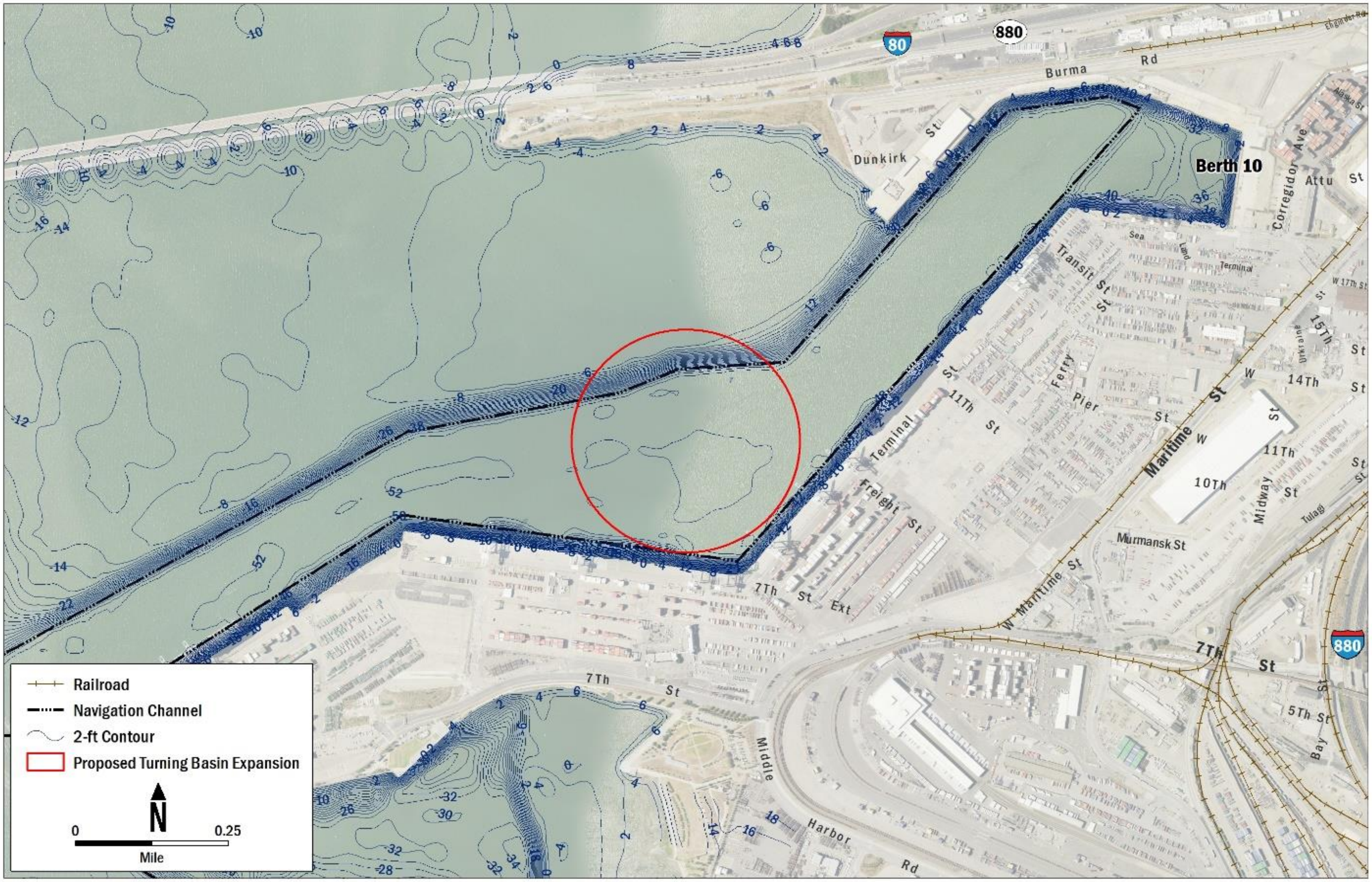

Figure 1-3: Proposed Expansion of OHTB

Dredging would be conducted with a diesel-powered barge-mounted excavator dredge with a clamshell bucket; dredged material would be placed onto scows for transport to a beneficial reuse site. Dredge equipment includes a barge-mounted excavator dredge with a clamshell bucket, scows for dredged material transport to the beneficial reuse site, and tugboats for positioning of the barge and towing the scows to the reuse site. Approximately 26 workers would be required for the dredging operation. Dredging is expected to be conducted during the 2027 in-water work window (June 1through November 30). Dredging would be conducted 24 hours per day on weekdays (Monday through Friday) and on weekends, if necessary, over a 6-month period (the entire in-water work window). Silt curtains would be used during dredging to minimize impacts to the aquatic environment. Construction staging would occur at Berth 10, at the eastern end of the Outer Harbor.

1.2.3. Expansion of Inner and Outer Harbor Turning Basins Alternative

Under this alternative, both the IHTB and OHTB would be expanded, allowing larger vessels easier access to all existing Port terminals. The proposed improvements and construction methods for each turning basin would be the same as those described for the individual turning basin expansion alternatives under Sections 1.2.1 and 1.2.2 above.

Similar to the Inner Harbor Turning Basin Only Alternative, the construction of this alternative would span over 2 years and 4 months, with an estimated start in July 2027. The sequencing of activities would be the same as described under Section 1.2.1, with the addition of dredging of the OHTB during the 2028 in-water work window (Figure 1-4).

Electric Dredging Variation

A variation of this alternative is being considered that would involve the use of an electric-powered barge-mounted clamshell/excavator dredge instead of a diesel-powered dredge. All other elements of the IHTB and OHTB expansion would be the same as described above.

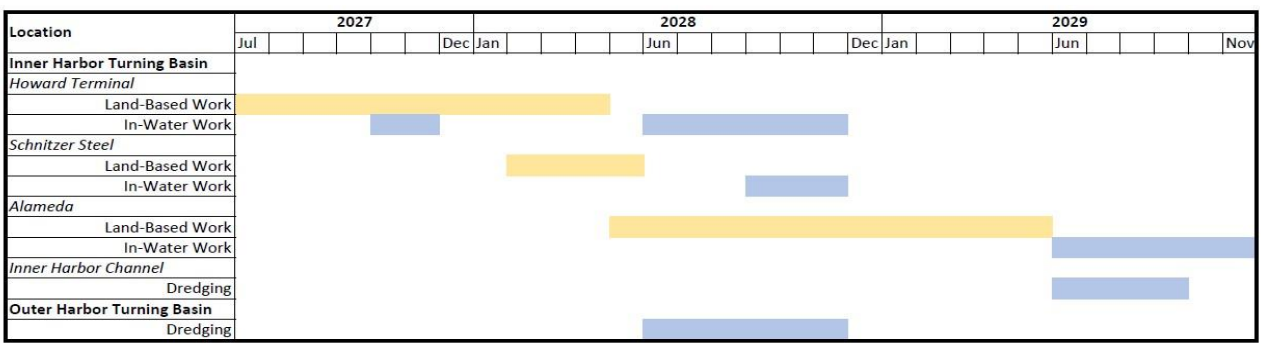

Figure 1-4: Expansion of Inner and Outer Harbor Turning Basins Alternative Construction Schedule

1.2.4. No Action/No Project Alternative

Under NEPA a No Action Alternative is analyzed as a benchmark to compare the magnitude of the potential environmental effects caused by the action alternatives. Under this alternative, the two turning basins would each remain at their existing dimensions and associated limitations, delays, safety issues, and inefficiencies in vessel operations would continue indefinitely**.**

1.3. Area of Potential Effects

The area of potential effects (APE) is defined as the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (Title 36, Section 800.16[b] of the Code of Federal Regulations [CFR] [36 CFR 800.16(b)]). The APE for the current undertaking as it pertains to both archaeological and historic architectural resources comprises all areas of the proposed project where project implementation could have direct impacts to cultural resources, should there be any present.

1.3.1. Horizontal Area of Potential Effect

To delineate the horizontal extent of the APE for the proposed undertaking, USACE in consultation with the Port used the boundaries of the entire area that could experience physical disturbance as a result of project implementation. The APE addresses only direct effects within the limit of construction because the proposed undertaking would not introduce new features that could result in effects to the setting of neighboring historic resources known to occur in the vicinity of the Port. The APE for this undertaking thus comprises the proposed construction footprints for the IHTB and OHTB. Construction staging would occur in developed areas adjacent to the proposed construction areas at Howard Terminal and the Alameda site, and at Berth 10. Because no ground disturbance is proposed at these staging areas, they are not considered to be part of the APE. Similarly, existing roads would be used to provide ingress and egress to the project area. Accordingly, the roads to be used are likewise not included in the APE defined for the project. Figure 1-2 is a United States Geological Survey (USGS)-based map depicting both the IHTB and OHTB, showing the limits of construction that comprises the APE for the proposed project (please also refer to **Error! Reference source not found.** and **Error! Reference source not found.**, which depict the construction limits in aerial-based imagery).

1.3.2. Vertical Area of Potential Effect

The APE for this undertaking includes all areas of potential sediment and upland ground-disturbing activity in association with the expansion of the turning basins, including buried/ submerged archaeological resources.

As determined from the construction details provided in Sections 1.3 and 1.4 above, the new bulkhead walls for the IHTB would require installation of sheet piles to a depth of 65 feet bgs. The expansion of both the IHTB and OHTB include excavation and dredging to a maximum depth a depth of -50 feet MLLW, which equates to roughly 45 feet or less of actual sediment dredging in presently inundated areas.

From the details provided above, the maximum depth of the APE for the current undertaking is 65 feet bgs, which corresponds to the replacement of sheet piles for installation of the bulkhead walls for the IHTB.

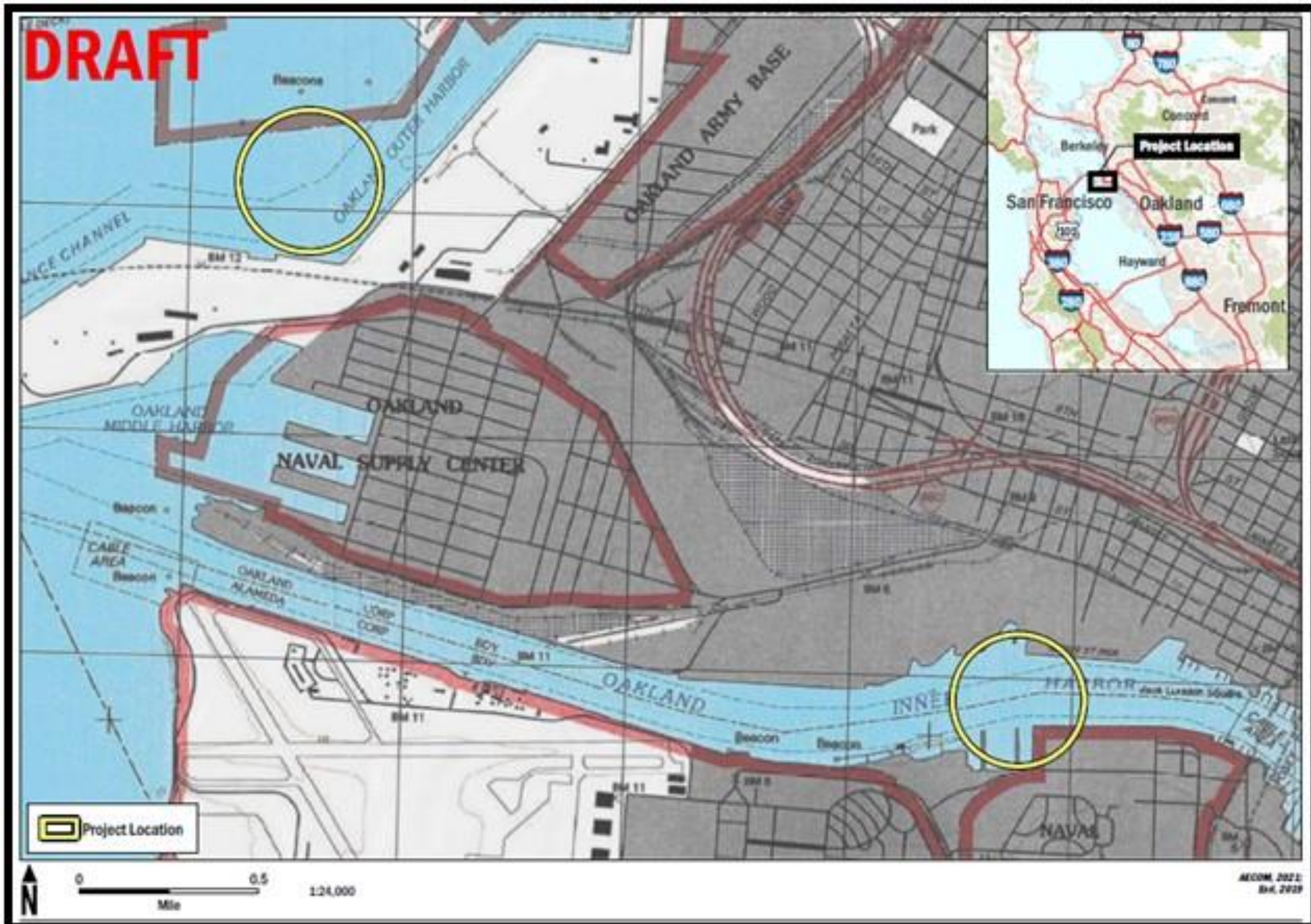

Figure 1-2 Area of Potential Effects

Chapter 2. Regulatory Setting

Cultural resources are typically buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance. Numerous laws, regulations, and statutes, on both the federal and state levels, seek to protect and target the management of cultural resources.

2.1. Federal Regulations

2.1.1. National Historic Preservation Act

The National Historic Preservation Act (NHPA) (16 United States Code [USC] 470 et seq.) declares federal policy to protect historic sites and values, in cooperation with other nations, states, and local governments. Subsequent amendments designated the State Historic Preservation Officer as the individual responsible for administering state-level programs. The act also created the President's Advisory Council on Historic Preservation (ACHP). Federal agencies are required to consider the effects of their undertakings on historic resources, and to give the ACHP a reasonable opportunity to comment on those undertakings. Federal agencies are required by statute to "take into account" the effects of their actions and undertakings on "historic properties." A historic property is the federal term that refers to cultural resources (e.g., prehistoric or historical archaeological sites, maritime historical resources including shipwrecks, buildings, and structures on the shore or in the water, and cultural artifacts) that are 50 or more years old, possess integrity, and meet the criteria of the National Register of Historic Places (NRHP). The NRHP eligibility criteria are found at 36 CFR Section 60.4. A lead federal agency is responsible for project compliance with Section 106 of the NHPA and its implementing regulations, set forth by the ACHP at 36 CFR Part 800.

2.1.2. Submerged Lands Act

The Submerged Lands Act established state jurisdiction over offshore lands within 3 miles of shore (or 3 marine leagues for Texas and the Gulf Coast of Florida). The act did reaffirm the federal claim to the Outer Continental Shelf, which consists of those submerged lands seaward of state jurisdiction. However, the act limited states' claims to the submerged lands inside the landward boundary of the Outer Continental Shelf. Several federal courts rejected, for various reasons, state positions on historic preservation laws that pertained to shipwrecks within this 3-mile zone. Judicial conclusions from cases involving the Submerged Lands Act were inconsistent, yet shipwrecks in state waters were still at risk from damage and destruction. These circumstances provided the momentum for the passage of the Abandoned Shipwreck Act, which largely superseded the Submerged Lands Act.

2.1.3. Abandoned Shipwreck Act

The Abandoned Shipwreck Act (43 USC 2101–2106) is a federal legislative act, but does protect shipwrecks found in state waters. The Abandoned Shipwreck Act also states that the laws of salvage and finds do not apply to abandoned shipwrecks protected by the act. Under the Abandoned Shipwreck Act, the United States asserts title to abandoned shipwrecks in state waters that are either:

- Embedded in state-submerged lands;
- Embedded in the coralline formations protected by a state on submerged lands; or
- Resting on state-submerged lands and are either included in or determined eligible for the NRHP.

The Abandoned Shipwreck Act also has a provision for the simultaneous transfer, by the federal government, of title for those abandoned shipwrecks to the state(s) in whose waters the wrecks are located.

2.1.4. American Indian Religious Freedom Act

The American Indian Religious Freedom Act (42 USC 1996, et seq.), regulated under 43 CFR 7, has been established to protect religious practices, ethnic heritage sites, and land uses of Native Americans. The Act makes it a policy to protect and preserve for American Indians, Eskimos, Aleuts, and Native Hawaiians their inherent right of freedom to believe, express, and exercise their traditional religions. The Act allows them access to sites, use and possession of sacred objects, and freedom to worship through ceremonial and traditional rights. It further directs various federal departments, agencies, and other instrumentalities responsible for administering relevant laws to evaluate their policies and procedures in consultation with Native American traditional religious leaders to determine changes necessary to protect and preserve Native American cultural and religious practices.

2.2. State Regulations

In California, cultural resources include archaeological and historical objects, sites and districts; historic buildings and structures; cultural landscapes; and sites and resources of concern to local Native American and other ethnic groups. Compliance procedures are set forth in CEQA, California Public Resources Code (PRC) Sections 15064.5 and 15126.4. The primary applicable state laws and codes are presented below.

California Native American Graves Protection and Repatriation Act (2001). In the California Health and Safety Code, Division 7, Part 2, Chapter 5 (Sections 8010-8030), broad provisions are made for the protection of Native American cultural resources. The Act sets the state policy to ensure that all California Native American human remains and cultural items are treated with due respect and dignity. The Act also provides the mechanism for disclosure and return of human remains and cultural items held by publicly funded agencies and museums in California. Likewise, the Act outlines the mechanism with which California Native American tribes not recognized by the federal government may file claims to human remains and cultural items held in agencies or museums.

California PRC, Section 5020. This California code created the California Historic Landmarks Committee in 1939. It authorizes the Department of Parks and Recreation to designate Registered Historical Landmarks and Registered Points of Historical Interest.

California PRC, Section 5097.9. PRC Section 5097.9 details procedures to be followed whenever Native American remains are discovered. It states that no public agency, and no private party using or occupying public property, or operating on public property, under a public license, permit, grant, lease, or contract made on or after July 1, 1977, shall interfere with the free expression or exercise of Native American religion as provided in the United States Constitution and the California Constitution. It further states that no such agency or party shall cause severe or irreparable damage to any Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine on public property, except on a clear and convincing showing that the public interest and necessity so require.

California PRC, Section 7050.5. Every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor, except as provided in Section 5097.99 of the PRC. In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, the PRC states that there shall be no further excavation or disturbance of the site, or any nearby area reasonably suspected to overlie adjacent remains, until the coroner of the county in which the human remains are discovered has determined the remains to be archaeological. If the coroner determines that the remains are not subject to his or her authority, and if the coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact the Native American Heritage Commission (NAHC) by telephone within 24 hours.

California Health and Safety Code, Section 7051. Under this code, every person who removes any part of any human remains from any place where it has been interred, or from any place where it is deposited while awaiting interment or cremation, with intent to sell it or to dissect it, without authority of law, or written permission of the person or persons having the right to control the remains under Section 7100, or with malice or wantonness, has committed a public offense that is punishable by imprisonment in the state prison.

California Code of Regulations, Title 14, Section 4307. Under this state preservation law, no person shall remove, injure, deface, or destroy any object of paleontological, archaeological, or historical interest or value.

2.3. Significance Criteria

This report is intended to support USACE’s NEPA compliance and to address their Section 106 obligations; and to serve the Port’s requirements under CEQA. Accordingly, federal and state significance criteria as well as the conformity between these criteria are presented in the following sections.

2.3.1. Federal Significance Criteria

The four evaluation criteria to determine a resource’s eligibility to the NRHP, in accordance with the regulations outlined in 36 CFR 800, are identified at 36 CFR 60.4. These evaluation criteria, listed below, are used to assist in determining what properties should be considered for protection from destruction or impairment resulting from project-related activities (36 CFR 60.2).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

a. Resources that are associated with events that have made a significant contribution to the broad patterns of our history; or

b. Resources that are associated with the lives of persons significant in our past; or
c. Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d. Resources that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

2.3.2. State Significance Criteria

In considering impact significance under CEQA, the significance of the resource itself must first be determined. At the state level, consideration of significance as an "important archaeological resource" is measured by cultural resource provisions considered under PRC Sections 15064.5 and 15126.4, and the draft criteria regarding resource eligibility to the California Register of Historic Resources (CRHR).

Generally, under CEQA, a historical resource (these include built-environment historic and prehistoric archaeological resources) is considered significant if it meets the criteria for listing on the CRHR. These criteria are set forth in PRC Section 15064.5 and are defined as any resource that:

a. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
b. Is associated with lives of persons important in our past;
c. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
d. Has yielded, or may be likely to yield, information important in prehistory or history.

Section 15064.5 of CEQA also assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. These procedures are detailed under California PRC Section 5097.98.

Impacts to "unique archaeological resources" are also considered under CEQA, as described under PRC Section 21083.2. A unique archaeological resource implies an archaeological artifact, object, or site about which it can be clearly demonstrated that—without merely adding to the current body of knowledge—there is a high probability that it meets one of the following criteria:

a. The archaeological artifact, object, or site contains information needed to answer important scientific questions, and there is a demonstrable public interest in that information;
b. The archaeological artifact, object, or site has a special and particular quality, such as being the oldest of its type or the best available example of its type; or
c. The archaeological artifact, object, or site is directly associated with a scientifically recognized important prehistoric or historic event or person.

The lead agency shall first determine whether an archeological resource is an historical resource before evaluating the resource as a unique archaeological resource (CEQA Guidelines 15064.5 [c] [1]). A nonunique archaeological resource is an archaeological artifact, object, or site that does not meet the above criteria. Impacts to nonunique archaeological resources and resources that do not qualify for listing on the CRHR receive no further consideration under CEQA.

Under CEQA Section 15064.5, a project would potentially have significant impacts if it would cause substantial adverse change in the significance of one of the following:

a. A historical resource (i.e., a cultural resource eligible for the CRHR);
b. An archaeological resource (defined as a unique archaeological resource which does not meet CRHR criteria); or
c. Human remains (i.e., where the project would disturb or destroy burials).

A nonunique archaeological resource is given no further consideration, other than the simple recording of its existence, by the lead agency.

2.3.3. Conformity of Federal and State Evaluation Criteria

The criteria for eligibility for the CRHR are very similar to those that qualify a property for the NRHP, which is the significance assessment tool used under the NHPA. The criteria of the NRHP apply when a project has federal involvement.

A property that is eligible for the NRHP is also eligible to the CRHR. All potential impacts to significant resources under a federal agency must be assessed and addressed under the procedures of Section 106 of the NHPA, set forth at 36 CFR 800. All resources encountered during the project, with the exception of isolate artifacts and isolate features that appear to lack integrity or data potential, will be evaluated for significance in regard to Section 106.

Chapter 3. Environmental and Cultural Setting

Because cultural resources, both archaeological and historic architecture, are best identified and assessed in association with their natural and cultural contexts, brief discussions of the natural and cultural settings of the APE and surrounding area are provided below.

3.1. Natural Setting

The San Francisco Bay region consists of a varied landscape of estuaries, plains, rolling hills, and rugged ridge lands. Dominating the landscape is the Bay itself, a 50-mile-long inland chain of salt-water estuaries (Milliken 1995:14). The eastern shore of San Francisco Bay is bordered by a broad, sloping plain, broken by isolated hills and ridges (Wallace and Lathrap 1975:1-2). Widely separated valleys, containing small streams that normally flow at all seasons, cut across this plain in an east-west direction. The plain extends gently upward to the Oakland/Berkeley Hills, a prominent range 15 miles long and 10 miles wide (Wallace and Lathrap 1975:2).

The local climate is typified by clear summer days and mild, cool winters (Josselyn 1983:21). The climate, sometimes classified as Mediterranean, consists of two seasons. The rainy season extends from late October to mid-April, a period during which 94 percent of the annual precipitation falls (Josselyn 1983:21). The dry season is influenced by cool marine air along the coast, and hot, dry weather inland.

3.1.1. Paleoenvironment

Because the early Native Americans were dependent entirely on natural resources, their lifeways can be understood fully only with reference to the land and climate (Moratto 1984:2). During the prehistoric period, the Bay Area featured a mosaic of plant communities ranging from salt marsh to redwood forest to grassland to mixed-evergreen woodland (Moratto 1984:221). The East Bay plain was predominately grass covered, with patches of brush and coast live oak groves (Wallace and Lathrap 1975:2; Chavez 1989). Vegetation was most dense along the freshwater drainages, which supported yellow willow, California laurel, California buckeye, and coast live oaks (Wallace and Lathrap 1975; Chavez 1989).

San Francisco Bay, as we now know it, was formed during a period of relatively rapid sea-level rise (an average rate of 2 centimeters per year) between 9,000 and 6,000 B.C. (Stright 1990:451). After 4,000 B.C., when the sea-level rise slowed to a rate of 0.1 to 0.2 centimeters per year, marshes began to develop around the Bay. During this post-4,000 B.C. period, numerous shell middens were created as a result of human activity in the Bay Area (Stright 1990:451). Because of rising sea levels, many early sites may have been destroyed or may currently be submerged. The changing environment would have also played a role in shifts in subsistence through time (Bickel 1978; Moratto 1984).

A marked slowing in the rate of sea-level rise occurred approximately 6,000 B.C. (Bickel 1978:11; Josselyn 1983:6). Eventually, sedimentation rates exceeded the sea-level rise and extensive intertidal mudflats developed (Bickel 1978:11; Josselyn 1983:6). Many of the marshlands surrounding the Bay were established no more than 3,000 years ago (Moratto 1984:221).

The growth of the marshes is of archaeological interest because most of the San Francisco Bay shell middens were near marshes (Nelson 1909; Bickel 1978). Marshes are particularly productive ecosystems. The area's prehistoric populations took advantage of this productivity by harvesting fish, shellfish, birds, and land mammals that live or feed in or near the marsh, as well as the marsh plants themselves (Bickel 1978:12).

The present-day tidal wetlands have been greatly impacted by anthropogenic influences, and we can now only infer how prehistoric marshes may have appeared (Josselyn 1983:6). The most dramatic changes occurred during the period of hydraulic mining for gold in the Sierra Nevada (1855-1884). Sediments resulting from the removal of overburden flowed into streams, and fine sediments reached Suisun and San Pablo Bays, causing widespread shoaling (Josselyn 1983:12). Prior to historic-period development described below, both the IHTB and OHTB were undeveloped marshlands (intertidal). The urbanization of the Bay Area in the post-World War II era has also encroached substantially on the remaining tidal wetlands.

3.2. Prehistoric Context

The first regional chronology for the Bay Area was established by R.K. Beardsley in 1948 (Beardsley, 1948, 1954a, 1954b). This scheme was originally devised for chronologically organizing sites from Central California, the Sacramento Delta, and the northern San Joaquin Valley (Lillard et al. 1939). Beardsley (1954a) refined this scheme, which became known as the Central California Taxonomic System (Moratto 1984). The system relies on identifying certain characteristics such as burial patterns (whether the body is flexed or extended), shell bead types, stone tools, and even where the sites tend to occur. These traits and characteristics are used to place a site in a specific time period. The system is still widely used by archaeologists, and organizes the archaeology of the region as follows:

- Paleoindian: earlier than 8,000 years ago
- Early Horizon: 8,000 to 2,500 years ago
- Middle Horizon: 2,500 to 1,100 years ago
- Late Horizon: 1,100 to 200 years ago
- Historic: 200 years ago, to modern times

Scholars have debated whether the Early Horizon inhabitants of the Central Valley were culturally related to inhabitants of San Francisco Bay, or if they developed independently (Bickel 1981; Gerow and Force 1968). The exact dynamics of cultural change and interchange between these two groups is still unclear.

It has been suggested that the Early Middle Horizon (4,500 to 2,500 years ago), now referred to as the Windmiller Pattern, is associated with an influx of peoples from outside of California who brought with them an adaptation to river-wetland environments (Moratto 1984:207). Typical Windmiller sites are often situated in riverine, marshland, and valley floors, settings that offer a variety of plant and animal resources. These sites often contain burials that are extended ventrally and oriented to the west. Burial artifacts include a variety of fishing paraphernalia (net weights, spear points, and bone hooks) and large projectile points, as well as large and small mammal remains.

The subsequent Middle Horizon or Berkeley Pattern covers a period from 2,500 to 1,500 years ago in Northern California. This pattern overlaps somewhat with the Windmiller attributes at the beginning and with the late Prehistoric artifacts at the end. Berkeley Pattern sites are much more common and well documented; therefore, they are better understood than the Windmiller sites. The sites are distributed in more diverse environmental settings, although a riverine focus is common. As described by Allan et al. (1997:9), sites from this period include deeply stratified midden deposits containing large assemblages of milling and grinding stones for the processing of vegetal resources, as well as smaller, lighter projectile points. Further distinguishing traits from earlier patterns include artifacts such as slate pendants, steatite beads, stone tubes, and ear ornaments. A shift in burial patterning is also evident with variable directional orientation, flexed body positioning, and a general reduction in mortuary goods (Fredrickson 1973; Moratto 1984).

Fredrickson (1973) has defined the later prehistoric period, which ranges from 1,500 to 150 years ago, as the Augustine Pattern. The pattern is characterized by intensive hunting, fishing, and gathering, a focus on acorn processing, large population increases, intensified trade and exchange networks, more complex ceremonial and social attributes, and the practice of cremation in addition to flexed burials. As pointed out by Allan et al. (1997:9), certain artifacts also typify the pattern: bone awls for use in basketry manufacture, small notched and serrated projectile points, the introduction of the bow and arrow, occasional pottery, clay effigies, bone whistles, and stone pipes.

3.3. Ethnographic Context

Based on linguistic and archaeological evidence, it is believe that Penutian-speaking peoples entered the Bay Area from the Sacramento River Delta region, displacing or replacing speakers of Hokan stock languages of the Bay Area, such as Esselen (Kroeber 1925; Moratto 1984:552). The proto-Costanoan homeland was probably in the East Bay area, possibly in the Carquinez Straits vicinity (Moratto 1984:554).

By around 1500 B.C., Costanoans occupied most of the eastern shore of San Francisco Bay, presumably displacing or assimilating older Esselen language speakers as they advanced (Moratto 1984:554). Moratto (1984:207) indicates that the Berkeley Pattern, including the components previously assigned to the Middle Horizon, is attributable to the emergence of the Costanoan peoples.

The project area is situated within the *Chochenyo* territory of the Costanoan Indians. Costanoan is not a native term, but rather is derived from the Spanish word *Costanos*, meaning coast people (Kroeber 1925:462). The term Ohlone is preferred by tribal groups representing the area.

The basic unit of the Ohlone political organization was the tribelet, consisting of one or more socially linked villages and smaller settlements within a recognized territory (Moratto 1984:225). Principal villages were established at ecotones; that is, junctures of two or more biotic communities (e.g., oak woodland – bayshore marsh) (Moratto 1984:225).

Subsistence activities emphasized gathering berries, greens, and bulbs; harvesting seeds and nuts—of which acorn was the most important; hunting for elk, deer, pronghorn, and smaller animals; collecting shellfish; and taking varied fishes in stream, bay, lagoon, and open coastal waters (Moratto 1984:225).

The population and traditional lifeways of the Ohlone were severely affected by the influences of the Spanish colonists and the Mission system. As the result of enforced missionization, disease, and direct assault, by 1800, few if any Ohlone remained on the land or subsisted in native lifeways; in fact, native population had declined in some areas by as much as 90 percent.

3.4. Historic Context

3.4.1. The Spanish Period

Spanish explorers first sighted San Francisco Bay in 1769, and a Spanish supply ship entered it in 1775. The first settlers—Spanish soldiers and missionaries—arrived in the Bay Area in 1776. The native Ohlone culture was radically transformed when European settlers moved into northern California, instituting the mission system and exposing the native population to diseases to which they had no immunity. Mission San Francisco de Asis (Mission Dolores) was founded in 1776, and still remains across the Bay, approximately 7 miles southwest of the APE. The Mission drew native people from the entire Bay Area, and Mission records indicate that the native Huchiun moved to the Mission from 1787 until 1805 (Archaeological/Historical Consultants 1993; Minor 2000; LSA 2011).

By the 1820s, the Bay Area had a Spanish fort, town, and five missions in the region. During this period, large tracts of land were granted to individuals for cattle ranches. The hide and tallow trade were the main economic activity in California during this time. Following the dissolution of the mission system in 1834, native people in the Bay Area moved to ranchos, where they worked as manual laborers. In 1820, the King of Spain granted Don Luis Maria Peralta the Rancho San Antonio (also known as the Peralta Grant), which comprised approximately 44,800 acres, and all of the present-day cities of Oakland, Piedmont, Berkeley, Emeryville, Alameda, Albany, and part of San Leandro (Archaeological/Historical Consultants 1993; Minor 2000; LSA 2011).

3.4.2. The Mexican Period

Following Mexico's independence from Spain in 1821, the hide and tallow trade continued to be a dominant industry in the Bay Area and throughout California. Peralta's land grant was confirmed after Mexico's independence from Spain in 1822, and the title would be honored again when California entered the Union in 1848. The Peralta family and other, smaller ranchers raised cattle along the hills and grasslands, and shipped hides and tallow from the Bay. Before Don Luis Peralta died, he divided his vast estate among his four surviving sons. Antonio Maria Peralta received all of Alameda and much of Oakland (Archaeological/Historical Consultants 1993; Minor 2000).

3.4.3. American Period

In 1850, Colonel Henry S. Fitch attempted to make the first purchase of land that would become Oakland; a year later, William Worthington Chipman and Gideon Aughinbaugh purchased from Antonio Peralta the 160-acre "Encinal" on the peninsula of what is now the island of Alameda. The township of Oakland was incorporated in 1852, following settlement by squatters in 1849–1850 on lands that were part of the Peralta family's Rancho San Antonio. During the 1850s and 1860s, Oakland developed as a small residential and industrial center. According to the 1860

United States Census, the population of Oakland had reached 1,543, and 10 years later the national census reported 10,500 residents (Bagwell 1982:41–42).

Oakland's development during this period was aided by its ability to provide goods and services to San Francisco, and by its proximity to natural resources (Douglass 2004:31). The creation of new and more extensive transportation networks, which delivered those goods and services to San Francisco and beyond, was central to the area's development. In 1863, a wharf was constructed at the foot of 7th Street to provide ferry service to San Francisco. That same year, a daily rail service was built along 7th Street, connecting downtown Oakland to the ferry terminal (Bagwell 1982:47). The Encinal train station was built in 1864; by 1869, Oakland was the western terminus for the first transcontinental railway (Hoover and Kyle 2002). The Alameda pier was built in 1884, providing a transportation connection for rails to ferries. The Central and Southern Pacific railroads merged in 1894, leading the pier to become known as the Alameda Mole. During the 1890s, streetcars gradually replaced horsecars, and new transit routes allowed residents to more easily travel between the communities of Oakland, Alameda, Berkeley, and Fruitvale (Rice et al. 2002:251).

With the completion of the Bay Bridge in 1936 and the increasing reliance on automobiles for routine transportation needs, suburbs expanded, leading to land use changes across the East Bay. West Oakland became a center of the African American community in the twentieth century, particularly because "red-lining" practices limited access to rental properties and home ownership east of Grove Street (now Martin Luther King Boulevard) (Baker 2015:10). The post-war period brought additional changes through expansive freeway construction, which resulted in the demolition of buildings and isolation of some neighborhoods (Douglass 2004:46).

3.4.4. Site-Specific History

Prior to the historic-era, both the IHTB and OHTB were undeveloped marshlands (intertidal). Following passage of the Rivers and Harbors Act of 1873, USACE began the planning of improvements in what was to ultimately become Oakland Harbor. The Act authorized improvements to San Antonio Creek, including deepening the channel leading to the Oakland Estuary and the Brooklyn Basin. USACE's first project was to build parallel "training walls," running 750 to 1,000 feet apart, to direct (i.e., train) the tides in such a way as to scour the bottom of the newly created channel. USACE determined through tidal flow studies that the natural tidal action would deepen the channel to 12 or 14 feet below low tide within 1 or 2 years. USACE also proposed improvements at the mouth of San Leandro Bay to direct the ebb tide to drain through the new channel (JRP 1996: 6).

Construction of the two training walls commenced in 1875. By July 1876, the northern training wall was 9,400 feet in length; the southern train wall was slightly longer, at 10,806 feet Construction of the walls continued through 1878, at which time USACE determined them to be complete. The channel had not, however, experienced the degree of scouring that had been anticipated, and USACE recommended raising the height of the walls (JRP 1996:6).

According to JRP (1996), construction was interrupted during the late 1870s due to a land-ownership dispute between the federal government and the State of California. In 1881, the disagreement had been settled and construction was allowed to resume. By July of 1881, about half of the northern training wall had been raised to the high-water mark and about half of the southern training wall had been raised to 5 feet above low water (just below the high-water level). The work continued through 1888, raising the walls to 9 feet above low water, which USACE believed to be at least 1 feet above the highest springtime level (JRP 1996: 6).

USACE continued construction of the training walls into the 1890s, further raising and ultimately finishing them in dry-laid masonry. Construction of the training walls appears to have been completed by 1896. The first infill behind the walls was the construction of the railroad moles. The Southern Pacific Railroad built a mole on the Alameda side in the late 19th century; the Western Pacific Railroad built their mole behind the northern training wall in the mid-1910s. The two cities and some private parties gradually filled in (i.e., reclaimed) land behind the moles. By the late 1930s, some minor infill existed on both sides, with more in Alameda than in Oakland. During the late 1930s and early 1940s, the Army and Navy filled in thousands of acres behind the two training walls, creating the land in Alameda for both Naval Air Station (NAS) Alameda and the Fleet Industrial Supply Center (FISC). The training walls ultimately established the boundaries for the future development of the area, including what was to become Alameda to the south of the channel and the Western Pacific Railroad rail yards (now Union Pacific Railroad), the Naval Supply Center, and the Oakland Army Base on the Oakland side of the channel. In time, the tidelands and waterways south of the Alameda Training Wall and north of the Oakland Training Wall would be infilled, and this infill obscured from view the surfaces of the two training walls (JRP 1996: 7-8).

Chapter 4. Identification of Cultural Resources

A number of tasks were completed to identify cultural resources in the APE. These included a records search, Native American consultation, and a mixed-strategy reconnaissance of the terrestrial project components. The marine components of the APE were analyzed using the database of shipwrecks maintained by the California State Lands Commission (SLC), in concert with the results of previously conducted geophysical surveys.

4.1. Records Search

A cultural resources records search was conducted by AECOM Senior Archaeologist and Historian Karin G. Beck at the Northwest Information Center (NWIC) of the California Historical Resources Information System, Sonoma State University, on June 30, 2021 (File No. 202678) (Appendix A). The NWIC, an affiliate of the State of California Office of Historic Preservation, is the official state repository of cultural resource records and studies for Alameda County. Site records and previous studies were accessed for the APE and a 0.5-mile radius in the USGS *Oakland West* 7.5-minute quadrangles. The following references also were reviewed:

- National Register of Historic Places (NRHP) (NPS 2021)
- California Register of Historical Resources (CRHR))OHP 2021)
- *Five Views: An Ethnic Historic Site Survey for California* (OHP 1988)
- California State Historical Landmarks (OHP 1996)
- California Inventory of Historic Resources (California Department of Parks and Recreation 1976)
- California Points of Historical Interest (OHP 1992)
- Built Environment Resources Directory (OHP 2020)
- Handbook of the North American Indians: Costanoan (Levy 1978)
- USGS 15-minute *San Francisco, California* Topographic Map (1895, 1915, 1947)
- USGS 7.5-minute Oakland West, California Topographic Maps (USGS 1949)
- Historic Aerial Photographs, Oakland and Alameda (University of California, Santa Barbara 1931, 1939, 1965)

No historic properties occur in the Outer Harbor portion of the APE. This is perhaps not surprising because the entirety of OHTB APE is situated offshore. The records search did reveal that the Carnation Mill and Elevator (P-01-011758) was recorded (Basin Research 1998; Corbett and Hardy 1988) onshore, just south of the OHTB APE, but the resource has since been razed and replaced by modern container cranes.

The records search also revealed that the entirety of the terrestrial portions of the APE, including Schnitzer Steel, Howard Terminal, and the FISC/Bay Ship & Yacht parcel in Alameda, have been previously inventoried for cultural resources. The two FISC structures partially located on the Alameda side of the IHTB APE were determined to be ineligible for listing on the NRHP

(JRP 1996), and no historic properties were identified by Lerner (1988) on the Pier 2 parcel (i.e., Schnitzer Steel). Corbett and Hardy (1988) did identify the Todd-United Engineering Company Shipyard Historic District (P-01-003218; Historic Resource Inventory #4501-0325-9999) in the Alameda portion of the IHTB APE; it is the only historic property identified within the undertaking's entire APE.

P-01-003218, Todd-United Engineering Company Shipyard Historic District. This resource was first recorded by Corbett and Hardy (1988), then later evaluated as a historic district by Basin Research (1998). The United Engineering Company Shipyard (at the time of recording) consisted of 27 structures that occupied almost 50 acres at the northern end of Main Street along the Oakland Estuary (Inner Harbor). Most of the structures dated from 1941 through 1948, when the shipyard was established. Four of the buildings were built in 1911 for the Southern Pacific Company's electric car shops, and five were built after 1948.

Noted in 1988, numerous alterations have occurred since its construction as a shipyard, including the construction of a large warehouse at the western end of the site and the demolition of three piers, none of which were thought to substantially affect the character of the site (Corbett and Hardy 1988: Continuation Sheet #1).

There are nine additional historic resources in the general vicinity, but none occur in the APE delineated for the undertaking. These include:

- Oakland Harbor Training Walls and Federal Channel;
- Naval Supply Center Oakland Historic District;
- Oakland Army Base Historic District;
- Southern Pacific West Oakland Shops Historic District;
- NAS Alameda Historic District on NAS Alameda;
- Southern Pacific Railroad Industrial Landscape Historic District in Oakland;
- Main Shop Building of the Todd Shipyard (individually eligible);
- USS Potomac; and
- Crane X422 – Howard Terminal.

Please note that dispute exists on the significance of Crane X422, as discussed in the recent Waterfront Ballpark District at Howard Terminal Environmental Impact Report (City of Oakland 2021). The final significance of the potential historic resource is, however, not an issue for the current undertaking because Crane X422 is mobile (i.e., on rails); the current undertaking does not include the removal or demolition of the structure, and it is assumed herein that it will remain at Howard Terminal.

In addition to the record search at the NWIC, a review of the shipwreck databases maintained by the SLC (http://shipwrecks.slc.ca.gov/ShipwrecksDatabase/Shipwrecks_Database.asp) was conducted, given that the majority of the APE occurs in currently inundated sediments. The SLC shipwreck database reveals that three vessels are reported to have gone down within 0.5 mile of the APE, all plotted by SLC at same location to the east, near what is now Jack London Square (Figure 4-1). As can be seen in Figure 4-1, none occur in the APE defined for the project.

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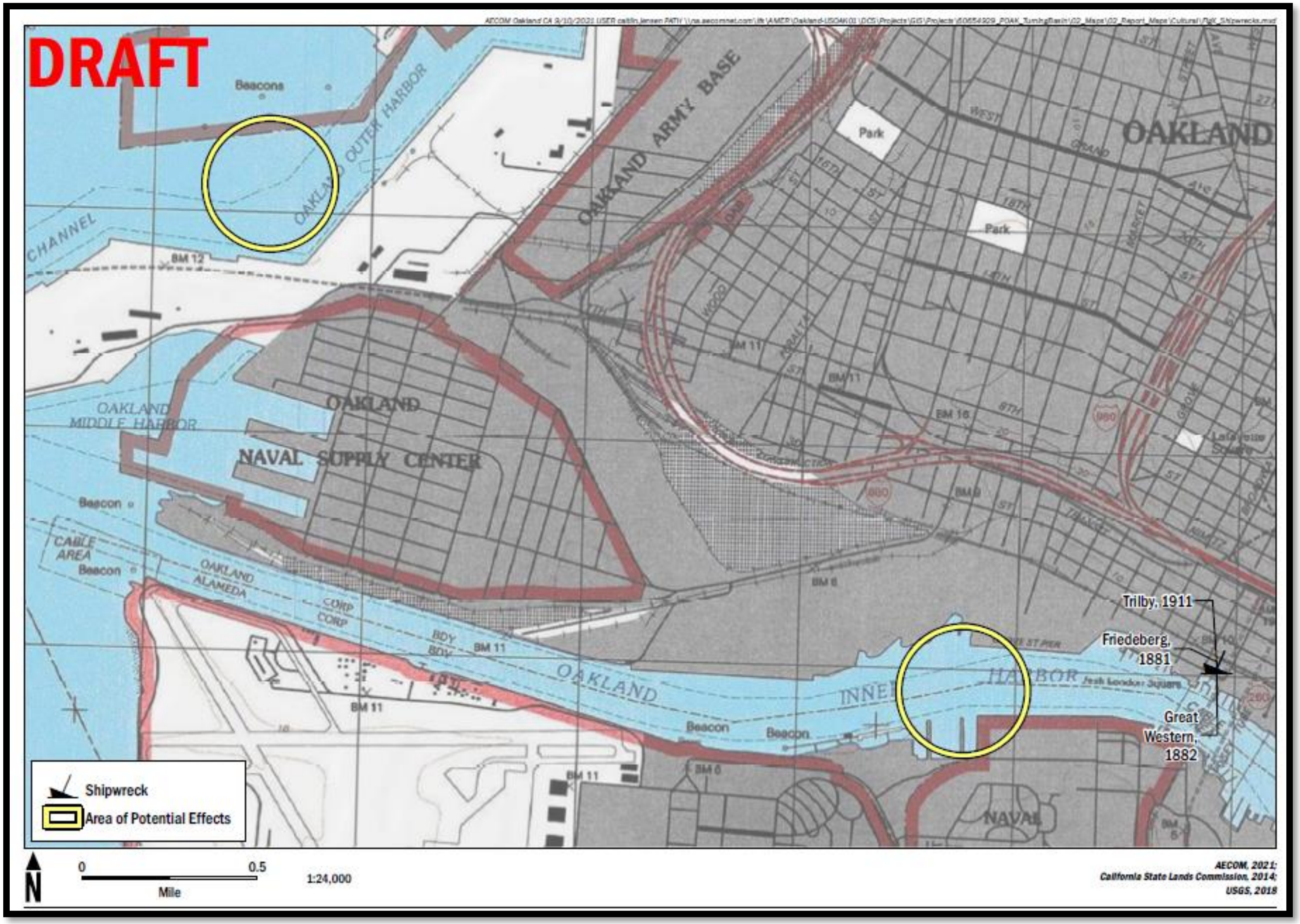

Figure 4-1 Shipwrecks in Relation to Area of Potential Effects

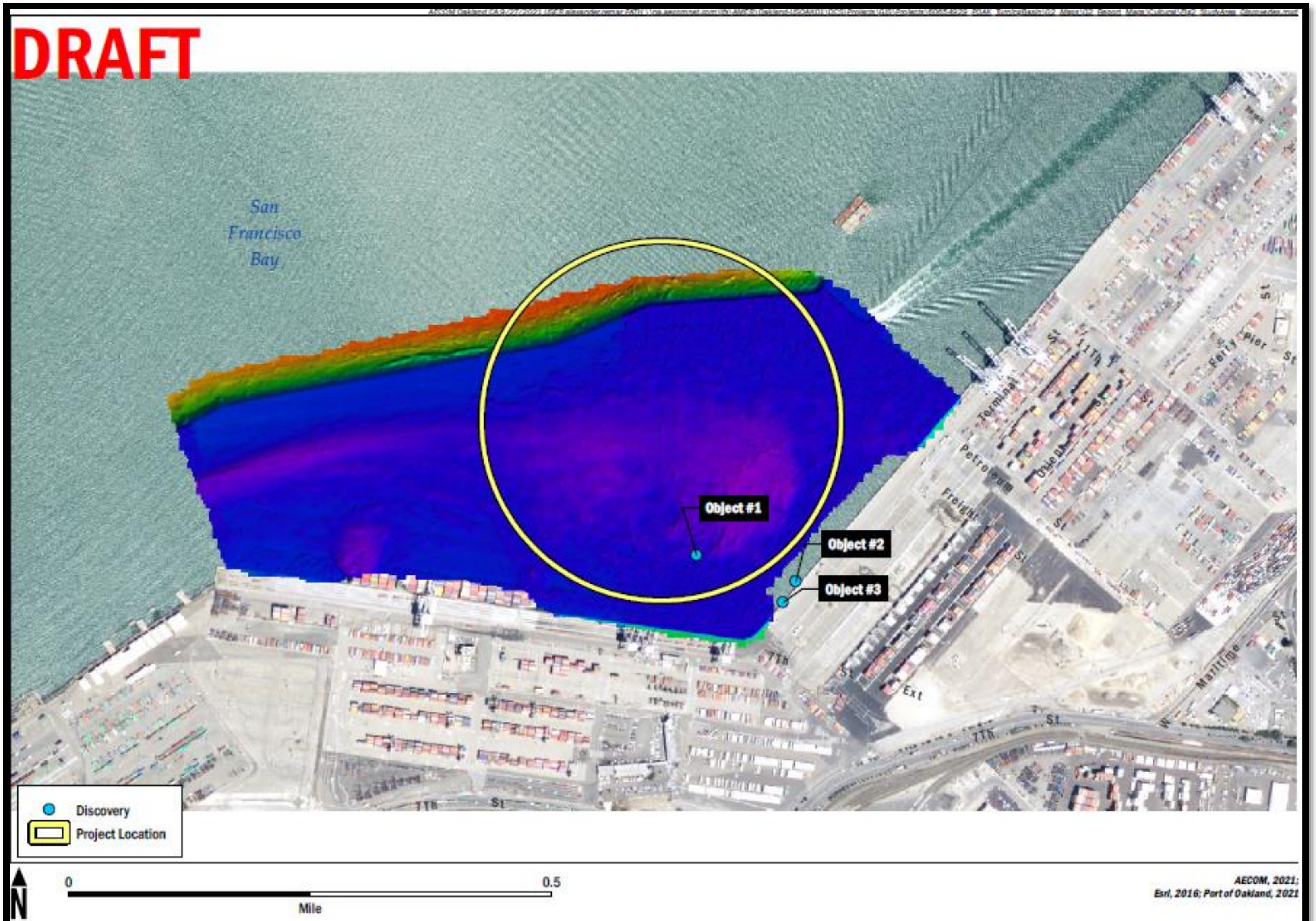

Figure 4-2 Geophysical Survey of the OHTB

In addition to the NWIC records search and the SLC shipwreck database review, a large number of documents were supplied to AECOM during completion of this inventory effort. These included other environmental documents, cultural resources reports, and technical data that could provide insight regarding the potential for cultural resources to occur in the APE.

Most important of these were the results of a recent geophysical survey conducted to identify lost shipping containers in the Outer Harbor. As seen in Figure 4-2, nearly the entire Outer Harbor portion of the APE was covered by this survey and the only anomalies identified were three of the lost containers (marked Objects # 1, # 2, and #3).

No such geophysical survey was identified for the Inner Harbor; however, both the existing IHTB and the OHTB, as well as the shipping channels to each, are subject to annual maintenance dredging. Therefore, the likelihood that undiscovered and undisturbed (i.e., intact) cultural resources remain in the waters of the APE is low.

4.2. Native American Consultation

USACE and the Port initiated consultation efforts with the local Native American community on September 16, 2020, with a letter requesting participation in public meetings to discuss the project . These meetings, held virtually given pandemic, were held on October 8, 2020; May 4, 2021; and August 17, 2021, all being attended according to the logs kept by Kanyon Konsulting LLC – Cultural Representative of Indian Canyon Mutsun Band of Costanoan Ohlone People.

On June 22, 2021, AECOM, on behalf of USACE and the Port, electronically submitted a Sacred Lands File (SLF) and Native American Contacts List Request form to the California NAHC. The NAHC replied on July 15, 2021, providing both a list of Native American contacts as well as the results of the SLF review. The NAHC indicated that their review of the SLF was “positive” and identified the Amah Mutsun Tribal Band of Mission San Juan Bautista and the North Valley Yokuts as the parties to contact concerning this finding.

On September 22 and 23, 2021, a second letter was sent out by USACE and the Port to all of the groups identified in the July 15, 2021, response from the NAHC, requesting any information these groups may have regarding properties, features, or materials in the project area and immediate vicinity that may be of concern to the local Native American community (Appendix A).

4.3. Field Methods

On July 7, 2021, AECOM Senior Project Archaeologist Mark Hale conducted a cursory survey/ windshield reconnaissance of the APE delineated for the undertaking. Because the Schnitzer Steel facilities were in active use, which precluded access, as well as the expanses of open water, an intensive cultural resources survey of the APE was prohibited. Such an approach was considered sufficient for identifying cultural resources, however, because the entire terrestrial portion of the APE has been constructed on imported fill and is therefore unlikely to contain intact archaeological deposits predating these facilities. Furthermore, what little ground surface occurs in APE is obstructed by large expanses of pavement, and the remainder of the APE is continuously inundated. Lastly, as detailed in Section 4.1 above, the entire terrestrial portion of the APE has been subject to previous cultural resources inventory efforts.

Chapter 5. Results

No new cultural resources, either archaeological or historic architecture, were identified in the APE delineated for the undertaking during completion of the cursory survey/windshield reconnaissance described above.

As described in Section 4.1, the only cultural resource previously identified in the APE is the Todd Shipyard Historic District (P-01-003218) in Alameda. The district was determined to be eligible for the NRHP pursuant to Criteria A and C because of its part in the transportation history of the San Francisco Bay Area from 1910 to 1963 (Basin Research 1998; Corbett and Hardy 1988). Subsequent to the original recordation, however, contributing elements of the district were demolished for the Port's -42-foot Channel Dredging Project; other elements were removed for the Oakland Harbor Navigation Improvement (-50-Foot) Project (Corbett and Hardy 1988; Port 1998). It is unclear which contributing elements or portions thereof were removed for which project, but suffice to say that no such contributing elements remain in the APE delineated for the current undertaking.

Chapter 6. Conclusions and Recommendations

6.1. Historic Architecture

As a result of the current cultural resources inventory effort, it has been determined that no historic structures that are NRHP and/or CRHR-listed or eligible to be listed occur in the APE delineated for the current undertaking.

6.2. Archaeology

No archaeological resources, prehistoric or historic, were identified in the APE during completion of the current cultural resources inventory effort. As noted above, there appears to be a low potential for intact archaeological resources in the submerged portions of the APE owing to past practices, including the routine maintenance dredging that has occurred in both the OHTB and IHTB and connecting channels.

The potential for undiscovered archaeological resources beneath the terrestrial portions of the APE for the IHTB likewise is low; all these areas are on reclaimed land, and past construction practices for the existing facilities at Schnitzer Steel, Howard Terminal, and Alameda Island were fairly extensive in scale and disturbed the underlying sediments (all are constructed atop introduced fill). Furthermore, the SLC Shipwrecks Database does not indicate any prior shipwrecks in vicinity that could have become entombed during reclamation efforts. Although the potential for intact archaeological resources to occur submerged and/or buried in the APE is low, the presence of such previously unidentified archeological resources cannot be completely dismissed. Of the proposed construction elements outlined for the undertaking, it is the installation of sheet piles to depths of 65 feet bgs and the excavation of landside soils to approximately 62 feet bgs that have the greatest potential to encounter buried archaeological resources. Pile installation and some excavation would presumably extend through the imported fill, on through the soft marine sediments—presumably Young Bay Mud (YBM)—and into more competent material that lies below, in this case presumably the Posey-Merritt Sands that occur in this vicinity.

These sand units are believed to be nonmarine sediments that were deposited prior to the inundation of San Francisco Bay. Posey Sand is typically deposited in broad channels, and Merritt Sand is deposited by wind action (e.g., sand dunes). Rehor has indicated (2008) that the greatest potential for buried prehistoric archaeological sites exists at the interface between the YBM and underlying strata (in this case, presumably, the Posey-Merritt sands), which represents the late-Holocene ground surface (i.e., pre-Bay inundation and sea-level stabilization). The YBM was too soft to support human habitation; it is therefore on these buried land surfaces (paleosols) that archaeological deposits could have developed and ultimately become buried during the sedimentation processes associated with rising sea levels.

Given that this interface, presumed herein to be between YBM and Posey-Merritt Sands, will be penetrated during the driving of sheet piles and a portion of the upland excavation, it is possible that an intact archaeological deposit could be inadvertently impacted. Therefore, ground-disturbing construction activities have the potential to adversely affect previously unknown archaeological resources, including those that may be NRHP and/or CRHR-eligible. That said, the presence of such deeply buried sites in the Bay Area are rare. Furthermore, no such sites have been identified in the project vicinity, including during completion of the previous -50-Foot Deepening Project.

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Oakland Harbor Turning Basins Widening Navigation Study

Cultural Resources Preliminary Assessment of Effects

September 2021

PORT OF OAKLAND

Oakland Harbor Turning Basins Widening

Cultural Resources Preliminary Assessment of Effects

Port of Oakland

U.S. Army Corps of Engineers

September 2021

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ACRONYMS

APE	Area of Potential Effects
bgs	below ground surface
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CRHR	California Register of Historic Resources
CY	cubic yard
IHTB	Inner Harbor Turning Basin
MLLW	mean lower low water
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
OHTB	Outer Harbor Turning Basin
Port	Port of Oakland
PRC	Public Resources Code
USACE	United States Army Corps of Engineers

Chapter 1. Introduction

The United States Army Corps of Engineers (USACE), as the federal lead agency, and the Port of Oakland (Port), as the nonfederal sponsor, are conducting the Oakland Harbor Turning Basins Widening Navigation Study. The purpose of the study is to determine if there is a technically feasible, economically justifiable, and environmentally acceptable recommendation for federal participation in a navigation improvement project to the constructed -50-Foot Oakland Harbor Navigation Project. The existing federal navigation channel was designed for a 6,500 20-foot equivalent units capacity ship, with a 1,139-foot length overall, 140-foot beam, and 48-foot draft, as part of the Oakland Harbor Navigation Improvement (-50-Foot) Project Study. The vessels routinely calling on the harbor today are longer, wider, and deeper than the design vessel from that study.

The Section 216 Initial Appraisal Report concluded that the problems in Oakland Harbor are caused by length limitations in the turning basins, not by depth limitations or landside capacity. The need for this navigation study arises from inefficiencies currently experienced by vessels in harbor, specifically the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-Foot Oakland Harbor Navigation Project. These inefficiencies are projected to continue in the future because vessel sizes are expected to increase.

This preliminary assessment is to be used in tandem with the cultural resources inventory report prepared for this project. This assessment discusses the potential effects/impacts of the project alternatives on cultural resources (i.e., archaeological and historic architecture/built-environment resources) to support the USACE's preparation of National Environmental Policy Act (NEPA) documentation, and address their obligations under Section 106 of the National Historic Preservation Act (NHPA), as well as assist the Port's preparation of California Environmental Quality Act (CEQA) documentation. The USACE and Port will determine the significance of project impacts pursuant to their evaluation criteria under NEPA and CEQA, respectively; this report provides a preliminary assessment of potential project impacts to assist with the USACE's and Port's evaluation of project alternatives. Federal and state significance criteria, as well as the conformity between these criteria, are presented below.

1.1.1. Federal Significance Criteria

The four evaluation criteria to determine a resource's eligibility to the National Register of Historic Places (NRHP), in accordance with the regulations outlined in 36 Code of Regulations (CFR) Part 800, are identified at 36 CFR Section 60.4. These evaluation criteria, listed below, are used to assist in determining what properties should be considered for protection from destruction or impairment resulting from project-related activities (36 CFR Section 60.2).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

a. Resources that are associated with events that have made a significant contribution to the broad patterns of our history; or

b. Resources that are associated with the lives of persons significant in our past; or

c. Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d. Resources that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR Section 60.4).

1.1.2. State Significance Criteria

In considering impact significance under CEQA, the significance of the resource itself must first be determined. At the state level, consideration of significance as an "important archaeological resource" is measured by cultural resource provisions considered under Public Resources Code (PRC) Sections 15064.5 and 15126.4, and the draft criteria regarding resource eligibility to the California Register of Historic Resources (CRHR).

Generally, under CEQA, a historical resource (these include built-environment historic and prehistoric archaeological resources) is considered significant if it meets the criteria for listing on the CRHR. These criteria are set forth in PRC Section 15064.5 and are defined as any resource that:

a. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

b. Is associated with lives of persons important in our past;

c. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

d. Has yielded, or may be likely to yield, information important in prehistory or history.

Section 15064.5 of CEQA also assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. These procedures are detailed under California PRC Section 5097.98.

Impacts to "unique archaeological resources" are also considered under CEQA, as described under PRC Section 21083.2. A unique archaeological resource implies an archaeological artifact, object, or site about which it can be clearly demonstrated that—without merely adding to the current body of knowledge—there is a high probability that it meets one of the following criteria:

a. The archaeological artifact, object, or site contains information needed to answer important scientific questions, and there is a demonstrable public interest in that information;

b. The archaeological artifact, object, or site has a special and particular quality, such as being the oldest of its type or the best available example of its type; or

c. The archaeological artifact, object, or site is directly associated with a scientifically recognized important prehistoric or historic event or person.

The lead agency shall first determine whether an archeological resource is a historical resource before evaluating the resource as a unique archaeological resource (CEQA Guidelines 15064.5 [c] [1]). A nonunique archaeological resource is an archaeological artifact, object, or site that does not meet the above criteria. Impacts to nonunique archaeological resources and resources that do not qualify for listing on the CRHR receive no further consideration under CEQA.

Under CEQA Section 15064.5, a project would potentially have significant impacts if it would cause substantial adverse change in the significance of one of the following:

a. A historical resource (i.e., a cultural resource eligible for the CRHR);

b. An archaeological resource (defined as a unique archaeological resource that does not meet CRHR criteria); or

c. Human remains (i.e., where the project would disturb or destroy burials).

A nonunique archaeological resource is given no further consideration, other than the simple recording of its existence, by the lead agency.

1.1.3. Conformity of Federal and State Evaluation Criteria

The criteria for eligibility for the CRHR are very similar to those that qualify a property for the NRHP, which is the significance assessment tool used under NHPA. The criteria of NRHP apply when a project has federal involvement. A property that is eligible for NRHP is also eligible to CRHR. All potential effects/impacts to significant resources are assessed and addressed herein under the procedures of Section 106 of the NHPA, set forth at 36 CFR Part 800.

Chapter 2. Projection Description

Description of Project Alternatives

Four project alternatives are under consideration: widening only the Inner Harbor Turning Basin (IHTB), widening only the Outer Harbor Turning Basin (OHTB), widening both the IHTB and OHTB, and No Action/No Project. Expansion of one or both turning basins would improve the efficiency of vessels entering and exiting the Port; however, the project would not change the projected overall volumes of freight that would come into the Port. Please see the provided Cultural Resources Inventory Report for detailed descriptions of the project alternatives.

Chapter 3. Finding of Effect

A cultural resources inventory report was prepared by AECOM for the proposed Oakland Harbor Turning Basins Widening Navigation Study (AECOM 2021). That report is to be used in concert with this document. For the inventory effort, AECOM completed a number of tasks including:

- Working with USACE and Port to delineate an Area of Potential Effects (APE) (Figure 3-1).
- A Records Search at the Northwest Information Center (NWIC) of the California Historical Resources Information System, Sonoma State University (File No. 202678). The NWIC, an affiliate of the State of California Office of Historic Preservation, is the official state repository of cultural resource records and studies for Alameda County. Site records and previous studies were accessed for the APE and a 0.5-mile radius of the APE as depicted on the U.S. Geological Survey *Oakland West* 7.5-minute topographic quadrangle.
- Reviewed the shipwreck database maintained by the California State Lands Commission in concert with the results of previously conducted geophysical surveys.
- Submitted, on behalf of USACE and the Port, a request for a Sacred Lands File review as well as a list of Native American contacts for the project from the California Native American Heritage Commission.
- Assisted the USACE in their tribal consultation efforts as required under Section 106 of the NHPA, including the drafting of consultation letters.
- Completed a mixed-strategy cultural resources reconnaissance of the project components.

The results of these efforts and the potential effects and/or impacts to both archaeological and historic architecture resources are presented below for each project alternative.

3.1. Inner Harbor Turning Basin Expansion

3.1.1. Archaeological Resources

As a result of the cultural resources inventory effort, it has been determined that no known archaeological resources occur in the APE delineated for the IHTB. Furthermore, as detailed in the inventory report, the potential for undiscovered archaeological resources beneath the surface of the APE (terrestrial and submerged) is low.

3.1.2. Historic Architectural Resources

As a result of the cultural resources inventory effort, it has been determined that no historic architectural structures or other elements of the built environment, NRHP, and/or CRHR-listed or eligible to be listed, occur in the APE delineated for the IHTB. The current APE includes the boundaries of the Todd Shipyard Historic District (P-01-003218) in Alameda. The district was determined to be eligible for the NRHP. Subsequent to the original recordation and evaluation,

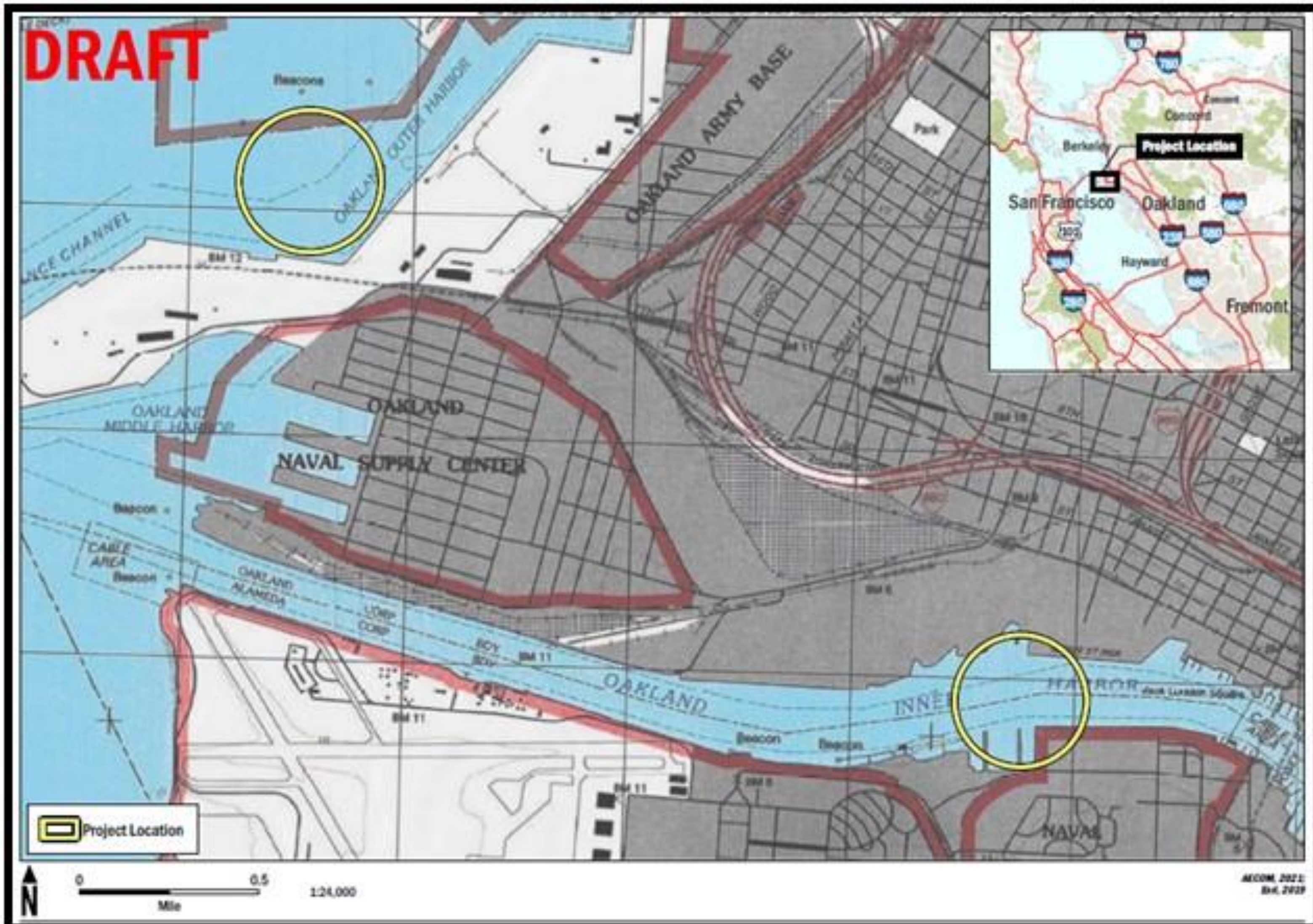

Figure 3-1 Area of Potential Effects Delineated for the Oakland Harbor Turning Basins Widening Navigation Study

however, contributing elements of the district were demolished for the Port's -42-foot Channel Dredging Project; other elements were removed for the Oakland Harbor Navigation Improvement (-50 Foot) Project (Corbett and Hardy 1988; Port 1998). It is unclear which contributing elements or portions thereof were removed for which project, but it is clear that no such contributing elements remain in the APE delineated for the current undertaking.

3.1.3. Assessment of Effects

The expansion of the IHTB would not result in effects and/or impacts to known Cultural Resources, because none occur in the portion of the APE delineated for this Project alternative. It is recommended herein that implementation of this alternative would result in a finding of *No Historic Properties Affected* pursuant to Section 106 of the NHPA.

Although the potential for intact archeological resources to occur in the APE delineated for the project is low, the inadvertent discovery of previously unidentified archeological resources cannot be completely dismissed. Therefore, it is assumed that both the NEPA and CEQA documents to be prepared for the Oakland Harbor Turning Basins Widening Navigation Study will include provisions for the accidental discovery of archeological resources, including human remains inadvertently exposed during construction activities. Should such an unanticipated discovery occur, and appropriate mitigation implemented, adverse effects/impacts to cultural resources under NEPA and CEQA are expected to be reduced to less-than-significant levels.

3.2. Outer Harbor Turning Basin Expansion

3.2.1. Archaeological Resources

As a result of the cultural resources inventory effort, it has been determined that no known archaeological resources occur in the APE delineated for the OHTB. Furthermore, as detailed in the inventory report, the potential for undiscovered archaeological resources beneath the surface of the APE is low.

3.2.2. Historic Architectural Resources

As a result of the cultural resources inventory effort, it has been determined that no historic architectural structures or other elements of the built environment, NRHP, and/or CRHR-listed or eligible to be listed, occur in the APE delineated for the OHTB.

3.2.3. Assessment of Effects

The expansion of the OHTB would not result in effects and/or impacts to known cultural resources, because none occur in the portion of the APE delineated for this alternative. It is recommended herein that implementation of this alternative would result in a finding of *No Historic Properties Affected* pursuant to Section 106 of the NHPA.

Although the potential for intact archeological resources to occur in the APE delineated for the project is low, the inadvertent discovery of previously unidentified archeological resources cannot be completely dismissed. Therefore, it is assumed that both the NEPA and CEQA documents to be prepared for the Oakland Harbor Turning Basins Widening Navigation Study will include provisions for the accidental discovery of archeological resources, including human remains inadvertently exposed during construction activities. Should such an unanticipated discovery occur, and appropriate mitigation implemented, adverse effects/impacts to cultural resources under NEPA and CEQA are expected to be reduced to less-than-significant levels.

3.3. Inner Harbor and Outer Harbor Turning Basin Expansion.

3.3.1. Assessment of Effects

As can be determined from the sections above, the expansion of both the IHTB and OHTB would not result in effects and/or impacts to known cultural resources, because none occur in the APE delineated for this project. It is recommended herein that implementation of this alternative would result in a finding of *No Historic Properties Affected* pursuant to Section 106 of the NHPA.

Although the potential for intact archeological resources to occur in the APE delineated for the project is low, the inadvertent discovery of previously unidentified archeological resources cannot be completely dismissed. Therefore, it is assumed that both the NEPA and CEQA documents to be prepared for the Oakland Harbor Turning Basins Widening Navigation Study will include provisions for the accidental discovery of archeological resources, including human remains inadvertently exposed during construction activities. Should such an unanticipated discovery occur, and appropriate mitigation implemented, adverse effects/impacts to cultural resources under NEPA and CEQA are expected to be reduced to less-than-significant levels.

3.4. No Project/No Action Alternative

With the No Project/No Action Alternative, there is not a change in existing conditions; therefore, no effects and/or impacts to Cultural Resources, known or unknown, would occur.

Chapter 4. References

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OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

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APPENDIX A-7:

Avoidance and Minimization Measures

Avoidance and Minimization Measures/Mitigation Measures

To reduce the potential impacts of the project alternatives on environmental resources, the analysis assumes the following or equivalent measures would be incorporated into the project as avoidance and minimization measures.

General Measures

- Marine-based construction and dredging would occur during the in-water work window (June 1 through November 30). If in-water work is determined to need to occur at times other than the approved work window, the Port and USACE would re-consult with NMFS, as necessary, to address potential impacts on special-status aquatic species. The USACE will also consult with USFWS in order to work outside of the Least Tern environmental window and implement required measures to do so.
- Standard construction best management practices (BMPs), such as a stormwater pollution prevention plan would be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during the course of the project would be fueled and serviced in a manner that would not affect the aquatic environment.
- A Spill Prevention Control and Countermeasure (SPCC) plan would be prepared to address the emergency cleanup of any hazardous material and would be available on site during construction. The SPCC plan would incorporate hazardous waste, stormwater, and other emergency planning requirements.
- Silt curtains will be used where specific site conditions demonstrate that they will be practicable and will effectively minimize any potential adverse effects caused by the mobilization of material that may cause adverse water quality conditions, or contain contaminants at levels in excess of applicable regulatory thresholds. Prior to in-water construction, a silt curtain will be deployed from the water’s edge and pushed out to the deployed location to avoid entrapping aquatic wildlife species.
- Prior to construction, a sampling and analysis plan would be developed and implemented to characterize soils and sediments to be removed or exposed.
- Piles would be removed by vibratory means or direct pull, where possible; piles that cannot be pulled would be cut 2 feet below the mudline, to the extent feasible.
- No pilings or other wood structures that have been pressure-treated with creosote would be installed.

Dredging-Related Measures

- Dredging would be conducted with a barge-mounted excavator dredge; there would be no hydraulic dredging.
- No overflow or decant water would be allowed to be discharged from any barge, with the exception of spillage incidental to mechanical dredge operations, unless monitoring or relevant studies show the effects of such discharge are negligible.
- Multiple horizontal dredge cuts would be taken where a thick horizontal volume needs to

be dredged to avoid overfilling the bucket and causing spillage.

- The load line on disposal barges used for mechanical dredging would be predetermined, and the barge would not be filled above this predetermined level. Before each disposal barge is transported to a placement site, the dredging contractor and a site inspector would certify that it is filled correctly.
- The cycle time would be increased as needed to reduce the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment from the bucket.
- Floating debris would be removed from the water and disposed of properly.

Pile-Driving–Related Measures

- To the extent feasible, landside pile driving shall not occur during the bird breeding season of February 1 to August 15. If such activities must occur during the bird breeding season, work areas plus an appropriate buffer area determined by a qualified biologist shall be surveyed by a qualified biologist to verify the presence or absence of nesting raptors or other birds. Pre-construction surveys shall be conducted within 15 days prior to the start of work. If the survey indicates the potential presence of nesting raptors or other nesting birds, the biologist shall determine an appropriately sized buffer around the nest in which no work will be allowed until the young have successfully fledged, so that nesting birds are not disturbed by the project activity. The size of the nest buffer will be determined by the biologist, in coordination with the appropriate resource agencies, and will be based to a large extent on the nesting species and its sensitivity to disturbance. In general, buffer sizes of 200 feet for raptors and 50 feet for other birds should suffice to prevent disturbance to birds nesting in the urban environment, but these buffers may be increased or decreased, as appropriate, depending on the bird species and the level of disturbance anticipated near the nest, as necessary to avoid disturbance of nesting birds.
- To the extent feasible, all pilings or similar in-water structures would be removed by vibratory means only.
- An impact pile driver would only be used where necessary to complete installation of landside piles in accordance with seismic safety or other engineering criteria.
- The impact hammer would be cushioned using a 12-inch-thick wood cushion block during any land-based impact hammer pile-driving operations.

Particulate Emissions Reduction Measures

To reduce impacts from fugitive dust emissions during project construction, construction contractors shall be required to implement the following Basic and Additional Construction Mitigation Measures recommended by the BAAQMD. These measures will reduce particulate emissions primarily during soil movement, grading, and demolition activities, but also during vehicle and equipment movement on unpaved project areas. Basic measures include:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet

power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

- All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure, Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Additional measures include:

- All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
- All excavation, grading, and/ or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- If applicable, vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- Site accesses to a distance of 100 feet from the paved road shall be treated with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than 1 percent.
- Minimize the idling time of diesel-powered construction equipment to 2 minutes.
- The project shall develop a plan demonstrating that the off-road equipment (more than 50 hp) to be used in the construction project (i.e., owned, leased, and subcontractor vehicles) would achieve a project-wide fleet-average 20 percent NO_X reduction and 45 percent PM reduction compared to the most recent CARB fleet average. Acceptable options for

reducing emissions include the use of late-model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/ or other options as such become available.

- Use low-VOC (i.e., ROG) coatings beyond the local requirements (i.e., Regulation 8, Rule 3: Architectural Coatings).
- Require that all construction equipment, diesel trucks, and generators be equipped with Best Available Control Technology for emission reductions of NO_x and PM.
- Require that all contractors use equipment that meets CARB's most recent certification standard for off-road heavy-duty diesel engines.

Best Available Control technology for Off-road Construction Equipment

- Construction contractors shall be required to demonstrate that all heavy-duty off-road construction equipment with engines greater than 25 hp used for construction activities shall be equipped with the most effective Verified Diesel Emissions Control Strategies (VDECS) available for the engine type. In this case, the best available VDECS would be the use of engines that meet the Tier 4 Final (Tier 4F) standards as certified by CARB and USEPA.

Temporary Noise Barrier

- A temporary noise barrier would be used as a minimization measure approximately 200 feet from the Oakland Inner Harbor Alameda side along the southern edge of the turning basin expansion area during dredging activities to lower the nighttime noise levels by 5 dBA. Such barriers are generally constructed with two layers of ½-inch thick plywood and would be 10-12 feet high.

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APPENDIX A-8:

Noise Modeling

To characterize the noise environment in the project sites and surrounding area, both long-term (48 hours or more) and short-term (20-minute) noise monitoring was conducted. Long-term noise monitoring was conducted at seven locations, and short-term noise monitoring was conducted at three locations. Long-term noise monitoring locations were selected based on the proximity of potential locations of residential use to different noise sources: UPRR rail tracks, Schnitzer Steel, and vessel operation in the Inner Harbor Channel. A quantitative assessment of each long-term and short-term noise monitoring location is provided below.

Airborne noise measurements were conducted using a Larson Davis Model 831 Type 1 sound-level meter for short-term measurements, and modal LxT2 for long-term measurements. The meters were laboratory-certified within the past year and were calibrated prior to each measurement using a laboratory-certified calibrator (Larson Davis model CAL-200). For short-term measurements, the sound-level meter was placed on a tripod at an approximate microphone height of 5 feet. Some long-term measurements necessitated a higher microphone height of approximately 12 feet to ensure equipment safety.

Underwater noise measurements were conducted using Cetacean Research Model CR1 hydrophone, SpectraDAQ precision data acquisition sound card (SpDAQ-200), and Spectra-PLUS-SC signal analyzer software. The CR1 hydrophones have a transducer sensitivity of -199.63 and -198.17 dB, referenced to 1 volt per µPa. The SpDAQ-200 was set to a sampling rate of 48 kilohertz (kHz) (48,000 bits per second) and a frequency response between 4 and 22 kHz. The input channels in the SpDAQ-200 provide four fixed-gain steps, which allow the system to be calibrated directly to the transducer sensitivity of the CR1 hydrophone on each start-up. Prior to daily deployment of the hydrophone, the CR1 hydrophone was calibrated to the SpDAQ-200 data acquisition sound card by manually entering the transducer sensitivity of the CR1 hydrophone into the Spectra PLUS-SC dual-channel signal analyzer software. The Spectra PLUS-SC software is able to convert the detected voltage of the transducer to the corresponding engineering units, based on the transducer sensitivity provided by the user. The transducer sensitivity of the CR1 hydrophone was obtained from the calibration certificate provided by the manufacturer.

Noise Monitoring Location LT-1: This noise monitoring location is on the northern side of military housing on the northern side of Barbers Point Road. This location is approximately 1,100 feet from the nearest work areas, on the southern side of the Inner Harbor Turning Basin. Observations during the deployment and collection of noise monitoring equipment indicated that existing daytime noise contributions at this location were generated by intermittent traffic on Main Street. Noise monitoring data indicate a consistent average noise level during both daytime and nighttime hours of 63 and 60 dBA, respectively. The data were collected in 2021. A large container vessel (*One Ibis*) entered and departed the Inner Harbor Turning Basin during the monitoring period, during which noise levels for the hour were consistent with the same hour on other weekdays when no vessels were in the Inner Harbor Turning Basin. This indicates that vessel movements in the Inner Harbor Turning Basin do not meaningfully contribute to the local noise environment.

Noise Monitoring Location LT-2: This noise monitoring location is on the northern side of Mosely Avenue, across from an existing multi-family housing complex and adjacent to Estuary Park. This location is approximately 500 feet from the nearest work areas on the southern side of the Inner Harbor Turning Basin. Observations during the deployment and collection of noise monitoring equipment indicated that existing daytime noise contributions at this location were generated by intermittent vehicle traffic on Mosely Avenue. Noise monitoring data indicate a consistent average noise level during both daytime and nighttime hours of 55 and 50 dBA, respectively. The data were collected in 2021. A large container vessel (*One Aquila*) entered and departed the Inner Harbor Turning Basin during the monitoring period, during which noise levels for the hour were consistent with the same hour on other weekdays when no vessels were in the Inner Harbor Turning Basin. This indicates that vessel movements in the Inner Harbor Turning Basin do not meaningfully contribute to the local noise environment.

Noise Monitoring Location LT-3: This noise monitoring location is on the southern side of Mitchell Avenue, adjacent to an existing multi-family housing complex. This location is approximately 1,000 feet from the nearest work areas on the southern side of the Inner Harbor Turning Basin. Observations during the deployment and collection of noise monitoring equipment indicated that existing daytime noise contributions at this location were generated by intermittent vehicle traffic on Mitchell Avenue. Noise monitoring data indicate an average noise level during both daytime and nighttime hours of 58 and 52 dBA, respectively. The data were collected in 2019.

Noise Monitoring Location LT-4: This monitoring location is at the terminus of Clay Street on the western side of the Port office building, south of Embarcadero West. It is approximately 2,000 feet from the nearest work areas on the northeastern side of the Inner Harbor Turning Basin. Observations during the deployment and collection of noise monitoring equipment indicated that existing daytime noise contributions at this location were generated by UPRR train activity, including warning bells and train horns, and operations of the Oakland Ferry Terminal. Noise monitoring data indicate average hourly noise levels of 73 dBA during daytime hours and 70 dBA during nighttime hours. The data were collected in 2019.

Noise Monitoring Location LT-5: This noise monitoring location is on the Howard Terminal wharf, east of the project site along the Inner Harbor Channel. It was selected for monitoring due to its potential to have the public trust designation removed and potentially be developed with a new ballpark as part of the Waterfront Ballpark District Project, and to characterize the noise environment nearest work areas on the northeastern side of the Inner Harbor Turning Basin. Noise monitoring data indicate a consistent average noise level during both daytime and nighttime hours of 58 to 59 dBA. The data were collected in 2019.

Monitoring Location LT-6: This noise monitoring location is on the western Howard Terminal boundary, along the property line with the adjacent Schnitzer Steel heavy metal recycling operation. It was selected due to its potential to be developed for residential or other noise-sensitive land use as part of the Waterfront Ballpark District Project, and to assess the noise contributions from the neighboring recycling activities. This location is currently occupied by XPO Logistics, which operates a truck transport business at 1 Market Street. Observations during the deployment and collection of monitoring equipment indicated that existing daytime noise contributions at this location were generated by multiple mobile cranes sorting incoming metals and operations in the easternmost shed of the adjacent Schnitzer Steel site. Trucking operations in the XPO Logistics trucking facility site, where the noise monitor was installed, were infrequent. Noise monitoring data indicate that operations at the Schnitzer Steel site occur 24 hours a day, with average noise level during both daytime and nighttime hours of 69 dBA. Based on the noise monitoring data, the only downtime in activity for Schnitzer Steel operations occurred between Sunday 3:00 a.m. and Monday 4:00 a.m. The data were collected in 2019.

Noise Monitoring Location LT-7: This noise monitoring location is on the eastern end of Matson Terminal, adjacent to Berth 63, along the property line with the adjacent Schnitzer Steel heavy metal recycling operation. It was selected due to its proximity to the Inner Harbor Turning Basin, approximately 700 feet to the southeast. Observations during the deployment and collection of monitoring equipment indicated that existing daytime noise contributions at this location were generated by truck operations on Matson Terminal and multiple mobile cranes sorting incoming metals at Schnitzer Steel. Noise monitoring data indicate an average noise level during both daytime and nighttime hours of 66 and 63 dBA, respectively. The data were collected in 2021. A large container vessel (*One Ibis*) entered and departed the Inner Harbor Turning Basin during the monitoring period, during which noise levels for the hour were consistent with the same hour on other weekdays when no vessels were in the Inner Harbor Turning Basin. This indicates that vessel movements in the Inner Harbor Turning Basin do not meaningfully contribute to the local noise environment. The data were collected in 2021.

Noise Monitoring Location ST-1: This short-term noise monitoring location is on the Howard Terminal wharf, immediately adjacent to the Inner Harbor Turning Basin. It was selected for monitoring due to its proximity to large vessels actively operating in the Inner Harbor Turning Basin. Airborne and underwater noise monitoring was conducted at this location on June 4, 2021. During the monitoring period, a large container vessel (the *One Aquila*) entered, was turned, and departed the Inner Harbor Turning Basin along with three assist tugboats; this operation occurred over an approximately 30-minute period. Maximum airborne noise levels during the turning activity were recorded to be 69 dBA at an approximate distance of 68 meters (225 feet). Underwater noise monitoring during the vessel turning period recorded a maximum sound pressure level of 174 dB and an RMS level of 151 dB at a depth of half the water column (25 feet).

Noise Monitoring Location ST-2: This short-term noise monitoring location is at Middle Harbor Shoreline Park, a recreational area approximately 2,500 feet south of the Outer Harbor Turning Basin. This location was selected as a nearby recreational receptor because there are no residential area or other noise-sensitive receptors within 1 mile of the Outer Harbor Turning Basin. The park is open to the public during daytime hours only, and a short-term daytime monitor recorded a daytime noise levels of 58 dBA. The primary sources of noise at this location were truck traffic along 7th Avenue, and ground-based equipment activity at the TraPac Terminal. The data were collected in 2021.

Noise Monitoring Location ST-3: This short-term noise monitoring location is on the TraPac Terminal wharf, immediately adjacent to the Outer Harbor Turning Basin. It was selected for monitoring due to its proximity to large vessels actively operating in the Outer Harbor Turning Basin. Airborne and underwater noise monitoring was conducted at this location on August 20, 2021. During the monitoring period, a large container vessel (the *Hyundai Hongkong*) entered, was turned, and departed the Outer Harbor Turning Basin along with three assist tugboats; this operation occurred over an approximately 30-minute period. Maximum airborne noise levels during the turning activity were recorded to be 70 dBA at an approximate distance of 200 meters (625 feet). Underwater noise monitoring during the vessel turning period recorded a maximum sound pressure level of 175 dB and an RMS level of 141 dB at a depth of half the water column (45 feet). Observations of the monitoring technician indicated that airborne noise levels were dominated by ground-based equipment activity of the TraPac Terminal even during vessel turning activity.

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OAKLAND HARBOR TURNING BASINS WIDENING, CA

NAVIGATION STUDY

DRAFT INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A-9:

Views Characterizing the Project Area

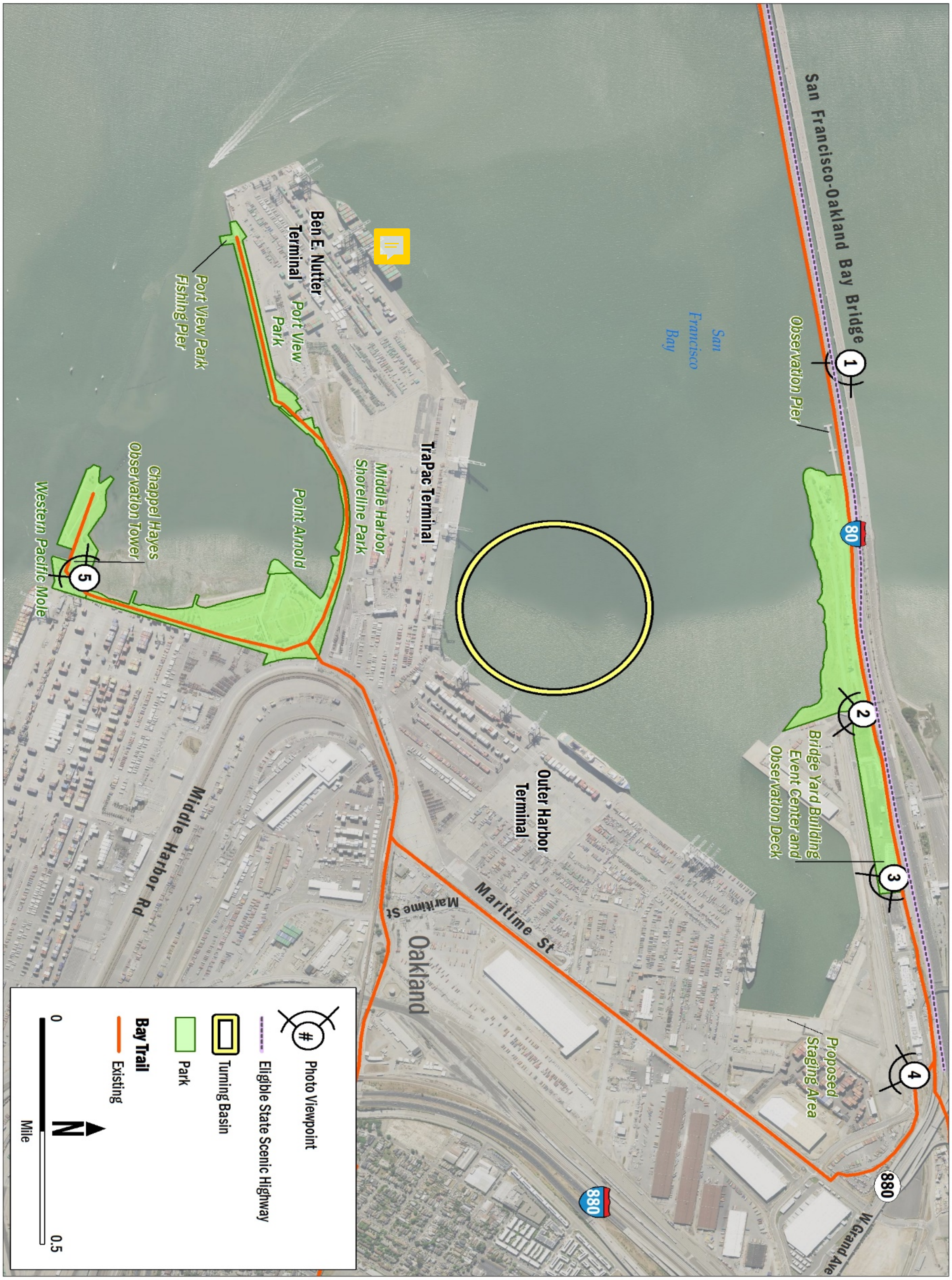


Figure 1: Key Observation Points and Parks, Outer Harbor Turning Basin Study Area

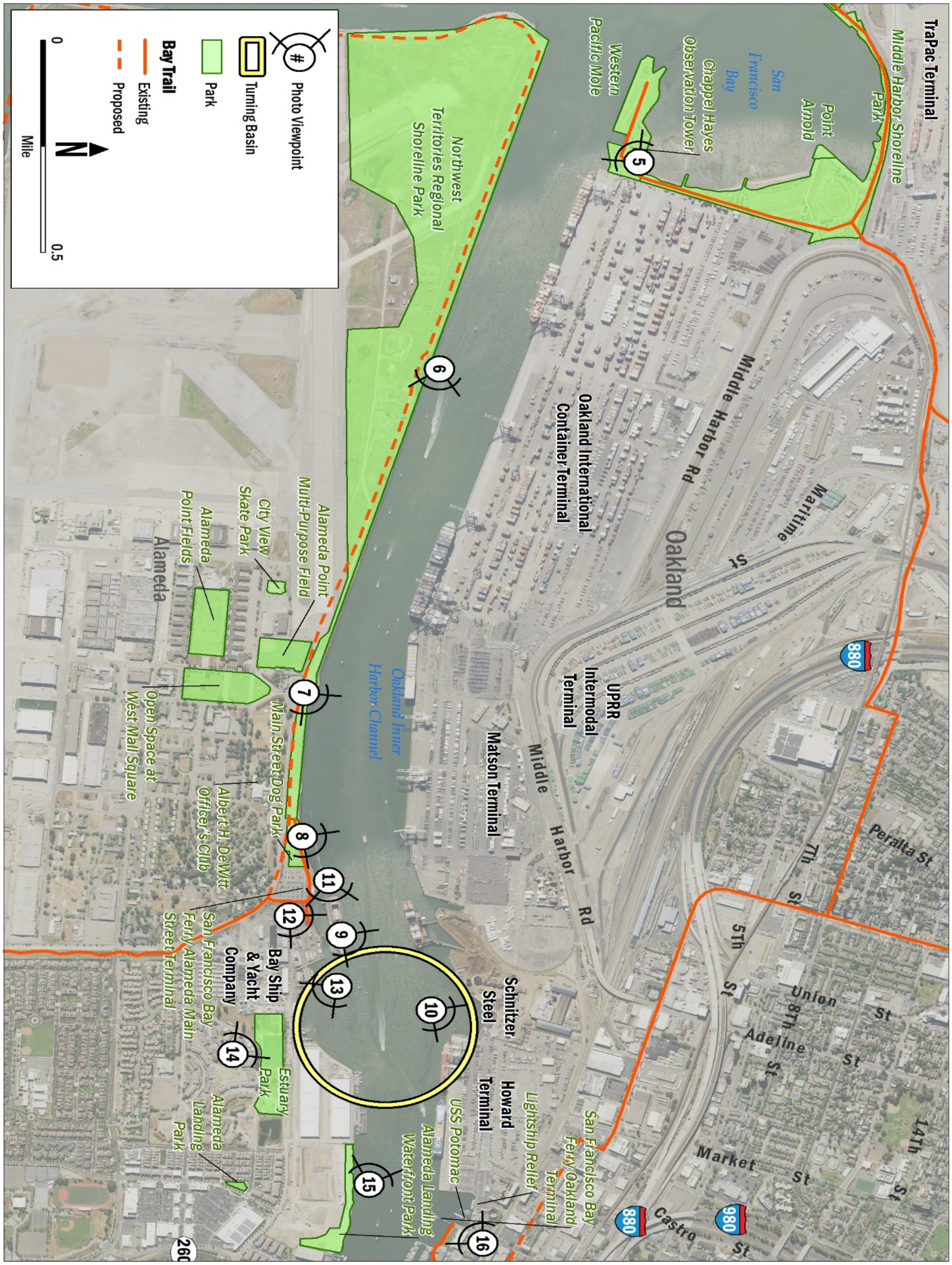
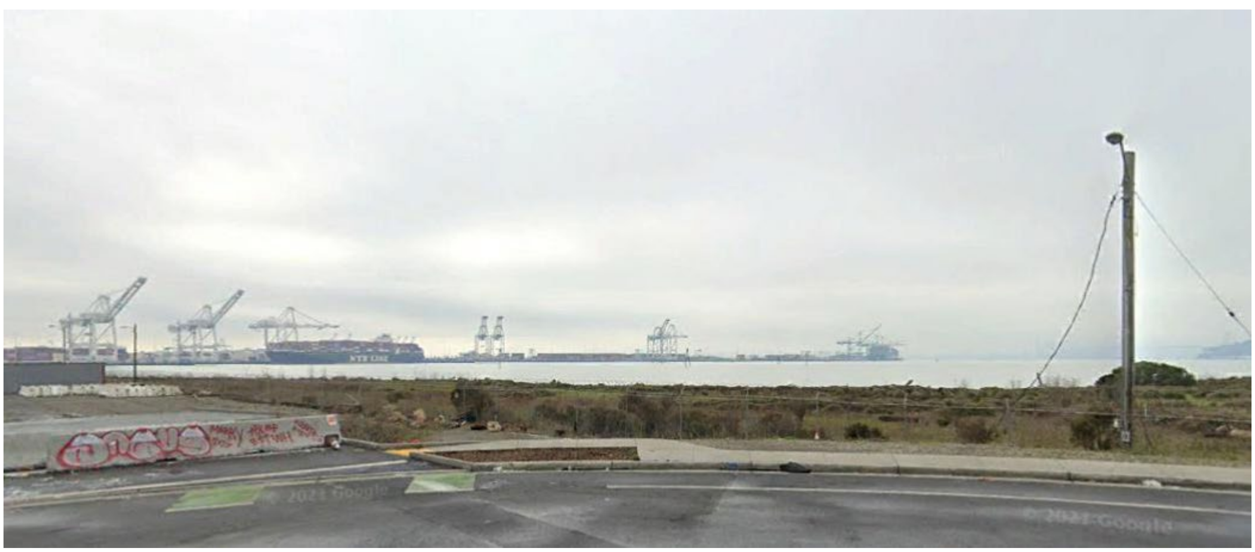


Figure 2: Key Observation Points and Parks, Inner Harbor Turning Basin Study Area

Viewpoint 1
View of the OHTB and Port Marine Terminals with mechanized cranes, docked cargo ships, and the San Leandro Hills, from the Bay Bridge and Bay Bridge Trail, looking east.
Source: Google Earth 2021

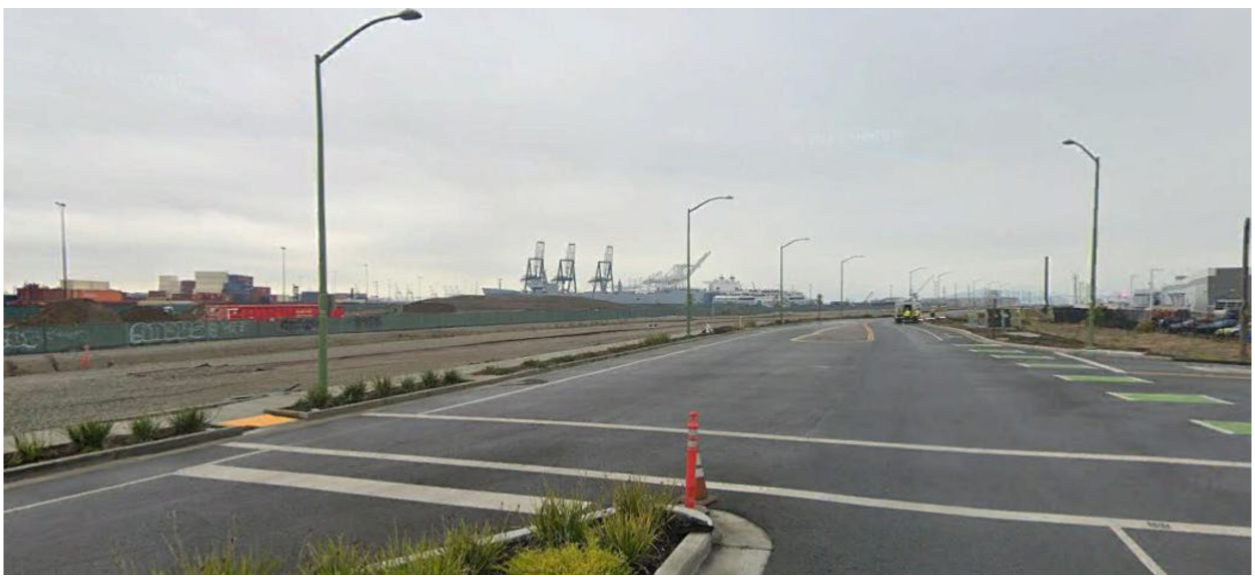


Viewpoint 2
View of the OHTB and Port Marine Terminals with mechanized cranes and docked cargo ship, from the Judge John Sutter Shoreline Park (Gateway Park) entrance, looking south.
Source: Google Earth 2021

Viewpoint 3

View of tugboats at Berths 8/9, proposed staging area at Berth 10, and the Outer Harbor and Marine Terminals with a docked ship, from the Judge John Sutter Shoreline Park Bridge Yard Building and Observation Deck at Burma Road, looking east.

Source: Google Earth 2021

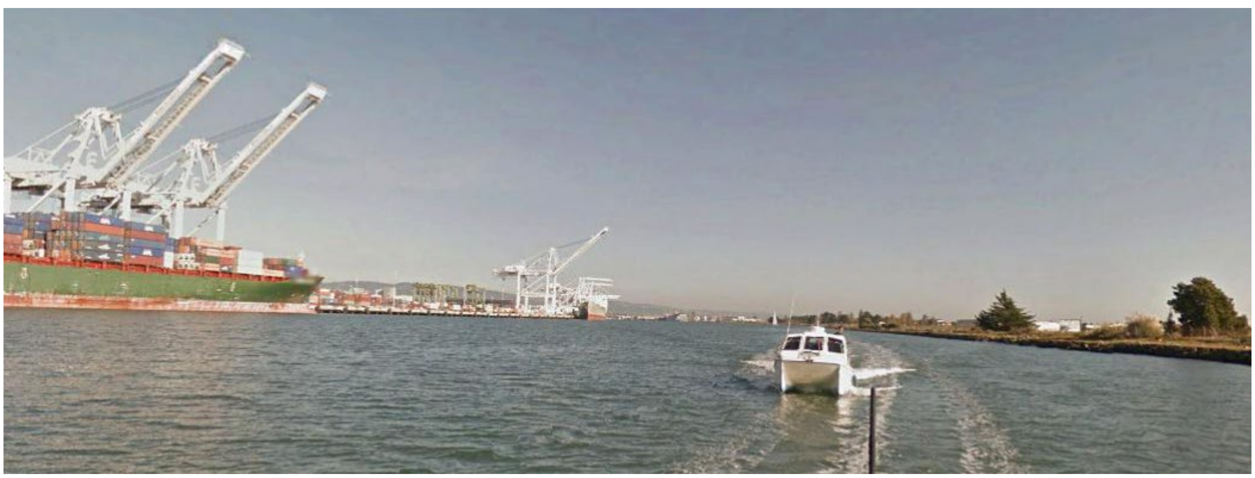


Viewpoint 4

View of cargo containers at City Development Area, dredged materials at Berth 10 (proposed staging area), and the Outer Harbor Marine Terminals with a docked ship, from the Bay Trail/Burma Road Intersection, looking south.

Source: Google Earth 2021

Viewpoint 5
View of the Entrance to Inner Harbor, San Francisco Skyline, and Chappel Hayes Observation Tower, from the Port's Middle Harbor Shoreline Park Western Pacific Mole, looking southwest.
Source: Google Earth 2021



Viewpoint 6
View of Inner Harbor Channel, Port berths with mechanized cranes and cargo ships, and the planned Northwest Territories Regional Shoreline Park, from the Inner Harbor Channel, looking east.
Source: Google Earth 2014

Viewpoint 7

View of waterfront area and Port Matson Terminal Near City of Alameda Point Multi-Purpose Field and Open Space at West Mall Square, with IHTB in the middleground and San Leandro Hills in the background, from Main Street and West Mall Square, looking east.

Source: Google Earth 2021

Viewpoint 8

View of black, mechanized crane at Schnitzer Steel, northwestern edge of IHTB, City of Oakland Skyline, San Leandro Hills, ship construction building and cranes at Bay Ship & Yacht Company, Alameda Ferry Terminal, Main Street Dog Park, and Bay Trail, from the Bay Trail, looking northeast.

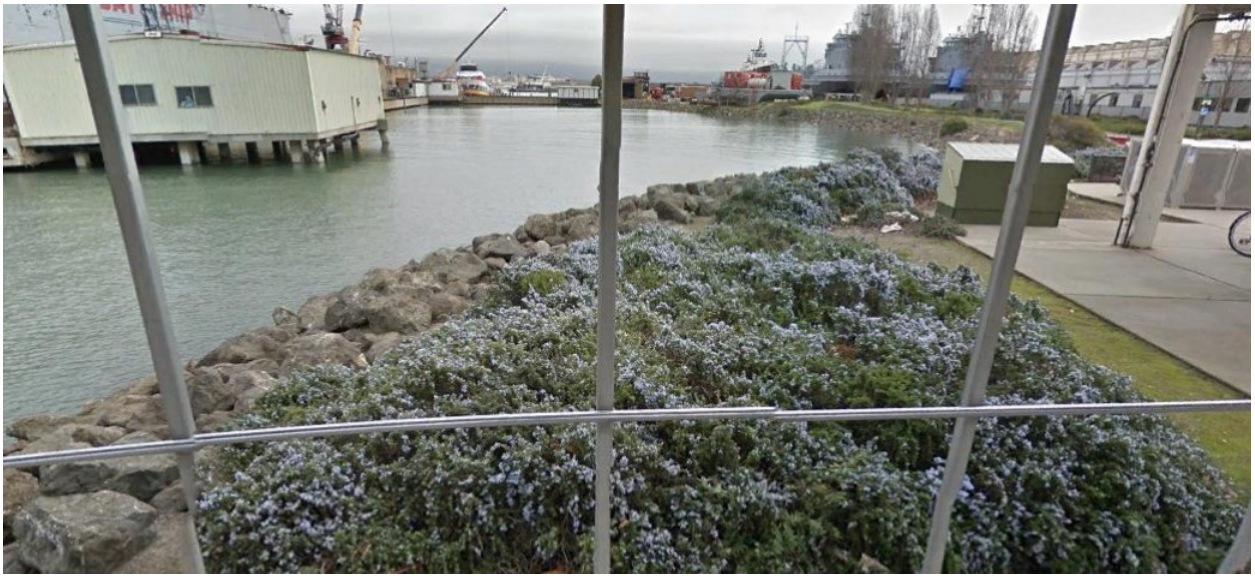
Source: Google Earth 2021

Viewpoint 9

View of Schnitzer Steel Facility with black mechanized crane, northwestern corner of IHTB, City of Oakland skyline, San Leandro Hills, and a San Francisco Bay Ferry boat, from the Inner Harbor Channel, looking north.
Source: Google Earth 2014

Viewpoint 10

View of northeastern IHTB, Howard Terminal with mechanized cranes, City of Oakland skyline, and San Leandro Hills, from the Inner Harbor Channel, looking northeast.
Source: Google Earth 2014



Viewpoint 11

View of Bay Ship & Yacht Company at southwestern corner of IHTB, and Bay Trail, from the San Francisco Bay Alameda Ferry Terminal, looking east.

Source: Google Earth 2021

Viewpoint 12

View of eastern end of Bay Trail and Bay Ship & Yacht Company adjacent to southwestern side of IHTB, from the Bay Trail, looking east.

Source: Google Earth 2016

Viewpoint 13

View of southeastern side of IHTB including warehouses and ships at Marine Express Services and trees in City of Alameda's Estuary Park, from the Inner Harbor Channel, looking southeast.
Source: Google Earth 2021

Viewpoint 14

View of playing fields and high-mast lighting at City of Alameda Estuary Park, cranes at the Bay Ship & Yacht Company, and warehouses at Marine Express Services, from Mosley Avenue, looking north.
Source: Google Earth 2019

Viewpoint 15

View of Inner Harbor Channel, cranes at Howard Terminal, northern portion of IHTB, cranes at Matson Terminal and the San Francisco skyline, from Inner Harbor at the planned Alameda Landing Waterfront Park, looking west.
Source: Google Earth 2021

Viewpoint 16

View of warehouses at Marine Express Services, the southern side of the IHTB, Oakland Ferry Terminal, USS Potomac, and Lightship Relief, from the Public Plaza at the San Francisco Bay Oakland Ferry Terminal and Historic Ship Dock, looking southwest.
Source: Google Earth 2019

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APPENDIX A-10:

Finding of No Significant Impact (FONSI)

DRAFT December 1, 2021

FINDING OF NO SIGNIFICANT IMPACT

OAKLAND HARBOR TURNING BASINS WIDENING NAVIGATION STUDY
OAKLAND, CALIFORNIA, ALAMEDA COUNTY

The U.S. Army Corps of Engineers, San Francisco District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The draft Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated 15 December 2021, for the Oakland Harbor Turning Basins Widening Navigation Study addresses Navigation Improvement opportunities and feasibility in Oakland, Alameda county, California. The final recommendation will be contained in the report of the Chief of Engineers.

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would improve navigation efficiency in the study area. The recommended plan is Alternative D-2, the Comprehensive Benefits Plan (CBP), which includes:

- Landside Installation of an estimated 2,500 linear feet of sheetpile bulkhead;
- Dredging of approximately 1,750,000 cubic yards of dredged material;
- Landside excavation of approximately 130,000 cubic yards of soil from Alameda, Howard Terminal, and Schnitzer Steel;
- Placement of material at Keller Canyon landfill, Kettleman Hills landfill, and an upland beneficial use site as either non-cover or cover in compliance with 33 U.S. Code § 2326 (WRDA 1992 § 204(d)); and
- Use of electrified dredges.

In addition to a “no action” plan, three alternatives were evaluated.[1] The alternatives included:

- Alternative B: Widening the Inner Harbor Turning Basin only, with beneficial placement of eligible material

- Alternative C: Widening the Outer Harbor Turning Basin Only, with beneficial placement of eligible material

- Alternative D-1: Widening the Inner and Outer Harbor Turning Basins, with beneficial placement of eligible material

- Alternative D-2 (CBP): Widening the Inner and Outer Harbor Turning Basins, with beneficial placement of eligible material and the electrification of dredges

These alternatives are compared in Chapter 4 Of the IFR/EA.

The CBP provides additional environmental benefits over the NED plan because it includes the use of electrified dredges which produce less local air quality impacts and associated health risks to the surrounding communities, which already experience a high pollution burden and are environmental justice communities of concern.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Essential Fish Habitat	☒	☐	☐
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☒	☐	☐
Hydrology	☐	☐	☒
Land use	☐	☐	☒
Navigation	☒	☐	☐
Noise levels	☒	☐	☐
Recreation	☒	☐	☐
Public infrastructure	☒	☐	☐
Socio-economics	☒	☐	☐
Environmental justice	☒	☐	☐
Soils	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the IFR/EA will be implemented, if appropriate, to minimize impacts. A complete list of avoidance and minimization measures is provided in Appendix A7 of the IFR/EA.

No compensatory mitigation is expected to be required as part of the recommended plan.

Public review of the draft IFR/EA and FONSI will be completed on 31 January 2022. All comments submitted during the public review period will be responded to in the Final IFR/EA and FONSI. A 45-day state and agency review of the Final IFR/EA will be completed.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan may affect but is not likely to adversely affect the following federally listed species or their designated critical habitat:

- California least tern
- Southern population of North American green sturgeon DPS
- Central California coast steelhead DPS
- Central Valley steelhead DPS
- Sacramento winter-run chinook salmon ESU
- Central Valley spring-run chinook salmon ESU
- Longfin smelt

USACE will request informal consultation with The National Marine Fisheries Service and U.S. Fish and wildlife service after the release of the IFR/EA.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan has no historic properties affected.

Pursuant to the Clean Water Act of 1972, as amended, no discharge of dredged or fill material to Waters of the U.S. associated with the recommended plan is expected.

If applicable, a water quality certification pursuant to section 401 of the Clean Water Act will be obtained from the San Francisco Bay Regional Quality Control Board prior to construction. All conditions of a water quality certification would be implemented in order to minimize adverse impacts to water quality.

The U.S. Army Corps of Engineers determined the recommended plan is consistent with the California Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972. A notice of consistency will be obtained from the San Francisco Bay Conservation and Development Commission. All conditions of the consistency notice shall be implemented in order to minimize adverse impacts to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.[2] Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date

Kevin P. Arnett
Lieutenant Colonel, U.S. Army
District Commander and Engineer