U.S. Army Corps of Engineers

Oakland Harbor Turning Basins Widening

Integrated Feasibility Report and
Environmental Assessment

January 2024

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Executive Summary

The Oakland Harbor Turning Basins Widening Integrated Feasibility Report and Environmental Assessment (IFR/EA) documents the U.S. Army Corps of Engineers (USACE) feasibility study planning process for channel improvements of the existing Oakland Harbor Navigation Improvement (-50-foot) Project and complies with the National Environmental Policy Act (NEPA) as incorporated into the planning process.

Final Integrated Feasibility Report and Environmental Assessment

This report is the Final IFR/EA for the study. A Draft IFR/EA was released 17 December 2021 for public review; the public comment review period for that draft closed 14 February 2022. Following the initial release of the draft report, public comment and subsequent to refinement of the tentatively selected plan led to shifting both the inner and outer harbor turning basin footprints. This shift required in-water fill and pile driving that was not previously evaluated in the initial draft report. This fill in Waters of the United States required the preparation of a Clean Water Act 404(b)(1) (CWA) analysis, which was not prepared for the initial draft. A revised draft report, including CWA 404(b)(1) analysis, was released for public review on 26 April 2023. In addition to CWA analysis, the revised draft report incorporated additional analysis and other updates in response to public and internal agency comments received on the initial Draft IFR/EA. The public comment review period for the revised Draft IFR/EA closed 16 June 2023. Response to public comments on both the initial and revised Draft IFR/EA may be found in Appendix A10 of this Final IFR/EA.

Study Authority and Planning Process

The Oakland Harbor Navigation Improvement (-50-foot) Project Final Feasibility Study of November 1998 was authorized by the Water Resources Development Act (WRDA) of 1986 § 203 (Pub. L. No. 99-662, 100 Stat. 4098 (Nov. 17, 1986), 33 United States Code (U.S.C.) § 2231). The study and resulting Chief's Report recommended a 50-foot-deep channel in the Oakland Harbor based on a design vessel with a 1,139-foot length overall, 140-foot beam, 48-foot draft, and 6,500 twenty-foot equivalent unit (TEU) carrying capacity. The Recommended Plan was authorized for construction in Section 101(a)(7) of WRDA 1999 (Pub. L. No. 106-53, 113 Stat. 275 (Aug. 17, 1999)). Construction of the project channels was completed in 2009. The completed channels are maintained at -50 feet mean lower low water (MLLW).

Today, vessels with nearly triple the capacity of the original design vessel call at the Port. The superseding of the current channel dimensions adversely affects the economic potential of the Harbor and requires reexamination of the engineering design of the existing -50-foot Project.

In October 2018, a Section 216 Initial Appraisal Report, in compliance with Section 216 of the Rivers and Harbors Act of 1970, was conducted to determine potential federal interest in undertaking modifications to the existing -50-foot Project. The Section 216 Initial Appraisal Report concluded that the problems in Oakland Harbor are caused by length limitations in the Inner and Outer Turning Basins, not by depth limitations or landside capacity. The vessels routinely calling on the Oakland Harbor today are larger than the design vessel and include Ultra Large Container Vessels (ULCV) or Post-Panamax Generation IV (PPX Gen

IV), such as the *MSC Sveva*, a 19,224 TEU container vessel. This vessel called at the Port of Oakland in late 2020 and 2021 and has nearly triple the capacity of the -50-foot Project's design vessel. While these vessels can call at the Port currently with operational restrictions, the existing turning basins are insufficiently sized for these larger vessels to utilize and provide no margin for error during turning operations for even the smaller Post-Panamax Generation III (PPX Gen III) vessels.

Pursuant to Section 216 of the Flood Control Act Act of 1970, the Oakland Harbor study evaluates proposed modifications to the existing -50-foot Project, specifically the existing turning basins. The need for this investigation arises from inefficiencies experienced by vessels in the Harbor, specifically the turning basins, where the current fleet exceeds the maximum dimensions of the constructed -50-foot Project. These inefficiencies are projected to continue as vessel sizes increase to meet needs for operational efficiency and environmental compliance requirements.

To meet the federal objective for the Oakland Harbor Study, the project delivery team followed the six-step planning process described in *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (U.S. Water Resources Council, 1983) and the *Planning Guidance Notebook* (USACE, 2000b). The purpose of water and related land resources project planning is to contribute to the Nation's national economic development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable Executive Orders, and other federal planning requirements. Plan formulation also considers all beneficial or adverse effects to the four accounts identified in the Principles and Guidelines (1983): NED, environmental quality, regional economic development, and other social effects.

This study's purpose is to determine if there is a technically feasible, economically justified, and environmentally acceptable recommendation for federal participation in a navigation improvement project in the Oakland Harbor. Based on a forecast of the future fleet, the study team, which includes the USACE Deep Draft Navigation Planning Center of Expertise, has determined the design vessel for this study is a vessel with 1,310 feet in length overall, 193 feet in beam, 52.5-foot maximum summer loadline draft, and 19,000 TEUs nominal intake. USACE considered a range of nonstructural and structural measures that have the potential to improve navigation efficiencies within the Oakland Harbor. These measures included but were not limited to channel widening, channel deepening, bend easing, improving vessel scheduling, relocating navigation aids, and increasing tugboat assistance. For structural measures, several footprint variations were considered, including two Outer Harbor footprints, four Inner Harbor footprints, and two new locations for the Inner Harbor turning basin. Through an iterative planning process, a focused array of alternatives was identified, evaluated, and compared. This evaluation led to a final array which was carried forward for the NEPA analysis.

During plan formulation, the study team identified the Federal Standard Base Plan (Base Plan), which is the least costly disposal alternative, consistent with sound engineering practices and meeting all federal environmental requirements. The Base Plan, which is a part of the NED plan, assumes some disposal at the Kettleman Hills and Keller-Canyon landfills (for potentially hazardous material and materials not suitable for beneficial use at a wetland restoration site as foundation material); placement at a local upland wetland restoration beneficial use site as foundation material to contribute to the protection, restoration, or creation of aquatic wetland habitats (for material not suitable for aquatic placement at the San Francisco Deep-Ocean Disposal Site (SFDODS)), as well as open water placement at the SFDODS (for materials suitable for such unconfined aquatic disposal). It should be noted that material suitable for SFDODS placement could also be suitable for placement as cover material at an upland wetland restoration beneficial use site, but the cost would be higher for such beneficial use.

After identifying the Base Plan, the study team assessed beneficial use opportunities beyond the Base Plan to determine whether there would be appropriate matches of sources and uses of dredged material. It was established that the incremental cost to place material suitable as cover material at an upland beneficial use site compared to placement at SFDODS was reasonable based on the environmental benefits to be achieved. Therefore, the alternatives other than the Base Plan, where applicable, include the additional beneficial use.

The analysis presented in this report identified a focused array of alternatives consisting of Alternative A – No Action and the following variations of Inner and Outer Harbor turning basin widening modifications: Alternative B – Inner Harbor modifications only; Alternative C – Outer Harbor modifications only; Alternative D-0 – Inner and Outer Harbor modifications using diesel dredges with the least costly dredged material placement (Base Plan) was identied as the NED Plan; Alternative D-1 – Inner and Outer Harbor modifications using diesel dredges and additional beneficial use (wetland restoration cover material) placement; and Alternative D-2 – Inner and Outer Harbor modifications using electric dredges and additional beneficial use placement (wetland restoration cover material). Except for Alternative D-2, all alternatives assume the use of diesel dredges.

The Recommended Plan

Generally, the NED plan for any dredging project consists of two components: the dredging action itself and the disposal of the dredged material. In the case of Oakland Harbor, which has an existing -50-foot, MLLW channel project, the NED plan maximizes the economic outputs that result from more efficient navigation of ships within the inner and outer harbors.

The NED plan was identified as Alternative D-0, which provides the highest net economic benefits to the project. The NED plan for the Oakland Harbor Turning Basins would expand both the inner and outer turning basins to a depth of -50 feet, MLLW using diesel dredges; disposal of dredged material would use the least cost disposal option, which is the Federal Base Standard.

In addition to economic outputs of the NED plan, this study identified the potential to place eligible dredged material for beneficial use, at a site that is not part of the Base Plan, as a part of Alternative D-1 and D-2. Alternative D-1 and D-2 build on the NED plan, adding a beneficial use increment to place this material at a wetland restoration site. Additionally, Alternative D-2 would utilize electric dredges to reduce impacts to the surrounding communities. Alternative D-2 is also the comprehensive benefits plan. USACE policy requires Assistant Secretary of the Army for Civil Works (ASA(CW)) approval to recommend federal cost share for both beneficial use and the use of electric dredges, because they are not components of the NED Plan.

Following the initial release of the draft report in December 2021, the study team submitted a policy exception request to the ASA(CW) for approval to recommend Alternative D-2 for full federal cost share as the comprehensive benefits plan. In September 2022, the ASA(CW) responded to the policy exception request and approved federal cost-share for beneficial use of all suitable dredged material. The ASA(CW) considered the use of electric dredges to be more appropriately classified as a local mitigation measure because the proposed project is expected to meet all federal air quality standards. The ASA(CW) therefore declined to recommend altering federal cost share to include electrified dredging. The ASA(CW) did state support for the use of electric dredges as an approach that can be implemented if requested by the non-federal sponsor and if the sponsor is willing to assume the additional associated costs. The non-federal sponsor, the Port of Oakland, requested the use of electric dredging as a betterment to the plan at full non-federal cost. Therefore, Alternative D-2 was carried forward as the plan recommended under NEPA. Under this Recommended Plan, federal cost sharing would be equivalent to the cost of Alternative D-1 (i.e. the cost of implementing the project with Diesel Dredging) and the Port would fund electric dredging as a betterment at 100% non-federal cost.

The Recommended Plan (Alternative D-2) would modify the Inner Harbor Turning Basin and Outer Harbor Turning Basin. These improvements will improve both the efficiency and safety of vessel movements within the Oakland Harbor thereby creating the savings that are the main driver of NED benefits. However, this will not cause an increase in cargo throughput, as widening the turning basins does not change the Port's container handling capacity or the number of vessels able to berth.

The Recommended Plan would widen both the Inner and Outer Harbor Turning Basins, bringing the expanded footprints to the -50ft MLLW depth of the existing turning basins. The diameter of the Inner Harbor Turning Basin will increase from 1,500 feet to 1,834 feet (334 feet total). The diameter of the Outer Harbor Turning Basin will increase from 1,650 feet to 1,965 feet (315 feet total). The turning basin footprint configurations were designed to avoid and minimize environmental and cultural resource impacts while still meeting navigation safety requirements.

Widening the Inner Harbor Turning Basin will impact approximately 4.6 acres of fast land at the Alameda Site and approximately 2.8 acres of fast land at Howard Terminal. 4,500 existing piles will be demolished, and and a total of 2,380 linear feet of bulkhead will be constructed at Schnitzer Steel, Howard Terminal, and the Alameda Site .

During the construction phase, electric dredges will be used to dredge an estimated 0.8 million cubic yards of material from the Inner Harbor Turning Basin and 1.3 million cubic yards of material from the Outer Harbor Turning Basin. The Recommended Plan will beneficially place all eligible dredged material in compliance with 33 U.S.C. § 2326 (WRDA 1992 § 204(d)). Eligible dredged and excavated material will be transported to either Montezuma Wetlands Site, or Cullinan Ranch. The Recommended Plan will beneficially place approximately 2.1 million cubic yards of dredged and excavated material contributing to the creation approximately 205 acres of wetland. Terrestial soils from the Inner Harbor will be transported to Class I or Class II landfill placement at Kettleman Hills landfill and Keller Canyon landfill, respectively.

The USACE has determined that the Recommended Plan will not significantly adversely impact physical and biological environmental resources, cultural resources, public health and safety, or the quality of the human environment.

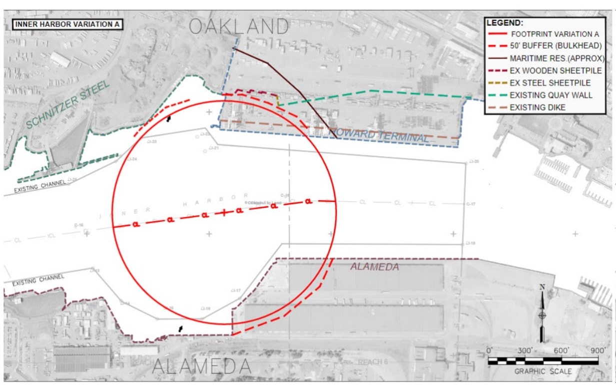
At current price levels (October 2023 price level and 2.75% discount rate), the Recommended Plan has an estimated project first cost of $541.8 million[1], provides an estimate of $27.4 million in Average Annual Equivalent (AAEQ) net benefits, and has a benefit-cost ratio of 2.3. The non-federal costs for the value of lands, easements, rights-of-way, and relocations are estimated to be $63.5 million. Operation and maintenance is estimated to cost $1.1 million annually.

Pertinent Data

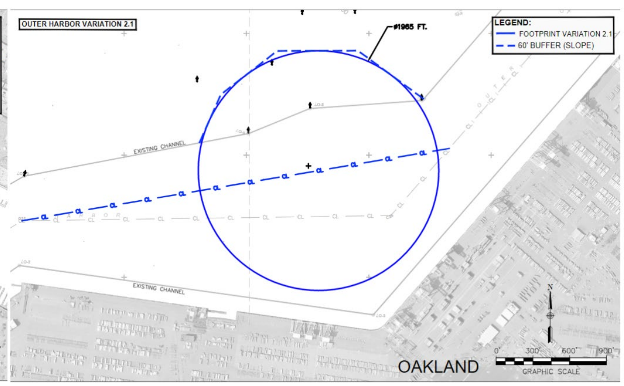
Recommended Plan Features

The Recommended Plan would modify the Inner Harbor Turning Basin and Outer Harbor Turning Basin to allow vessels to operate within the Oakland Harbor more efficiently and allow large vessels to call more frequently. The increase in cargo per vessel call yields economic benefits by allowing more efficient use of containerships.

The Recommended Plan assumes the use of electric dredges as a betterment at full non-federal cost and places material at Keller Canyon landfill, Kettleman Hills landfill, and at a beneficial use site for the protection, restoration, or creation of aquatic wetland habitats as either foundation (non-cover) or cover material in compliance with Section 204(d) of WRDA 1992.



Inner Harbor



Outer Harbor

Construction

The project assumes a construction start date of June 2027 with an overall duration of approximately 2.5 years, ending November 2029. Construction years are assumed for the economics evaluation in this study and are subject to report and project approvals and funding requirements, including federal and non-federal funds. Construction will take place within the applicable environmental work windows.

[1] Cost does not include the cost for electric dredges, which is being treated as a betterment and will be paid for by the non-federal sponsor.

Real Estate Requirements

Federal law requires that the non-federal sponsor, here the Port of Oakland, provide the lands, easements, rights-of-way, and relocations necessary for a USACE project[1]. The Recommended Plan's lands, easements, and rights-of-way costs are $63,686,000. Included in this amount is facility/utility relocation costs of $1,706,000. These costs will be borne by the Port of Oakland.

The project is located at the Port of Oakland on the eastern side of San Francisco Bay in Alameda and San Francisco counties, California. This study includes the Entrance Channel – Oakland Bar, the Outer Harbor Channel and its Outer Harbor Turning Basin, and the Inner Harbor Channel and its Inner Harbor Turning Basin. The NFS will acquire the minimum interests in Real Estate to support the construction and subsequent operation and maintenance of the future USACE project.

Project First Cost

Project first cost is the constant dollar cost at the October 2023 price level and is the cost used in the authorizing document for a project. The project first cost for the Recommended Plan is estimated to be $541.8 million, including navigation ports and harbors facilities costs of $382.4 million.

[1] Any conclusion or categorization that an item is a utility or facility relocation to be performed by the non-federal sponsor as part of its lands, easements, rights-of-way, and relocations responsibilities is preliminary only. USACE will make a final determination of the relocations necessary for the construction, operation or maintenance of the project after further analysis and completion and approval of a Final Attorney's Opinion of Compensability for each of the impacted utilities and facilities.

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AAEQ	Average Annual Equivalent
AAPA	American Association of Port Authorities
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
APE	Area of Potential Effects
ASA(CW)	Assistant Secretary of the Army for Civil Works
BAAQMD	Bay Area Air Quality Management District
BART	San Francisco Bay Area Rapid Transit
BCDC	San Francisco Bay Conservation and Development Commission
BLT	Bulk Loading Tool
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe
BU	Beneficial Use
CAA	Clean Air Act
CAPP	Community Air Protection Program
CARB	California Air Resource Board
CCC	Central California Coast
CDF	Cumulative Distribution Function
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CHC	Commercial Harbor Craft
CO	Carbon Monoxide
COC	Constituents of Concern
CT	Census Tract
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	Decibels
dBA	A-weighted decibels
DC	Distribution Centers
DMMO	Dredged Material Management Office
DNL	Day-Night Average Noise Level
DPM	Diesel Particulate Matter
DPS	Distinct Population Segment
DTSC	Department of Toxic Substances Control
DWT	Deadweight Tons
EFH	Essential Fish Habitat
EGM	Economic Guidance Memorandum
EJ	Environmental Justice
EO	Executive Order

ACRONYMS AND ABBREVIATIONS	
EPA	Environmental Protection Agency
EQ	Environmental Quality
ER	Engineer Regulation
ESL	Environmental Screening Level
ESU	Evolutionarily Significant Unit
ETTC	Estimated Total Trip Cargo
EU	Europe
FCC	Fully Cellular Container
FE	Far East
FHWA	Federal Highway Administration
FISC	Fleet Industrial Supply Center
FMP	Fisheries Management Plan
FTA	Federal Transportation Administration
FUSRAP	Formally Utilized Sites Remedial Action Program
FWCA	Fish and Wildlife Coordination Act
FY	Fiscal Year
GDP	Gross Domestic Product
Generation	Generation
GI	Global Insight
GNF	General Navigation Feature
GRP	Gross Regional Product
HAPs	Hazardous Air Pollutants
HMST	HarborSym Modeling Suite of Tools
HOPs	Hydrocarbon Oxidation Products
HRA	Health Risk Assessment
HTRW	Hazardous, Toxic, Radioactive Waste
I-880	Interstate 880
IANA	Intermodal Association of North America
IDC	Interest During Construction
ILWU	International Longshore and Warehouse Union
IPCC	Intergovernmental Panel on Climate Change
ISIC	International Standard Industrial Classification
IWR	Institute for Water Resources
LERR	Lands, Easements, Rights of Ways, Relocations
LFA	Load Factor Analysis
LOA	Length Overall
LR	Lloyd's Register
LTMS	Long-Term Management Strategy
LUC	Land Use Covenant
MBTA	Migratory Bird Treaty Act
MED	Mediterranean
MHEA	Middle Harbor Enhancement Area
MHHW	Mean Higher High Water

ACRONYMS AND ABBREVIATIONS	
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MRF	Material Recovery Facility
MSA	Metropolitan Statistical Area
MSI	Maritime Strategies, Inc.
MXSLLD	Maximum Summer Loadline Draught
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NAICS	North American Industry Classification System
NAS	Naval Air Station
NAVD	North American Vertical Datum
NED	National Economic Development
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NO_X	Nitrous Oxides
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWIC	Northwest Information Center
O&M	Operations & Maintenance
OD	Origin-to-Destination
OHT	Outer Harbor Terminal
OMRR&R	Operations, Maintenance, Rehabilitation, Repair & Replacement
OSE	Other Social Effects
P&G	Principles & Guidelines
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PED	Pre-construction Engineering and Design
PIANC	Permanent International Association of Navigation Congresses
PM	Particulate Matter
PM_{10}	Particulate Matter - 10 microns in diameter or less
$PM_{2.5}$	Particulate Matter - less than 2.5 microns
PPV	Peak Particle Velocity
PPX	Post-Panamax
PPX Gen I	Post-Panamax Generation I
PPX Gen	Post-Panamax Generation II
PPX Gen	Post-Panamax Generation III
PPX Gen	Post-Panamax Generation IV
PX	Panamax

ACRONYMS AND ABBREVIATIONS	
RCRA	Resource Conservation and Recovery Act
RECONS	Regional Economic System
RED	Regional Economic Development
RHA	Rivers and Harbors Act
RMS	Root Mean Square
RNA	Regulated Navigation Area
ROG	Reactive Organic Gasses
SEA	Southeast Asia
SFRWQC	San Francisco Regional Water Quality Control Board
SHPO	State Historic Preservation Office
SJVAB	San Joaquin Valley Air Basin
SLF	Sacred Lands File
SO_2	Sulphur Dioxide
SPX	Sub-Panamax
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TACs	Toxic Air Contaminants
TEU	Twenty-foot Equivalent Unit
TMP	Traffic Management Plan
TPH	Total Petroleum Hydrocarbons
TPI	Tons Per Inch Immersion
TSP	Tentatively Selected Plan
U.S.C.	United States Code
ULCV	Ultra-large Container Vessel
UPRR	Union Pacific Railroad
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	United States Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VdB	Vibration Decimals
VMT	Vehicle Miles Traveled
VOC	Vessel Operating Costs
VTS	Vessel Traffic Service
WCUS	West Coast United States
WQC	Water Quality Certification
WRDA	Water Resources Development Act
WTM	World Trade Model

Chapter 1: Introduction

1.1 Integrated Feasibility Report and Environmental Assessment

The Oakland Harbor Turning Basins Widening Study (Oakland Harbor Study) Final Integrated Feasibility Report and Environmental Assessment (Final Integrated Report) documents the U.S. Army Corps of Engineers (USACE) feasibility study planning process for channel improvements of the existing Oakland Harbor Navigation Improvement (-50-foot) Project. This report integrates the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321 *et seq.*), as amended, the Council on Environmental Quality (CEQ) 2020 Regulations for Implementing the Procedural Provisions of the NEPA (40 C.F.R. §§1500-1508), and USACE Procedures for Implementing NEPA (Engineer Regulation (ER) 200-2-2), with the requirements of the USACE plan formulation and selection process. The feasibility report and NEPA analysis are integrated because the study planning process informs NEPA, and NEPA compliance informs study planning. Sections marked with an asterisk (*) next to their title are denoted to assist readers in identifying information that would commonly be provided as part of a standalone NEPA Document.

This report is the Final IFR/NEPA Environmental Assessment (EA) for the study. A Draft IFR/EA was released 17 December 2021 for public review; the public comment review period for that draft closed 14 February 2022. Following the initial release of the draft report, public comment and subsequent refinement of the tentatively selected plan led to shifting the proposed widened footprints for both the inner and outer harbor. The shifts were determined to require in-water fill and pile driving that was not previously evaluated in the initial draft IFR/EA. This fill in Waters of the United States also required the preparation of a Clean Water Act (CWA) 404(b)(1) (CWA) analysis, which was not prepared for the initial draft. Therefore, a revised draft IFR/EA, including a CWA 404(b)(1) analysis, was released for public review on 26 April 2023. In addition to CWA analysis, the revised draft report incorporated additional analysis and other updates in response to public and internal agency comments received on the initial draft IFR/EA. The public comment review period for the revised draft IFR/EA closed 16 June 2023. Response to public comments on both the initial and revised Draft IFR/EA may be found in Appendix A10 of this Final IFR/EA.

1.2 Study Purpose & Scope and NEPA Purpose & Need for Action*

Pursuant to 33 U.S.C. § 540, deep draft navigation is one of the USACE's primary mission areas[3]. Under this authority, USACE studies and recommends channel improvements that would increase the efficiency of containership movements and other port operations which would yield national economic development (NED) benefits.

On April 28, 2017, the Port of Oakland requested that USACE exercise this authority to investigate technically feasible, economically justifiable, and environmentally acceptable improvements, justifying federal participation, to the existing Oakland Harbor (-50-foot Project. As with many of the nation's ports, the Port of Oakland recognized that the

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[3] 33 U.S.C. § 540 states "Federal investigations and improvements of rivers, harbors, and other waterways shall be under the jurisdiction of and shall be prosecuted by the Department of the Army…"

maritime industry had moved rapidly toward larger container vessels, requiring ports to handle ships bigger than what they were designed to accommodate, creating inefficiencies.

Transportation inefficiencies occur when channels and maneuvering areas do not fully accommodate the vessels using them. For the Port of Oakland, the original design vessel for the 1998 Oakland Harbor Deepening Study was a 1,139-foot-long, 140-foot beam (width), and 48-foot draft (depth) containership with a 6,500 TEU capacity. This size falls into the post Panama Canal expansion classification post-Panamax Gen I (PPX Gen I). Since then, the length of the ULCVs has grown substantially, from 300 meters (984 feet) to 400 meters (1312 feet). When compared to the original 1998 design vessel with a length of 1,139 feet, the ULCV are roughly 173 feet longer, something that the current turning basins cannot accommodate.

In 2019, nearly half of the vessels that called at the Port were larger than the PPX Gen I. To transit the turning basins, operational restrictions are placed on these larger ships. These restrictions result in inefficiencies which include vessel delays, vessel idling, and requiring additional tugs, pilots, and specific tide schedules for movement of the largest vessels. The need for the study is to address inefficiencies resulting from the increase in the size of vessels calling at the Port and to ensure safe navigation for existing and prospective commerce.

The length of a ship is a major limiting factor in its ability to utilize a turning basin since the entire ship's length must be able to maneuver within the basin. This is especially true considering that water is dynamic, with currents, waves, and wind that can make maneuvering vessels less controllable. For this reason, the industry standard for turning basins is to provide for an additional 20% of the ships length on either side as a buffer to prevent vessels from grounding and colliding. Although there have been no documented collisions or allisions to date, this project by its nature will provide a general level of safety for vessels transiting the system.

In USACE's 2018 initial appraisal report under Section 216 of the Flood Control Act of 1970, the San Francisco Bar Pilots confirmed that it was indeed the two existing turning basins which limited the movements of the large vessels at the Port.

The Inner Turning Basin has a diameter of 1,500 feet and it is limited to 1,210-foot long ships (PPX Gen III). As this does not provide a 20% length buffer, vessels that long have additional restrictions such as more tugboats and pilots, a 1.5 knots current limit, and only turning during the hours of 6 a.m. through 11 p.m. to turn safely. Waiting until these conditions are met can delay vessels from transiting. In addition, ships in the Inner Turning Basin have the added difficulty of having to counteract the drift caused by the channel's natural current. While midturn, vessels are perpendicular to the current and act like a dam. In all, it can take up to 3 and half hours for such the larger ships to undock, turn and leave the harbor. Smaller vessels can undock and leave in 1-2 hours.

While the Outer Turning Basin is bigger than the Inner Turning Basin with a diameter of 1,650 feet, it is subject to stronger currents. Thus, vessels longer than 1,115 feet (PPX Gen III) are only able to use this turning basin when the ebb (falling) tide is zero or when the flood (rising) tide is 1.0 knot. Since these tides can occur as little as twice a day, waiting for these tides can suspend vessel transits.

The ULCVs are unable to utilize either turning basin, but this does not prevent them from calling at the Port, albeit with great effort. ULCVs must back out of the channel because they cannot use the turning basins to turn around, which leads to navigation inefficiencies within the harbor. In the Inner Turning Basin, ULCV cause a 2- to 3-hour delay for all other Inner Harbor vessels to allow ULCV to back out through the channel rather than turning in the basins and sailing out forwards. Much like cars, it is easier and safer to sail a vessel forward than backwards; thus, ULCVs sailing backwards requires an empty channel to prevent collisions and groundings. In addition, this necessitates the use of the Entrance Channel as a makeshift turning basin for ULCVs. The Entrance Channel is not designed for this purpose and due to its location, subjects ULCVs to the greatest exposure to wind and current effects in the Oakland Harbor, putting them at higher risk of groundings and collisions. This fact further limits ULCVs to only leaving during the slack water, a period between tidal changes where the water movement is minimal, which only occurs twice a day. All other times are unsafe and not allowed. Waiting until these conditions are met can again delay vessels from transiting.

These requirements ultimately lead to increased vessel idle times for multiple vessels throughout the Port. Any vessel that wishes to berth at the Inner Harbor when a ULCV is transiting, must wait in the Bay, without shore power, to allow the ULCV to leave. These idling vessels form a backlog of ships wanting to enter the channel to berth, thereby creating cascading delays, which puts pressure on Port related services ability to meet their needs all at once.

Delays also occur with ULCVs transiting in the Outer Harbor. The ULCVs cannot fully utilize the Outer Turning Basin safely and must berth next to it to swing out and leave. This prevents all other vessels from using the Outer Turning Basin, which inhibits other vessels from leaving, again creating cascading delays.

Whether the ships calling at the Port are PPX Gen III or IV (ULCV), the limitations of the Port’s turning basins and their resulting delays create wide ranging inefficiencies for all vessels. Therefore, under NEPA (40 C.F.R. § 1502.13), the purpose of the Recommended Plan is to improve these inefficiencies and ensure safe navigation for existing and prospective commerce. The Recommended Plan proposes to do so by expanding both turning basins to allow PPX Gen III and IV to use them with fewer restrictions. There is a need to address the navigation inefficiencies because the maritime industry has continued to signal a move toward more ULCVs. Without modifications, the inefficiencies currently experienced at the Port will only worsen, creating potential navigation safety issues such as an increased risk of grounding and collisions, with all the associated environmental and safety risks.

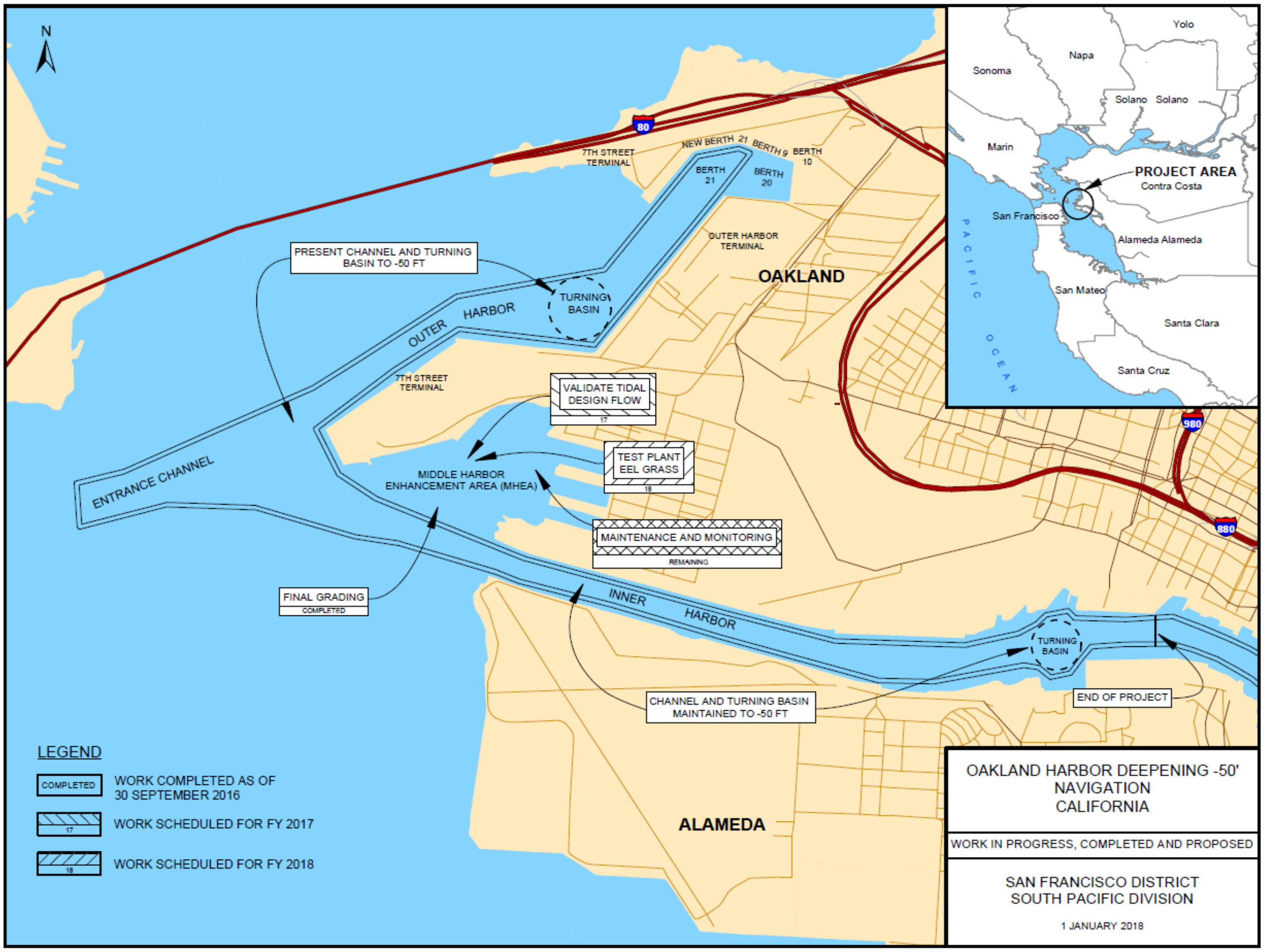

Figure 1: Current Port of Oakland Navigation Features

Table 1. Project Channel Dimensions

Channel	Authorized or Regulatory Depth (MLLW) (ft.)	Length (ft.)	Width (ft.)	Turning Basin Diameter (ft.)	Area (acres)
Entrance Channel	-50	3,600	900	-	86.9
Outer Harbor Channel	-50	16,500	900	1,650	373.9
Inner Harbor Channel	-50	20,000	800	1,500	402.1

1.3 Study Authority

1.3.1 Oakland Harbor Turning Basins Widening Feasibility Study

Section 216 of the Flood Control Act of 1970 authorizes USACE to review previously completed projects, when found advisable due to significant changed physical or economic conditions, and to report to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest. This study reviews the May 1998 Oakland Harbor Navigation Improvement (-50-foot) Project.

1.3.2 Oakland Harbor Navigation Improvement (-50-foot) study and Project Authorizations

The study authority for the May 1998 Oakland Harbor Navigation Improvement (-50-foot) Study was Section 203 of the Water Resources Development Act (WRDA) of 1986 (Pub. L. No. 99-662, 100 Stat. 4098 (Nov. 17, 1986), 33 U.S.C. § 2231). It reads:

SEC. 203 STUDIES OF PROJECTS BY A NON-FEDERAL INTEREST

1. **Submission to Secretary**. - A non-federal interest may on its own undertake a Feasibility Study of a proposed harbor or inland harbor project and submit it to the Secretary. To assist non-Federal interests, the Secretary shall, as soon as practicable, promulgate guidelines for studies of harbors or inland harbors to evidence sufficient information for the formulation of studies.
2. **Review by Secretary**. - The Secretary shall review each study submitted under subsection (a) for the purpose of determining whether such study and the process under which such study was developed comply with Federal laws and regulations applicable to Feasibility Studies of navigation projects for harbors or inland harbors.
3. **Submission to Congress**. - Not later than 180 days after receiving any study submitted under subsection (a), the Secretary shall transmit to the Congress, in writing, the results of such review and recommendations the Secretary may have concerning the project described in such plan and design.
4. **Credit and Reimbursement**.- If a project for which a study has been submitted under subsection (a) is authorized by any provision of Federal law enacted after the date of such submission, the Secretary shall credit toward the non-Federal share of the cost of construction of such project an amount equal to the portion of the cost of developing such study that would be the responsibility of the United States if such study were developed by the Secretary.

The -50-foot study conducted pursuant to Section 203 resulted in a Chief's Report dated April 21, 1999, recommending a 50-foot-deep channel and wider turning basins in the Oakland Harbor based on a design vessel with 1,139-foot length overall, 140-foot beam, 48-foot draft, and 6,500 TEU carrying capacity. The Recommended Plan was authorized for construction in Section 101(a)(7) of WRDA 1999 (Pub. L. No. 106-53, 113 Stat. 275 (Aug. 17, 1999)), which reads in part:

SEC. 101. PROJECT AUTHORIZATIONS.

(a) PROJECTS WITH CHIEF'S REPORTS

The following projects for water resources development and conservation and other purposes are authorized to be carried out by the Secretary substantially in accordance with the plans, and subject to the conditions, described in the respective reports designated in this subsection:

(7) OAKLAND HARBOR, CALIFORNIA

The project for navigation, Oakland Harbor, California: Report of the Chief of Engineers dated April 21, 1999, at a total cost of $252,290,000, with an estimated federal cost of $128,081,000 and an estimated non-Federal cost of $124,209,000.

1.3.3 Section 216 Initial Appraisal Report (2018)

In October 2018, an Initial Appraisal Report, compliant with Section 216 of Flood Control Act of 1970, was completed to determine if there is potential federal interest to modify the existing -50-foot Project. As described in Section 1.3.2 above, the Initial Appraisal Report found that:

> "based on the data provided, the vessels currently calling on Oakland are not constrained by draft, nor by landside capacity, but by length. An increase in the widths of the turning basins would create a transportation cost savings benefit by allowing future ultra large container vessels (ULCVs) to call at Oakland. The accelerating expansion of the volume of trade that has taken place over the recent past has led to the design vessel in the Oakland Harbor Navigation Improvement (-50-foot) Feasibility Study being superseded in use in the Port much sooner than expected. This has a material effect on the economic conditions and engineering design incurring economic inefficiency associated with ULCV's operations and navigational safety hazards at Project."

Therefore, the Initial Appraisal Report made the recommendation to "investigate and determine if there is a federal interest in continuing the project with the preparation of cost-shared feasibility report for analyzing alternatives to address the identified problems through possible modifications of the project."

The Oakland Harbor Turning Basins Widening Navigation Feasibility Study (Oakland Harbor Study) is the resulting investigation (study) that was recommended by the initial appraisal report. Section 216 of the Flood Control Act of 1970 limits the analysis of this Oakland Harbor Study to the constructed -50-foot Oakland Harbor Navigation Project.

1.4 Non-Federal Sponsor

A Feasibility Cost Sharing Agreement was executed on July 1, 2020, with the Port of Oakland as the non-federal sponsor. The Oakland Harbor Study is cost shared 50% federal and 50% non-federal.

1.5 Existing Project

Oakland Harbor includes the Entrance Channel—Oakland Bar, the Outer Harbor Channel and its Outer Harbor turning basin, and the Inner Harbor Channel and its Inner Harbor turning basin. It provides access to the Port of Oakland's berthing areas, which serve deep-draft vessels including container, break-bulk, bulk, roll-on/roll-off, and U.S. government vessels. The Inner Harbor is also maintained to -50 feet MLLW through the Howard Terminal, which is approximately 2.5 miles from the Inner Harbor entrance. The deepening of the Inner and Outer Harbor from -42 to -50 feet MLLW was completed in 2009. Annual operation and maintenance dredging is carried out to maintain the authorized project depth of -50 feet MLLW within the existing federal channel.

1.6 Prior Studies and Reports

Numerous studies and reports related to the Oakland Harbor have been conducted. A detailed list of these reports can be found in the 1998 Oakland Harbor Navigation Improvement (-50-foot) Project Report (Port of Oakland and USACE, 1998). Relevant studies, reports, and authorizations since 1998 are:

- Oakland Harbor Navigation Project, Section 216 Initial Appraisal Report (USACE, March 2018)
- Oakland Harbor Navigation Improvement (-50-foot) Project Revised Final Feasibility Study (Port of Oakland and USACE, November 1998)
- Final Environmental Assessment/ Environmental Impact Report for the Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay Fiscal Years 2015-2024 (San Francisco Regional Water Quality Control Board and USACE, April 2015)

1.7 Study Area

The Oakland Harbor study area includes the existing -50-foot federal navigation channel and the immediately surrounding areas (Figure 1 Figure 2). The study area is located on the eastern side of the San Francisco Bay, about 35 miles northwest of San Jose, in the counties of Alameda and San Francisco, California and within California's 12th congressional district (Representative Barbara Lee, previously 13th congressional district). The federally authorized Oakland Harbor navigation project is located about 8 miles inside the Golden Gate Bridge and consists of an Outer and Inner Harbor. The channel is maintained to a depth of -50 feet MLLW. The existing -50-foot federal navigation channel includes the Entrance Channel, Outer Harbor Channel, Inner Harbor Channel, the Outer Harbor Turning Basin, the Inner Harbor Turning Basin, and the Middle Harbor. The existing navigation channels provide access to four active container terminals:

- TraPac Terminal
- Ben E. Nutter Terminal
- Oakland International Container Terminal
- Matson Terminal

This planning study area is a geographic space with an identified boundary that includes the area identified in the study authorizing document and is where alternative plans (which are often called project areas) are located. The NEPA affected environment includes the locations that would be affected or created by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area (40 Code of Federal Regulations (C.F.R.) § 1502.15).

1.8 National Environmental Policy Act Coordination*

This IFR/EA contains the components of a Final NEPA Environmental Assessment – a concise public document prepared by a federal agency to determine whether the proposed action has the potential to cause significant environmental effects (40 C.F.R. § 1508.1(h)). The purposes of an Environmental Assessment are to:

- support the agency's determination of whether to prepare an Environmental Impact Statement or Finding of No Significant Impact;
- aid a federal agency's compliance with NEPA when no Environmental Impact Statement is necessary;
- facilitate preparation of an Environmental Impact Statement when applicable; or
- serve as the basis to justify a Finding of No Significant Impact, when applicable.

In accordance with 40 C.F.R. § 1501.5(h), an Environmental Assessment must discuss:

- the need for the proposed action;
- the proposed action and the reasonable alternatives;
- the probable environmental impacts of the proposed action and reasonable alternatives; and,
- the agencies and persons consulted during preparation of the EA.

Pursuant to 40 C.F.R. § 1501.6, USACE requested the involvement of the following federal agencies as cooperating agencies in the NEPA process for the Oakland Harbor Study: Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), and United States Fish and Wildlife Service (USFWS). The USACE also requested the involvement of the following non-federal agencies as participating agencies: California Department of Fish and Wildlife, California State Historic Preservation Office (SHPO), California State Lands Commission, City of Oakland, San Francisco Bay Conservation and Development Commission (BCDC), and the San Francisco Bay Regional Water Quality Control Board (SFRWQCB). The USACE additionally requested the involvement of the following tribes as participating tribal entities: Indian Canyon Mutsun Band of Costanoan, Amah Mutsun Tribal Band, Esselen Tribe of Monterey County, and Ohlone Indian Tribe. A correspondence log with the tribal entities is included in Appendix A06d.

The EPA, NMFS, and USFWS provided responses accepting the USACE's request to serve as cooperating agencies. The SHPO provided a response stating they would engage in the study through the Section 106 process but could not serve as a participating agency under NEPA and BCDC provided a response stating they would engage in the NEPA process, but their review of the project would be governed by the Coastal Zone Management Act and its implementing regulations. No other responses were received.

The USACE and Port of Oakland held resource agency working group meetings throughout the course of the study process to engage and obtain input from those invited as cooperating or participating entities, as well as additional agency stakeholders such as the Bay Area Air Quality Management District, Department of Toxic Substances Control (DTSC), California Department of Fish and Wildlife, and the United States Coast Guard. These meetings were held October 2020, May 2021, August 2021, and September 2022. Additionally, USACE and the Port held community stakeholder engagement meetings in August 2021, January

2022, February 2023, May 2023, June 2023, October 2023, and November 2023. See Section 7.2, Public Involvement, for more community and stakeholder engagement details.

Chapter 2: Existing and Future Economic and Navigation Conditions

The existing conditions are defined in this report as the conditions that exist today plus any changes that are expected to occur before project year one, which is anticipated to be 2030 for this study. Project year one (2030) is referred to as the base year for comparison of the proposed with-project alternatives to the without-project condition. It is the year a project is expected to be operational and accrue benefits. The year 2019 is the most recent year for which complete data was available for containerized cargo volumes at the time of the analysis and is used as the baseline for the commodity forecast. The compilation of this complete data typically takes 18 months to 2 years. Utilizing this data for this study allows for more "normalized" pre-COVID pandemic data to drive long-term forecasts.

The existing and future without-project conditions of the project area are described in this report. This chapter focuses on the existing and future without-project economic conditions and chapter 3 focuses on existing environmental conditions. In short, the existing turning basins are insufficiently sized for Ultra Large Container Vessels (ULCVs) to operate efficiently. As described in Section 2.1.5 Existing Fleet, the existing turning basins were sized based on a design vessel significantly smaller than the larger vessels that routinely call at the Port of Oakland today. As a result, these larger vessels have a greater risk of marine casualty[4] within the Oakland Harbor which has resulted in operational limitations being imposed. Additionally, smaller vessels have less space to maneuver within the harbor and must adjust their transit times based on the needs of the ULCVs. These inefficiencies and operational limitations are projected to continue and to increase in the future as a larger share of the cargo shifts to the larger vessel fleet, and these vessels call Oakland more often. The largest vessels in the fleet will continue to be delayed due to restrictions and cause delays for the rest of the fleet that must accommodate them.

The existing and projected future navigation conditions are compared later in this IFR/EA and their influence on the local and national economies are evaluated. This comparison is integral to the selection of the Recommended Plan.

2.1 Existing Conditions

2.1.1 Port Operations

Waterside Port Operations

Annually, thousands of container vessels visit the Port of Oakland. The movement of vessels to and from a dock requires pre-planning and in-time adjustments as schedule changes are

[4] A marine casualty or accident is defined at 46 C.F.R. § 4.03-1 as any casualty or accident involving any vessel other than a public vessel that occurs upon the navigable waters of the United States or involving a United States vessel elsewhere, including but not limited to occurrences such as grounding, stranding, foundering, flooding, collision, allision, explosion, fire, any other circumstance that might impair seaworthiness, any incident involving significant harm to the environment, or any fall overboard, injury, or loss of life of any person.

common. Specifically, arriving vessels will sometimes proceed to a nearby anchorage or slow their approach for vessel traffic or a berth in the Oakland Harbor to clear, enabling them to dock. While they wait, they will be operating their ship's diesel engines at idle speed, even while at anchor, in anticipation of moving quickly to their assigned dock. This vessel idling results in vessel CO_2 and other air emissions near the Port. An individual vessel's wait time depends on whether their assigned dock is available, whether the prevailing weather conditions permit a transit, and the availability of pilots, tugs, and terminal labor. With set terminal labor shifts to work vessels, it is common to witness multiple container vessels arriving and departing around the same time, that is early morning or late afternoon. While in transit or waiting at anchorage, vessels operate their engines. Once docked, a vessel will plug into landslide electric power and turn off all engines.

Landside Port Operations

The Port of Oakland is a landlord Port whereby it leases land to companies, often referred to as terminal operators, who directly manage the movement of cargo to and from vessels, trucks, and rail. Terminal operators invest in and maintain cargo-handling equipment (e.g., forklifts, yard trucks, cranes, etc.), hire the dockworkers and yard workers to operate such equipment, and contract with ocean carriers to handle the unloading and loading of cargo.

In response to changes in cargo throughput, container terminal operations have and continue to transition to a more densified operation which includes placing containers on the ground and in sorted piles. This operational modal shift has also introduced appointment systems to manage container pickup and delivery. These appointment systems are maintained and managed by the individual terminal operators to moderate transactions (e.g., hourly truck arrivals to a terminal) in accordance with available equipment and staffing.

Vehicle Freight Transport

On average, approximately 2 million truck trips[5] visit the Port each year. One truck trip is a round-trip which combines two one-way trips. These truck trips are associated with the annual movement of approximately 1.1 to 1.3 million containers[6,7].

A variety of factors influence the quantity of trucks within a marine terminal and transaction times (the time from entering to exiting a marine terminal). These factors include both large-scale effects from global economic conditions, global pandemics, geopolitical instability, and the price of oil to issues that may be smaller-scale and more short-term such as but not

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[5] Average truck trips reported in the Port of Oakland Emissions Inventory for five years: 2005, 2012, 2015, 2017, and 2020.

[6] Average truck trips reported in the Port of Oakland Emissions Inventory for three years: 2015, 2017, and 2020 was 1.3 million. From 1998 through 2021, the average number of TEUs was 2.2 million TEUs and with most containers being 40-foot containers versus 20-foot containers, this would be approximately 1.1 million containers being moved.

[7] The difference in the number of truck trips versus the number of containers moved may be attributed to more "single transaction" trips that take place in which a truck either drops off one container or picks up one container versus a "dual transaction" trip which would include a truck both dropping off and picking up a container in a single trip.

limited to equipment failures, utility disruptions, labor shortages, changing/adjustment of vessels or vessel routes, space limitations, and the hours a terminal gate is open or closed (e.g., lunch period).

Port tenant operations at the Seaport have evolved and continue to adapt to improve freight movement efficiencies by modernizing and optimizing terminal infrastructure and leveraging advances in technology and communication systems. Vessel companies, marine terminal operators, trucking companies, and third-party logistics firms use advanced appointment systems to coordinate the picking up and delivery of a container; information is pre-loaded to expedite both the pickup and delivery processes which are scheduled to the predicted arrival and departure of ships. Appointment systems allow efficient labor planning to help reduce hourly traffic on traveled roadways by managing the quantity of trucks allowed per hour; thus, eliminating uncontrolled surge volumes (when the volume of containers exceeds available labor and equipment). Additionally, gate hours have been extended with night-time open hours to spread out deliveries throughout the day.

The Port, in partnership with the Alameda County Transportation Commission (Alameda CTC), is installing a series of information technology (I.T.) improvements called the Freight Intelligence Transportation System (FITS) within the Seaport as part of a larger suite of programs collectively called the “GoPort Program” to add transparency and efficiencies for Seaport traffic management. Once FITS installation and commission are complete (anticipated early 2024), the Port will commence a five-year pilot program to operate the system. FITS will use radio frequency identification device (RFID) technology, smart cameras, automated traffic signal systems, changeable message signs, and various other I.T. technology to optimize traffic, improve real-time communication flow, and provide increased security. During and following the five years, the Port will evaluate its effectiveness for continuing its use. Also, as part of the GoPort Program and in partnership with Alameda CTC, a new grade separation along 7th Street is planned for construction (”7SGE Project”), with construction scheduled to commence in late Summer 2023. The 7SGSE project will improve safety, efficiency, and reliability of truck and rail access to the Port along 7th Street, one of the three primary entry routes (the other entry routes being West Grand Avenue to the north and Adeline Street to the south). The 7SGSE Project will realign 7th Street and replace an existing railroad underpass between I-880 and Maritime Street to increase clearance for trucks and improve the shared pedestrian/bicycle pathway that will be separated from vehicular traffic.

As noted above, there are three primary access gateways to and from the Port that directly connect to three main freeways including the Interstate 80, and 880 and State Route 24. These direct routes to adjacent highways allow Port-related trucks to quickly access or depart the Port. Local truck trips in the City of Oakland, and in particular West Oakland, and the City of Alameda must comply with designated truck routes (and related parking) in each respective jurisdiction. This includes the recently updated truck parking restrictions in West Oakland that were implemented through the West Oakland Truck Management Plan.

2.1.2 Facilities and Infrastructure

The Oakland Seaport is made up of 1,543 acres of waterfront land and nearby properties including container terminals, general purpose/cargo terminals, break-bulk cargo and refrigerated cargo and storage. There are four active container terminals in the Port of

Oakland, as well as several other facilities. The Port of Oakland's four active container terminals, shown in Figure 2are:

- TraPac Terminal
- Ben E. Nutter Terminal
- Oakland International Container Terminal
- Matson Terminal

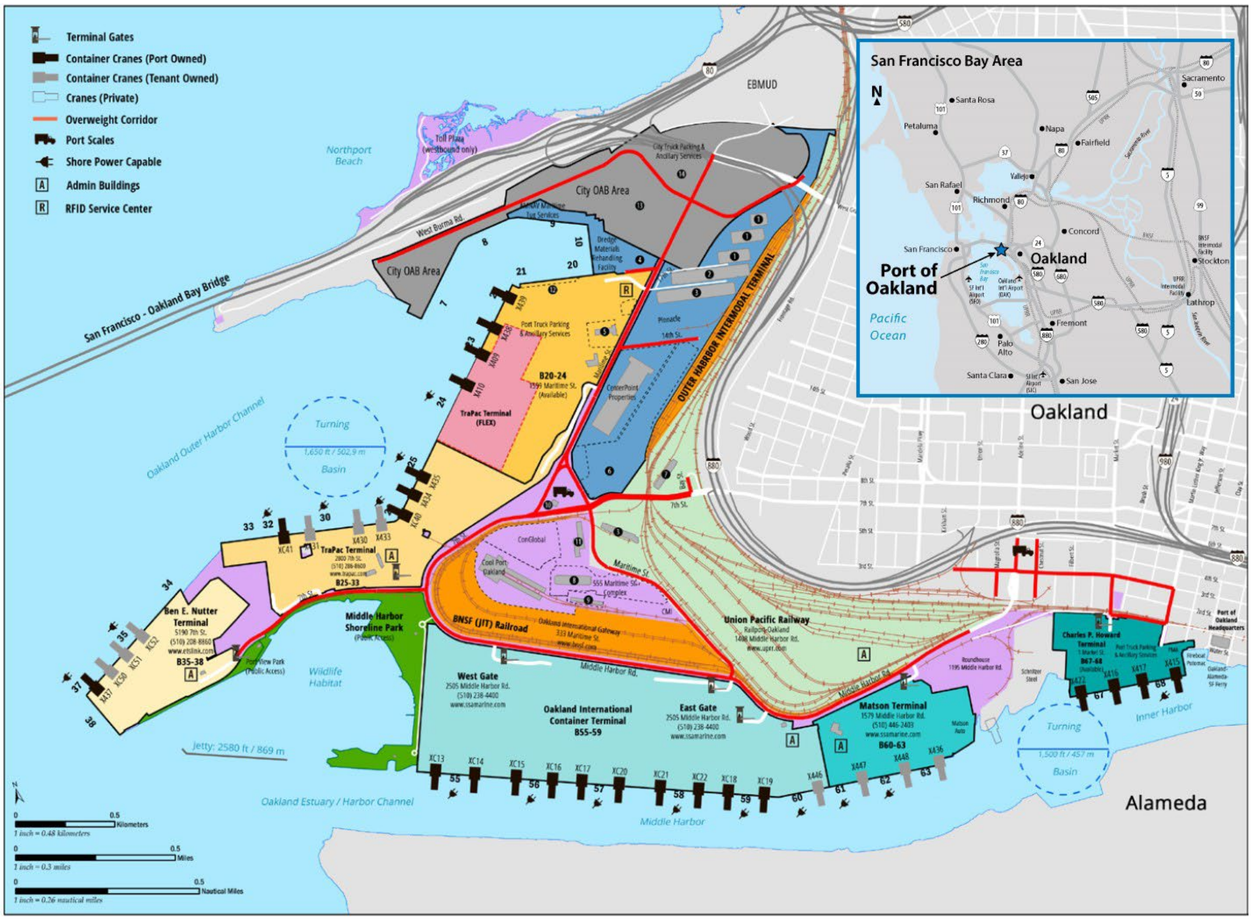

Figure 2. Port of Oakland Terminal Facilities

TraPac Terminal

The TraPac Terminal is a container terminal at the north end of the Outer Harbor, adjacent to the Outer Harbor Turning Basin, and is operated by TraPac. The terminal size is 123 acres (50 hectares). This terminal includes four container berths with an overall length of 4,263 feet, and all berths have maintained a depth of -50 feet MLLW. This terminal contains seven Post-Panamax cranes and can accommodate large containerships with an outreach of 13 to 18 boxes wide (144 feet). There are typically six container vessel calls to this terminal per week, which keeps the terminal at or near its throughput capacity. Refer to Section 2.2.1 Port Operations on future improvements to TraPac to accommodate ultra-large containerships. Additionally, this terminal has a refrigerated container capacity with 860 electric plug connections.

Ben E. Nutter Terminal

The Ben E. Nutter Terminal is a container terminal located at the junction of the Entrance Channel and the Outer Harbor Channel at the western edge of the port. Everport Terminal Services, a subsidiary of Evergreen, operates it. The terminal size is 75 acres (30.5 hectares). This terminal includes two container berths with an overall length of 2,157 feet. All berths are currently maintained to a depth of -50 feet MLLW. This terminal consists of four cranes, all of which can accommodate large containerships with an outreach of 23 boxes wide (203 feet). There are typically three container vessel calls to this terminal per week. Additionally, this terminal has a refrigerated capacity with 346 electric plug connections.

Oakland International Container Terminal

The Oakland International Container Terminal is a container terminal located north of the Inner Harbor Channel near downtown Oakland. Stevedoring Services of America Terminals operates it. The terminal size is 270 acres (109 hectares). This terminal has five berths with an overall length of 6,000 feet. All berths are currently maintained to a depth of -50 feet MLLW. This terminal typically sees 18-25 container vessel calls per week, utilizing all five berths simultaneously. This terminal includes ten Super Post-Panamax cranes, which can accommodate large containerships. Oakland International Container Terminal has recently raised and replaced its existing cranes to accommodate larger containerships. Oakland International Container Terminal is adjacent to two Class I rail yards: Oakland International Gateway – Joint Intermodal Terminal (BNSF) and Railport Oakland (Union Pacific). Additionally, this terminal has a refrigerated container capacity with 1,503 electric plug connections.

Matson Terminal

The Matson Terminal is a container terminal located along the Inner Harbor Channel, adjacent to the Inner Harbor Turning Basin. It is operated by Stevedoring Services of America Terminals, Inc. The terminal size is 80 acres (32 hectares). All berths are currently maintained to a depth of -42 feet MLLW, and four Post-Panamax cranes. This terminal is mainly used for domestic shipping to Alaska and Hawaii. Summary information for all Oakland Harbor container terminals is shown in Table 2.

Table 2: Oakland Harbor Container Terminals

Container Terminal	Berths	Length (ft.)	Water Depth (MLLW) (ft.)
TraPac Terminal	25-33	4,263	50
Ben E. Nutter Terminal	35-38	2,157	50
Oakland International Container Terminal	55-56	2,400	50
	57-59	3,600	50
Matson Terminal	60-63	2,743	42

2.1.3 Historical Commerce

The year 2019 is the most recent year for which complete data was available for containerized cargo volumes at the time of the analysis and is used as the baseline for the commodity forecast. The compilation of this complete data typically takes 18 months to 2 years. Utilizing this data for this study allows for more "normalized" pre-COVID pandemic data to drive long-term forecasts. Based on 2018 data, Oakland's cargo volume makes it the eighth busiest container port in the United States in TEU. It ranks San Francisco Bay among the three principal Pacific Coast gateways for U.S. containerized cargoes, along with San Pedro Bay in southern California and Puget Sound in the Pacific Northwest. The Port of Oakland loads and discharges more than 99% of the containerized goods moving through Northern California (Port of Oakland, 2020). In 2018, about 78% of Oakland's trade was with Asia. Europe accounted for about 11%, Australia, New Zealand, and Oceania accounted for about 2%, and other foreign economies accounted for about 2%. About 7% of Oakland's trade is domestic (primarily Hawaii). In 2018, over 17 million short tons of cargo moved through the Port for import or export (USACE, 2020). Figure 3 below shows the levels of tonnage by major commodity between 2009-2018.

Most commodities passing through the Port of Oakland include food and farm products, followed by crude materials (pulp/wastepaper and scrap metal) and manufactured equipment. Port volumes have been trending higher since the low point of the 2009 recession, with all-time highs reached in 2018. Flat trade growth in 2011 and a labor dispute in 2015 resulted in the only interruptions to this upward trend.

The Port's container vessel calls account for about 95% of total vessel calls in 2019 (Port of Oakland, 2020). Figure 4 provides a summary of the Port's commerce measured in TEUs from 2009 through 2019 closely mirroring tonnage volumes over the same period.

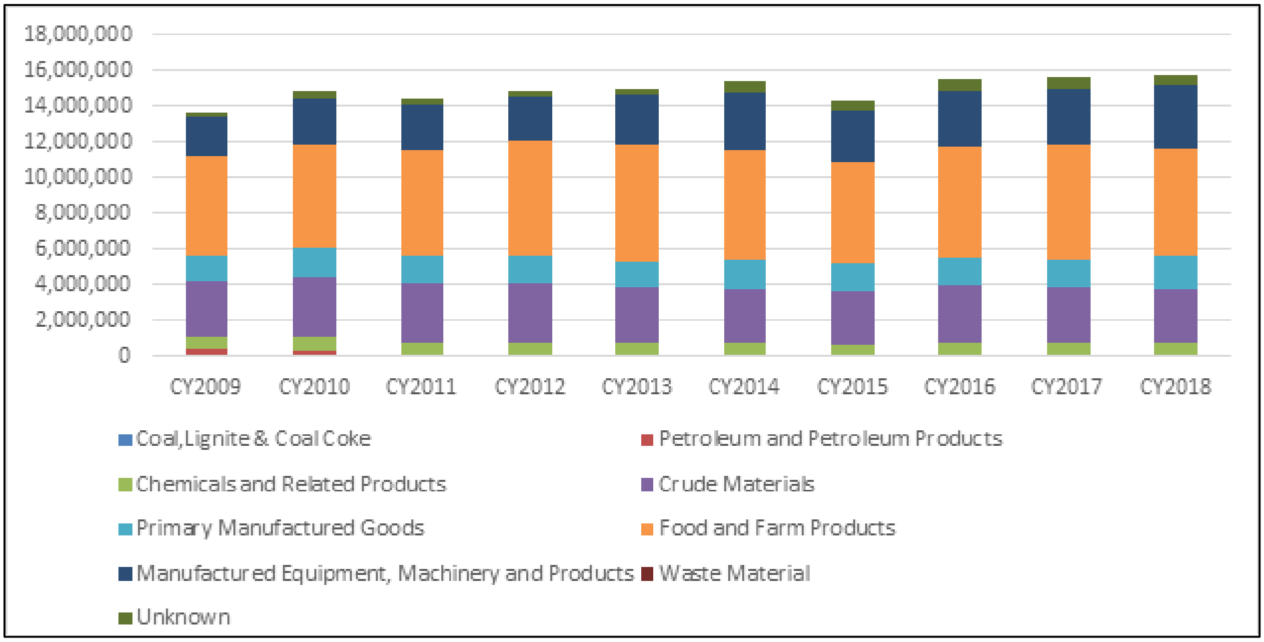

Figure 3: Oakland Distribution of Commodities in Metric Tons (Source: USACE WCSC, 2018)

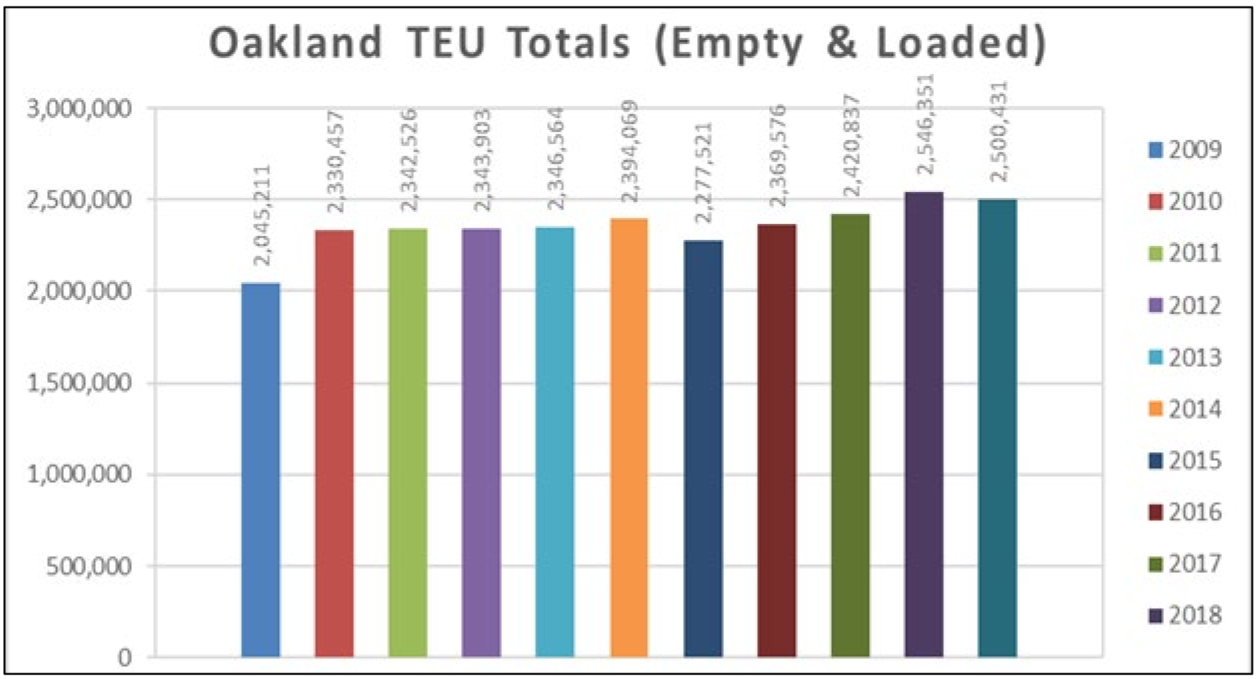

Figure 4: Oakland TEUs, Empty and Loaded [2009-2019] (Source: Port of Oakland 2020)

There has been an almost even split of the TEU volumes between imports and exports since 2009. Imports have averaged around 1.1 million TEUs per year since 2009, and exports have averaged around 1.3 million TEUs per year, as shown in Figure 5. Machinery, toys and sports equipment, furniture and bedding, clothing, footwear, plastic, iron, and steel products were among the greatest value of imported commodities in 2018. High value export commodities included a variety of food products (grain, fish and seafood, preserved food, meat, fruit, dairy, vegetables, cereals, etc.), paper products, and wood products. California is a top national producer of fruit and nuts, fresh and frozen vegetables, and wine. Imports and exports in 2018 were valued at $28.1 billion and $19.2 billion, respectively, and about 45% of the trade value is with China alone (USACE, 2020). This larger volume in exports from Oakland is one reason that it has been able to maintain more steady throughput volumes during the trade conflict with China and other uncertainties surrounding Trans-Pacific trade.

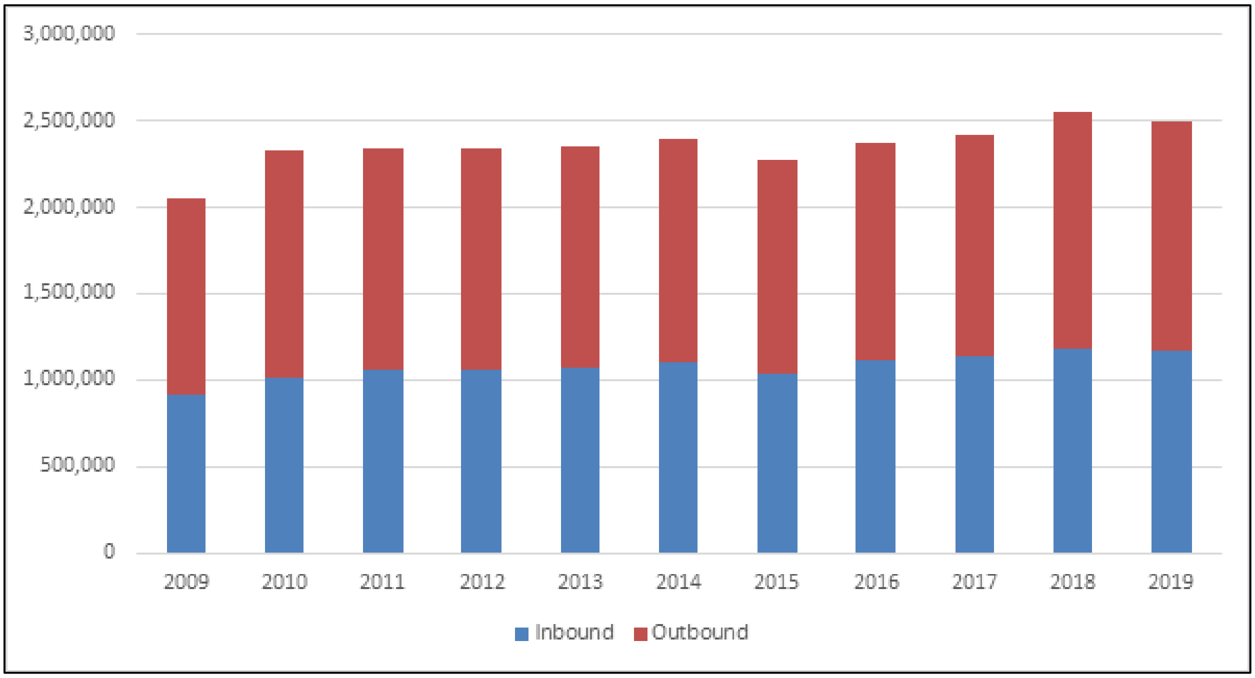

Figure 5: Oakland TEUs Inbound and Outbound Years [2009-2019] (Source: Port of Oakland, 2020)

2.1.4 Existing Container Services

The majority of Port of Oakland's container traffic is handled at Oakland International Container Terminal. Annual throughput capacity at active terminals is over 2 million TEUs and expected to increase with the completion of landside infrastructure improvement and expansion projects at all terminals. According to the Port, in summer 2020, there were 61 different container services at Oakland.

The Port of Oakland is typically a second port of call for several of the Asia – West Coast U.S. routes (Figure 6), usually after stops in San Pedro Bay (Los Angeles or Long Beach). Most services call from Asia via trans-Pacific routes. Major lines include COSCO, CMA CGM, OOCL, Hyundai, Maersk, and APL. Figure 6 is a snapshot showing one ocean carrier's trans-Pacific route showing all their services call at San Pedro Bay before stopping at Oakland. These example service rotations are like the other trans-Pacific carriers calling at the Port of Oakland. In 2020 and 2021 the Port added multiple services that call directly from Asia to Oakland as its first U.S. West Coast stop. However, as of January 2023, the Port is no longer showing any services that call at Oakland as their first West Coast stop, so the first call services in 2020 and 2021 are assumed to have been anomalies related to the COVID 19 Pandemic.

THE Alliance	Hapag-Lloyd, ONE, Yang Ming, Hyundai			
OCEAN CARRIER	**SERVICE NAME**	**TERMINAL**	**VESSEL SIZE**	**ROTATION**
1 **ONE** Hapag-Lloyd Hyundai	FP1	TRAPAC	9,000	Singapore(‡)–Kobe–Nagoya–Tokyo–San Pedro Bay–**Oakland**–Tokyo–Shimizu(‡)–Kobe–Nagoya–Tokyo
CMA CGM(‡)	*FUJI*			
COSCO(‡)	*JPSW*			
OOCL(‡)	*JPX*			
Evergreen(‡)	*PS1*			
2 **ONE** Hapag–Lloyd Yang Ming Hyundai(‡)	FP2	OICT	14,000	Jeddah(‡)–Singapore–Laem Chabang–Vung Tau/Cai Mep–Hong Kong–Yantian–San Pedro Bay–**Oakland**–Yokohama–Hong Kong–Laem Chabang–Vung Tau/Cai Mep–Singapore
3 **ONE** Hapag–Lloyd Yang Ming Hyundai	PS3	TRAPAC	8,500	Nhava Sheva–Pipavav–Colombo–Port Klang–Singapore–Vung Tau/Cai Mep–Haiphong–San Pedro Bay–**Oakland**–Busan–Shanghai–Ningbo–Shekou–Singapore–Port Kelang–
4 **Yang Ming** ONE Hapag-Lloyd Hyundai	PS4	TRAPAC	6,500	Xiamen–Yantian–Kaohsiung–Keelung–San Pedro Bay–**Oakland**–Keelung–Kaohsiung–
5 **ONE** Hapag-Lloyd Yang Ming Hyundai	PS6	TRAPAC	9,000	Qingdao–Ningbo–Busan–San Pedro Bay–**Oakland**–Kobe–
6 **ONE** Hapag-Lloyd Yang Ming Hyundai	PS8	TRAPAC	8,600	Shanghai–Kwangyang–Busan–San Pedro Bay–**Oakland**–Busan–Kwangyang–Incheon

Figure 6: Example Trans-Pacific Route

2.1.5 Existing Fleet

Data for the container fleet was obtained from IHS Maritime's Sea-web database. From 2014 to 2019 a variety of different container ships called on the Port of Oakland. These ships are classified for this study as Sub-Panamax, Panamax, Post-Panamax Generation 1 (PPX Gen I), Post-Panamax Generation II (PPX Gen II), Post-Panamax Generation III (PPX Gen III), and Post-Panamax Generation IV (PPX Gen IV) depending on their capacity. The vessels are distinguished based on physical and operational characteristics, including length overall (LOA), design draft, beam, speed, and TEU capacity.

The original design vessel (circa 1998) for the Oakland -50-foot Study was a 1,139-foot-long containership with a 6,500 TEU capacity (PPX Gen I). Today's vessels are nearly triple that capacity. Table 3 displays the fleet mix and associated dimensions of container ships that call at the Port of Oakland. The table displays the fleet in order of size, smallest to largest. Sub-Panamax (SPX) and Panamax (PX), generally 4,800 TEUs and below, refer to those vessels that fit through the Panama Canal locks prior to its redesign. Post-Panamax Generation I and II (PPX Gen I and Gen II), generally 9,900 TEUs and below, refer to those vessels that were too large to fit through the original Panama Canal. Post-Panamax Generation III (PPX Gen III), generally 15,000 TEUs and below, refers to the "New Panamax" vessels that were designed to fit through the expanded Panama Canal locks, which opened in 2016. Finally, Post-Panamax Generation IV (PPX Gen IV) refers to those vessels that are too large to fit through the -expanded Panama Canal (i.e., the "new" Post-Panamax vessels), with capacities generally above 15,000 TEUs. All vessel classes listed in Table 3 regularly call at the Port.

Table 3: Container Vessel Fleet Subdivisions and Dimensions

Vessel fleet Subdivision (Containerships)		From	To
Sub Panamax	Beam		98
	Draft	8.2	38.1
	LOA	222	813.3
	TEUs		2,800
Panamax	Beam	98	106
	Draft	30.8	44.8
	LOA	572	970
	TEUs	2,801	4,800
Post-Panamax Generation I (Post-Panamax)	Beam	106	138
	Draft	35.4	47.6
	LOA	661	1045
	TEUs	4,801	6,800
Post-Panamax Generation II (Super Post-Panamax)	Beam	138	144
	Draft	39.4	49.2
	LOA	911	1,205
	TEUs	6,801	9,900
Post-Panamax Generation III (New Panamax, or Ultra Post-Panamax)	Beam	144	168
	Draft		51.2
	LOA	Up to	1220
	TEUs	9,901	15,000
Post-Panamax Generation IV (New Post-Panamax)	Beam	168	200
	Draft		52.5
	LOA	1,295	1,315
	TEUs	15,000	23,000

Table 4 displays the number of container calls by vessel class at the Port of Oakland between 2014 and 2019. Over this period, the use of Panamax vessels at the Port of Oakland is trending downward while the use of larger vessels is trending upward. Most vessel calls shifted from PPX Gen I in 2014 to PPX Gen II by 2019. This shift can be attributed to smaller vessels (i.e., Panamax) being replaced with larger vessels that carry more tonnage on a single voyage, as evidenced by the increase in cargo tonnage and TEUs, and decrease in vessel calls, since 2014. The trend to reduce voyages is an effort to realize economies of scale in the container shipping market.

Table 4: Container Vessel Fleet Port Calls by Class (2014-2022)

	Sub-Panamax	Panamax	PPX Gen I	PPX Gen II	PPX Gen III	PPX Gen IV	Total
2014	109	485	518	273	174	0	1,558
2015	76	277	424	268	208	0	1,252
2016	112	316	508	378	247	3	1,563
2017	99	232	492	416	205	0	1,442
2018	96	163	498	398	231	0	1,386
2019	175	140	352	371	210	0	1,248
2020	191	141	257	436	203	4	1,232
2021	204	113	144	225	157	5	848
2022	271	113	133	181	118	1	817
Sources: USACE, 2018; Port of Oakland, 2023							

Although no PPX Gen IV vessels called from 2017-2019, there were four calls in 2020 (over 1,295 ft LOA), five calls in 2021, and one call in 2022.

Finally, Figure 7 shows the progression of containerships calling the Port of Oakland from 1955 to present day. It should be noted that the 18,000 nominal TEU capacity ship CMA CGM Benjamin Franklin called the Port of Oakland on February 29, 2016 as part of a trial deployment of these ultra-large containerships to U.S. West Coast ports from Asia. Since then, many of these large capacity ships called on Oakland for spot charters in 2020.

Oakland is already handling a significant number of Post-Panamax ships. From 2014 through 2018, about 80% of all calls were Post-Panamax calls. Of all containership calls in this same period, 1,656 inbound or outbound transits were longer than current PPX Gen II length overall (1,115 ft), which represents 12% of all containership transits over that period.

Table 5 displays percent cargo by vessel class for years 2014 to 2018. Total cargo movements on PPX Generation II or larger containerships grew from 38% in 2014 to 45% in 2018.

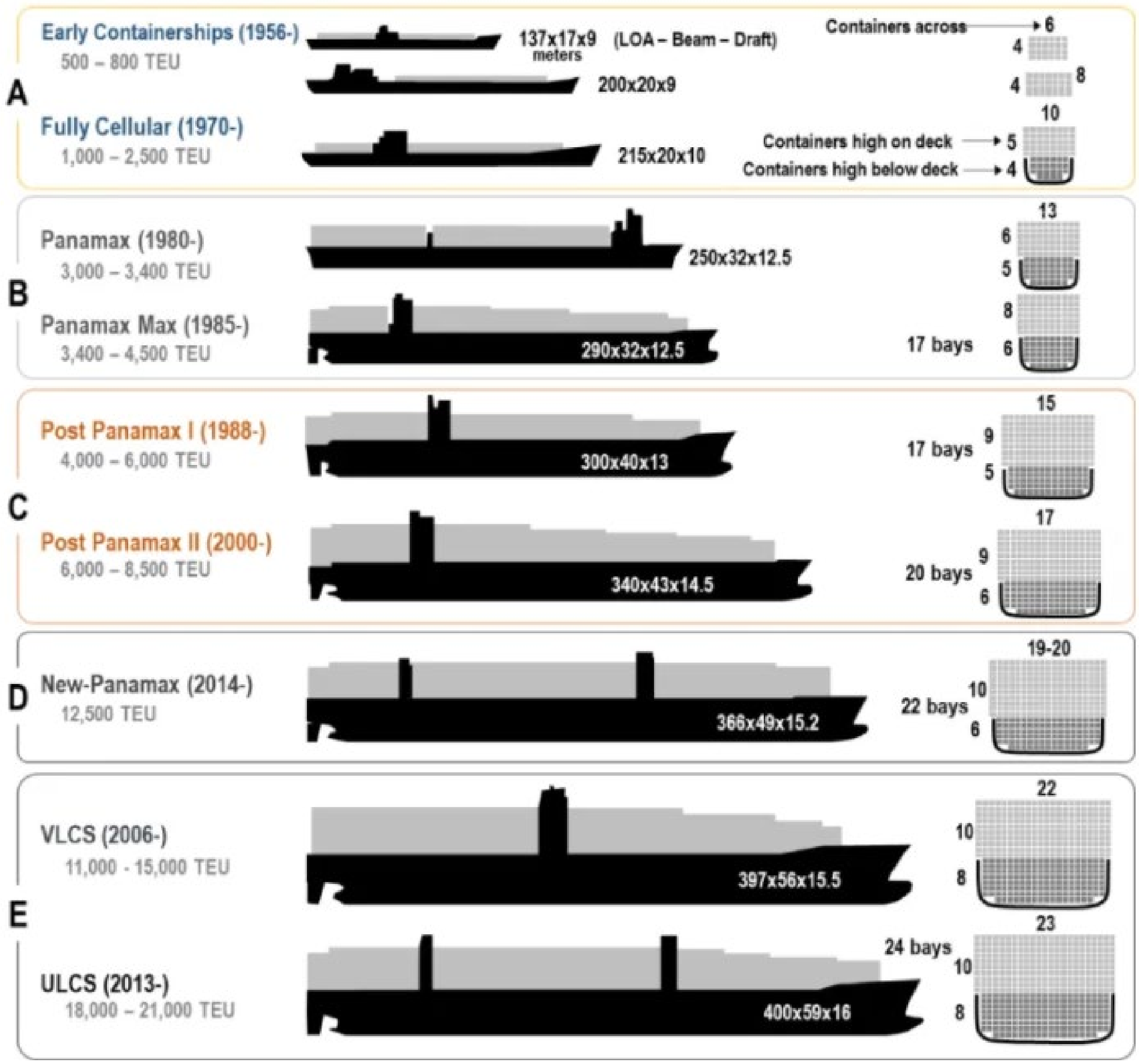

Figure 7: Progression of Containerships

Table 5: Percent Cargo by Vessel Class (2014-2018)

	2014	2015	2016	2017	2018
Sub Panamax	6%	5%	5%	6%	5%
Panamax	9%	10%	10%	8%	7%
PPX Gen I	46%	43%	37%	41%	42%
PPX Gen II	21%	28%	32%	28%	28%
PPX Gen III	17%	14%	16%	17%	17%
PPX Gen IV	0%	0%	0.3%	0%	0%
Source: USACE, 2020					

Vessels currently calling at the Port of Oakland include 1,210-foot-long vessels in both the Inner and Outer Harbors, including 14,354 TEU capacity Evergreen vessels and 13,892 TEU capacity APL vessels. In Spring 2016, the 18,000 TEU CMA CGM Benjamin Franklin called both Inner and Outer Harbors. As previously mentioned, in 2020, four 19,000 TEU vessels called, with lengths of over 1,300 feet. Although these 18,000-19,000 TEU vessels already call on Oakland, the dimensions of the current turning basins result in them maneuvering with many restrictions, as outlined below in Section 2.1.6.

2.1.6 Pilot Restrictions on Large Container Vessels

Ships calling at the Port of Oakland are subject to the San Francisco Bar Pilot (Pilots) guidelines. Below are general guidelines for containership operations at the Port.

Though the PPX Gen IV vessel class is expected to call with increased frequency on the U.S. west coast, it cannot call at the Port of Oakland without extensive restrictions, particularly in the Inner Harbor, due to the size of the turning basins. PPX Gen IV vessels typically range from 1,295-1,315 feet in length; therefore, they require additional tugs, pilots, and specific schedules to operate safely. Additionally, large tides and resultant strong currents can cause navigation issues for larger vessels transiting to and from Oakland's harbors.

In late 2015 and 2016, an 18,000 TEU container vessel, the CMA CGM Benjamin Franklin, called at the Port, in anticipation of PPX Gen IV vessels being deployed on Asia-West Coast routes. This PPX Gen IV vessel has a length overall of 1,310 feet, a breadth of 178 feet, and a design draft of 52.5 feet. It was able to call at the Port's Outer and Inner Harbor, but required the following limitations:

Outer Harbor:
- Daylight transits only
- Move only during slack water
- Have an additional pilot onboard
- Does not use turning basin to dock (berth adjacent to the turning basin, blocking it for other traffic); swing through the basin from the dock to depart

Inner Harbor:
- Daylight transits only
- Move only during slack water
- Have an additional pilot onboard
- Does not use turning basin to dock (drive straight to berth, bow-in)
- Back out of berth with multiple tugs and turn outside the Inner Harbor Channel
- No other movements into Outer or Inner Harbors during transits; resulting in 2-3-hour delays in scheduled arrivals and departures

These limitations have been adopted as standard practice for the pilots when handling PPX Gen IV vessels at the Port since 2016, including the four calls that occurred in 2020, five calls in 2021, and three calls in 2022.

2.2 Future Without-Project Conditions

Without the project, to accommodate commodity volume as modeled in the 2020 Tioga Report (see "Commodity Forecast in Section 2.2.1 below), the shipping industry and the Port will see an increase in vessel traffic to accommodate this increase in TEU volume. In

2019, the Port saw 1,248 vessel calls, a decrease of 10% from 2018. While smaller vessels are being replaced by larger ones to carry more cargo on a single voyage, the overall number of vessels will have to increase to match increasing TEU volumes over time in the future without project condition. Also, the depth of the channels at Oakland are not expected to change over the study period, so loading practices and load factors are assumed to be unchanged from the existing condition. Vessels significantly larger than the previous study's design vessel, such as the Post-Panamax Generation III, currently carry about 20% of Oakland's TEU cargo and make up about 16% of the total vessel calls to the Port. The largest vessels in the current container fleet, Post-Panamax Generation IV vessels, have called infrequently at the Port historically. However, both types of vessels will call more often over the forecast period in the future without project condition to help accommodate future TEU volume increases, while helping suppliers and shippers take advantage of economies of scale. Gen IV vessels already in the world fleet are assigned to services from Asia to either the Middle East or Northern Europe because of its long voyage duration. The largest container vessels typically start their service on those routes and cascade into the trans-Pacific routes later. It is reasonable to assume that upwards of 40% of Oakland's TEU volume would be shifted to these larger classes of vessels by the end of the forecast period.

If Gen IV vessels cascade to Asia-Northern Europe to Pacific services, then they will likely call at San Pedro Bay, then Oakland next. To see the same vessel utilization rates as currently on the Asia-Europe routes, there needs to be double the TEU volumes in the Pacific, while maintaining their current service frequencies. Once the volumes have nearly doubled, by the end of the forecast period, utilization rates and frequencies of Gen IV vessel movements in the Pacific may more closely resemble those currently found on Asia to Northern Europe or Middle East services. This assumption to frequency is bolstered by the reliance of weekly agricultural exports by the Port of Oakland.

The existing vessel fleet experiences operational inefficiencies due the turning basins' dimensions. These inefficiencies are projected to continue and increase in the future as a larger share of the cargo is shifted to the larger vessel fleet, and these vessels call on Oakland more often. Because of these inefficiencies and delays, the total number of Gen IV vessels to call on Oakland under the future without project condition will be lower than it would have been if the turning basins had been widened. Economies of scale will be easier to realize if the turning basins are widened, and longer, higher capacity vessels can call more efficiently. The largest vessels in the fleet will continue to be delayed in a future without project condition due to restrictions and produce delays for the rest of the fleet that must accommodate them. Based on inputs from the Port's operators and Harbor Pilots, each Gen IV vessel creates delays of around 2-4 hours per transit—which could create additional delays if Gen III vessels are tide and current restricted already.

These assumptions and projections are made within the context of a "multiport analysis," i.e., a systematic determination of alternative routing possibilities, regional port analyses, and intermodal networks given the absence of a project.

Terminal Facilities

The Ben E. Nutter Terminal is located on a peninsula and qualifies as a berth expansion area. Oakland International Container Terminal is effectively fully built out at 290 acres, sharing its eastern boundary with the Matson terminal.

Despite its recent partial rehabilitation and expansion to 123 acres, the TraPac terminal, located next to the vacant 150-acre Outer Harbor Terminal (former Ports America) site has space to expand. Recent discussions regarding such an expansion support the assumption in this analysis that TraPac will expand at least an additional 50 acres in the without-project condition.

The Matson terminal presently occupies 80 acres. The Howard Terminal, presently used for ancillary support functions, covers 50 acres. There are no significant expansion options for Howard, and, if implemented, the proposed widening of the Inner Harbor Turning Basin could reduce the available land to 40 acres.

The Port has three parcels of land contiguous with marine terminals available for terminal expansion, including:

- Berths 33 and 34. The unused area at Berths 33 and 34, between the Ben E. Nutter and TraPac terminals, totals 23 acres. This is the only possible expansion space for the Nutter terminal, and the study team has treated it as part of a full build-out for that facility. The area at Berth 34 is not usable as a vessel berth due to the presence of BART's Transbay Tube about 20 feet below water level. In the FWOP condition, the 23 acres and Berth 33 are assumed to be developed and therefore not available for terminal expansion.
- Roundhouse Site. The adjacent Roundhouse site of 39 acres could be used to extend Matson's terminal to a total of 95 acres, although it does not provide additional berth length. This is assumed to be added to the Matson terminal in the FWOP condition and therefore not available for terminal expansion.
- Berths 20 and 21 and 22 to 24. The Berth 22 to 24 Outer Harbor Terminal (OHT) site is what remains of the former Ports America terminal after a portion was used to expand TraPac. The site covers 150 acres, and this analysis treats it as potential future TraPac expansion. Based on the Port's September 2019 release of a Notice of Preparation of a Draft Supplemental Environmental Impact Report to develop a dry bulk terminal on 20 acres of land at Berths 20-21, that land may not be available for near-term container terminal use, leaving 130 usable acres. The Port intends to use the Berth 20-21 land for dry bulk over the next 15 years, with potential reversion to container use thereafter. In the future without project condition, all four of these berths are assumed to be added to TraPac for future operations and thus not available for terminal expansion.

Current California Air Resources Board (CARB) emission goals generally target zero emissions or near-zero emissions at marine terminals by 2030. With current and foreseeable technologies, achieving these goals requires electrification. Existing electrification technologies place two additional requirements on terminal land:

- Space for a battery exchange and servicing building. At Long Beach Container Terminal in Long Beach, this function consumes about 1 acre.

- Additional electric service, potentially including a local substation. The study team has allowed an additional acre for this function.

The post-electrical acres therefore reduce the available size of each terminal by 2 acres. Since automation effectively requires electrification, the capacity estimates below reduce the working acres of each terminal as automation is added.

The Port also has about 126 acres of undeveloped off-dock space, part of the former Oakland Army Base. All existing planning documents anticipate this land being used for ancillary support uses, rail infrastructure, or commercial development like the CenterPoint and CoolPort projects. This analysis therefore excludes this site from the terminal capacity estimates.

Whether the Berth 33–34 site becomes part of the Nutter terminal or the TraPac terminal does not make a difference in the planning-level capacity estimates. Nor does it matter whether Outer Harbor Terminal becomes a separate terminal or part of TraPac. The only relevant size distinction is that automation strategies favor larger terminal sizes. While that factor may influence the sequence in which terminals are automated under some scenarios, the long-term potential capacity is a function of the total acres available. Therefore, these details don't impact future without project assumptions of port capacity or throughput.

2.2.1 Port Operations and Economic Considerations

Components of port operations consist of moving and storing cargo containers, storage capacity, cargo composition, fleet composition, container services, and routing groups. Future without project conditions at the port require a commodity forecast for future cargo and a fleet forecast to move that cargo.

Commodity Forecast

An essential step when evaluating navigation improvements is to analyze the types and volumes of cargo moving through the port. Trends in cargo history can offer insights into a port's long-term trade forecasts and thus the estimated cargo volume upon which future vessel calls are based. This data was provided by the Port of Oakland in a seaport forecast prepared in 2020 by an external consulting firm (Bay Area Seaport Forecast, The Tioga Group and Hackett Associates, Prepared for the San Francisco BCDC, May 22, 2020) ("2020 Tioga Report") and is incorporated by reference into this report.

The international TEU forecasts for imports and exports provided in the BCDC report are driven by projections of economic growth developed by Moody's and Caltrans, including sub-components of national-level Gross Domestic Product, industrial output, and Gross Metro Product.

Under future without and future with project conditions, the same volume of cargo is assumed to move through Oakland Harbor. A modification project such as the with-project alternatives considered in this study will allow shippers to better take advantage of larger vessels but would not change the volume of cargo assumed to move through Oakland harbor. The efficiency of larger vessels translates to cost savings and is the main driver of economic benefits from implementing a project (i.e., NED). For the Port of Oakland, containerized cargo was inventoried and forecasted to provide estimates of future container volumes at the Port.

Figure 8 displays the forecasted changes for TEU and tonnage for the Trapac, Ben E. Nutter, and OICT docks respectively. Forecasts of the slow, moderate, and strong growth scenarios predict increased TEU's from current year until 2050. The moderate growth scenario predicates an increase from 2,500,000 TEU in 2018 to 5,200,000 TEU by the year 2050 moving through the Port of Oakland.

In Table 6 forecasted tonnage was predicted for the years 2030, 2040, and 2050. The results revealed increasing tonnage for the Trapac, Ben E. Nutter, and OICT docks for all global shipping routes. Appendix C – Economics presents all forecasts for changes at the Port of Oakland from current year until 2050. The recurring trend is that imports and exports will be increasing year over year. These forecasts are the same under the future without and future with project conditions.

The international TEU forecasts for imports and exports provided in the 2020 Tioga Report are driven by projections of economic growth developed by Moody's and Caltrans, including sub-components of national-level Gross Domestic Product, industrial output, and Gross Metro Product.

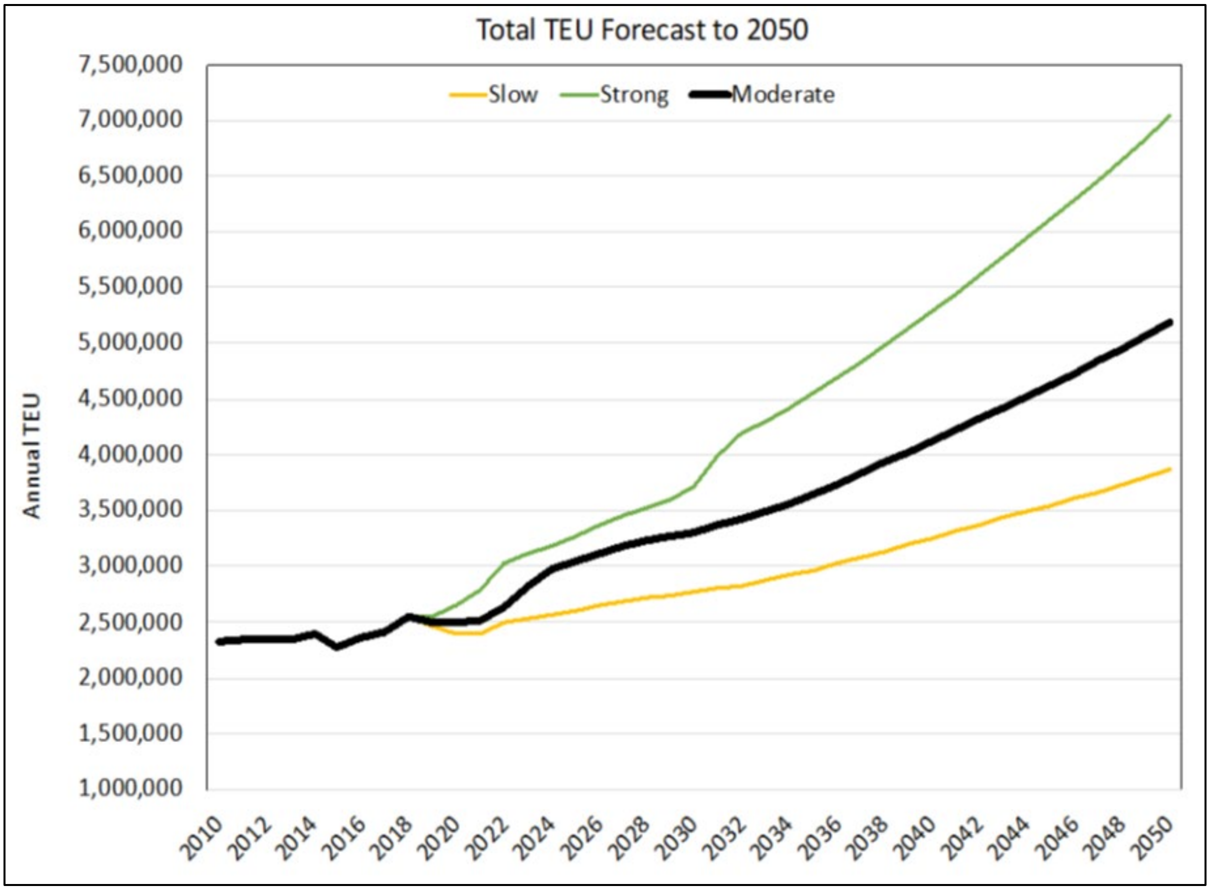

Figure 8. Total TEU Forecast to 2050 in All Scenarios[8]

[8] TEU forecasts provided in the consultant's report to BCDC, developed by Moody's and Caltrans.

Table 6. Forecasted tonnage to Oakland by Dock and Route, 2030-2050[9]

	Route	2030	2040	2050
	Trapac			
Imports	NEA-WCUS	1,829,356	2,298,157	2,914,448
	SEA-WCUS	196,874	247,326	313,651
	EU-NA-LA-WCUS	718,273	902,342	1,144,320
	OCEANIA-WCUS	80,286	100,861	127,908
	Ben E Nutter			
	NEA-WCUS	1,614,138	2,027,786	2,571,571
	SEA-WCUS	173,713	218,229	276,751
	EU-NA-LA-WCUS	633,770	796,184	1,009,694
	OCEANIA-WCUS	70,841	88,995	112,860
	OICT			
	NEA-WCUS	7,317,424	9,192,628	11,657,790
	SEA-WCUS	787,497	989,306	1,254,605
	EU-NA-LA-WCUS	2,873,092	3,609,367	4,577,281
	OCEANIA-WCUS	321,144	403,443	511,633
	Trapac			
Exports	NEA-WCUS	165,881	179,300	193,953
	SEA-WCUS	4,844	5,236	5,664
	EU-NA-LA-WCUS	37,374	40,398	43,699
	OCEANIA-WCUS	4,686	5,065	5,479
	Ben E Nutter			
	NEA-WCUS	146,365	158,206	171,135
	SEA-WCUS	4,274	4,620	4,998
	EU-NA-LA-WCUS	32,977	35,645	38,558
	OCEANIA-WCUS	4,135	4,469	4,835
	OICT			
	NEA-WCUS	663,523	717,200	775,810
	SEA-WCUS	19,377	20,945	22,657
	EU-NA-LA-WCUS	149,497	161,591	174,796
	OCEANIA-WCUS	18,745	20,261	21,917

Fleet Forecast

In addition to a commodity forecast, a forecast of the future fleet is required when evaluating navigation projects. To develop projections of the future fleet calling at Oakland, the study team developed a world fleet forecast of containerships, a methodology to forecast total capacity calling at Oakland Harbor based on previous USACE studies at other West Coast ports and future throughput capacity at the Port, and a breakdown of that capacity calling into containership size and TEU classes. The methodology was then linked to the commodity forecast data for U.S. West Coast and Oakland. The commodity forecasts were unconstrained forecasts and consequently the fleet forecast model is similarly unconstrained in respect to inter-port competition on the U.S. West Coast. Further, the study team did not consider land-based infrastructure as a limiting factor in its projections of the World Fleet.

By combining information from the commodity forecast with forecasted fleet capacity and Oakland's average share of cargo on a containerized vessel, the study team was able to allocate several post-Panamax, Panamax, and sub-Panamax vessels calls to Oakland's fleet. The number of transits, particularly those made by larger vessels, is a key variable in calculating the transportation costs. The study team's forecasting technique begins with performing a detailed review of the current world fleet and how it is deployed on the trade routes of the world.

When evaluating data on vessel composition, vessel age, and container markets, the study team considered the "order book" to estimate new deliveries to the fleet into the future. Vessel scrapping is accounted for based on historical scrapping rates by vessel class and age. Containerships, particularly the largest ones, are relatively new, so widespread scrapping is not expected to take place until well into the future. Likewise, when economies are strong, vessel owners are more likely to hold onto their existing vessels (or build new ones) and less likely to scrap them. The forecasted world fleet provides a frame of reference to verify the validity of the Oakland fleet forecast and is provided as background information.

As new larger vessels become a greater percentage of the world fleet and are deployed to Oakland, they replace smaller vessels which are redeployed to shorter routes, which may utilize the smaller vessels more efficiently.

There is a strong relationship between the economic condition of a port and its total nominal vessel capacity. As an economy grows, exports from the port often increase (from the increased output) or demand for imports increase (from increased consumer purchasing power). Vessels respond accordingly to satisfy this increased level of trade. As the tonnage in Oakland grows over time, the nominal TEU vessel capacity, i.e., the total number of available container slots, grows. As explained in the 2020 Tioga Report, under the slow, moderate, or high growth scenarios, the Port of Oakland would be expected to see 38, 40, or 43 vessel calls a week, respectively, by 2050 in a future without project scenario. In comparison, total weekly vessel calls in a future with project are forecasted to be 29, 29, or 30. The Port currently averages 28 vessel calls a week.

While vessel calls are expected to increase under all growth scenarios, a future with project would allow the maritime industry to take advantage of more PPX G IV vessels that have

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[9] Data provided by the Port of Oakland in a seaport forecast prepared in 2020 by The Tioga Group and Hackett Associates. (2020 Tioga Report)

larger TEU capacity, as shown in the vessel call projections. The absence of expanded turning basins will limit, but not eliminate, the shift to PPX Gen IV vessels in the without-project condition. Efficiencies will still be pursued in the without-project condition, consistent with economic production theory, which states that firms will always look to lower costs and maximize profits. However, the efficiencies gained will not be as significant as they are in the with-project condition. Results of the fleet forecast are displayed in the Appendix C – Economics.

Chapter 3: Existing Environmental Conditions

This chapter describes the existing physical and human environment conditions within the study action area. This is not a comprehensive discussion of every resource within the study area but focuses on those aspects of the environment that may be affected by the study alternatives. Resource aspects that would not be affected by the study alternatives include the following: currents, circulation, or drainage patterns; erosion and accretion patterns; aquifer recharge; water supplies and conservation; land use classification; floodplains; prime and unique farmland; public facilities, utilities, and services; public health and safety (other than as discussed as a factor in the resource analyses that are included); and energy consumption or generation. Because there would be no effect on these resources, they are not analyzed further in the existing environmental conditions section, or the environmental effects analysis presented in Chapter 6.

This chapter was prepared per NEPA and the Council on Environmental Quality's NEPA Implementing Regulations. The existing (baseline) conditions of the affected environment provide a sound basis for plan formulation, as described in Chapter 4 and the impact analysis that is provided in Chapter 6. This description of the existing affected environment is used as the baseline to forecast the changes that would be expected in a future without action to address inefficiencies in the federal navigation system at Oakland Harbor. In Chapter 6, the environmental consequences of the future without-project (or no action) and future with-project alternatives are evaluated and compared. Chapter 6 is structured to mirror the resource sub-sectionspresented here.

3.1 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement[10] of all people regardless of race, color, national origin, income, or educational levels with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (USEPA 2020).

Executive Order (EO) 12898 (59 Fed. Reg. 762, February 16, 1994) directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. More recently, EO 14008, "Tacking the Climate Crisis at Home and Abroad" (86 Fed. Reg. 19, February 1, 2021) and subsequent implementation guidance from the Assistant Secretary of the Army for Civil Works directs USACE to go beyond 'do not harm' and meet the needs of disadvantaged communities by reducing disparate environmental burdens, removing barriers to participation in decision-making, and increasing access to benefits provided by Civil Works programs within USACE authorities.

This section identifies environmental justice communities that could potentially be affected by this project.

[10] EPA (2020) defines meangiful involvement to be when potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; the public's contribution can influence regulatory agencies decisions; the concerns of all participants involved areconsidered in the decision-making process; and the decision makers seek out and facilitate the involvement of those potentially affected .

3.1.1 Regulatory Setting

The basis for environmental justice lies in the Equal Protection Clause of the United States Constitution. The Fourteenth Amendment expressly provides that the states may not "deny to any person within [their] jurisdiction the equal protection of the laws" (United States Constitution, amendment XIV, § 1). On February 11, 1994, President Clinton signed Executive Order (EO) 12898, titled "*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.*" EO 12898 requires all federal agencies to "…make achieving environmental justice part of [their] mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The EO directs federal agencies to perform the following activities:

- Analyze the environmental effects, including human health, economic, and social effects, of federal actions, including the effects on minority and low-income communities, when required by NEPA.
- Provide opportunities for community input during the NEPA process, including potential effects and mitigation measures.
- Ensure that the public, including minority and low-income communities, have adequate access to public information relating to human health or environmental planning, regulations, and enforcement.

The federal definition of a minority environmental justice community requires that the minority population (or total of all minority groups) of that community (at the Census block group, Census County Division [CCD], or reservation level) either 1) exceeds 50% of the total population of the community; or 2) is meaningfully greater than the general population (CEQ 1997; USEPA 2016).

Minority status is composed of both race and ethnicity. As defined in EO 12898 and Council on Environmental Quality guidance, a minority population occurs where one or both of the following conditions are met in a given geographic area:

- The American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic population of the affected area exceeds 50%; or
- The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Neither EO 12898 nor any subsequent federal regulations on environmental justice provide specific criteria for determining the poverty level threshold necessary for meeting the definition of a low-income environmental justice community. The United States Environmental Protection Agency's (USEPA) guidance criteria suggest that identification and analysis of low-income populations can be accomplished by selecting and disclosing the appropriate poverty thresholds as defined by the Census, the poverty guidelines as defined by the Department of Health and Human Services, or other appropriate sources, and identifying an appropriate geographic unit of analysis for identifying low-income populations in the affected environment (USEPA 2016).

3.1.2 Minority and Low-Income Environmental Justice Communities in the Study Area

EO 14008 requires Federal agencies to use the CEQ Climate and Economic Justice Screening Tool[11] to identify disadvantaged communities that may be affected by a proposed project. Additionally, USACE guidance suggests that additional methods can be utilized to identify Environmental Justice Communities as appropriate. For this study, the CEQ screening tool and the methodology described below were utilized to identify environmental justice communities at the census tract level in the study area. All the census tracts identified by the CEQ tool are included in the analysis below in Figure 9and Table 7. However, the methodology below identified two additional census tracts that were not identified as environmental justice communities by the CEQ's tool. These include the Census tracts 4017 (West Clawson) and 4287 (West Alameda).

3.1.3 Potential Environmental Justice Communities of Concern

The Port of Oakland is in Alameda County which contains 14 cities and six unincorporated communities. The cities of Alameda and Oakland are the focus of this environmental justice analysis as they are adjacent to the project area. Data for this analysis was derived from the United States Census Bureau's 2015-2019 American Community Survey, the most recent data available at the Census tract level at the time of this study (Census 2021). The American Community Survey data consist of "period" estimates that represent data collected over an interval of time (as opposed to "point-in-time" estimates, such as the decennial census, that approximate the characteristics of an area on a specific date) (Census 2018). This data was used to determine whether environmental justice communities occur in the analysis area.

Using United States Census data, the study team identified the racial and income characteristics for census tracts (CT) within or significantly intersecting both a 0.5-mile and 1-mile radius. The 0.5-mile radius accounts for the primary study area, while the 1-mile radius is intended to account for potential construction traffic impacts in the areas closest to the construction sites. Figure 9 shows the CTs within those distances of the Inner Harbor Turning Basin and Outer Harbor Turning Basin study sites. Table 7 shows the race, ethnicity, and poverty percentages for each community (by CT) in the analysis area. The table also shows the corresponding demographics for both Alameda County and California's statewide populations. Alameda County is applied as the general reference population for evaluating whether a community has a meaningfully greater (i.e., 10 percentage points or more) minority or low-income population.

3.1.4 Minority Environmental Justice Communities

This analysis used Alameda County to represent the general population, and "meaningfully greater" was defined as 10 percentage points or more. This threshold was selected, consistent with federal guidance, as a reasonable and frequently used measure, providing a more inclusive identification of minority communities of concern for environmental justice analysis (Federal Interagency Working Group on Environmental Justice & NEPA Committee 2016). As a result, given the total minority population county-wide of 68.6%, a community

[11] The tool can be accessed at https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

with a total minority population of 27.4% or more would meet the definition criteria even though its minority population is less than 50% of the community's total population.

3.1.5 Low-Income Environmental Justice Communities

This analysis considered a Census tract to meet the definition of low income if the percentage of people in the Census tract whose income was below the federal poverty level was 10 percentage points higher than that of the reference population. As a frame of reference, the federal poverty level in 2019 was $26,500 for a family of four (HHS 2021).

Given the total low-income population in Alameda County is 9.9%, a tract with a total low-income population of 19.9% or more would meet the definition criteria even though its low-income population is less than 50% of the community's total population.

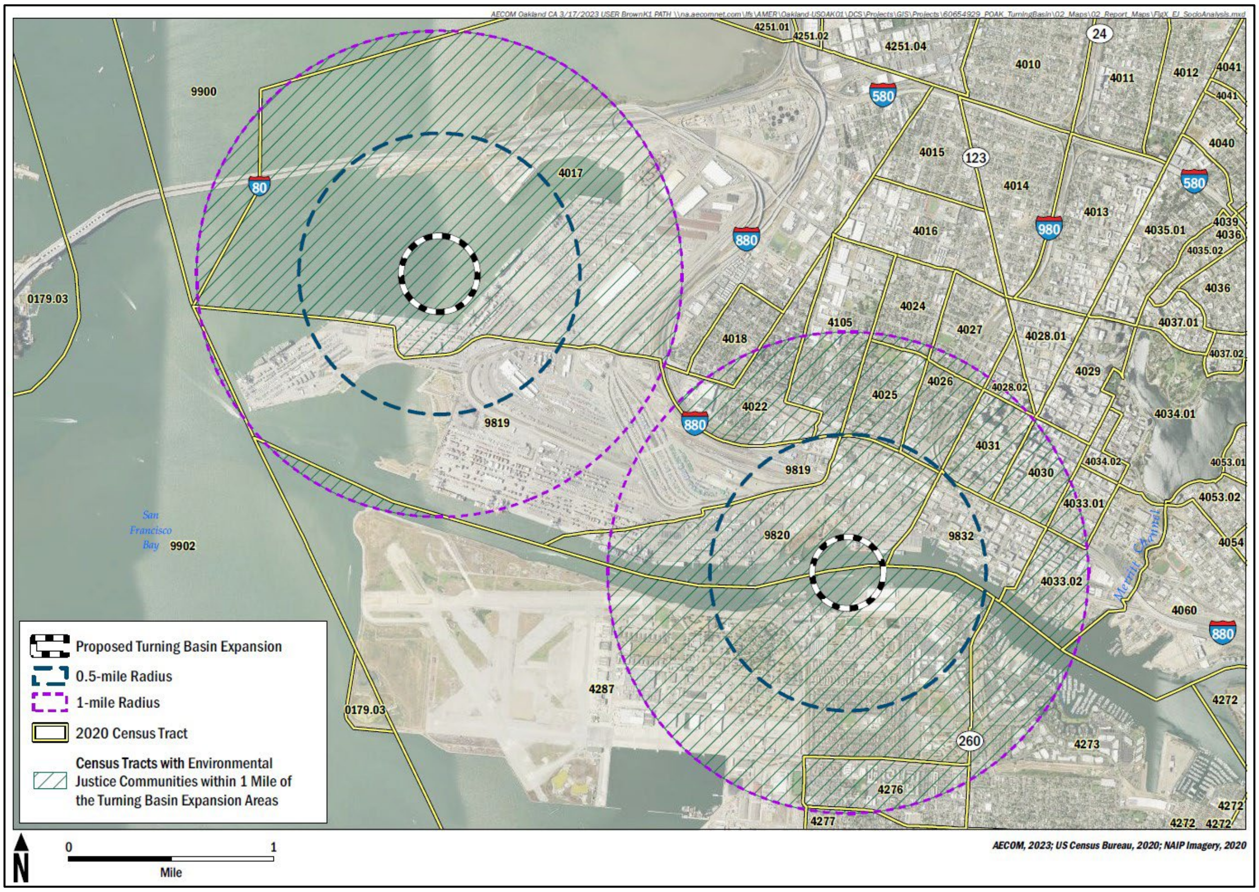

Figure 9: Census Tracts in the Vicinity of the Project Alternatives

Table 7: Key Demographic Data for Census Tracts within One Mile Radius of Project

Location	Total	Total Minority		White Non-		Low-Income	
	Pop.	%	Pop.	%	Pop.	%	Pop.
California	39,283,497	62.3	24,678,185	37.2	14,605,312	13.	5,149,74
Alameda County	1,656,754	68.6	1,136,307	31.4	520,447	9.9	161,581
Alameda, City of	77,624	57.3	44,478	42.7	33,145	7.3	5,667
Oakland, City of	433,031	71.7	310,483	28.3	122,548	16.	72,316
West Oakland	25,723	76.0	19,555	24.0	6,198	21.	5,629
0.5-Mile Radius:							
Outer Harbor Turning Basin							
CT 4017	3,018	61.1	1,845	38.9	1,173	10.	323
CT 9819	58	13.8	8	86.2	50	0.0	0
Inner Harbor Turning Basin							
CT 9819	58	13.8	8	86.2	50	0.0	0
CT 9820	63	84.1	53	15.9	10	19.	12
CT 9832	583	47.2	275	52.8	308	8.4	49
CT 4287	4,472	72.6	3,246	27.4	1,226	20.	842
One-Mile Radius:							
Outer Harbor Turning Basin – all census tracts included in 0.5-mile radius							
Inner Harbor Turning Basin							
CT 4022	2,477	70.1	1,737	29.9	740	25.	631
CT 4025	1,781	89.1	1,587	10.9	194	35.	627
CT 4026	1,243	85.6	1,064	14.4	179	35.	438
CT 4030	2905	93.5	2,716	6.5	189	31.	923
CT 4031	2,101	72.2	1,516	27.8	585	26.	486
CT 4033	4,178	73.8	3,085	26.2	1,093	26.	1,116
CT 4105	2,705	85.1	2,302	14.9	403	38.	1045
CT 4273	5,346	62.7	3,350	37.3	1,996	8.1	434
CT 4276	5,200	71.5	3,717	28.5	1,483	12.	658

Based on the environmental justice criteria thresholds identified above in Section 3.1, three minority environmental justice communities (CTs) of concern were identified within the project's 0.5-mile study area. Common general neighborhood or geographic area locations are noted in parentheses for each CT to assist in identifying the general areas associated with each CT; however, CT boundaries do not exactly align with locally identified neighborhood boundaries.

- **CT 4017 (West Clawson)** is a residential area in Oakland primarily following the east side of Interstate 880 that was predominantly working class but recently has undergone some urban revitalization, with a new population moving into the area. The community has a 61%minority population, which is well over both the 10% meaningfully greater threshold and the 50% minority threshold, making it an area of concern for environmental justice. The high minority percentage primarily consists of Hispanic or Latino, African American, Asian, and Some Other Race residents. However, the portion of the CT within the 0.5--mile radius of the project is nonresidential, with the nearest residence of this community about 1 mile east of the Outer Harbor Turning Basin.

- **CT 9820 (West Jack London Square)** has a very small residential population in Oakland because it is primarily home to many industrial and commercial uses, with few residential dwellings. The small residential population of 63 is 84.1% minority, which is well above the 50% threshold, making it an area of concern for environmental justice. The high minority percentage primarily consists of African American, Asian, and Hispanic or Latino residents.
- **CT 4287 (West Alameda)** is a largely residential area but also includes the College of Alameda and commercial uses. The population is 72.6% minority, which is well over the 50% threshold, making it an area of concern for environmental justice. The high minority percentage primarily consists of Asian, African American, and Hispanic or Latino residents.

Based on the environmental justice criteria thresholds identified above, one low-income environmental justice community of concern was identified within the 0.5-mile study area. The community of West Alameda (CT 4287) has a low-income population of 20.1%, which is 10.2 percentage points above that of the reference population of the County of Alameda (9.9%). It is also a minority environmental justice community of concern as described above.

There are two other CTs within the 0.5-mile radius of the study area which are not considered to be environmental justice communities of concern. CT 9819 and CT 9832 are primarily white non-Hispanic, and their percentages of low-income residents are below the countywide average. In addition, CT 9819 is primarily non-residential with a total population of 58 residents.

While the primary study area is the 0.5-mile radius, when considering the nexus between environmental justice and resources such as air quality which may be impacted over a wider area, it is contextually relevant to note that nine additional CTs within 1 mile of the Inner Harbor Turning Basin are minority environmental justice communities of concern (Table 7, Figure 9). Seven of these CTs are also low-income environmental justice populations of concern. Another five CTs have a very small portion of their total area within the outer limits of the Inner Harbor Turning Basin 1-mile radius and are consequently not shown in Table 7. No additional census tracts are within 1 mile of the Outer Harbor Turning Basin.

At a broader geographic level, the community of West Oakland can also be recognized as both a minority and low-income environmental justice community of concern based on its proportion of minority (76%) and low-income (21.7%) residents. West Oakland's status as an environmental justice community of concern and the relevance of environmental justice issues has also been previously determined and analyzed by both the Bay Area Air Quality Management District (BAAQMD) and the City of Oakland (BAAQMD and WOEIP 2019a; City of Oakland 2019 and 2022). In particular, the community of West Oakland is also identified as an area with disproportionate impacts from air quality under the State of California's Community Air Protection Program (Assembly Bill [AB] 617). For Air Quality specific discussion, see Section 3.13.

3.2 Socioeconomics

The socioeconomics characteristics of the community in the vicinity of Oakland Harbor are summarized in this section. The parameters used to describe the demographic and socioeconomic environment include recent trends in population for Alameda County and the cities of Oakland and Alameda.

3.2.1 Regulatory Setting

Under NEPA, economic or social effects must be discussed if they are interrelated to the natural or physical environmental effects of a project (40 C.F.R. § 1508.1(g)). Because there are potential economic effects of the proposed alternatives that are related to the physical environmental effects of the alternatives, a socioeconomics analysis is required.

No federal plans, policies, regulations, or laws related to socioeconomics (including population, housing, and employment) apply to the alternatives under consideration.

3.2.2 Population and House Setting

Table 8 shows the local population, housing, and occupancy rates for the county and CTs intersecting a 0.5-mile economic study area used for this analysis (see Figure 9). The census tracts and their data shown in Table 8 are for their full jurisdiction and consequently may include households and homes outside the project's 0.5-mile economic study area. For example, the community of West Clawson (CT 4017) has a total population of 1,295 households. However, the nearest of these households is approximately 1 mile east of the Outer Harbor Turning Basin. For the other three CTs in Oakland within the 0.5-mile study area, the total population is less than 1,000, which reflects the greater proportion of commercial and industrial land uses relative to residences located within this area.

Table 8: Population and Housing of the Census Tracts within 0.5-mile of the Inner Harbor Turning Basin or Outer Harbor Turning Basin

Location/Tract	Population	Households	Housing Units	Occupied Housing Units	Vacancy Rate
Alameda County	1,656,591	585,049	617,415	585,588	5%
Oakland	435,514	167,913	178,207	167,680	6%
CT 9819	58	27	27	27	0%
CT 9820	63	32	32	32	0%
CT 4017	3,018	1,295	1,435	1,292	10%
CT 9832	583	340	384	342	11%
Alameda	80,884	32,000	33,272	32,054	4%
CT 4287	4,472	1,380	1,609	1,384	14%
Source: DOF 2021 Note: CT = census tract					

3.2.3 Labor Force and Unemployment Conditions

Table 9 shows the current labor force (i.e., people that are either working or actively looking for work) and employment (i.e., number of people who are employed) for the cities of Oakland and Alameda, as well as the corresponding Alameda County and state-wide data.

The employment data in Table 9 indicates the number of employed residents and not the number of jobs in those locations; job numbers are discussed under Major Industry Sector Employment, below. Current unemployment levels in the City of Oakland (6.3%) are higher than the county's unemployment rate (5.2%) but slightly below the statewide average (6.4%). The City of Alameda's unemployment rate of 4.8% is less than the county's rate of unemployment (5.2%).

Table 9: Labor Force and Employment (2021)

Area	Labor Force	Employment	Unemployed	Rate
California	19,041,600	17,825,000	1,216,600	6.4%
Alameda County	805,200	763,000	42,200	5.2%
City of Oakland	207,700	194,600	13,100	6.3%
City of Alameda	38,900	37,000	1,900	4.8%
Source: EDD 2021				

Major Industry Sector Employment

Table 10 shows the job employment by major industry sector for the cities of Oakland and Alameda, as well as Alameda County, in 2020 and projected for 2035. Alameda County and its cities provide more jobs than their corresponding number of employed residents, which is common for urban areas.

Table 10: Employment by Major Industry Sectors (2020 and 2035)

Sector	Oakland		City of Alameda		Alameda County	
Industry Sector	2020	2035	2020	2035	2020	2035
Natural resources and agriculture	300	270	20	20	1,245	1,250
Construction, government, and information	68,360	66,125	11,215	10,850	201,420	205,505
Finance and professional	61,415	66,955	9,805	11,695	205,570	217,245
Health and educational	82,245	98,495	12,260	14,225	247,645	295,175
Manufacturing and wholesale	22,440	21,280	3,460	3,355	128,240	134,145
Retail	12,545	14,115	2,140	2,090	74,560	80,405
Total	247,310	267,240	38,905	42,235	858,685	933,725
Source: ABAG 2018						

The health and educational services sectors are the largest industries in all three jurisdictions and account for the largest share of future job growth expected to occur by 2035. Construction, government, and information services jobs are currently the second-largest employment sector in Oakland and Alameda. However, job levels in these sectors are expected to decrease over the next 10 to 15 years. The finance and professional services sector currently provides slightly fewer jobs than the combined construction and government sector. Finance sector jobs are expected to grow over the next 10 to 15 years and become the second-largest job sectors in both the City of Oakland and the City of Alameda.

3.2.4 Port of Oakland

The Port provides large global and local economic values. Over the past 30 years, the Port has seen steady employment growth, an increase in personal income and local consumption, an increase in business revenue, and an increase in generated state and local taxes. Port operations are estimated to support a total of 27,732 direct, induced, and indirect jobs in California. Of the Port's 11,393 direct jobs, 4,115 are for surface transportation, 6,777 are maritime services, and 501 jobs belong to the Port Authority (Table 11). Trucking and warehouse distribution industries account for the most Port-related jobs (Port 2018).

Table 11: Port of Oakland Employment

Port of Oakland Direct Jobs by Category	
Job Category	Direct Jobs
Maritime Services	
International Longshore and Warehouse Union	1,808
Freight forwarders	1,613
Warehouse distribution centers	1,980
Other maritime services	1,376
Port Authority and Government	501
Surface Transportation	
Rail	203
Truck	3,912
Total	11,393
Source: Port 2018	

Table 12 shows the local residency of the approximately 11,400 workers directly employed by the Seaport activities at the Port. Alameda County residents account for a majority (53.5%) of the workers directly employed by the Seaport. Of the workers directly employed by the Seaport activities, 22.9% (2,612) live in Oakland and 4.9% (557) are Alameda residents.

Table 12: Residency of Employees Directly Employed by Seaport Activities

Residency of Direct Seaport Workers		
Municipalities	Direct Jobs	Percent
Alameda	557	4.9
Fremont	93	0.8
Hayward	443	3.9
Oakland	2,612	22.9
San Leandro	454	3.9
Other Alameda County	1,938	17.0
Total Alameda County	6,098	53.5
Non-Alameda County Residents	5,295	46.5
Source: Port 2018		

3.3 Geology, Soils, and Seismicity

3.3.1 Regulatory Setting

No federal plans, policies, regulations, or laws related to geology, soils, or seismicity apply to the alternatives under consideration.

3.3.2 Existing Geology, Soils, and Seismic Conditions

This section provides an overview of the geology, soil, and seismicity, features in the vicinity of the study area.

Physiography

Oakland Harbor lies along the eastern margin of San Francisco Bay within the Coast Ranges Geomorphologic Province of California. The Province is defined by the north to northwest trending Coast Ranges, which are traversed by numerous faults of the San Andreas fault system. The dominant geologic processes that have shaped the San Francisco Bay Area region are active faulting along the San Andreas, Hayward, and other faults; uplift and erosion of the East Bay and peninsular hills; and subsidence of the San Francisco Bay basin.

The San Francisco Bay is an approximately 400-square-mile body of water between the Sacramento Delta system and the Pacific Ocean. Drainage from the Central Valley region enters the Bay through the Carquinez Strait at San Pablo Bay and is discharged to the Pacific Ocean through the Golden Gate. Shallow water reclamation by infilling along the margins has reduced the original Bay from approximately 700 square miles to its present size. Approximately 85% of the Bay is less than 30 feet deep; the deepest waters lie at the Golden Gate where depths exceed 340 feet.

Geologic Structure

The geology of the Bay Area region is characterized by three structural blocks bounded roughly by the San Andreas and Hayward faults. The three structural blocks are the San Francisco and Marin peninsular hills, rocks underlying San Francisco Bay, and the East Bay hills. Basement rocks underlying sediments in the San Francisco Bay, where Oakland Harbor is located, are Franciscan Formation units. The Franciscan Formation is a late Mesozoic terrane of heterogenous rocks found throughout the California Coast Ranges and is bound on the west by the San Andreas Fault.

Aquatic Sediments

The following is a description of the primary sediments that underlie a large part of the San Francisco Bay, sources of current sediment input in the Bay, and terrestrial soils in the study areas.

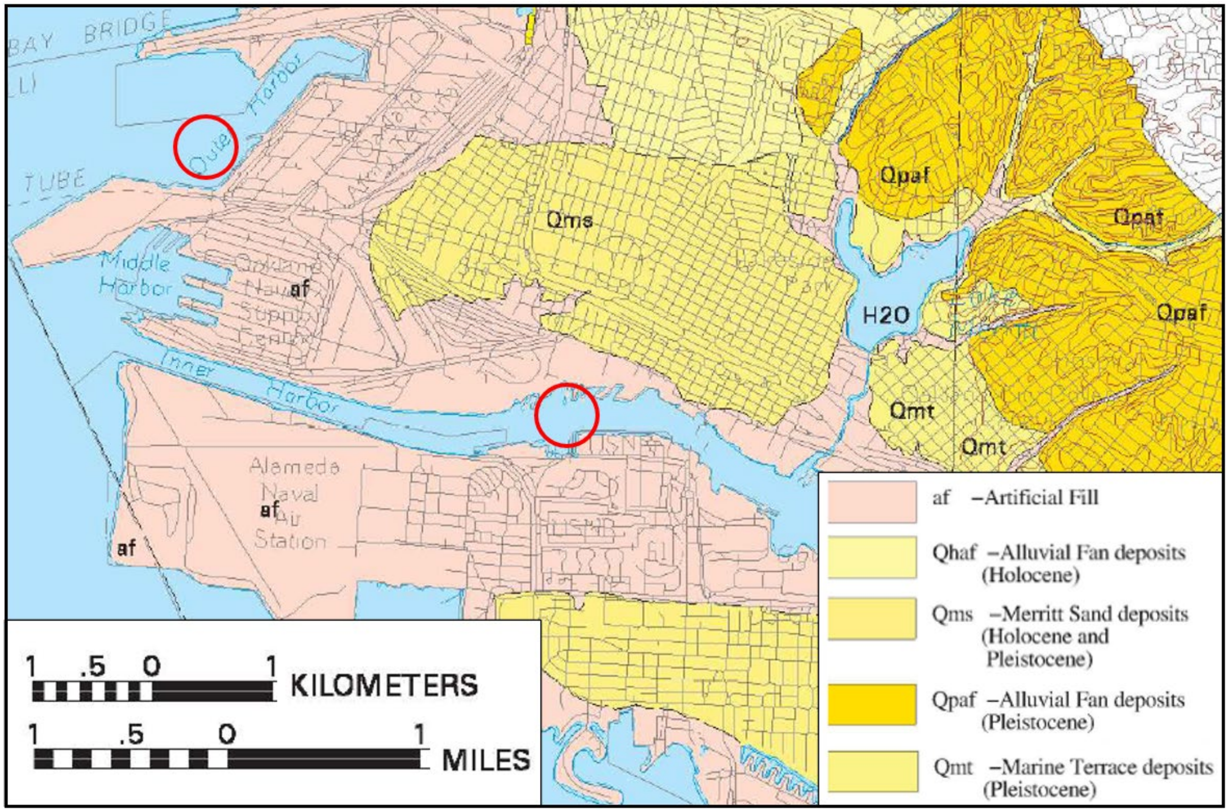

Figure 10: Surficial Geologic Map (Helly and Graymer, 1997)

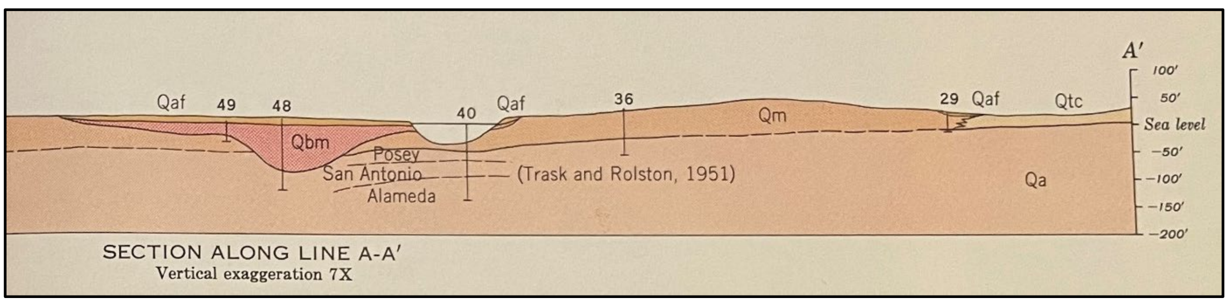

Figure 11: Geologic Cross-Section through the Inner Harbor

Alameda Formation

The initial unit deposited on the Franciscan Formation basement was the Alameda Formation, a complex variety of a lower non-marine alluvial fan, fluvial (streams and floodplains), and lacustrine (lake) deposits, and an upper marine unit. The lower and upper units range in thickness from 300 to 600 feet, and 200 to 400 feet, respectively.

Old Bay Mud (Yerba Buena Formation)

Approximately 115,000 years ago, the Pacific Ocean fully entered the region depositing the Old Bay Mud on top of the Alameda Formation. The Old Bay Mud is thicker than 50 feet beneath the central part of the Bay, with a maximum thickness of more than 100 feet just east of Yerba Buena Island.

Merritt Sand

Merritt Sand is aeolian in origin, and generally mapped in localized areas near downtown Oakland and Alameda. The unit is fine-grained, very well sorted (poorly graded), well-drained, with lenses (stringers) of sandy clay and clay. The deposit is typically yellowish-brown to dark yellowish-orange. The upper few feet are loose and contain humus, and the unit becomes more consolidated and medium dense to dense with increased depth. The thickness of the Merritt Sand varies between several inches and a maximum thickness of about 65 feet, and deposits express a yardang dune morphology (Radbruch, 1957).

San Antonio Formation

During the Wisconsin glacial stage (90,000 to 11,000 years ago), the sea level fell, exposing the Old Bay Mud. Estuarine and alluvial sediments named the San Antonio Formation were deposited on top. The San Antonio sediments, typically 25 feet thick, were deposited in individual units that are discontinuous and difficult to correlate regionally. There are three mappable units: wind-blown and beach sands called the Merritt Sand; sandy clays underlain by sandy channel fill materials collectively called the Posey Sand; and unnamed alluvial deposits overlying the Old Bay Mud. The Merritt and Posey sands form the uppermost aquifer beneath the East Bay shoreline, confined by the Young Bay Mud (see below). In some areas, such as the shipping channel, the Young Bay Mud has been removed by past dredging operations, exposing the underlying Merritt and Posey aquifer.

Young Bay Mud

Another rise in sea level beginning between 11,000 and 8,000 years ago inundated the region and deposited on top of the San Antonio Formation an estuarine mud known as Young Bay Mud. The Young Bay Mud infills reached a maximum thickness east of Hunters Point of about 120 feet.

Current Sediment Inputs

Sources of new sediment into the San Francisco Bay estuary system include the Sacramento and San Joaquin Rivers, which flow through the Carquinez Strait into the northeastern end of San Pablo Bay; the Napa, Sonoma, and Petaluma Rivers; and a variety of smaller streams and other drainages (including storm drains and flood control channels). As observed in a study from 1995-2010, small tributaries adjacent to San Francisco Bay supply 61 percent of the new suspended sediment to San Francisco Bay (McKee et al. 2013). Recent research also reinforces that episodic sediment loads, primarily during storm events, dominate the sediment supply to San Francisco Bay (Barnard et al. 2013). In the Oakland Harbor, sediment is contributed from vicinity shorelines and creeks, and carried via tidal currents, which cause siltation of the existing turning basins and shipping channels.

The USACE performs annual operation and maintenance dredging of shoaled sediment in the federal navigation channels at Oakland Harbor to return the channels to their authorized depth of –50 feet.

Approximately 1 to 2 feet of new material is deposited annually within the federal channel and turning basin. The most recent Operations and Maintenance Dredging Sampling and Analysis Report shows that the annual dredged material are typically silts and clays. As part of USACE's maintenance dredging, sediments in the channel are sampled and tested regularly to determine the suitability of the material for placement at dredged material placement sites (which may include in-bay, Ocean, or upland beneficial reuse sites) in accordance with the Dredged Material Management Program Historically, shoaled sediments in the channel have tested as clean and suitable for aquatic or upland beneficial use sites. The Inner and Outer Harbor Turning Basin Widening areas contain aquatic sediment outside of the federal channels. The potential characteristics of these sediments is discussed further in Section 3.12 Contaminants in Dredge or Fill Material.

Terrestrial Soils

Most of the uplands in and surrounding the turning basins are surfaced in concrete, asphalt, or other impermeable surfaces associated with industrial and marine support developments. The underlying material on which these impermeable surfaces and associated above ground facilities are built is largely fill. The proposed action area for alternatives that involve the Inner Harbor Turning Basin expansion, includes areas approximately -17 feet below ground surface at Howard Terminal, Schnitzer Steel, and Alameda Gateway. The long history of industrial and marine support land uses in the project vicinity has impacted subsurface soil conditions at Howard Terminal and Schnitzer Steel, and potentially at Alameda Gateway. Conditions of these soils are discussed further in Section 3.11.

Seismicity

The San Francisco Bay area lies within the active San Andreas fault system. Major faults in the area include the San Andreas, Hayward, Calaveras, and Concord faults. The region is therefore subject to potential significant ground shaking due to earthquakes along these faults and other faults within the San Andreas system.

The Alquist-Priolo Special Studies Zones Act of 1972, administered by the California Division of Mines and Geology, is designed to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault rupture. Development projects are regulated if they fall within one of these zones. The Oakland Harbor turning basin sites and the proposed upland placement locations for dredged and excavated materials are not within a special studies zone, and no active faults are mapped at any of the sites based on the Fault Map of California (Jennings 1994).

3.4 Water Quality

3.4.1 Regulatory Setting

Clean Water Act (33 U.S.C. § 1257 *et seq.*)

The Clean Water Act (CWA) established the federal structure for regulating surface water quality standards and discharges of pollutants into waters of the United States. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The CWA requires states to set standards to protect water quality. Specific sections of the CWA control discharge of pollutants and wastes into marine and aquatic environments.

Section 303 – Water Quality Standards and Implementation Plans (40 C.F.R. § 131.2)

This section of the CWA describes water quality standards as the water quality goals for a particular water body. The water quality goals are the designated uses for the water, and the criteria to protect those uses. States adopt water quality standards that are approved by EPA to protect public health or welfare, enhance the quality of water, and serve the purposes of the CWA. California's water quality is governed by the Porter-Cologne Water Quality Control Act (Wat. Code § 13000 *et seq.*) which provides for the establishment of approved implementation plans, here, the San Francisco Bay Basin Plan (SFRWQCB 2019).

Section 401 – Water Quality Certification

Under Section 401 of the CWA, Water Quality Certification (WQC) is required for any activity that requires a federal permit or license, and that may result in discharge into navigable waters. To receive certification under Section 401, an application must demonstrate that activities or discharges into waters are consistent with state effluent limitations (CWA Section 301), water quality effluent limitations (CWA Section 302), water quality standards and implementation plans (CWA Section 303), national standards of performance (CWA Section 306), toxic and pretreatment effluent standards (CWA Section 307), and "any other appropriate requirements of State law set forth in such certification" (CWA Section 401).

Section 402 – National Pollutant Discharge Elimination System Permitting

Under Section 402 of the CWA, discharge of pollutants to navigable waters is prohibited unless the discharge complies with general or individual National Pollutant Discharge Elimination System (NPDES) permits. This includes both point-source and nonpoint-source (i.e., stormwater) discharges. NPDES stormwater regulations are intended to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of structural and nonstructural best management practices (BMPs). BMPs can include educational measures, regulatory measures, public policy measures, or structural measures. Implementation and enforcement of the NPDES program is conducted through the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards. The San Francisco Regional Water Quality Control Board (SFRWQCB) has set standard conditions for each permittee in the San Francisco Bay Area, which includes effluent limitation and monitoring programs.

Section 404 – Discharge of Dredged or Fill Material

Section 404 of the CWA regulates the discharge of dredged or fill material (e.g., fill, pier supports, and piles) into waters and wetlands of the United States, which includes San Francisco Bay. The USACE implements Section 404 of the CWA, and EPA has oversight authority. Section 404(b)(1) of the CWA establishes procedures for the evaluation of permits for discharge of dredged or fill material into waters of the United States. In situations where the USACE proposes work that involves discharge of dredged or fill material into waters of the United States, the USACE must comply with the requirements of the Section 404(b)(1) Guidelines, although the USACE would not issue a permit for its own activities. Any discharge under Section 404 must also obtain a Section 401 WQC.

Rivers and Harbors Act of 1899 (33 U.S.C. § 403)

The Rivers and Harbors Act of 1899 was the first federal water pollution act in the United States that focused on protecting navigation, protecting waters from pollution, and acted as a precursor to the CWA of 1972. Section 10 of the Rivers and Harbors Act regulates alteration of, and prohibits unauthorized obstruction of, navigable waters of the United States. The Rivers and Harbors Act covers construction, excavation, or deposition of materials in, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. Original construction of the Oakland Harbor channels was authorized under the Rivers and Harbors Act and by other Congressional authorities. The USACE maintains the navigability of the channels in accordance with their authorized dimensions. The USACE, as the implementing authority of Section 10 of Rivers and Harbors Act, ensures its work or structures do not impede navigation in waters of the United States, and, therefore, is not subject to Section 10.

Coastal Zone Management Act (CZMA, 16 U.S.C. § 1451 *et seq.*)

The CZMA, established in 1972 and administered by NOAA's Office of Ocean and Coastal Resource Management, provides for management of the nation's coastal resources, including water quality. The overall purpose of the act is to balance competing land and water issues in the coastal zone. The San Francisco BCDC is the regional coastal zone management agency and is responsible for issuing concurrence with consistency determinations under the CZMA. The Bay Plan is BCDC's policy document specifying goals, objectives, and policies for BCDC jurisdictional areas. Pursuant to the federal CZMA, USACE is required to be consistent to the maximum extent practicable with the enforceable policies of the Bay Plan.

3.4.2 Surface Water Characteristics

The study area for surface waters includes the proposed Inner Harbor Turning Basin and Outer Harbor Turning Basin expansion areas and adjoining waters, which occur in the Central San Francisco Bay (Central Bay). The Central Bay generally consists of the San Francisco Bay waters south of the Interstate 580 Richmond-San Rafael Bridge and north of the State Route 92 San-Mateo Hayward Bridge. Like all estuaries, San Francisco Bay has a wide river mouth flooded by the sea, which flows on ocean tides east through the Golden Gate. Central Bay hydrology is most strongly influenced by tidal currents because of its proximity to the Pacific Ocean. The Central Bay is characterized by Pacific Ocean waters that are cold, saline, and low in total suspended sediment. Net circulation patterns in the larger San Francisco Bay are influenced by Sacramento-San Joaquin Delta (Delta) inflows, gravitational currents, and by tide- and wind-induced horizontal circulation (LTMS 1998). The turning basin expansion area footprints do not include wetlands or non-Bay water features (e.g., streams, drainages), although upland stormwater drainage patterns and infrastructure likely to affect surface waters are in the project areas.

The Oakland-Alameda Estuary is the strait separating the cities of Oakland and Alameda and the Alameda Island from the East Bay mainland (Figure 1). It includes the Inner and Middle Harbors of 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.

Vessel traffic, industrial activity, and annual dredging activities affect the condition of surface waters in the project area. Most of the uplands surrounding the turning basins are surfaced in concrete, asphalt, or other impermeable surfaces associated with industrial and maritime-related developments. Operations at these facilities are subject to applicable regulatory oversight for stormwater conveyance, treatment, and discharge.

3.4.3 Physical and Chemical Characteristics

Temperature

Temperature affects water chemistry and exerts a major influence on biological activity and growth in San Francisco Bay. Seasonally, water temperatures in the San Francisco Bay range from about 8 to 23 degrees Celsius (46 to 73 degrees Fahrenheit). Water depths also influence small irregular temperature changes.

Salinity

The salinity of the San Francisco Bay Estuary varies considerably by location and is most strongly influenced by river inflow and ocean tides. In Suisun Bay, salinity averages about 7 parts per thousand; at the Presidio in San Francisco near the Golden Gate, it averages about 30 parts per thousand; and in the southern extents of San Francisco Bay, salinities remain at near-ocean concentrations (32 parts per thousand) during much of the year.

pH

pH is a measure of the acidity or basicity of an aqueous solution on a scale of 0 to 14, with 7 being neutral; less than 7 being acidic; and greater than 7 being basic [alkaline]). The pH of waters in San Francisco Bay is relatively constant and typically ranges from 7.8 to 8.2 (LTMS 1998; SFEI 2013). As reported by LTMS, pH has remained relatively constant throughout the San Francisco Bay Estuary regardless of maintenance dredging projects that have occurred (USACE et al. 2009).

Dissolved Oxygen

Dissolved oxygen is one of the most important indicators of water quality. It is essential for the survival of fish and other aquatic organisms. The water in the Central Bay, in the vicinity of the Port of Oakland, is generally well oxygenated. Typical concentrations of dissolved oxygen in most of San Francisco Bay range from 9 to 10 milligrams per liter (mg/L) during high periods of river flow, 7 to 9 mg/L during moderate river flow, and 6 to 9 mg/L during the late summer months, when flows are lowest (SFEI 2008). River flows directly affect the amount of oxygen dissolved in water. Higher volumes of faster moving water increase the turbulent diffusion of atmospheric oxygen into the water.

Environmental factors other than river flows can also affect dissolved oxygen concentrations. This includes increases in dissolved oxygen by the mixing action of wind, waves, and tides; photosynthesis of phytoplankton and other aquatic plants; and high dissolved oxygen levels in freshwater inflow. Dissolved oxygen concentrations are lowered by plant and animal respiration, chemical oxidation, and bacterial decomposition of organic matter (USACE et al. 2009).

Suspended Sediments/Turbidity

Turbidity is an optical property related to clarity of water; it causes light to be scattered and absorbed rather than transmitted in straight lines. Turbidity is caused by the presence of suspended and dissolved matter such as clay, silt, finely divided organic matter, plankton, other microscopic organisms, organic acids, and dyes. Factors affecting turbidity include shape, size, refractive index, color, and absorption spectra of particles. Turbidity is expressed in Nephelometric Turbidity Units (NTUs). Total suspended solids (TSS), on the other hand, are a measure of the amount of dry-weight mass of non-dissolved solids suspended per unit of water (often measured in mg/L). TSS include inorganic solids (clay, silt, and sand) and organic solids (algae and detritus). Increased suspended solids increase turbidity and affect aquatic ecosystems in several ways, such as reduced light transmission, exposure to chemicals in suspended solids, and resettling effects.

Sediment inputs to the Bay are discussed under Geology, Soils, and Seismicity (Section 3.3) above and can contribute to TSS and turbidity in the bay. Aside from new sediment, existing deposits of typical fine-grained surface sediments in the extensive shallow areas of the San Francisco Bay Estuary are subject to hydraulic movement (resuspension) by riverine, tidal, and wind-driven currents, and are the primary source of suspended particulate matter and turbidity.

TSS levels in the San Francisco Bay Estuary vary greatly, typically ranging from 10 mg/L to over 100 mg/L, and as high as 200 mg/L (SFEI 2011). In general, higher TSS results in more turbid water. Although the Central Bay generally has the lowest TSS concentrations due to depth, increased tidal exchange and sediment type (LTMS 1998), waters in the navigation channel and turning basins are naturally turbid because of the resuspension of sediments from wind, waves, and tides. In addition, suspended sediment generated by vessel movement contributes to the turbid ambient (i.e., background) conditions. Seasons also play an important role in suspended sediment loads, with generally higher TSS levels in the summer, and lower levels in the winter. (USACE et al. 2009).

Sediment quality, including the potential for contaminants in dredge or fill material, is described in Section 3.12, Contaminants in Dredge or Fill Material.

3.4.4 Groundwater

The California Department of Water Resources considers the East Bay Plain, extending from Richmond to Hayward, an important and beneficial groundwater basin underlying the East Bay. This deep (more than 500 feet) basin provides municipal, industrial, and agricultural water supply. However, water supply for the study area is not provided by groundwater sources in this basin, but rather from surface water sources maintained and distributed by East Bay Municipal Utility District. Further, groundwater beneath the project sites is brackish due to the adjacent Oakland Harbor and San Francisco Bay waters and therefore is not designated by the SFRWQCB as a drinking water beneficial use.

The past industrial and maritime support land uses in the project vicinity have impacted groundwater conditions at Howard Terminal, as described below, and potentially at the Alameda site. Groundwater sampling and monitoring data (in addition to soil and soil gas data) is available on EnviroStor and GeoTracker, online data management systems maintained by the DTSC and the SWRCB, respectively, for known contaminated sites. Groundwater conditions for the upland areas where excavation is proposed are described below.

Howard Terminal

During recent investigations, the depth to groundwater at Howard Terminal has been observed at approximately 5 to 9 feet below ground surface, and groundwater depths are subject to tidal fluctuation of several feet daily (ENGEO 2019b). Groundwater at Howard Terminal is diverted by a concrete quay wall that bisects the southern portion of the parcel, which directs flows generally to the southwest where it connects to a historic wood bulkhead where three groundwater monitoring wells are situated—one located inland (or north) of the bulkhead and two located on the harbor side (or south) of the bulkhead.

Numerous investigations and cleanup actions pertaining to site contamination including impacts to groundwater have been performed at the 50-acre Howard Terminal. In 2019, a site investigation was conducted in support of the proposed Waterfront Ballpark District at Howard Terminal that included grab groundwater samples collected at nine boring locations and an additional four groundwater samples at newly constructed groundwater wells for a total of thirteen groundwater samples collected (ENGEO 2020). During the most recent biannual groundwater monitoring event conducted in 2020, two groundwater monitoring wells were observed to contain petroleum hydrocarbon product floating in groundwater, consistent with past observations (Baseline 2020). The two groundwater monitoring wells are both located north of the existing quay wall and wood bulkhead, outside of the Inner Harbor Turning Basin expansion area (Baseline 2020).

Recent ecological risk assessment and fate and transport modeling indicate that aquatic receptors in the Oakland Inner Harbor are not being adversely affected by the contaminants identified in the groundwater currently underlying Howard Terminal. This has been demonstrated through monitoring of the three groundwater monitoring wells located near wood bulkhead that is located north of the proposed expansion area. The monitoring results indicate that contaminants in groundwater inland of the concrete quay wall and wood bulkhead are not migrating to the Inner Harbor at detectable concentrations (Baseline 2020).

The 50-acre Howard Terminal site is under the regulatory jurisdiction of the DTSC and has land use restrictions applied to the entire site, some of which affect groundwater management.

Alameda Property

The southeastern edge of the proposed Inner Harbor Turning Basin expansion area would encroach on an upland portion of Alameda. The -50-Foot Project previously removed a corner of the same Alameda property to expand the Inner Harbor Turning Basin to its current dimension. Current groundwater elevation is approximately 9.5 feet MLLW and based on sampling conducted for the -50-Foot Project, groundwater was encountered at approximately 11.2 feet below ground surface. There is no indication of groundwater contamination above regulatory thresholds (DMMO 1998, Apex 2021).

3.5 Wildlife

3.5.1 Regulatory Setting

Fish and Wildlife Coordination Act (16 U.S.C. §§ 661-666c)

Under the Fish and Wildlife Coordination Act, any federal agency that proposes to control or modify any body of water must first consult with the United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), as appropriate, and with the head of the appropriate state agency exercising administration over wildlife resources of the affected state.

3.5.2 Terrestrial Wildlife

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

Avian species common to highly developed urban areas have potential to nest in ruderal shrubs, street trees, or building roofs in the study area. Potentially present species include the non-native 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*). For information regarding seabird species that may utilize the study area, see Section 3.6.4.

Small mammals may also occur in industrial and maritime support facilities in the study area. Species common to developed areas include striped skunk (*Mephitis mephitis*) and raccoon (*Procyon lotor*), and non-natives 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 that may be present and could include the common Mexican free-tailed bat (*Tadarida brasiliensis*) (City of Oakland 2021).

3.5.3 Pelagic (Open Water) Fauna

Pelagic communities occupy the open waters of the Bay above the substrate. Pelagic food webs are primarily based on the consumption of plankton, which includes many species of microscopic algae and protozoa, as well as larval mollusks, crabs, and fish, and other larger floating organisms. San Francisco Bay contains both shallow and deep estuarine pelagic habitat (Goals Project 1999).

The entirety of the maintained federal navigation channels and turning basins is classified as deep estuarine pelagic habitat (water depths greater than 18 feet below MLLW). Deep pelagic areas may provide habitat to free-swimming invertebrates such as California Bay shrimp (*Crangon franciscorum*), and fishes such as Brown Rockfish (*Sebastes auriculatus*), halibut, sturgeon (*Acipenser* sp.), and Longfin Smelt. Deepwater habitat may also serve as a migratory pathway for anadromous fish such as Chinook Salmon and steelhead. Waterbirds such as surf scoter (*Melanitta perspicillata*), scaups (*Aythya* spp.), brown pelican, and terns (*Sterna* spp.) may forage, roost or loaf in these open waters, particularly in areas protected from strong winds and waves. Marine mammals, such as Pacific harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and harbor porpoise (*Phocoena phocoena*), also use pelagic waters of the Bay.

Shallow open bay habitat occurs on the northern margins of the Outer Harbor Turning Basin and at the outer margins of the Inner Harbor Turning Basin (water depths less than 18 feet below MLLW). This habitat may function as a feeding area for Pacific Herring (*Clupea pallasii*), northern anchovy (*Engraulis mordax*), bat ray, 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 San Francisco Bay (Central Bay). Shallow bay habitat is also a nursery area for juvenile halibut and sanddabs *(Citharichthys stigmaeus*), shiner perch (*Cymatogaster aggregata*) and other fishes. Like 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.

Although not protected under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA), Pacific Herring are a CDFW managed species and are protected within the San Francisco Bay under the state Marine Life Management Act which provides guidance, in the form of Fisheries Management Plans, for the sustainable management of California's historic fisheries.

The Pacific Herring is a small schooling marine fish that enters estuaries and bays to spawn. This species is known to spawn along the Oakland and San Francisco waterfronts and attach its egg masses to eelgrass, seaweed, and hard substrates such as pilings, breakwater rubble, and other hard surfaces. An individual can spawn only once during the season, and the spent female returns to the ocean immediately after spawning. Spawning usually takes place between October and March with a peak between December and February. After hatching, juvenile herring typically congregate in the San Francisco Bay during the summer and move into deeper waters in the fall.

Portions of the Oakland-Alameda Estuary have been identified as potential herring spawning locations with habitat consisting of man-made riprap, pilings, and boat hulls and subtidal eelgrass, hard sand, and oysters (Watters et al. 2004). However, while suitable habitat exists, no herring spawning has been observed along the study area portion of the Oakland waterfront since CDFW began mapping the herring spawn in the 2012-2013 survey year (CDFW 2019). CDFW has consistently observed herring spawning on the Bay-facing (southern) side of Alameda Island, adjacent to the Ballena Isle Marina, but has not observed herring spawning within the Oakland Inner Harbor (CDFW 2019).

3.5.4 Benthic and Intertidal Fauna

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 maintenance 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 rock riprap.

Intertidal habitats (areas that lie between low and high tides) are very limited in the study area, consisting of seawalls, piles, and riprap. In the Outer Harbor, intertidal habitat is limited to portions of the existing vertical seawall that are exposed and inundated during tidal cycles. Intertidal habitat in the Inner Harbor Turning Basin is also predominantly seawall surfaces, but may also include piles that support above-water structures. This area also includes short lengths of rock riprapped shoreline in the intertidal zone. Hard substrates such as piers, breakwaters, and rock riprap provide colonization habitat for invertebrates. Common species include green algae, barnacles (*Balanus glandula* and *Chthamalus fissus*), Olympia oyster (*Ostrea lurida*), mussels, tunicates, bryozoans, cnidarians, and crabs.

Benthic communities in the Oakland Harbor and Central Bay are affected by increased water flow and sedimentation. Relatively high numbers of subsurface deposit feeding worms (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 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 such as blackspotted shrimp (*Crangon nigromaculata*), bay shrimp (*Crangon franciscorum*), Dungeness crab (*Metacarcinus magister*), and the slender rock crab (*Cancer gracilis*) (City of Oakland 2021).

Several common benthic species in San Francisco 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 non-indigenous species serve ecological functions like 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 provides 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.

3.6 Special Status Species and Protected Habitat

3.6.1 Regulatory Setting

Endangered Species Act (16 U.S.C. § 1531 *et seq.*), as amended

The federal Endangered Species Act (ESA) protects threatened and endangered species and their designated critical habitat from unauthorized take. Section 9 of the ESA defines take as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." In accordance with Section 7 of the ESA, federal agencies are required to consult with the USFWS and/or NMFS on actions that may affect listed species to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat.

As part of the implementation of the Long-Term Management Strategy (LTMS) for dredged material in the San Francisco Bay region, the federal LTMS agencies initiated ESA consultation with NMFS and USFWS for maintenance dredging and placement activities. These consultations reduced the need for individual consultation for maintenance dredging projects through the establishment of programmatic work windows. These programmatic work windows are based on presence/absence information for various sensitive species, and establish times and locations wherein maintenance dredging and disposal activities may take place without further (formal or informal) consultation. Although the work windows were established for maintenance dredging projects, these work windows are also considered when evaluating potential project impacts associated with new dredging and other types of in-water work. Applicable work windows for species that may be affected by a project will be implemented as reasonable and prudent measures during the Section 7 consultation. The work windows for each species are identified below in 3.6.2.

Marine Mammal Protection Act (16 U.S.C. § 1361 *et seq.*)

Under the Marine Mammal Protection Act (MMPA), all species of marine mammals are protected. The MMPA prohibits, with certain exceptions, the "take" of marine mammals. Under the MMPA, take is defined as the means "to hunt, harass, capture, or kill, or attempt to hunt, harass, capture, or kill." Under Section 101(a)(5)(D), an incidental harassment permit may be issued for activities other than commercial fishing that may impact small numbers of marine mammals. Amendments to this act in 1994 statutorily defined two levels of harassment. Level A harassment is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal in the wild. Level B harassment is defined as harassment having potential to disturb marine mammals by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

Migratory Bird Treaty Act (16 U.S.C. §§ 703-712)

The Migratory Bird Treaty Act (MBTA) established special protection for migratory birds by regulating hunting or trade in migratory birds. Furthermore, this act prohibits anyone to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. Part 21). Definition of "take" includes any disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young).

Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 *et seq.*)

Essential fish habitat (EFH) is defined under the Magnuson – Stevens Fishery Conservation and Management Act (MSA) as those waters (i.e., aquatic areas and associated physical, chemical, and biological properties) and substrate (i.e., sediments, hardbottom, structures underlying the waters, and associated biological communities) necessary to fish for spawning, feeding, or growth to maturity. In accordance with the MSA, federal agencies are required to consult with NMFS on proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH for fish species covered under a fisheries management plan (FMP). NMFS is required to comment and provide conservation recommendations for any federal or state activity that could impact EFH.

3.6.2 Federally Threatened and Endangered Species and Designated Critical Habitat

Table 13 identifies federal ESA -listed endangered and threatened species and marine mammals known to occur or with potential to occur in the study area. Designated critical habitat under the federal ESA has been established in the study area for two aquatic species: Southern Population of North American Green Sturgeon Distinct Population Segment (DPS) and Steelhead Central California Coast DPS. There is no designated critical habitat for terrestrial species in the study area.

Table 13: Federal and State Endangered and Threatened Species and Marine Mammals Known to Occur or Potentially Occurring in the Study Area

Species	Federal Status
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, San Francisco Bay-Delta DPS (*Spirinchus thaleichthys*)	FP
Marine Mammals	
Pacific harbor seal (*Phoca vitulina richardii*)	MMPA
California sea lion (*Zalophus californianus*)	MMPA
Harbor porpoise (*Phocoena phocoena*)	MMPA
Federal Status: CH = Critical Habitat; FP – Federal Proposed Species for Listing; FE = Federally Listed Endangered; FT = Federally Listed Threatened; MMPA = Marine Mammal Protection Act	

California Least Tern

The California least tern (*Sterna antillarum*) is a federally-listed endangered species. 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).

The least tern breeds in California from mid-May to August. The least tern typically departs California in August and winters in Latin America. There is a California least tern breeding colony at the former Alameda Naval Air Station on Alameda Island, located approximately 1.5 miles southwest of the Inner Harbor Turning Basin. The former Naval Air Station on Alameda Point has hosted a breeding colony since at least 1976, and possibly earlier (CDFW 2021). Least terns have been observed to forage primarily along the breakwaters and shallows of the southern shoreline of the former Naval Air Station (NAS) Alameda, and in Alameda's Ballena Bay from May through August (USACE and SFRWQCB 2015).

Outside of the proposed turning basin expansion areas but within the Port is the 180-acre Middle Harbor Enhancement Area, adjacent to Middle Harbor Shoreline Park. The Middle Harbor Enhancement Area is approximately 1,500 feet south of the proposed Outer Harbor Turning Basin expansion footprint and 10,500 feet northwest of the proposed Inner Harbor Turning Basin expansion footprint. Least terns are known to use the Middle Harbor Enhancement Area for foraging and roosting (USACE and SFRWQCB 2015).

In the Port, the LTMS maintenance dredging work window for California least tern is August 1 through March 15 (LTMS 2021). This window applies to all areas within 1 mile of the coastline from the Berkeley Marina south to San Lorenzo Creek.

North American Green Sturgeon Southern Distinct Population Segment (DPS)

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. The southern DPS, federally listed as threatened, spawns only in the Sacramento River system. Adult Green Sturgeon migrate into freshwater beginning in late February, with spawning occurring 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). According to studies, Green Sturgeon adults begin moving upstream through the Bay during winter (Kelly et al. 2003). During periods of migration, adults occur throughout the Bay and Delta.

Juvenile distribution and habitat use are still largely unknown. While juveniles are present in the southern Bay year-round (mostly south of the Dumbarton Bridge), juveniles are presumed present year-round in all parts of the San Francisco Bay in low densities (Israel and Klimley 2008). As a result, Green Sturgeon are potentially present throughout all marine portions of the study area at any time of the year. However, their preferred migration routes do not traverse the study area. Adult Green Sturgeon typically take the more direct migratory route from San Pablo Bay, past Raccoon Strait adjacent to Angel Island, and out to the Golden Gate Bridge (Kelly et al. 2007, City of Oakland 2021).

Sub-adult and adult Green Sturgeon occupy a diversity of depths for feeding and migration, although most of the study 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 study area.

Federal ESA designated 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. This includes the aquatic portion of the study area.

Steelhead

Steelhead are anadromous and there are two DPSs known to occur in the Central Bay: the Central California Coastal (CCC) DPS (federally listed as threatened), and the Central Valley DPS (federally listed as threatened). The CCC steelhead DPS occupies a large area that includes the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island, at the confluence of the Sacramento and San Joaquin Rivers. The Central Valley Steelhead DPS includes the Sacramento and San Joaquin Rivers and their associated tributaries.

Typically, individuals migrate to freshwater for spawning after spending anywhere from 1 to 4 years in marine habitats. Steelhead typically enter the Bay in early winter, using the main channels in the Bay and Delta to migrate to upstream spawning habitat, as opposed to small tributaries. 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).

The CCC DPS steelhead has small spawning runs in multiple Bay tributaries, including San Leandro Creek, approximately 5 miles southeast of the study area (Goals Project 2000). Fish migrating to and from these spawning grounds may occur in the study area. 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). No spawning or rearing habitat for steelhead exists in the study area.

Federal ESA designated critical habitat for CCC steelhead includes all river reaches and estuarine areas accessible to 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. Therefore, critical habitat for this DPS includes the waters in the study area.

The in-water work window for steelhead established through the LTMS program ESA consultation is June 1 through November 30.

Chinook Salmon

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). Chinook Salmon have three distinct runs, referred to as Evolutionarily Significant Units (ESUs), that use San Francisco Bay. These ESUs are distinguished by the seasonal differences in adult upstream migration, spawning, and juvenile downstream migration. The Sacramento River winter-run ESU is listed as an endangered species under the ESA. The Central Valley spring-run ESU is listed as threatened under the ESA. The Central Valley fall-run ESU is not protected under the ESA, but NMFS classifies it as a Species of Concern, and it is a state-designated species of special concern.

In San Francisco Bay, Chinook migrate 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).

Sacramento River winter-run Chinook ESU enter the 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). They are suspected to forage in Central Bay shallow water areas (less than 30 feet deep) during in-migration and out-migration transits. No spawning or quality rearing habitat for this species exists near the Port.

While migrating through San Francisco Bay, the Central Valley spring-run Chinook ESU has a similar life history to the Sacramento winter-run Chinook ESU. The Central Valley spring-run Chinook ESU are primarily present during in-migration and out-migration periods and are known to forage in Central Bay shallow water areas. No spawning or quality rearing habitat for this species exists near the Port.

The in-water work window for salmonids established through the LTMS program ESA consultation is June 1 through November 30.

Longfin Smelt

Longfin Smelt is a small anadromous fish that was historically among the most abundant fish in San Francisco Bay and the Delta. The San Francisco Bay-Delta DPS of Longfin Smelt is currently proposed for listing as endangered under the federal ESA. Significant declines in Longfin Smelt abundance have occurred throughout its range during the past quarter century. 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 2009). In April and May, juveniles are believed to migrate downstream to San Pablo Bay.

Longfin smelt are most likely to occur within the Central Bay during the late summer months before migrating upstream in fall and winter. During CDFW's Bay surveys, Longfin Smelt have been predominantly observed in observation stations in or upstream of San Pablo and Suisun Bays. At observation stations nearest the study 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, no Longfin Smelt were recorded south of San Pablo Bay; and from 2009 through 2013, none were observed between the southern limit and the entrance to San Pablo Bay. Based on these findings, there is a low likelihood of Longfin Smelt in the study area.

3.6.3 Marine Mammals

There are three species of marine mammals that are likely to occur in the vicinity of the study area: Pacific harbor seal, California sea lion, and harbor porpoise. There are several other species of marine mammals that uncommonly occur in the Central Bay, such as northern elephant seal (*Mirounga angustirostris*), common bottlenose dolphin (*Tursiops truncatus*), and gray whale (*Eschrichtius robustus*). None of these species are federally or state listed as threatened or endangered; however, all marine mammals are protected under the MMPA.

Pacific Harbor Seal

Pacific harbor seal is the most common marine mammal species observed in San Francisco Bay and is also commonly seen near the San Francisco-Oakland Bay Bridge east span (Caltrans 2018), as well as the western shoreline of Alameda Island. Foraging can occur throughout the Bay and prey abundance and distribution affect where harbor seals will forage.

Harbor seals in the Bay typically haul out in groups ranging from a few individuals to several hundred seals. In the central portion of the Bay, there is an active haul-out site on the southern side of Yerba Buena Island, approximately 2 miles west of the Outer Harbor Turning Basin, and another on the far side of Alameda Island at the Alameda Point Marina, about 1.5 miles south of the Inner Harbor Turning Basin. There are other areas in the Central Bay that may occasionally be used as a haul-out, but there are no records of harbor seal hauling out at the Port, and the shorelines of the Port generally do not provide suitable haul-out locations due to the developed nature of the shoreline.

California Sea Lion

California sea lions breed on the offshore islands of southern California and Mexico from May through July (Heath and Perrin 2008). During the non-breeding season, adult and sub-adult males and juveniles migrate northward along the California, Oregon, Washington, and Vancouver Island coastlines.

California sea lions have been observed occupying docks near Pier 39 in San Francisco, about 3.2 miles from the study area, since 1987. Occurrence of sea lions near Pier 39 typically is lowest in June (breeding season) and highest in August. Pier 39 is the only regularly used haul-out site in the Central Bay, but sea lions occasionally haul out on human-made structures, such as bridge piers, jetties, or navigation buoys (Caltrans 2018). Foraging can occur throughout the Bay.

Harbor Porpoise

Harbor porpoise are the smallest cetacean found in California waters and inhabit nearshore waters as well as estuaries. Harbor porpoises began to re-enter the Bay in 2008, following a long absence of several decades. Keener et al. (2012) reports sightings of harbor porpoises from just inside the Bay, northeast to Tiburon, and south to the San Francisco-Oakland Bay Bridge west span.

3.6.4 Species Protected under the Migratory Bird Treaty Act

There are a variety of seabirds protected under the MBTA that are relatively common in the Central Bay and may occur on or above the waters of the Port. For example, double-crested cormorant (*Phalacrocorax auritus*) and Caspian tern (*Hydroprogne caspia*) are common in the study area. Osprey (*Pandion haliaetus*) are also regularly seen at the Port terminals. The Middle Harbor Enhancement Area supports a variety of migratory birds, including wading shorebirds and burrowing owls. With the exception of at the Middle Harbor Enhancement Area, wading shorebirds are unlikely to occur at the Port because shallow water habitat is generally absent. Shoreline structures at the Port and on Alameda Island also support loafing gulls. Recent surveys at the Howard Terminal recorded presence of ring-billed gull (*Larus delawarensis)*, California gull (*Larus californicus)*, and western gull (*Larus occidentalis)* (City of Oakland 2021). California gulls are the only species known to breed in the vicinity of the study area, with a breeding colony at the former Alameda Naval Air Station, located approximately 1.5 miles from the Inner Harbor Turning Basin (Shuford and Ryan 2000). Common species of terrestrial migratory birds may also be present.

3.6.5 Magnuson-Stevens Fishery Conservation Act - Fisheries Management Plans in the Affected Area

All waters and intertidal areas of San Francisco Bay and its tributaries are designated as EFH under the following FMPs:

- Pacific Coast Groundfish
- Coastal Pelagic Species
- Pacific Salmon

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, groundfish, 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 (approximately 11,500 feet) to Mean Higher High Water (MHHW) level, or the upriver extent of saltwater intrusion in estuaries. The entirety of the San Francisco Bay below MHHW is designated as EFH for Pacific Coast Groundfish.

The Coastal Pelagic FMP protects and manages northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel, market squid, and all krill species that occur in the West Coast exclusive economic zone.[12] Coastal Pelagic 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 (50 and 79 degrees Fahrenheit). The entirety of the San Francisco Bay below MHHW is designated as EFH for Coastal Pelagic Species.

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 and Coho Salmon (*Oncorhynchus kisutch*). Pacific Coast Salmon freshwater EFH includes all rivers or creeks 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. 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 FMP also defines five Habitat Areas of Particular Concern for the Pacific Coast Salmon essential fish habitat: complex channels and floodplain habitats, thermal refugia, spawning habitat, estuaries, and marine and estuarine submerged aquatic vegetation.

3.6.6 Vegetation, Wetlands, and Submerged Aquatic Vegetation

No wetlands or terrestrial vegetation occur in the proposed expansion footprint for, or in the vicinity of, the Outer Harbor Turning Basin, aside from the shoreline 2,000 feet to the north, near the touchdown of the San Francisco-Oakland Bay Bridge. At this shoreline, a strip of ruderal upland vegetation is present between Interstate 80 and the intertidal waters of the Bay; no wetlands are present.

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[12] 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.

No wetlands or significant upland vegetation occur in the proposed expansion footprint for, or in the vicinity of, the Inner Harbor Turning Basin, aside from small, landscaped areas adjacent to buildings and roadways. The natural vegetation present is limited to ruderal growth along the shoreline fill adjacent to Schnitzer Steel.

Near the turning basins, there are small patches of eelgrass, a type of submerged aquatic vegetation. 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. Eelgrass is also an important habitat for Pacific Herring, which lay their eggs on the eelgrass blades. 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).

The nearest patch at the Outer Harbor is approximately 167 meters (548 feet) northeast of the proposed Outer Harbor Turning Basin expansion area. The nearest patch in the Inner Harbor occurs greater than 500 meters (1,640 feet) west of the proposed Inner Harbor Turning Basin 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. The results of that survey are provided in Appendix A1.

The Middle Harbor Enhancement Area (MHEA) is a subtidal restoration site created during the -50 foot project that beneficially reused dredged material from the deepening to create 180 acres of shallow water habitat that includes eelgrass. This restoration site is immediately adjacent to the entrance of the Inner Harbor channel. The MHEA habitats present include intertidal and shallow subtidal soft-bottom habitat and eelgrass. Phase I of the eelgrass planting took place in June 2019 and a supplemental planting occurred in August 2022. The minimum target eelgrass acreage for the MHEA is 15 acres.

3.7 Cultural Resources

3.7.1 Regulatory Setting

National Historic Preservation Act (16 U.SC. § 470 *et seq.*)

The National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of their 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, structures such as bridges and tunnels, architectural features, landscapes such as transportation corridors, railroad stations, and traditional cultural properties and resources) that are at least 50 years old, possess integrity, and meet the criteria for listing in the National Register of Historic Places (NRHP) (36 C.F.R. Part 60). Federal agencies are responsible for compliance with Section 106 of the NHPA (36 C.F.R. Part 16 U.S.C. § 4700) and for allowing the State Historic Preservation Office (SHPO) and Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on an undertaking's adverse effects to historic properties.

Abandoned Shipwreck Act (43 U.S.C. §§ 2101–2106)

The Abandoned Shipwreck Act is a federal legislative act that protects 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 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.

American Indian Religious Freedom Act (42 U.S.C. § 1996, *et seq.*)

The American Indian Religious Freedom Act (42 U.S.C. § 1996, *et seq*.), regulated under 43 C.F.R. Part 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.

3.7.2 Cultural Setting

Cultural resources, both archaeological and historic architecture, are identified and assessed in association with their natural and cultural contexts. A brief discussion of the cultural settings of the study area and vicinity are provided below. A more detailed discussion of the cultural setting is provided in Appendix A6.

San Francisco Bay, as we now know it, was formed during a period of relatively rapid sea-level rise. After 4,000 B.C. the sea-level rise slowed and marshes began to develop around the Bay. During this post-4,000 B.C. period, numerous shell middens were created because of human activity in the Bay Area (Stright 1990:451). Marshes are particularly productive ecosystems and most of the San Francisco Bay shell middens were near marshes (Nelson 1909; Bickel 1978). 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). Prior to historic-period development, both the Inner and Outer Harbor Turning Basins were undeveloped marshlands.

By around 1500 B.C., Costanoans entered the Bay Area from the Sacramento River Delta region and occupied most of the eastern shore of San Francisco Bay, presumably displacing or assimilating older Esselen language speakers as they advanced (Moratto 1984:554). The study 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). 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. 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. 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% . 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 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 the present-day cities of Oakland, Piedmont, Berkeley, Emeryville, Alameda, Albany, and part of San Leandro (Archaeological and Historical Consultants 1993; Minor 2000; LSA 2011).

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. 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. During the 1850s and 1860s, Oakland developed as a small residential and industrial center. In 1863, a wharf was constructed at the foot of 7th Street to provide ferry service to San Francisco. By 1869, Oakland was the western terminus for the first transcontinental railway (Hoover and Kyle 2002).

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. Construction of the two training walls commenced in 1875 and appears to have been completed by 1896. The first infill behind the walls was the construction of the railroad moles.[13] 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. 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 NAS Alameda and the Fleet Industrial Supply Center

[13] Historically, the term "mole" was used in the San Francisco Bay Area to refer to the combined structure of a causeway and wooden pier or trestle upon which railroad tracks were extended into the Bay to link railroads with the ferry system.

(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 (north) 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). 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.

3.8 Aesthetics

Visual resources consist of the natural and manmade features that give a particular environment its aesthetic qualities. These features may be natural-appearing or modified by human activities. Together, they form the overall impression of an area, referred to as its landscape character. Landforms, water surfaces, vegetation, and manmade features are treated as characteristic of an area if they are inherent to the formation, structure, and function of the landscape. Visual resources also include public values, goals, awareness, and concern regarding visual quality. The concept of visual sensitivity encompasses the relative degree of public interest in visual resources and concern over adverse changes in the quality of that resource. Some visual resources may be generally described as Scenic vistas - panoramic views of a large geographic area for which the field of view can be wide and extend into the distance. Scenic vistas are experienced from publicly accessible locations and include urban skylines, valleys, mountain ranges, or large bodies of water (including large waterfalls).

This section describes the existing visual character of the area through representative key viewpoints with photographs from in and around the study area. The locations of the key viewpoints and the direction of the views are shown in Figure 12 and Figure 13. Photographs for select viewpoints are included in the following discussion; photographs of all viewpoints shown in Figure 12 and Figure 13 are presented in Appendix A09.

Figure 12: Key Observation Points and Parks, Outer Harbor Turning Basin Study Area

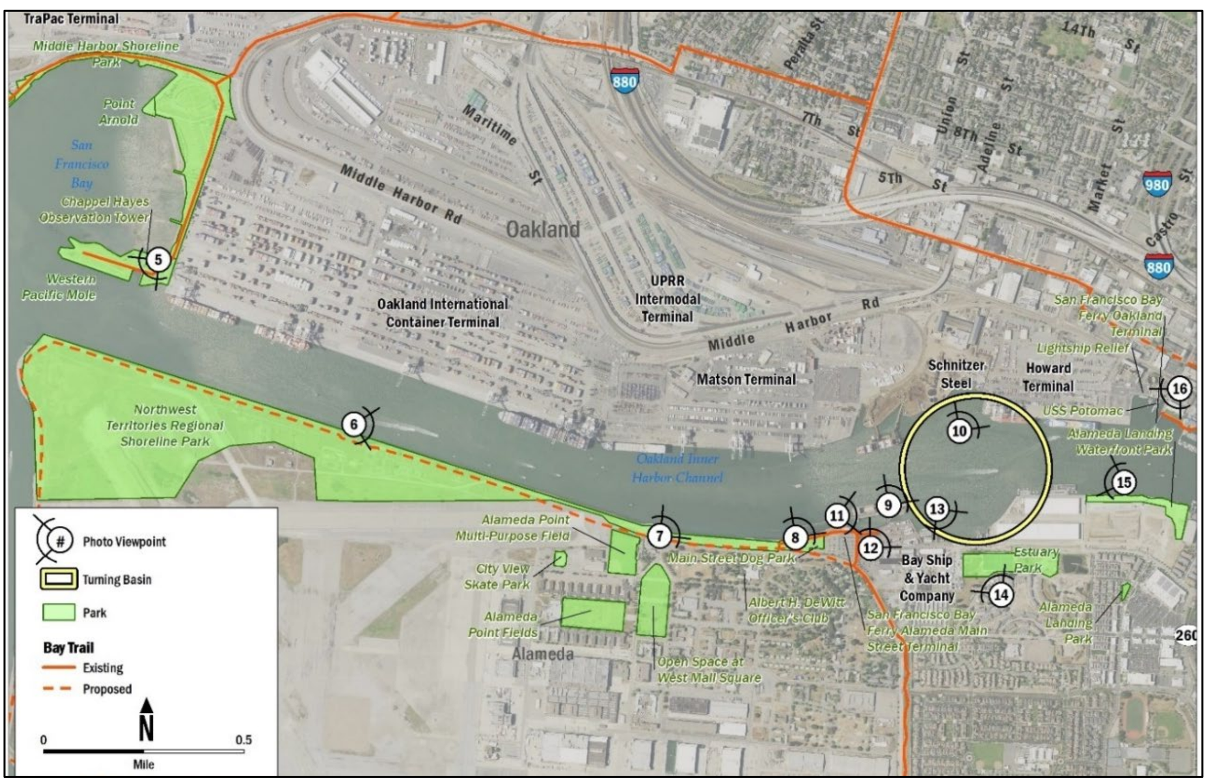

Figure 13: Key Observation Points and Parks, Inner Harbor Turning Basin Study Area

3.8.1 Regulatory Setting

Coastal Zone Management Act (16 U.S.C. § 1451 *et seq.*)

Federal activities that affect the San Francisco Bay Conservation and Development Commission (BCDC) jurisdiction are subject to review by BCDC, pursuant to the federal Coastal Zone Management Act, for their consistency with BCDC's federally approved coastal management program: the Bay Plan. The Bay Plan includes policies for managing Bay resource appearance, design, and scenic views to avoid visual impacts and promote scenic views. Additionally, the Bay Plan's public access policies include policies related to public visual access to the Bay.

3.8.2 Existing Visual Character

The viewsheds in the immediate area of the turning basins are characterized by an industrial waterfront. Although limited scenic features are observed from some viewpoints, such as views of the channel waterways and San Francisco Bay, City of Oakland skyline, and San Leandro Hills, the viewsheds at the turning basins are generally dominated by cranes, container storage, warehouses, and docked cargo ships. The Port of Oakland white container cranes that line the Seaport shoreline are a notable scenic feature in the Oakland skyline; however, they can be viewed from various vantage points and are not unique to the viewsheds afforded from or specifically toward the project sites. Nearby locations, such as Middle Harbor Shoreline Park, Port View Park, and the northwestern Alameda shoreline provide expansive and unobstructed high-quality views of the Bay, surrounding hills, and San Francisco skyline. Therefore, the viewsheds associated with the turning basin project are relatively low scenic value compared to other nearby viewsheds.

Outer Harbor Channel and Turning Basin

There are two major active marine terminals (i.e., TraPac and Ben E. Nutter) along the Outer Harbor, with one of them adjacent to the Outer Harbor Turning Basin. The Outer Harbor includes 14 berths for various ship lengths, mechanized cranes, container storage areas, and large paved parking lots for employees. The ocean-going cargo vessels that dock at these terminals, along with the berths, cranes, container storage, and nearby warehouses give the area a distinct industrial waterfront visual character (see photographs from viewpoints 1-3; Figure 14, Figure 15, and Figure 16. The elevated Bay Bridge East Span including the pedestrian path (also known as the Alexander Zuckerman Bay Bridge Trail) provides expansive views to the east of the Outer Harbor (including the Turning Basin) and the Inner Harbor entrance for millions of motorists yearly, as well as recreationists. Floodlighting on high-mast structures is present for operations and security and is visible at night throughout the immediate Bay Area.

Figure 14: Viewpoint 1 - View of the Outer Harbor Turning Basin and Port Marine Terminals from the Bay Bridge and Bay Bridge Trail, looking east. (Source: Google Earth, 2021)

Figure 15: Viewpoint 2 - View of the Outer Harbor Turning Basin and Port Marine Terminals from the Judge John Sutter Shoreline Park entrance, looking south. (Source: Google Earth, 2021)

Figure 16: Viewpoint 3 - View of tugboats at Berths 8/9, Government Lay berth Vessel at Berths 9 and 20, and the Outer Harbor and Marine Terminals from the Judge John Sutter Shoreline Park Bridge Yard Building and Observation Deck at Burma Road, looking east. (Source: Google Earth, 2021)

On the northwestern side of the Outer Harbor, the 22.5-acre Judge John Sutter Shoreline Park (Gateway Park) has been developed between the Oakland Harbor and I-80. There is a pedestrian observation pier, constructed by Caltrans, at the western end of the park that provides expansive views of the Bay Bridge, the San Francisco skyline to the west, and the Outer Harbor (including the Turning Basin) to the south and east. The Bay Trail is immediately adjacent to and north of the Judge John Sutter Shoreline Park, and the shoreline in this area is flat, so park visitors and recreationists on the Bay Trail have expansive views to the south of the Outer Harbor and the associated ships and cranes. The Park includes the historic Bridge Yard Building, which is available for event rentals, and has an associated elevated viewing platform with views to the northeast of Terminal Gate/Berth 10 (see Figure 16), and views to the southwest of the Outer Harbor Turning Basin.

The area around Berth 10 is heavy industrial in nature, consisting of shipping containers, soil stockpiles, industrial buildings and warehouses, metal fencing, paved roadways, construction and container-moving equipment, gravel equipment yards, truck parking, and high-mast light standards (Figure 17). The equipment and materials present at this location vary over time depending on specific projects and activities occurring at any given time, however, views remain primarily industrial in nature.

Figure 17: Viewpoint 4 - View of shipping containers, soil stockpiles, and the Outer Harbor Marine Terminals from the Bay Trail and Burma Road, looking south. (Source: Google Earth, 2021)

Inner Harbor Channel and Turning Basin

The Inner Harbor is bordered to the north by the Port (in the City of Oakland) and to the south by the City of Alameda. The Port's Middle Harbor is located between the western channel entrance to the Inner Harbor and the Oakland International Container Terminal. Middle Harbor includes Port View Park and Middle Harbor Shoreline Park (MHSP). The Western Pacific Mole, located within MHSP, includes the Chappell Hayes observation tower, which provides scenic views of the surrounding landscape, including the Inner Harbor, the Oakland International Container Terminal, the City of Alameda, the Oakland Hills, San Francisco Skyline, and the Coast Ranges to the southwest. Port View Park includes a fishing and observation pier, which provides a vantage point like the observation tower, but from a lower elevation (Figure 18).

Figure 18: Viewpoint 5 - View of the Inner Harbor Entrance, San Francisco Skyline, and Chappell Hayes Observation Tower, from Middle Harbor Shoreline Park, looking southwest. (Source: Google Earth 2021)

Port facilities at the western end of the Inner Harbor include the Oakland International Container Terminal and views are characterized by similar industrial waterfront visual character as the Outer Harbor. The southern side of this portion of the Inner Harbor includes the former NAS Alameda, which is planned and approved for redevelopment as the Northwest Territories Regional Shoreline Park—a 158-acre open space that will include an extension of the San Francisco Bay Trail and benches for seated viewing opportunities. The Inner Harbor Turning Basin is not visible from the planned park or the planned extension of the Bay Trail in this area (Figure 19). Similar views consisting of typical maritime industrial activities associated with the Port along the Inner Harbor Channel from NAS Alameda and Alameda's Main Street are included as viewpoints 7 and 8 in Appendix A09.

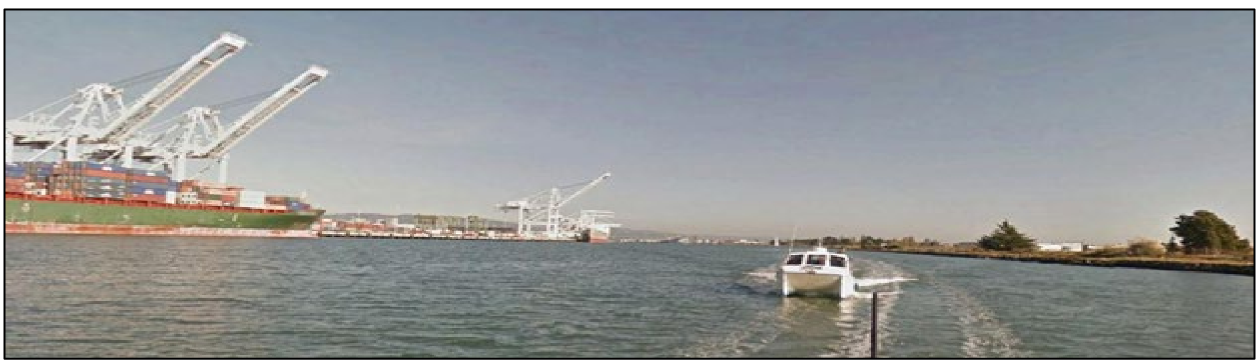

Figure 19: Viewpoint 6 - View of Inner Harbor Channel and the planned Northwest Territories Regional Shoreline Park, from the Inner Harbor Channel, looking east. (Source: Google Earth 2014)

Views of the northern portion of the Inner Harbor Turning Basin are primarily heavy industrial in nature and associated with maritime operations. Schnitzer Steel owns an approximately 29-acre property that abuts the northwestern side of the existing Inner Harbor Turning Basin and includes a large, black, wharf affixed crane near the shoreline (Figure 20). The western edge of the Howard Terminal abuts the northeastern side of the Inner Harbor Turning Basin (Figure 21).

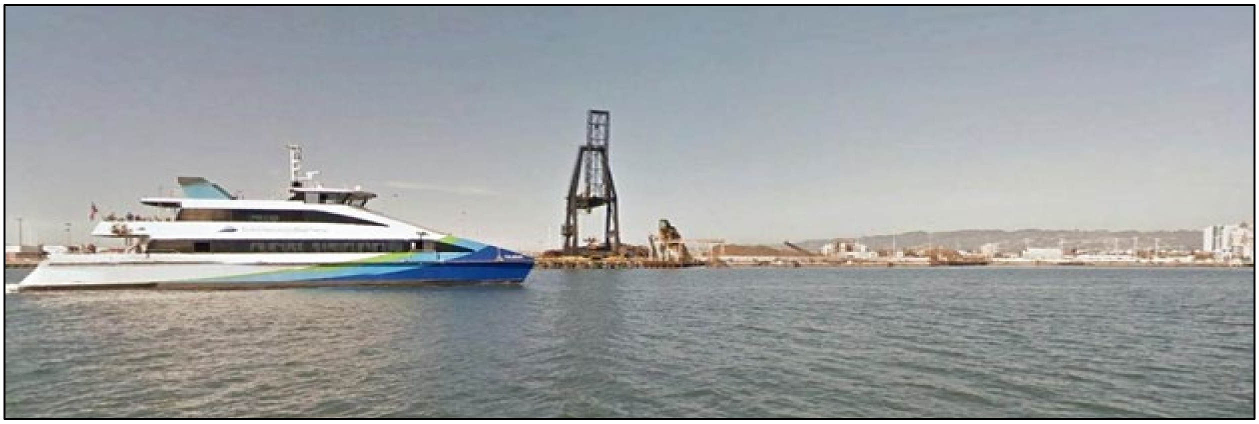

Figure 20: Viewpoint 9 - View of Schnitzer Steel Facility with black mechanized crane, northwestern corner of Inner Harbor Turning Basin from the Inner Harbor Channel, looking north. (Source: Google Earth 2014)

Figure 21: Viewpoint 10 - View of northeastern Inner Harbor Turning Basin, Howard Terminal from the Inner Harbor Channel, looking northeast. (Source: Google Earth 2014)

The southwestern side of the Inner Harbor Turning Basin is also dominated by views of heavy industrial maritime shipbuilding operations, equipment, and warehouses. These views are exemplified by Viewpoints 11, 12, 13, and 15 in Appendix A09 from the San Francisco Bay Alameda Ferry Terminal, the Bay Trail at Bay Ship & Yacht Company, and planned Alameda Landing Waterfront Park location. The City of Alameda's Estuary Park, created in 2017, is adjacent to and south of the maritime industrial operations. The northwestern corner of the park includes a limited view (partially blocked by vegetation, warehouses, and berthed boats) into the Inner Harbor Turning Basin (Viewpoint 14 in Appendix A09). Outside the project area to the northeast are the San Francisco Bay Ferry Oakland Terminal and Jack London Square (a pedestrian-oriented mixed-use office, retail, hoteling, and entertainment area). Boardwalks along the shore, waterfront restaurants, and a hotel provide opportunities for panoramic views of the working maritime industrial visual character of the Inner Harbor and the opposite shore (Figure 22). From upper-story levels, the area provides westward views of the Inner Harbor Channel, Inner Harbor Turning Basin, and the Port; ground-level views toward the Inner Harbor Turning Basin are blocked or dominated by the Howard Terminal.

Figure 22: Viewpoint 11 - View of the southern side of the Inner Harbor Turning Basin from the Public Plaza at the San Francisco Bay Oakland Ferry Terminal and Historic Ship Dock, looking southwest (Source: Google Earth 2019)

3.9 Recreation

3.9.1 Regulatory Setting

Coastal Zone Management Act (16 U.S.C. § 1451 *et seq.*) (see Section 3.8.1)

The Bay Plan includes policies for management of Bay resources designed to promote water-oriented recreation facilities such as marinas, launch ramps, beaches, and fishing piers, in addition to landside parks along the shoreline.

3.9.2 Recreation Resources and Activities

Recreational resources in the study area vicinity include public parks and open spaces; pedestrian and bicycle trails; playfields; fishing and observational piers; and water-oriented recreational activities, including fishing, boating, and two historic ship museums that are occasionally open for public viewing. On-street bicycle routes are considered transportation facilities and therefore are not considered recreational facilities for the purposes of this analysis.

Recreational activities in the study area consist of boating and fishing (outside the federal deep draft commercial waterway) in the Outer and Inner Harbors, walking and bicycling along portions of the Bay Trail, bird and wildlife viewing, and a variety of activities at several existing and planned landside public parks in Oakland and Alameda. These activities and recreational facilities are described in further detail below. The names and locations of recreational resources considered in this analysis are shown in Appendix A09 – Visual Points and Table 14.

Table 14. Public Parks in Project Area

Resource Name	Amenities	Size	Approximate Distance from Project Sites	Nearest Project Feature
Oakland				
Judge John Sutter Regional Shoreline Park (Gateway Park)	Observation and fishing pier, Bridge Yard Building and Observation Deck (available for special events), walking path, restrooms, and day use parking for the Alexander Zuckerman Bay Bridge Trail	22.5 acre	0.35 mile	Outer Harbor Turning Basin
			0.35 mile	Berth 10 Staging Area
Middle Harbor Shoreline Park Complex (Port View Park, Point Arnold, Western Pacific Mole)	Surrounds the Middle Harbor Basin. Includes pedestrian and bicycle paths, open space, beach, fishing pier, amphitheater, Chappell Hayes Observation Tower, historical exhibits, benches, viewing telescopes, restrooms and water fountains, picnic tables, children's play structure, and parking	45 acres	0.25 to 0.75 mile	Outer Harbor Turning Basin
Alameda				
Alameda Point Fields	Soccer fields	6.5 acres	0.75 mile	Inner Harbor Turning Basin
City View Skate Park	Skate park, picnic tables, water fountains, and parking	1.5 acres	0.8 mile	Inner Harbor Turning Basin
Alameda Point Multi-Purpose Field	Multi-purpose athletic field and restrooms	4.6 acres	0.70 mile	Inner Harbor Turning Basin
Open Space at West Mall Square (former Parade Grounds)	Open space with walking paths; Douglas A-4 Skyhawk Display	7.5 acres	0.64 mile	Inner Harbor Turning Basin
Northwest Territories Regional Shoreline Park (Planned and Approved)	Open space, wildlife preserve, walking and bicycle paths (Bay Trail), viewing and seating areas, restrooms, drinking foundations, and parking	158 acres	0.37 mile	Inner Harbor Turning Basin
Albert H. DeWitt Officer's Club	Former Naval Officer's Club now available for event rentals	2.0 acres	0.37 mile	Inner Harbor Turning Basin
Main Street Dog Park	Fenced grass dog park, picnic tables, and parking	1.5 acres	0.36 mile	Inner Harbor Turning Basin
Estuary Park	Baseball and softball field, soccer field, wetland area, grassy open space, and walking path (additional amenities are planned)	12.5 acres	60 feet	Inner Harbor Turning Basin and Alameda Staging Area
Alameda Landing Waterfront Park (Planned and Approved)	Reuse of existing historic wharf as public park with landscaped promenade, plaza, greenspace, dock, kayak launch, fitness area, children's play area, picnic tables, Bay Trail, and parking	5.4 acres	375 feet	Inner Harbor Turning Basin
Alameda Landing Park	Walking path, benches, picnic tables, grassy open space, and landscaping	0.75 acre	0.32 mile	Inner Harbor Turning Basin

Source: Data Compiled by AECOM, 2021

Resource Name	Amenities	Size	Approximate Distance from Project Sites	Nearest Project Feature
Oakland				
Judge John Sutter Regional Shoreline Park (Gateway Park)	Observation and fishing pier, Bridge Yard Building and Observation Deck (available for special events), walking path, restrooms, and day use parking for the Alexander Zuckerman Bay Bridge Trail	22.5 acre	0.35 mile	Outer Harbor Turning Basin
			0.35 mile	Berth 10 Staging Area
Middle Harbor Shoreline Park Complex (Port View Park, Point Arnold, Western Pacific Mole)	Surrounds the Middle Harbor Basin. Includes pedestrian and bicycle paths, open space, beach, fishing pier, amphitheater, Chappell Hayes Observation Tower, historical exhibits, benches, viewing telescopes, restrooms and water fountains, picnic tables, children's play structure, and parking	45 acres	0.25 to 0.75 mile	Outer Harbor Turning Basin
Alameda				
Alameda Point Fields	Soccer fields	6.5 acres	0.75 mile	Inner Harbor Turning Basin
City View Skate Park	Skate park, picnic tables, water fountains, and parking	1.5 acres	0.8 mile	Inner Harbor Turning Basin
Alameda Point Multi-Purpose Field	Multi-purpose athletic field and restrooms	4.6 acres	0.70 mile	Inner Harbor Turning Basin
Open Space at West Mall Square (former Parade Grounds)	Open space with walking paths; Douglas A-4 Skyhawk Display	7.5 acres	0.64 mile	Inner Harbor Turning Basin
Northwest Territories Regional Shoreline Park (Planned and Approved)	Open space, wildlife preserve, walking and bicycle paths (Bay Trail), viewing and seating areas, restrooms, drinking foundations, and parking	158 acres	0.37 mile	Inner Harbor Turning Basin
Albert H. DeWitt Officer's Club	Former Naval Officer's Club now available for event rentals	2.0 acres	0.37 mile	Inner Harbor Turning Basin
Main Street Dog Park	Fenced grass dog park, picnic tables, and parking	1.5 acres	0.36 mile	Inner Harbor Turning Basin
Estuary Park	Baseball and softball field, soccer field, wetland area, grassy open space, and walking path (additional amenities are planned)	12.5 acres	60 feet	Inner Harbor Turning Basin and Alameda Staging Area
Alameda Landing Waterfront Park (Planned and Approved)	Reuse of existing historic wharf as public park with landscaped promenade, plaza, greenspace, dock, kayak launch, fitness area, children's play area, picnic tables, Bay Trail, and parking	5.4 acres	375 feet	Inner Harbor Turning Basin
Alameda Landing Park	Walking path, benches, picnic tables, grassy open space, and landscaping	0.75 acre	0.32 mile	Inner Harbor Turning Basin

Source: Data Compiled by AECOM, 2021

Resource Name	Amenities	Size	Approximate Distance from Project Sites	Nearest Project Feature
Oakland				
Judge John Sutter Regional Shoreline Park (Gateway Park)	Observation and fishing pier, Bridge Yard Building and Observation Deck (available for special events), walking path, restrooms, and day use parking for the Alexander Zuckerman Bay Bridge Trail	22.5 acre	0.35 mile	Outer Harbor Turning Basin
			0.35 mile	Berth 10 Staging Area
Middle Harbor Shoreline Park Complex (Port View Park, Point Arnold, Western Pacific Mole)	Surrounds the Middle Harbor Basin. Includes pedestrian and bicycle paths, open space, beach, fishing pier, amphitheater, Chappell Hayes Observation Tower, historical exhibits, benches, viewing telescopes, restrooms and water fountains, picnic tables, children's play structure, and parking	45 acres	0.25 to 0.75 mile	Outer Harbor Turning Basin
Alameda				
Alameda Point Fields	Soccer fields	6.5 acres	0.75 mile	Inner Harbor Turning Basin
City View Skate Park	Skate park, picnic tables, water fountains, and parking	1.5 acres	0.8 mile	Inner Harbor Turning Basin
Alameda Point Multi-Purpose Field	Multi-purpose athletic field and restrooms	4.6 acres	0.70 mile	Inner Harbor Turning Basin
Open Space at West Mall Square (former Parade Grounds)	Open space with walking paths; Douglas A-4 Skyhawk Display	7.5 acres	0.64 mile	Inner Harbor Turning Basin
Northwest Territories Regional Shoreline Park (Planned and Approved)	Open space, wildlife preserve, walking and bicycle paths (Bay Trail), viewing and seating areas, restrooms, drinking foundations, and parking	158 acres	0.37 mile	Inner Harbor Turning Basin
Albert H. DeWitt Officer's Club	Former Naval Officer's Club now available for event rentals	2.0 acres	0.37 mile	Inner Harbor Turning Basin
Main Street Dog Park	Fenced grass dog park, picnic tables, and parking	1.5 acres	0.36 mile	Inner Harbor Turning Basin
Estuary Park	Baseball and softball field, soccer field, wetland area, grassy open space, and walking path (additional amenities are planned)	12.5 acres	60 feet	Inner Harbor Turning Basin and Alameda Staging Area
Alameda Landing Waterfront Park (Planned and Approved)	Reuse of existing historic wharf as public park with landscaped promenade, plaza, greenspace, dock, kayak launch, fitness area, children's play area, picnic tables, Bay Trail, and parking	5.4 acres	375 feet	Inner Harbor Turning Basin
Alameda Landing Park	Walking path, benches, picnic tables, grassy open space, and landscaping	0.75 acre	0.32 mile	Inner Harbor Turning Basin

Source: Data Compiled by AECOM, 2021

Boating and Fishing

Recreational boating for privately owned pleasure craft is available throughout the Inner and Outer Harbor Turning Basins. The San Francisco Bay Water Trail was created to promote recreational non-motorized boating access throughout the Bay, including within the study area. Approximately 0.5 mile east of the Inner Harbor Turning Basin, there are numerous private marinas with boat docks on both sides of the Oakland Estuary, particularly the Jack London Square area in Oakland and the Mariner Square Drive area in Alameda. Recreational boating and sightseeing are also available in the form of ferry trips through the Inner Harbor and across the Bay from the San Francisco Bay Ferry terminals at the Oakland Terminal and the Alameda Main Street Terminal. Non-motorized recreational boating use in the study area includes sailboats and human-powered watercraft such as kayaks and team rowing boats (e.g., shells and dragon boats). In addition, businesses at Jack London Square offer sailing and kayak rentals, classes, and tours.

The USS Potomac, former President Roosevelt's presidential yacht, is moored in the Inner Harbor at Jack London Square, approximately 0.3 miles northeast of the Inner Harbor Turning Basin. The ship is occasionally open to the public for tours and cruises in the Bay. The Lightship Relief, which served as a lighthouse station to aid maritime navigation along the coast of Delaware and in California at Cape Mendocino, is moored in the Inner Harbor at Jack London Square next to the USS Potomac. The ship is open to the public for tours on weekends.

Recreational fishing is available throughout the Inner and Outer Harbor waterways from private boats via trolling. However, boats may not stop or anchor within the federal navigation channel or turning basins to fish. Landside recreational fishing is available from the pier in the Judge John Sutter Shoreline Park (Outer Harbor); from Point Arnold, the Western Pacific Mole, and the fishing pier in the Middle Harbor Park Complex (Middle Harbor); from the area around the Main Street Dog Park and near the Alameda Ferry Terminal (Inner Harbor). Fish species commonly reported by the recreational fisherman in the area include jacksmelt, perch, rays, small sharks, rockfish, halibut, and striped bass (among others).

San Francisco Bay Trail

In the City of Oakland, portions of the Bay Trail have been constructed across the eastern span of San Francisco-Oakland Bay Bridge, along the Judge John Sutter Regional Shoreline Park, along Burma Road and Maritime Street, along 7th street connecting to Middle Harbor Shoreline Park, and in the Middle Harbor Shoreline Park complex. In the City of Alameda, a portion of the Bay Trail has been constructed along the Main Street Dog Park to the Main Street Alameda Ferry Terminal, immediately adjacent to the Inner Harbor Channel, and from the Alameda Ferry Terminal to the western end of the Bay Ship & Yacht Company. The Bay Trail provides walking and bicycling opportunities, as well as scenic viewing and birdwatching.

Landside Public Parks

Several public parks in Oakland and Alameda are either fully constructed and operational, or planned and approved, in the vicinity of the study area. Appendix A09 – Visual Points, describes the size, recreational amenities provided, and distance of the landside public parks from the project sites. In addition to the activities afforded by the amenities listed Appendix A09 – Visual Points, several of these parks provide for bird and wildlife viewing opportunities.

3.10 Navigation and Transportation

3.10.1 Regulatory Setting

United States Coast Guard

Under 14 U.S.C. § 2 and 33 U.S.C., and portions of the Code of Federal Regulations, the United States Coast Guard (USCG) has authority for maritime law enforcement on the navigable waters of the United States, as well as responsibilities for search and rescue. Inland Waters Navigation Regulations (33 C.F.R. Part 162) identifies regulations for navigation by both commercial and noncommercial vessels.

Inland Navigational Rules Act of 1980

The Inland Navigational Rules Act of 1980 (Pub. L. 96-591, 94 Stat. 3415, 33 C.F.R. Part 83), more commonly known as the Inland Rules, governs many rivers, lakes, harbors, and inland waterways. The International Regulations for Preventing Collision at Sea have also been incorporated into federal law (Pub. L. 95-75, 91 Stat. 308, 33 U.S.C. § 1601 *et seq.*). Together, these regulations (known as the Rules of the Road) govern open bodies of water to promote navigational safety, including requirements for steering and sailing practices, navigation lights and day-shapes, and sound signals for both good and restricted visibility.

Regulated Navigation Areas

The USCG has established regulated navigation areas (RNAs) in the San Francisco Bay region to reduce vessel congestion where maneuvering room is limited. These RNAs increase navigational safety by organizing traffic flow patterns; reducing meeting, crossing, and overtaking situations between large vessels in constricted channels; and limiting vessel speed. The RNAs apply to all large vessels, defined as any power-driven vessels of 1,600 or more gross tons, or tugs with a tow of 1,600 or more gross tons.

Ports and Waterways Safety Act of 1972

The Ports and Waterways Safety Act of 1972 (33 U.S.C. § 1221) authorized the USCG to establish, operate, and maintain vessel traffic services for ports, harbors, and other waters subject to congested vessel traffic. As a result, in 1972, the USCG established the Vessel Traffic Service (VTS) for San Francisco Bay, and designated traffic lanes for inbound and outbound vessel traffic, specified separation zones between vessel traffic lanes, and set up rules to govern vessels entering and leaving ports. The VTS, which is on Yerba Buena Island, controls marine traffic throughout the San Francisco Bay Area. Although small and private vessels shorter than 20 meters (approximately 66 feet) in length are not required to coordinate their movements by contacting the VTS, the USCG monitors all commercial, United States Navy, and private marine traffic in San Francisco Bay and local coastal waters.

America’s Marine Highway Program

The Marine Highway Program was established by Section 1121 of the Energy Independence and Security Act of 2007 to reduce landside congestion through the designation of Marine Highway Routes. Section 405 of the Coast Guard and Maritime Transportation Act of 2012 further expanded the scope of the program beyond reducing landside congestion to efforts that generate public benefits by increasing the use or efficiency of domestic freight or passenger transportation on Marine Highway Routes between ports in the United States. Marine Highway M-5 serves commercial navigation channels, ports, and harbors along the U.S. west coast from San Diego north to the border with Canada. The study area also includes a portion of Marine Highway M-580, a spur of M-5 serving Northern California that includes the San Joaquin and Sacramento Rivers.

3.10.2 Land-Based Transportation

This section describes the existing land-based transportation network in the study area, including roadways, transit service, bicycle facilities, pedestrian facilities, freight rail facilities, and emergency access. Figure 23and Figure 24 show the Inner Harbor and Outer Harbor turning basin study areas (respectively) with roadways, freight way facilities, and navigation facilities in the vicinity.

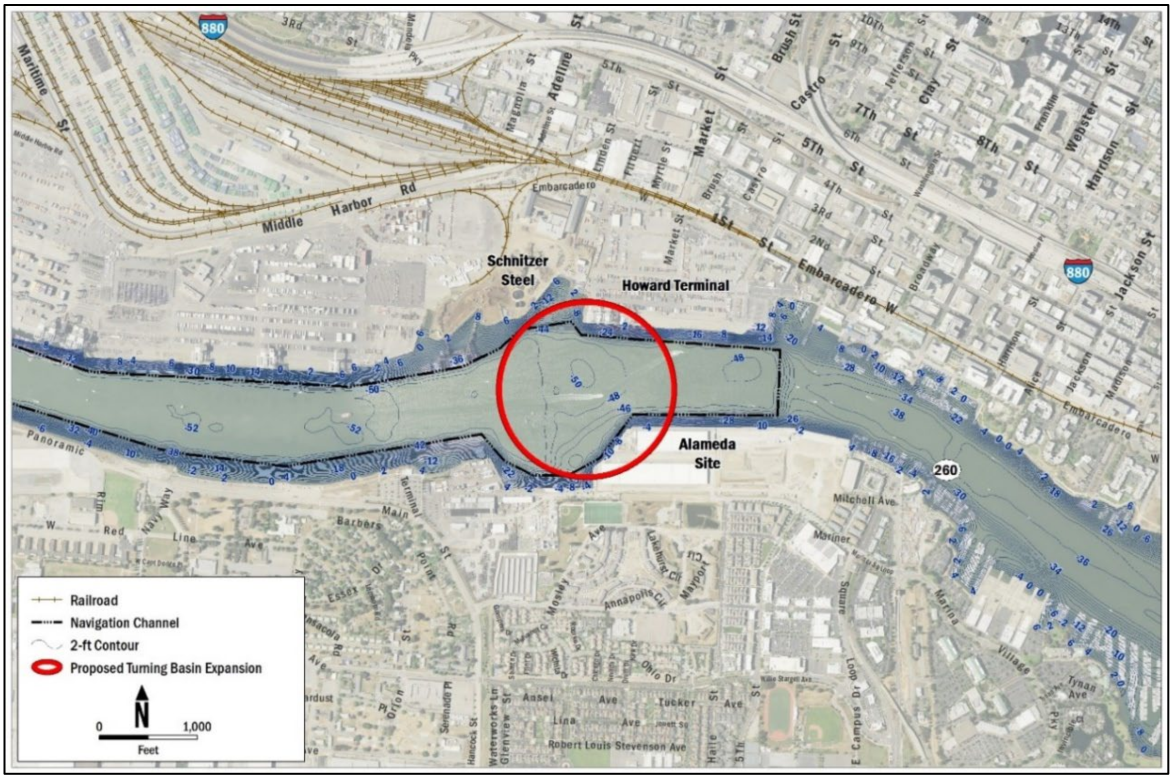

Figure 23: Transportation and navigation facilities around the Inner Harbor Turning Basin

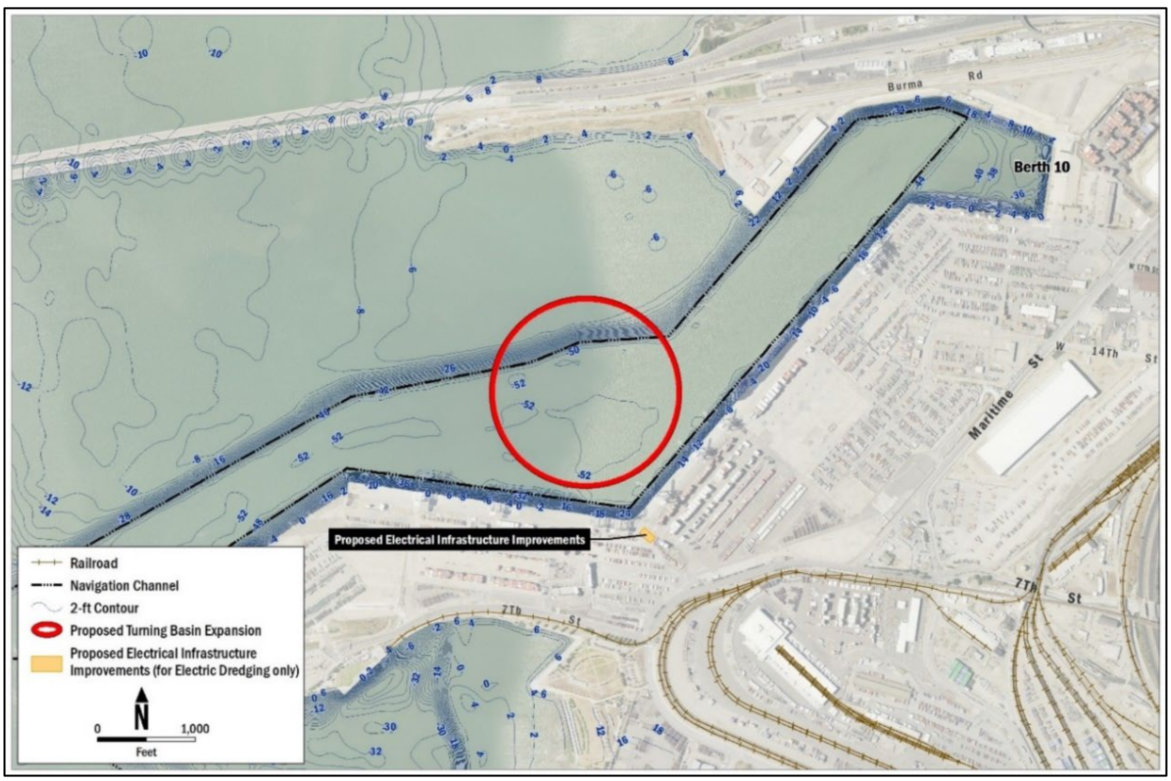

Figure 24: Transportation and navigation facilities around the Outer Harbor Turning Basin

Regional Roadways

Primary regional access to the study area is provided by Interstate 880 (I-880), an auxiliary Interstate Highway connecting Interstate 80 and Interstate 580 in Oakland (near the Emeryville border) with Interstate 280 in San Jose. Through the study area, I-880 generally follows a northwest-southeast orientation, except for where it is near the Seaport, with at least three travel lanes in each direction. I-880 provides the primary freeway access for the Port's maritime facilities, including the container terminals and intermodal yards, and generally serves as the dividing line between the industrial and residential areas of West Oakland. Average daily traffic (ADT) levels on the I-880 between the Adeline Street/Union Street interchange and the Interstate 980 junction are on the order of 123,700 vehicles per day (Caltrans 2021a).

Local Roadways

Local roadways in the vicinity of the Inner and Outer Harbor study areas are briefly described below. Roadway classifications are defined by the relevant local jurisdiction (City of Oakland 2021a; City of Alameda 2020). In general, existing ADT for most of these local roadway segments is on the order of 5,000–10,000 vehicles or more daily. Roadways closer to the northern side of the Inner Harbor and to the Outer Harbor are primarily used for Port-related traffic, such as Market Street south of 3rd Street and Maritime Street south of Burma Street, and existing ADT on these streets is less than 5,000 vehicles daily. Existing ADT on all these roadways is below—and in some cases, well below—the existing capacity of the roadways (e.g., 18,000-36,000, see Table). Conversely, existing ADT through the Webster and Posey tubes is on the order of 66,500 vehicles daily (Caltrans 2021a). Local streets that would likely be used as truck routes are identified in the "Truck Routes" section immediately following this section. The capacity and existing ADT for truck route segments is identified in detail in Section 6.10.

Both the City of Oakland and the City of Alameda have designated several local streets as "local truck routes" for use by commercial trucks. Truck traffic can use non-truck route streets when it is necessary to reach a destination granted that the truck leaves a designated truck route at the closest point to its destination. In Alameda, the routes are governed by the City of Alameda General Plan's Transportation Element, which includes designated truck routes (City of Alameda n.d.) designed to maintain a limited number of streets on which through truck traffic is allowed.

In Oakland, local truck routes are defined in the California Vehicle Code and Oakland Municipal Code (OMC) and shown on both a City of Oakland Truck Routes and Prohibited Street map and online interactive map3F.[14]

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[14] Published in February 2018 and August 18, 2018 and noted as updated January 2017 online at: https://cao-94612.s3.amazonaws.com/documents/oak063236.pdf

While both maps are meant to reflect the published OMC, discrepancies have been noted between the two. The 4F[15] Truck routes in West Oakland are being re-evaluated through implementation of the West Oakland Truck Management Plan that incorporates community feedback in its process. Relevant truck routes are described below; the capacity and existing ADT for truck route segments are identified in Section 6.10.

City of Oakland local truck routes in the Inner Harbor Turning Basin study area include the following roadways:

Local roadway access for the Oakland (i.e., northern) side of the Inner Harbor Turning Basin is generally provided by the following streets:

- **Adeline Street** is generally oriented north-south and connects South Berkeley with West Oakland (where it continues south into the Port as Middle Harbor Road, a non-public roadway). In the study area, Adeline Street is classified as a Principal Arterial and accommodates two travel lanes in each direction. In urban centers, Principal Arterials are corridors with the highest traffic volume and those with the longest trip lengths. Adeline Street south of 7th Street is a designated local truck route.
- **Market Street** is generally oriented north-south and connects North Oakland (where it diverges from Sacramento Street near Alcatraz Avenue) with West Oakland (where it terminates at the main access for Howard Terminal at Embarcadero West). In the study area, Market Street north of 3rd Street is classified as a Minor Arterial (roads that service trips of moderate length at a lower level of travel mobility than Principal Arterials) and south of 3rd Street as a Local Street (a road that primarily provides direct access to abutting land and access to Collectors [defined below] and Arterials). It generally accommodates two travel lanes in each direction, although the Local Street portion between 3rd Street and Embarcadero West through the at-grade crossing with the Union Pacific Railroad (UPRR) Niles Subdivision is striped with three travel lanes in the southbound direction and one travel lane in the northbound direction. Market Street south of 7th Street to Howard Terminal is a designated local truck route.
- **Martin Luther King Jr. Way** is generally oriented north-south and connects Uptown at San Pablo Avenue with Howard Terminal. It serves as the main entrance to Howard Terminal. In the study area, Martin Luther King Jr. Way is classified as a Minor Arterial north of Embarcadero West and as a Local Street south of Embarcadero West. It accommodates two travel lanes in each direction.
- **Embarcadero West** is generally oriented east-west and begins from the Schnitzer Steel facility (immediately west of Howard Terminal) east to Oak Street, where it continues across the Lake Merritt Channel into the Brooklyn Basin and East Peralta neighborhoods as Embarcadero. In the study area, Embarcadero West is classified as a Local Street west of Martin Luther King Jr. Way and as a Collector (a road that collects and distributes traffic from the arterial system) east of Martin Luther King Jr. Way. It functions as a frontage road for properties on either side of the UPRR Niles Subdivision through the Jack London Square area, and generally accommodates one travel lane in each direction. From the Schnitzer Steel facility east to Martin Luther King Jr. Way, both travel lanes are provided along the southern side of the railroad tracks; east of Martin Luther King Jr. Way, only an eastbound lane continues. There is

[15] Where the published OMC and maps differ, the shortest truck route of the two are proposed here.

no westbound travel lane between Martin Luther King Jr. Way and Jefferson Street. From Jefferson Street one block east to Clay Street, the westbound travel lane is located along northern side of the tracks and the eastbound travel lane is located along the southern side of the railroad tracks. East of Clay Street, the railroad tracks become at-grade with both the westbound and eastbound travel lanes through the Jack London Square area east to Webster street where Embarcadero West again shifts to along the southern side of the railroad tracks and where it is again not at-grade with the railroad tracks.

- **3rd Street** is generally oriented east-west and connects West Oakland (where it begins as a continuation of Mandela Parkway) and the Jack London Square area (where it terminates at Oak Street). In the study area, 3rd Street is classified as a Local Street from Mandela Parkway east to Magnolia Street, as a Collector from Magnolia Street east to Market Street, and as a Minor Arterial east of Market Street. It generally accommodates one travel lane in each direction and includes a Class II bikeway (on-street bicycle lane) in each direction west of Brush Street. 3rd Street also serves as part of a permitted heavy container transportation program. 3rd Street between Market Street and Adeline Street is a designated local truck route.
- **5th Street** is generally oriented east-west and connects West Oakland (where it begins at Peralta Street) and the Jack London Square area (where it terminates in a dead-end just east of Franklin Street near the north portal of the Webster Tube). In the study area, 5th Street is classified as a Local Street west of Market Street, as a Minor Arterial between Market Street and Broadway, and as a Local Street east of Broadway. West of Market Street, 5th Street generally accommodates two travel lanes in each direction; east of Market Street, it becomes an eastbound-only roadway, generally with three travel lanes. The portion between Adeline Street and Market Street is designed as two travel lanes on the northern side, separated from a one-lane “frontage road” on the southern side by structural supports for the San Francisco Bay Area Rapid Transit (BART) aerial guideway. 5th Street between Market Street and Union Street is a designated local truck route.
- **6th Street** is generally oriented east-west and extends as a one-way roadway from Fallon Street (near Laney College) to Adeline Street (in West Oakland), where it merges into 5th Street. Because of the presence of adjacent I-880 on- and off-ramps, through traffic along 6th Street is totally or partially restricted at several locations, such as the portions approaching Oak Street (a forced right turn onto Oak Street) and Broadway (concrete barriers prevent all access to 6th Street downstream of the intersection). In the study area, 6th Street is classified as a Local Street west of Brush Street and as a Major Collector between Brush Street and Broadway. East of Broadway, 6th Street includes surface portions classified as a Local Street (primarily providing local access) and an elevated portion that provides access to and from northbound I-880. The cross-section of 6th Street varies considerably over the course of its length (depending on the street classification and the presence of adjacent on- and off-ramp connectors for I-880) but generally consists of one to three travel lanes.
- **Castro Street** is a designated local truck route north of 7th Street and south of 12th Street.

Local roadway access for the Alameda (i.e., southern) side of the Inner Harbor Turning Basin includes the following roadways:

- **Webster and Posey Tubes** are separate (i.e., one-way) underwater tunnels connecting Alameda with Oakland. The Webster Tube runs in the southbound direction, with entrances from the 5th Street/Broadway and 7th Street/Webster Street intersections in Oakland and exits to the Webster Street/Willie Stargell Avenue and Constitution Way/Marina Village Parkway intersections in Alameda. The Posey Tube runs in the northbound direction, with entrances from the Webster Street/Willie Stargell Avenue and Constitution Way/Mariner Square Drive intersections in Alameda and an exit to the 7th Street/Harrison Street intersection in Oakland. Each tube accommodates two lanes. Currently, the Webster and Posey Tubes are temporarily closed to vehicles with three or more axles for maintenance work, reopening to these vehicles by approximately 2026 (Caltrans 2021b). There is no pedestrian or bicycle access in the Webster Tube, and only limited access through the Posey Tube. The Webster and Posey Tubes are designated as a local truck route.
- **Willie Stargell Avenue** is oriented east-west and connects Webster Street with Main Street, where it continues west into Alameda Point as West Midway Avenue. Stargell Avenue is classified as an Island Arterial (a route that connects local streets with regional roadways). Stargell Avenue generally accommodates two lanes in each direction east of 5th Street and one lane in each direction west of 5th Street. A Class II bikeway (on-street bicycle lane) is also provided in each direction east of 5th Street, transitioning to Class III bikeways (shared lanes with arrow markings) west of 5th Street. Vehicles exceeding 3 tons are prohibited.
- **5th Street** is oriented north-south and connects Mitchell Avenue with Ralph Appezzato Memorial Parkway. North of Stargell Avenue, 5th Street is classified as an Island Arterial and generally accommodates one travel lane in each direction. South of Stargell Avenue, 5th Street is classified as an Island Collector and generally accommodates two travel lanes in each direction. A Class II bikeway (on-street bicycle lane) is also provided in each direction of 5th Street. Island Collectors typically funnel all local traffic onto arterials for longer trips and disperse arterial traffic onto local streets for local traffic.
- **Mitchell Avenue** is oriented east-west and connects Bette Street with Mariner Square Drive, where it continues east as Marina Village Parkway. At Bette Street, a short cul-de-sac provides access to the study area's Alameda site. Mitchell Avenue is classified as an Island Arterial and generally accommodates one travel lane and a Class II bikeway (on-street bicycle lane) in each direction.
- **Webster Street** is oriented north south and connects the Webster/Posey Tubes with Central Avenue. Webster Street is classified as a Regional Arterial (routes that carry the heaviest volumes of traffic on the longest trip lengths including intercity trips and regional through traffic). Webster Street generally accommodates three lanes in each direction north of Ralph Appezzato Memorial Parkway and two lanes in each direction south of Ralph Appezzato Memorial Parkway. The outermost lane in the northbound direction between Willie Stargell Avenue and Ralph Appezzato Memorial Parkway is signed and striped as a bus-only lane at all times. Webster Street and the Webster/Posey Tubes are formally designated as part of State Route 260.

- **Ralph Appezzato Memorial Parkway** is oriented east–west and connects Ferry Point within the former NAS Alameda with Webster Street, where it continues east as Atlantic Avenue. Ralph Appezzato Memorial Parkway is classified as an Island Arterial west of Main Street and a Regional Arterial east of Main Street. It generally accommodates two travel lanes in each direction. Ralph Appezzato Memorial Parkway is a designated local truck route.
- **Atlantic Avenue** is a designated local truck route.
- **Main Street** is generally oriented north–south and connects Navy Way within the former NAS Alameda with Pacific Avenue and Central Avenue. Main Street generally features one travel lane and one Class II bikeway (on-street bicycle lane) in each direction, with a two-way center left-turn lane. Near the Alameda Main Street Ferry Terminal, however, the cross-section transitions to two travel lanes in each direction with no dedicated bikeway facilities, which continues west to the terminus at Navy Way. Main Street is designated as a local truck route.
- **Marina Village Parkway** is designated as a local truck route.
- **Wilma Chan Way** is designated as a local truck route north of Atlantic Avenue.

Local roadway access to the Outer Harbor, including Berth 10, is provided by the following streets:

- **Maritime Street** is oriented north-south and connects West Grand Avenue (where it continues north as Wake Avenue to Engineer Road) with Middle Harbor Road. Maritime Street is classified as a Minor Arterial and generally accommodates two travel lanes in each direction, with a two-way center left-turn lane. Maritime Street is one of the primary thoroughfares through the Port's maritime facilities, in conjunction with 7th Street/Middle Harbor Road. Berth 10 is accessed from Maritime Street via 17th Street. Maritime Street north of 7th Street and south of West Grand Avenue is a designated local truck route.
- **West Grand Avenue** is oriented east-west and connects Maritime Street/Wake Avenue in West Oakland with Broadway in Uptown, where it continues as Grand Avenue. In the study area, West Grand Avenue is classified as a Principal Arterial and generally accommodates two travel lanes in each direction. West Grand Avenue between Maritime Street and Northgate Avenue is designated as a local truck route.
- **7th Street** is oriented east-west and extends from the Port's Ben E. Nutter Terminal to Downtown Oakland, continuing east across the Lake Merritt Channel as East 8th Street. In the study area, 7th Street is classified as a Minor Arterial east of Maritime Street and as a Collector west of Maritime Street. In the study area, 7th Street accommodates two to three travel lanes in each direction. 7th Street west of Wood Street is a designated truck route.

Public Transit Services

Local bus service in Oakland and Alameda is provided by the Alameda–Contra Costa Transit District. High-frequency local and regional rail service is provided by BART (with the closest stations at West Oakland, 12th Street/Oakland City Center, Lake Merritt, and MacArthur), supplemented by less-frequent regional and intercity mainline rail services on the Amtrak *Capitol Corridor* and *San Joaquins*, with the closest stations at Oakland (Jack London Square) and Emeryville.

There are no existing transit services in the immediate vicinity of the Oakland/northern side of the Inner Harbor Turning Basin. The closest bus services are the following (AC Transit 2021):

- Line 12: Martin Luther King Jr. Way – Temescal – Grand.
- The 12 operates along Broadway and continues to Embarcadero West, Webster Street, and 2nd Street to/from Amtrak's Oakland (Jack London Square) station. Its closest stops are at Embarcadero West/Broadway.
- Line 62: 7th Street – San Antonio – 23rd Avenue.
- The 62 operates along the 7th Street/8th Street couplet, with the closest stops at 7th Street/Market Street, 7th Street/Jefferson Street (eastbound only), and 8th Street/ Jefferson Street (westbound only).
- Line 72: Hilltop – Contra Costa College – San Pablo
- Line 72M: Macdonald – San Pablo
- Line 72R: San Pablo Rapid
- The 72, 72M, and 72R are the closest services, operating on Broadway through Downtown Oakland and following a clockwise loop via 3rd Street, Clay Street, and 2nd Street to a terminus at 2nd Street/Washington Street, the closest stop to Howard Terminal.

The closest bus services to the Alameda/southern side of the Inner Harbor Turning Basin include the following:

- Line 96: Alameda Point – 14th Avenue – Dimond.
- The 96 operates along Mitchell Avenue and 5th Street, with the closest stops at 5th Street/Singleton Avenue, 5th Street/Mitchell Avenue (northbound only), and 5th Street/Diller Street (southbound only).
- Line 19: Buena Vista – Fruitvale
- The 19 operates along Marina Village Parkway in the vicinity of the Alameda site, with the closest stops at Marina Village Parkway/Mariner Square Loop (eastbound only) and Marina Village Parkway/Mariner Square Drive.
- Additional routes farther away at bus stops at the Webster Street/Stargell Avenue intersection, including the 20 (Dimond – Fruitvale – South Shore), 51A (Broadway – Santa Clara), 851 (College – Broadway All Nighter), O (Santa Clara – Encinal Transbay), and W (High – South Shore Transbay).

There are no existing transit services in the immediate vicinity (i.e., within reasonable walking distance) of the Outer Harbor. The closest bus service is the NL (MacArthur Transbay Limited), which runs along West Grand Avenue, 1.5 miles away. The closest NL stops to the Outer Harbor are 1.75 miles away along West Grand Avenue at Mandela Parkway.

Bikeway Network

There are existing and planned bikeways in the vicinity of the Inner and Outer Harbor Turning Basins. Nearby existing and proposed bikeways in the vicinity of the Inner Harbor Turning Basin are summarized in Table 15 for Oakland and in Table 16 for Alameda. Nearby existing and proposed bikeways in the vicinity of the Outer Harbor are summarized in Table 17.

Bikeway facilities are classified based on their level of separation from vehicle traffic:

- **Class I facilities (bicycle paths)** are off-street paved paths completely separated from vehicle traffic, often designed for shared use between bicyclists and pedestrians.
- **Class II facilities (bicycle lanes)** are on-street facilities designated specifically for bicyclists using pavement markings (striping and stencils). Some Class II facilities (referred to as Class IIB) offer an added level of protection through use of a buffer zone between bicyclists and vehicle traffic.
- **Class III facilities (bicycle routes)** are lanes shared with vehicle traffic, usually denoted by signage or pavement markings.
- **Class IV facilities (separated bicycle lanes or "cycle tracks")** are on-street bicycle lanes separated from motorized traffic through grade separation, flexible posts, inflexible physical barriers, on-street parking, or other means.

In addition to bikeway facilities, a regional bike-sharing transportation service Bay Wheels operates in Oakland including in the vicinity of the Inner Harbor. Based on point-to-point trips with bikeshare docking stations, the closest Bay Wheels bikeshare stations for the Oakland Inner Harbor are at Jack London Square (Clay Street south of Embarcadero West), Webster Street/2nd Street, and Market Street/8th Street. Currently, Bay Wheels does not serve the City of Alameda. The City of Alameda is evaluating bikeshare programs. There are no bikeshare stations in the immediate vicinity of the Outer Harbor; the nearest bikeshare station is at the West Oakland BART station.

Table 15. Bikeway Network – Inner Harbor Turning Basin (Oakland Site)

Bikeway Class	**Oakland Routes** – * denotes a proposed route
Class I (Bicycle path)	• Bay Trail: Water Street/Clay Street to Estuary Park • Bay Trail: Water Street/Clay Street to Embarcadero West/Filbert • Howard Terminal portions of Bay Trail (proposed as part of the proposed Oakland A's Waterfront Ballpark District Project) * • Water Street: Martin Luther King Jr. Way to Clay Street * • Brush Street: 2nd Street to Embarcadero West * • Clay Street: Embarcadero West to waterfront* • Washington Street: Embarcadero West to waterfront*
Class II (Bicycle lane)	• Brush Street: 3rd Street to 2nd Street • 2nd Street: East of Brush Street • Market Street: North of 3rd Street • Clay Street: Embarcadero West to Water Street • Washington Street: North of 3rd Street • Clay Street: 3rd Street to 2nd Street* • Washington Street: 2nd Street to Embarcadero West*
Class IIB (Buffered bicycle lane)	• 3rd Street: Brush Street to Mandela Parkway/5th Street • Clay Street: 2nd Street to Embarcadero West • Broadway: 6th Street to Embarcadero West*
Class III (Bicycle route)	• Martin Luther King Jr. Way: North of Embarcadero West
Class IV (Cycle track)	• Market Street: North of Embarcadero West* • Martin Luther King Jr. Way: North of Embarcadero West* • 3rd Street: Market Street to Oak Street*

Bikeway Class	**Oakland Routes** – * denotes a proposed route
Source: City of Oakland 2021b	

Table 16: Bikeway Network - Inner Harbor Turning Basin (Alameda Site)

Bikeway Class	**Alameda Routes** – * denotes a proposed route
Class I (Bicycle path)	• Posey Tube (substandard) • Mariner Square Drive: Mitchell Avenue/Marina Village Parkway to Atlantic Avenue • Bay Trail: Mariner Square Marina to Alameda Main Street Ferry Terminal*
Class II (Bicycle lane)	• Mitchell Avenue: East of Bette Street • Marina Village Parkway • 5th Street/East Campus Drive: South of Mitchell Avenue • Mariner Square Loop: South of Mitchell Avenue • Singleton Avenue: 5th Street to Annapolis Circle • Willie Stargell Avenue: Webster Street to 5th Street • Mitchell Avenue: Bette Street to Main Street* • 5th Street: Mitchell Avenue to waterfront* • Willie Stargell Avenue: West of 5th Street*
Class III (Bicycle route)	• Willie Stargell Avenue: West of 5th Street*
Source: Bike Walk Alameda 2015; City of Alameda 2010	

Table 17: Bikeway Network – Outer Harbor Turning Basin

Bikeway Class	**Routes** – * denotes a proposed route
Class I (Bicycle path)	• Maritime Street: North of 7th Street • 7th Street: East of Wood Street and West of Maritime Street • Burma Road: South of Bay Bridge Trail • West Grand Avenue: Maritime Street/Wake Avenue to Wood Street*
Class II (Bicycle lane)	• Admiral Toney Way: East of Maritime Street • Burma Road: West of Bay Bridge Trail
Source: City of Oakland 2021b	

Pedestrian Facilities

Given that the project location for the Oakland/northern side of the Inner Harbor Turning Basin is within the Seaport, pedestrian facilities and access in the immediate vicinity are limited. The heavy industrial nature of this area means that pedestrian activity is generally low.

Direct pedestrian access to/from the Inner Harbor Turning Basin study area on the Oakland side is provided by Embarcadero West, with the nearest crossing opportunities across the UPRR tracks at Market Street and Martin Luther King Jr. Way. There are no sidewalks present along Embarcadero West, west of Martin Luther King Jr. Way, with only a south-side sidewalk provided east of Martin Luther King Jr. Way until Clay Street. Crosswalk markings are missing in some locations, and many curb ramps do not appear to be Americans with Disabilities Act (ADA)-compliant.

East of Clay Street, the land use mix transitions to commercial and mixed use, generally with good pedestrian facilities and access. Crosswalk markings at some locations use high-visibility designs, although many less-used crossings remain unmarked. Several at-grade crossings and three grade-separated pedestrian bridges are available east of Clay Street for pedestrians to cross the UPRR tracks.

Pedestrian facilities and access along the Alameda side of the Inner Harbor Turning Basin study area are generally good, with sidewalks provided along both sides of most streets. In the residential communities immediately southeast of the study area, many intersections include crosswalk markings and traffic-calming treatments such as bulb-outs.

Near the Outer Harbor, pedestrian facilities and access are limited due to the prevalence of industrial uses in the immediate vicinity, the extensive freeway infrastructure for the MacArthur Maze and connecting freeways, and the UPRR and BNSF tracks. Sidewalks and/or multi-use paths with ADA-compliant curb ramps and crosswalk treatments have been installed along most of the length of Maritime Street. A multi-use path is also provided along 7th Street within the Seaport. Sidewalks are unimproved in many other locations within the Seaport, but pedestrian activity is low due to the heavy industrial nature of the area.

Freight Rail Facilities

The Port's maritime facilities are served by UPRR mainline tracks running north-south as part of the Martinez Subdivision (extending from the Port north to Richmond and beyond) and the Niles Subdivision (extending south from the Port to Hayward and beyond). Major intermodal facilities in the Port area include two railyards—Railport Oakland (operated by UPRR) and the Oakland International Gateway/Joint Intermodal Terminal (operated by BNSF Railway)—and a manifest and support yard (the Seaport Logistics Complex and Outer Harbor Intermodal Terminal [OHIT], occupying land formerly part of the Oakland Army Base).

Near the Inner Harbor Turning Basin study area, Howard Terminal is immediately adjacent to the UPRR's Niles Subdivision, which includes two mainline tracks and an additional third track (siding and yard lead) operating down the center of Embarcadero West. Howard Terminal has access to the two mainline tracks via the siding. At grade crossings across the UPRR tracks are provided at Market Street, Martin Luther King Jr. Way, and Clay Street. There are no freight rail facilities in the vicinity of the Alameda side of the Inner Harbor Turning Basin.

There are no freight rail facilities in immediate proximity to the Outer Harbor Turning Basin and Berth 10, although the UPRR Martinez Subdivision and the Seaport Logistics Complex/OHIT are a short distance away to the south and east. Grade separation is provided between the railroad tracks and major local roadways serving the area, including West Grand Avenue and 7th Street.

Emergency Access

Emergency access for the Inner Harbor Turning Basin and Outer Harbor Turning Basin study area is generally provided by the existing street network.

For the Inner Harbor Turning Basin Oakland side, the nearest Oakland Fire Department station is Station No. 2, at 47 Clay Street (south of Embarcadero West), just east of the Howard Terminal site; there are no other Oakland Fire Department stations within 0.5 mile.

Oakland Police Department headquarters are at 455 7th Street (at Broadway); there are no other Police Department stations within 0.5 mile. There are no hospitals within 0.5 mile of the Inner Harbor Turning Basin on the Oakland side. The closest hospitals are the Alta Bates Summit Medical Center Summit Campus (2.5 miles away at 350 Hawthorne Avenue) and the Kaiser Permanente Oakland Medical Center (3 miles away at 3600 Broadway). In addition, the Oakland Police Department has several police boats docked at Roosevelt Pier at the waterfront end of Water Street and Clay Street, approximately 1,500 feet east of the Inner Harbor Turning Basin.

On the Alameda side of the Inner Harbor Turning Basin there are no emergency service providers within 0.5 miles. The closest Alameda Fire Department station is Station No. 2, at 635 Pacific Avenue (1.5 miles away, west of Webster Street). The closest and only Alameda Police Department station is the headquarters building, at 1555 Oak Street (3.3 miles away at Lincoln Avenue). The closest hospital is Alameda Hospital, at 2070 Clinton Avenue (3.2 miles away at Willow Street).

There are also no emergency service providers within 0.5 mile of the Outer Harbor Turning Basin and Berth 10. The closest Oakland Fire Department station is Station No. 3, 2 miles away at 1445 14th Street (at Castro Street). The closest Oakland Police Department station is the headquarters building, approximately 3 miles away at 455 7th Street. The closest hospitals are the Alta Bates Summit Medical Center Summit Campus (5 miles away) and the Kaiser Permanente Oakland Medical Center (5 miles away).

3.10.3 Waterway Navigation

Container Services

Existing facilities, fleets, and navigation conditions at the Port of Oakland are described in Section 2.1 of this report.

Passenger Ferry Service

There are two existing passenger ferry terminals in the study area: the Oakland terminal, at 10 Clay Street in Oakland's Jack London Square area and the Alameda Main Street terminal, at 2990 Main Street on Alameda Island. Ferry service to both terminals is operated by San Francisco Bay Ferry as a combined Oakland and Alameda route, with the ferry service running 7 days a week to/from the Downtown San Francisco Ferry Terminal.

Twenty daily roundtrips are provided on weekdays, although only some of the trips serve only either Alameda or Oakland. On weekends and holidays, 13 daily roundtrips are provided, with all trips serving both Oakland and Alameda, except for one westbound trip serving only Oakland.

United States Coast Guard Facilities

To the east of the Inner Harbor Turning Basin in Brooklyn Basin lies Coast Guard Island Alameda (a secured federal property), only accessible by Coast Guard Island Bridge off of Dennison Street and Embarcadero. The USCG operates vessels from the island and into San Francisco Bay by way of the Inner Harbor Channel.

Marinas

There are several public and private marinas in operation in the waterway to the east of the Inner Harbor Turning Basin that accommodate the berthing and operation of privately-owned recreational boats, which may traverse through the Inner Harbor Turning Basin and Channel. From west/north to east/south, they are Jack London Square Marina, Portobello Marina, 5th Avenue Marina, Embarcadero Cove Marina, and Union Point Marina on the Oakland side of the waterway; and Mariner Square and Drystack Marina, ISB, Dock Q, Marina Village Yacht Harbor, Fortman Marina, Grand Marina, and Alameda Marina on the Alameda side of the waterway.

3.11 Hazardous, Toxic, and Radioactive Wastes

This section describes the existing conditions for hazardous materials in the study area.

3.11.1 Regulatory Setting

Resource Conservation and Recovery Act (42 U.S.C. § 6901 *et seq.*)

The Resource Conservation and Recovery Act (RCRA) controls the management and disposal of hazardous waste. "Hazardous or toxic wastes," classified by RCRA, are materials that may pose a potential hazard to human health or the environment due to quantity, concentration, chemical characteristics, or physical characteristics. This applies to discarded or spent materials that are listed in 40 C.F.R. §§ 261.31-34 or that exhibit one of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. Radioactive wastes are materials contaminated with radioactive isotopes from anthropogenic sources (e.g., generated by fission reactions) or naturally occurring radioactive materials (e.g., radon gas or uranium ore).

Comprehensive Environmental Response, Compensation and Liability Act and Superfund Amendments and Reauthorization Act (42 U.S.C. § 9601 *et seq.*)

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) governs the liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous substance disposal sites. The National Oil and Hazardous Substances Pollution Contingency Plan outlines CERCLA's implementing regulations and provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances at sites identified on the National Priority List.

Toxic Substances Control Act (15 U.S.C. §§ 2601–2629)

The Toxic Substances Control Act limits or prohibits the manufacture, processing, distribution, use, and disposal of certain toxic substances. The Toxic Substances Control Act contains requirements specific to asbestos, indoor radon abatement, and lead exposure reduction. Hazardous materials transported through the study area would be subject to these regulations.

Transportation of Hazardous Materials and Waste (40 C.F.R. Part 263)

Transportation of hazardous materials and hazardous waste is carried out by individuals or entities that move hazardous materials and waste from one site to another by highway, rail, water, or air (refer to 40 C.F.R. § 260.10). This includes transporting hazardous waste from a generator's site to a facility that can recycle, treat, store, or dispose of the waste. It can also include transporting treated hazardous waste to a site for further treatment or disposal. Transportation of hazardous materials is required by law to occur in accordance with the Hazardous Waste Manifest System, which is a set of forms, reports, and procedures that track hazardous waste from the time it leaves the generator facility until it reaches the waste management facility that receives it. Transportation of hazardous materials by truck and rail is regulated by the United States Department of Transportation. The United States Department of Transportation regulations include transporter requirements for labeling, marking, placarding, and usage of appropriate storage containers, and requirements for responding to spills, among others.

3.11.2 Hazardous, Toxic, and Radioactive Waste Conditions

Hazardous materials are present at the Port as part of normal operations. Shipping and maritime-related operations use large equipment that is fueled and maintained using common hazardous materials (e.g., petroleum products, solvents, and lubricants). Further, infrastructure maintenance and construction activities at the Port may also use or generate small quantities of hazardous materials or waste. As part of shipping operations, cargo containing hazardous materials may be shipped into and out of the Port. The Port requires shippers to follow applicable laws and regulations in shipping their cargo, including hazardous materials. Various vessels calling at the Port may also use or generate small quantities of hazardous materials as part of their routine operations (e.g., on-board maintenance). A material can be classified as a hazardous waste only after it is generated, i.e., after it has been designated as a waste by its owner. Any materials that meet the statutory definition of hazardous wastes generated at the Port are taken off Port property for treatment or disposal, as appropriate.

Terrestrial (upland) soils, as well as associated groundwater, have previously been found to contain hazardous materials. Hazardous materials are referred to in this document more categorically as hazardous, toxic, and/or radioactive waste (HTRW), although no radioactive waste has been documented within or adjacent to either of the proposed turning basin expansion footprints. A number of industrial land uses in the vicinity are likely to have historically contributed to elevated levels of contaminants such as hydrocarbons and heavy metals. Since the early 1900s the Inner Harbor area was used as a shipyard and numerous types of industrial and related activities could have contaminated the soils. These include ship building and repair, a lumber yard, metal working, energy production facilities, coal storage and distillation, petroleum refineries, oil distribution plants, rail repair and cleaning, and naval aviation operations. The potential for presence of HTRW in terrestrial soil in the areas proposed for expansion of the Inner Harbor Turning Basin footprint are discussed in detail below.

Howard Terminal Soils

The 50-acre Howard Terminal site, which includes a portion of the Inner Harbor Turning Basin proposed expansion area, is under the regulatory jurisdiction of the Department of Toxic Substances Control and has land use restrictions applied to the site. The land use covenant (LUC) restrictions require notice and approval before any excavation or changes in land use, as well as regular groundwater monitoring and cap integrity inspections. In 1999, an underground diesel fuel storage tank was removed near the general area currently proposed for excavation for the Inner Harbor Turning Basin expansion; post removal sampling indicated the tank had not leaked (Baseline 1999). Monitoring of various hydrocarbons through the fill is ongoing. The most likely source of site contamination is movement of liquid contaminants from historical site uses through the fill into groundwater. Ongoing data collections indicate low levels of hydrocarbons in the fill at or near the range of groundwater tidal movement (ENGEO 2019a). Low concentrations of total petroleum hydrocarbons (TPH) in the diesel range, TPH in the motor oil range, and benzene were detected, but met the criteria for regional beneficial reuse as non-residential fill or as wetland non-cover. Various polycyclic aromatic hydrocarbons (PAHs) were also detected, but at generally low concentrations (ENGEO 2019a). In addition, metals have been detected in soils above groundwater; however, they are present at concentrations consistent with Merritt/Posey soil formation sands that were likely mined for fill (Apex 2021).

Alameda Soils

The -50-Foot Project previously removed a corner of the Alameda property to expand the Inner Harbor Turning Basin to its current dimension. Soil sampling conducted for that project is directly relevant to the current proposed expansion of the Inner Harbor Turning Basin, with samples collected very near the current potential expansion area. Testing of the material for the -50-Foot Project indicated that fill material from ground surface to 3 feet below ground surface contained elevated levels of PAHs (EVS 1998). Based on sampling conducted for the -50-Foot Project there is no indication of contamination above regulatory thresholds in material between 3 feet below ground surface and groundwater (approximately 11 feet below ground surface). This interval of soil material has no known additional or new sources of contamination, and therefore should be similar to the material removed for the -50-Foot Project.

3.12 Contaminants in Dredge or Fill Material

3.12.1 Regulatory Setting

Clean Water Act (33 U.S.C. § 1257 *et seq.*) (see Section 3.4.1)

Coastal Zone Management Act (16 U.S.C. § 1451 *et seq.*) (see Section 3.4.1)

San Francisco Bay Long Term Management Strategy Dredged Material Management Office

The LTMS program for San Francisco Bay provides a framework for federal and state agencies to coordinate dredged material disposal policies and regulations. The Dredged Material Management Office (DMMO) was established as part of the LTMS program to consolidate the process for obtaining approvals for dredged material disposal. The DMMO is led by USACE and staffed by USEPA, BCDC, SFRWQCB, and California State Lands Commission with participation from CDFW, NMFS, and USFWS.

As part of the approval process, an applicant must submit results from recent sediment testing or sufficient data to support a finding by the DMMO agencies (a suitability determination) that the sediments are suitable for the applicant's proposed placement location(s). Based on this information, the DMMO will determine the location(s) at which dredged materials can be placed.

3.12.2 Dredged Material Characteristics

Sediments in the existing federal channel at Oakland Harbor are annually dredged by USACE as part of Operation and Maintenance (O&M) dredging to maintain authorized channel depth. Sampling and analysis of the material removed during O&M dredging has generally shown it to be suitable for placement at aquatic locations and as wetland cover. Sediment that would be dredged in the potential Turning Basin expansion areas may contain levels of contaminants that render this material unsuitable for placement at aquatic or wetland sites (as either cover or non-cover). In a generalized sense, sediment that is sampled, analyzed, and found to contain chemical constituent concentrations and bioaccumulation characteristics at or below aquatic (in-bay or Ocean) or wetland cover material screening criteria is considered relatively "clean" material. Material that exceeds criteria for aquatic or wetland cover placement may meet less stringent criteria for wetland non-cover (also known as foundation) material that is placed and capped with clean material. As used in this section, "contaminated sediment" refers to sediment that exceeds the chemical criteria for wetland non-cover material (Wolfenden and Carlin 1992) but does not refer to the presence of regulated HTRW (as discussed in Section 3.11). In general, contaminated sediment may be rehandled at a designated location and reused at an upland location for construction fill (if suitable) or disposed of at an appropriate landfill. Contaminated aquatic sediment may require treatment prior to reuse as construction fill, due to elevated levels of soluble compounds.

For expansion of the Inner Harbor Turning Basin, sediments would be dredged from submerged lands within the current Inner Harbor waterway and from depths below -5 feet MLLW at the Howard Terminal and Alameda sites (soils above -5 feet MLLW, which is approximately 15 feet below existing ground surface, would be excavated from land). Expansion of the Outer Harbor Turning Basin would involve dredging submerged lands within and adjacent to the Outer Harbor Channel. While the sediments in the study area have not yet been sampled and analyzed for this study, the USACE and the Port have reviewed sampling and testing results from other actions occurring within or near the study area to make informed assessments of the potential for contaminants in the aquatic sediment. These assessments are presented below.

Howard Terminal Dredging Footprint

Metals have been detected in soils above groundwater; however, they are present at concentrations consistent with Merritt/Posey soil formation sands that were likely mined for fill (Apex 2021). Old Bay Mud (OBM)/Merritt Sand (MS) Formation material is likely present in fills below the groundwater elevation at Howard Terminal. While there is no specific data regarding the fill quality between groundwater, which occurs at approximately 5-9 feet below ground surface, and the underlying OBM/MS interface where dredging would occur as part of the alternatives considered in this study, because the fill is marine-derived it is unlikely that the deeper fill is contaminated. Therefore, sediments below the groundwater table are likely suitable for beneficial use at a wetland site.

Alameda Dredging Footprint

The -50-Foot Project previously removed a corner of the Alameda property to expand the Inner Harbor Turning Basin to its current dimension. Sampling conducted for that project is directly relevant to the Inner Harbor Turning Basin expansion, with samples collected very near the proposed expansion area. Young Bay Mud (YBM) is likely present from -5.5 feet below ground surface to -29.3 feet below ground surface, and material below -29.3 feet below ground surface likely consists of OBM/MS (EVS 1998). The material that would be removed where dredging would occur as part of the alternatives considered in this study is adjacent to the material removed for the -50-Foot Project and has no additional or new sources of contamination. Therefore, it 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 at levels making it unsuitable for beneficial use (Apex 2021).

Inner Harbor Turning Basin Expansion Area Open Water Dredging Footprint

There are two areas in the proposed Inner Harbor Turning Basin expansion study area that are subtidal: the basin between Howard Terminal and Schnitzer Steel, and a portion of the current Port of Oakland Berth 67.

During the -50-Foot Project, the Port investigated the need for deepening their non-federal berths. 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 DMMO agencies for beneficial use as wetland non-cover (USACE 1998). Because the deepening material has not been exposed to any new contaminant sources since the testing was completed, it is assumed that the material from Berth 67 would still be suitable for wetland non-cover (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. Recent investigation results demonstrated that groundwater discharge from the Schnitzer Steel site to downgradient sediment pore water in this basin has not resulted in constituents of concern (COC) concentrations in pore water above hazardous waste levels; samples were collected 0 to 3 feet below the sediment surface (Terraphase Engineering 2022). Additionally, a few things can be assumed from the site history and the stratigraphy. First, as with other areas of the Inner Harbor, the OBM/MS formation underlying the basin should be suitable for beneficial use. This was true for the -50-foot Project even in areas that contained significant contamination in the overlying areas such as the Drydock Pits on the Alameda side of the channel, which were removed for the -50-Foot Project. Material above OBM/MS may contain contaminants that would preclude open water disposal or beneficial use as cover. If the material is similar to the Drydock Pits, it would also = be unsuitable for use as wetland foundation. It is reasonable and conservative to assume the material above OBM/MS would require landfill disposal in a Class II (non-hazardous) landfill (Apex 2021).

Outer Harbor Turning Basin Expansion Area Open Water Dredging Footprint

The Outer Harbor Turning Basin expansion area is divided into two definable units: a YBM layer, and an underlying OBM/MS layer. The Outer Harbor Turning Basin expansion is not proximate to any known sources of contamination. Data from samples collected for the -50-Foot Project close to the proposed Outer Harbor Turning Basin expansion area suggest that the YBM layer sediments would be suitable for wetland foundation; and the OBM/MS strata should be considered clean and suitable for any disposal or beneficial use (Apex 2021).

3.13 Air Quality

3.13.1 Regulatory Setting

Clean Air Act and National Ambient Air Quality Standards (42 U.S.C. § 7401 *et seq.*)

The federal Clean Air Act (CAA) is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Last amended in 1990, it requires the United States Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS or "national standards") for six principal pollutants (termed as "criteria" air pollutants) prevalent in the atmosphere and found to be harmful to public health and the environment: ground-level ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (PM), and lead. Separate standards were later established for PM less than 10 microns in diameter (PM_{10}) and PM less than 2.5 microns in diameter ($PM_{2.5}$). NAAQS for the criteria air pollutants have been established for specified averaging times which typically include 1-hour, 8-hour, 24-hour and annual averages based on health effects observed over the duration of exposure. Pursuant to the 1990 CAA amendments, the USEPA classifies air basins (or portions thereof) as "attainment" or "nonattainment" for each criteria air pollutant, based on whether the NAAQS have been achieved. USEPA further classifies nonattainment areas according to increasing severity of pollution as marginal, moderate, serious, severe, and extreme.

Table 18 shows the current NAAQS for each pollutant as well as the attainment status of the San Francisco Bay Area Air Basin (SFBAAB) with respect to these standards. The SFBAAB is designated as nonattainment for the national 8-hour ozone, nonattainment for the 24-hour $PM_{2.5}$ standard which has precursors from NO_X, SO_2, VOC, and ammonia, and is considered in maintenance for CO, but the region has not exceeded that CO standard for many years. On January 9, 2013, USEPA issued a final rule determining that SFBAAB has attained the 24-hour $PM_{2.5}$ national standard. This rule suspends key State Implementation Plan (SIP) requirements, further described below, as long as monitoring data continue to show that SFBAAB attains the standard. Despite this USEPA action, SFBAAB will continue to be designated as "nonattainment" for the national 24-hour $PM_{2.5}$ standard until the Bay Area Air Quality Management District (BAAQMD) submits a "redesignation request" and a "maintenance plan" to USEPA, and USEPA approves the proposed redesignation. (USEPA, 2013).

The federal CAA requires each state to prepare an air quality control plan referred to as the SI, and for states containing areas that violate the NAAQS to incorporate additional control measures to reduce air pollutants that are in violation of the standards. The EPA has responsibility to review all SIPs to determine if they meet federal requirements and will achieve air quality goals when implemented.

Table 18: National Ambient Air Quality Standards (NAAQS) and Attainment Status for the SFBAAB

Pollutant	Averaging Time	National Standard	SFBAAB Attainment Status (National)
Ozone (0_3)	8 Hour	0.070 ppm	Nonattainment (Marginal)
Carbon Monoxide (CO)	8 Hour	9 ppm	Attainment (Maintenance)
	1 Hour	35 ppm	Attainment (Maintenance)
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm	Attainment
	1 Hour	0.100 ppm	Unclassified
Sulfur Dioxide (SO_2)	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 mg/m^3	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12.0 mg/m^3	Unclassified/Attainment
	24 Hour	35 mg/m^3	Nonattainment (Moderate)[1]
Lead (Pb)	Calendar Quarter	1.5 mg/m^3	Attainment
	3-Month Rolling Average	0.15 mg/m^3	Unclassified

Notes:
SFBAAB = San Francisco Bay Area Air Basin
ppm = parts per million; mg/m^3 = micrograms per cubic meter
PM_{10} = particulate matter 10 microns in diameter or less; $PM_{2.5}$ = particulate matter 2.5 microns in diameter or less
[1] On January 9, 2013, USEPA issued a final rule, determining that SFBAAB has attained the 24-hour $PM_{2.5}$ national standard. This rule suspends key SIP requirements as long as monitoring data continue to show that SFBAAB attains the standard. Despite this USEPA action, SFBAAB will continue to be designated as "nonattainment" for the national 24-hour $PM_{2.5}$ standard until BAAQMD submits a "redesignation request" and a "maintenance plan" to USEPA, and USEPA approves the proposed redesignation.
SOURCE: BAAQMD 2017a; USEPA 2013.

General Conformity (40 C.F.R. Part 93 Subpart B)

The regulatory framework for General Conformity applies to federal actions that occur in a nonattainment area (or an area previously classified as nonattainment and operating under a maintenance program) if annual emissions totals from the action exceed applicability thresholds, known as *de minimis* levels, for each respective pollutant. 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. General Conformity refers to the process of evaluating federal plans, programs, and projects to determine and demonstrate that they meet the requirements of the CAA and the applicable SIP.

The *de minimis* levels are established in the General Conformity Rule in 40 C.F.R. § 93.153, and the levels vary by severity of the nonattainment designation of the region. Emissions used for comparison to *de minimis* levels for each respective pollutant include both direct and indirect emissions that are reasonably foreseeable.

Actions 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 C.F.R. Part 93 Subpart B, which requires a comparison of pollutant-specific annual emissions to their respective pollutant-specific *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 regulations.

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 regulations and is specific to the pollutant or pollutants that are identified as applicable.

The SFBAAB is classified as nonattainment with respect to the national standards for ozone (marginal nonattainment) and $PM_{2.5}$ (moderate nonattainment). The *de minimis* level for ozone precursors (nitrogen oxides [NO_X] and volatile organic compounds [VOCs]) for areas in marginal nonattainment is 100 tons per year. 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 SFBAAB is classified as an attainment maintenance area with respect to the federal CO standard and the applicable *de minimis* threshold is 100 tons per year (USEPA 2022).

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." Some of the material removed Howard Terminal and Alameda for the Inner Harbor Turning Basin expansion may be transported to Kettleman Hills Class I landfill in Kings County in the San Joaquin Valley Air Basin (SJVAB). These on-road emissions associated with disposal hauling travel through the SJVAB are also considered but are tabulated separately from those occurring in the SFBAAB. The SJVAB is classified as nonattainment with respect to the national 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. The SJVAB is classified as an attainment area with respect to the federal CO standard and the applicable *de minimis* threshold is 100 tons per year.

Hazardous Air Pollutants (42 U.S.C. § 7412(b))

Federal law uses the term "hazardous air pollutants" (HAPs) to refer to the same types of compounds that are referred to as "toxic air contaminants" (TACs) under state law; HAPs are a subset of TACs. Currently, 187 substances are regulated as HAPs. The federal CAA requires the USEPA to identify the National Emission Standards for Hazardous Air

Pollutants (NESHAP) to protect public health and welfare. More than 125 types of stationary sources are regulated under the NESHAP, while mobile-source emissions of HAPs are regulated through vehicle and fuel standards.

3.13.2 Existing Air Quality Conditions

Topography, Meteorology, and Climate

Climate and meteorological conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. The climate of the SFBAAB is determined largely by a high-pressure system that is often present over the eastern Pacific Ocean off the West Coast of North America. The combination of abundant sunshine under the restraining influences of topography and subsidence inversions creates conditions that are conducive to the formation of photochemical pollutants, such as ground-level ozone and secondary particulates, including nitrates and sulfates. The study area lies in the Northern Alameda and Western Contra Costa Counties climatological subregion. In this subregion, marine air traveling through the Golden Gate, as well as across San Francisco and the San Bruno Gap (a gap in the Coastal Range between the ocean and the San Francisco Airport), is a dominant weather factor. Average wind speeds vary from season to season, with the strongest average winds occurring during summer and the lightest average winds during winter. Summer temperatures in Oakland average at a low of 57 degrees Fahrenheit (°F) and a high of 72°F, while winter temperatures average at a low of 46°F and a high of 59°F.

Regional Criteria Air Pollutant Conditions

The BAAQMD, the regional agency responsible for developing air quality plans and broad responsibility for air quality conditions in the SFBAAB, operates a regional monitoring network that measures the ambient concentrations of the six federal criteria air pollutants. Existing and probable future levels of air quality in Oakland can generally be inferred from the historical ambient air quality measurements at the nearby BAAQMD monitoring stations. The monitoring station closest to the study area is the Oakland West station, approximately 1.3 miles north of the Inner Harbor Turning Basin at 1100 21st Street. The Oakland West station monitors ozone, NO_2, SO_2, CO, and $PM_{2.5}$. Measurement of PM_{10} is not conducted at any of the monitoring stations in Oakland, and data from stations farther away would not be representative of conditions in the project area.

Pollutants of concern in the SFBAAB include ozone and PM; the SFBAAB is nonattainment with respect to the federal and state standards for these pollutants (Table 18). Ozone is a secondary air pollutant produced in the atmosphere through a complex series of reactions involving VOC and NO_X in the presence of sunlight. The main sources of VOC and NO_X, often referred to as ozone precursors, are the evaporation of solvents, paints, and fuels, and combustion processes. In the SFBAAB, automobiles are the single largest source of ozone precursors. Sources of PM in the SFBAAB include wood burning, demolition and construction activities, wildfire smoke, and vehicular traffic. $PM_{2.5}$ in particular includes diesel exhaust particles, referred to as diesel particulate matter. $PM_{2.5}$ has precursors such as NO_X and VOC.

Table 19 shows a 5-year summary of monitoring data (2016 through 2020) for ozone and $PM_{2.5}$ from the Oakland West station, as well as NO_2, an ozone precursor, and CO, for which the SFBAAB is in attainment maintenance status. Table 19 also compares measured pollutant concentrations with the NAAQS. NAAQS for $PM_{2.5}$ precursor emissions from NO_X and VOC have current de minimis thresholds of 100 tons per year in the SFAAB for federal projects.

Table 19: Air Quality Data Summary for the West Oakland Monitoring Station

Pollutant	Standard[1,2]	Average Daily Emissions (pounds per day)				
		2016	2017	2018	2019	2020
Ozone						
Highest 8-Hour Average (ppm)	0.070 ppm	0.052	0.068	0.050	0.072	0.056
National/ State Standard Exceedance Days		0	0	0	1	0
Fine Particulate Matter ($PM_{2.5}$)						
Highest 24-Hour Average (µg/ m^3)	35 µg/ m^3	23.9	56.0	169.2	29.3	159.7
Measured Exceedances over National Standard[3]		0	7	14	0	8
National Annual Average (µg/ m^3)	12.0 µg/ m^3	8.6	12.8	14.3	7.7	10.2
Nitrogen Dioxide (NO_2)						
Highest Hourly Average (ppm)	0.18 ppm	0.049	0.052	0.076	0.050	0.048
Carbon Monoxide (CO)						
Highest 8-Hour Average (ppm)	9.0 ppm	2.2	2.1	3.1	1.7	NA
Measured Days over National/ State Standard		0	0	0	0	NA

Notes:
1. Generally, national standards are not to be exceeded more than once per year, after which an exceedance counts as a violation.
2. A violation occurs only if the standard is exceeded. Because 0.091 rounds to 0.09, it is not considered a violation. A recorded concentration of 0.095 or greater would constitute a violation of the standard.
3. 2017, 2018, and 2020 exceedances were largely due to the California wildfires.
4. Bolded values show exceedance of standard.
NA = Not Available
ppm = parts per million
µg/ m^3 = micrograms per cubic meter
Source: Table compiled by ESA in 2021 based on data from CARB (2021f).

West Oakland Community Air Pollution Burden

The community of West Oakland is identified as an area with disproportionate impacts from air quality under the State of California's Community Air Protection Program (Assembly Bill [AB] 617). West Oakland has a high cumulative exposure burden to air pollution due to numerous existing sources of air pollution in the community. Sources include major highways (includes Interstates 80, 580, 880, and 980); streets; Port-related sources such as ships, harbor craft, Port trucks, cargo handling off-road equipment, rail, and other Port-related sources; passenger rail; permitted sources including recyclers such as Schnitzer Steel, the East Bay Municipal District (EBMUD) wastewater treatment plant, and others; and sources such as ferries, Schnitzer Steel ships, Schnitzer Steel trucks and other truck-related businesses. These sources all contribute to the exposure of residents to harmful air pollutants and TACs that accumulate and lead to health effects. For instance, a 2008 California Air Resources Board (CARB) health risk assessment found that West Oakland residents are exposed to air concentrations of diesel pollution (a TAC) that are almost three times higher than average background levels in the SFBAAB. Along with its high pollution exposure burden, the community experiences some of the highest asthma and cardiovascular disease impacts in the region (CARB, 2008). Based on modeling data provided by the BAAQMD, as part of the health risk analysis conducted for the West Oakland Community Action Plan (BAAQMD and WOEIP 2019c), background cancer risk values range from 55 to 2,492 in one million within 2,000 feet of the Inner Harbor Turning Basin. Background $PM_{2.5}$ concentrations range from vary between 1.1 to 64 µg/m3 within 2,000 feet of the Inner Harbor Turning Basin.

Diesel Particulate Matter (DPM)

The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. The USEPA does not include DPM in its list of HAPs but regulates diesel exhaust from various of sources through emission standards on on-road and off-road engines. Individual compounds (typically polycyclic aromatic hydrocarbons) that are components of diesel exhaust are considered HAPs and constitute the mixture that CARB classifies as DPM. Recent BAAQMD health risk modeling for West Oakland shows that for 2017, the total average annual $PM_{2.5}$ concentration from local and background sources combined was 8.61 $\mu g/m^3$ (BAAQMD and WOEIP 2019c).

As one of the communities in the State of California most impacted by TAC emissions, West Oakland was designated in 2017 as one of ten initial Community Air Protection Program (CAPP) communities under California law. CAPP communities are focus areas for reducing human health risk levels by reducing air toxics exposure and the West Oakland community has taken a very active role in seeking such reductions. For example, the West Oakland Environmental Indicators Project – a resident led, community-based environmental justice organization – developed *Owning Our Air: The West Oakland Community Action Plan* (WOCAP) which focuses on reducing exposure to fine particulate matter ($PM_{2.5}$), DPM, and other TACs from sources such as port-related activities, trucks, industrial sources, commercial sources, road dust, and residential burning.

Similarly, the Port has focused on strategies to reduce DPM emissions. The Port set a goal to reduce DPM emissions by 85% from the 2005 levels by 2020. In reducing those emissions by 86% despite an 8% higher cargo throughput, the Port met their target and continues to make strides in reducing emissions further. Specifically, the Port saw reductions of 87% for ocean-going vessels, 60% from harbor craft, 88% from cargo handling equipment, 99% reduction from trucks, and a 94% reduction from locomotives. These reductions are the function of regulatory changes, fleet turnover, infrastructure upgrades, and other programs implemented by the Port (Port 2021).

Air Pollution Sensitive Receptors in the Study Area

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater-than-average sensitivity include age, pre-existing health conditions, proximity to emissions sources, or duration of exposure to air pollutants. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, with greater associated exposure to ambient air quality. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly, and infirm persons are more susceptible to respiratory distress and other air quality-related health problems compared to the general public. Recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system.

Sensitive receptors in the study area are presented in Table 20, along with their approximate distance at the closest point to the Inner Harbor Turning Basin or the Outer Harbor Turning Basin boundary. With respect to the Inner Harbor Turning Basin locations, the sensitive receptors on the Oakland (north) side include the residential receptors at Phoenix Lofts, the potential live-aboards at the Jack London Square Marina, and future residential uses proposed for Howard Terminal in the City of Oakland. Sensitive receptors on the Alameda (south) side of the Inner Harbor Turning Basin area consist of a multi-family residential neighborhood at the terminus of Mitchell Avenue, multi-family housing south of Mosley Avenue, and former Navy housing to be redeveloped with multi-family housing south of Main Street in the City of Alameda.

There are no residential receptors within 2,000 feet of the Outer Harbor Turning Basin. The nearest recreational receptors in the area consist of Middle Harbor Shoreline Park and Port View Park, which are approximately 2,000 feet from the Outer Harbor Turning Basin.

Table 20: Existing and Proposed Sensitive Receptors in the Project Vicinity

Receptor / Address	Type - Public or Private	Distance from Turning Basin (at closest point)
Oakland Receptors		
Phoenix Lofts, 737 2nd Street, Oakland	Private	1,300 feet from Inner Harbor Turning Basin
Jack London Square Marina (live-aboards), Oakland	Public	1,400 feet from Inner Harbor Turning Basin
Potential Howard Terminal Multi-Family Residences, Oakland	Private	100 feet from Inner Harbor Turning Basin
Middle Harbor Shoreline Park, Port of Oakland	Public	2,000 feet from Outer Harbor Turning Basin
Alameda Receptors		
Admiral's Cove Residential Development, 250 Mosley Avenue	Private	500 feet from Inner Harbor Turning Basin
Alameda Landing Residential Development / 400 Block of Mitchell Avenue and southward, Alameda	Private	1,000 feet from Inner Harbor Turning Basin
Navy Housing, Alameda (future Main Street Residential Development)	Private	1,100 feet from Inner Harbor Turning Basin

Future Landing at Bay 37 Residential Development North of Mitchell Avenue, Alameda (currently under development)	Private	500 feet from Inner Harbor Turning Basin

Source: Table compiled by ESA in 2023

3.14 Greenhouse Gases

3.14.1 Regulatory Setting

Executive Order 13990 – Protecting Public Health and the Environmental and Restoring Science to Tackle Climate Change

On January 20, 2021, President Joe Biden signed *Executive Order 13990, "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis."* The executive order rescinded the Council on Environmental Quality (CEQ's) 2019 draft guidance on GHGs and climate change related to NEPA. Further, the executive order establishes a program for accounting for the benefits of reducing climate pollution, emphasizing that it is essential for agencies to capture the full costs of GHG emissions as accurately as possible, including by taking global damages into account.

Council on Environmental Quality Guidance on Consideration of Greenhouse Gas Emissions and Climate Change

On January 9, 2023, the CEQ released *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* (GHG Guidance) (CEQ 2023). This guidance provides details for how federal agencies can incorporate GHG and climate change considerations into the NEPA process, including assessing and reducing impacts from GHG emissions or incorporating climate resiliency. Although the GHG guidance is considered "interim," it is effective immediately, while CEQ seeks public comment on the guidance. The guidance recommends agencies consider the potential effects of a proposed action on climate change, including by assessing both direct and indirect GHG emissions and reductions from the proposed action, quantifying the baseline (no-action) emissions, and the effects of climate change on a proposed action and that action's impacts. The GHG guidance further recommends that GHG emissions should be quantified for the gross and net emissions for each chemical compound (i.e., methane, nitrous oxide, etc.) and summarized as carbon dioxide equivalent (CO_2e) and social cost of greenhouse gases. The GHG guidance recommends the social cost of greenhouse gas (SC-GHG) be included in NEPA studies to disclose the potential future costs to society stemming from the carbon emitted by a proposed action. Per this guidance, SC-GHG is not required for use in a cost-benefit analysis but is intended to provide an additional metric for alternatives comparison (CEQ 2023).

3.14.2 Baseline Greenhouse Gas Emissions

Climate change is a term commonly used to describe the increase in the average temperature of the earth's near-surface air and oceans since the mid–20th century. Natural processes and human actions have been identified as affecting the climate. However, increasing GHG concentrations in the atmosphere resulting from human activity since the 19th century, such as fossil fuel combustion, deforestation, and other activities, are believed to be a major factor in climate change. Increases in the concentrations of GHG in the atmosphere during the last 100 years such as methane and nitrous oxide have trapped additional solar radiation, intensifying the natural greenhouse effect and resulting in an increase in global average temperature which has increased at an average rate of 0.17 F per decade since 1901 (EPA 2021e).

Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are the principal GHGs emitted which contribute to global warming. Emissions of CO_2 are largely byproducts of fossil fuel combustion, while methane results from off-gassing, natural gas leaks from pipelines and industrial processes, and incomplete combustion associated with agricultural practices, landfills, energy providers, and other industrial facilities. Other human-generated GHGs include fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, which have much higher potential for heat absorption than CO_2 and are byproducts of certain industrial processes. Conversely, CO_2 sinks include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution, and are two of the largest reservoirs of CO_2 sequestration.

In 2021, the United States total gross greenhouse gas emissions were approximately 6,340.2 million metric tons of CO_2e. Emissions decreased by 2.3 percent from 1990 to 2021 though there have been noteworthy fluctuations in recent years. There was a sharp decline from 2019 to 2020 due to reductions in emissions from travel and other economic activity due to the COVID-19 pandemic though emissions from fossil fuel production rebounded from 2020 to 2021, with a 6.8 percent increase contributing to an overall increase by 5.2 percent. Emissions from the electric power sector also decreased 10 percent, reflecting both a slight decrease in demand from the COVID-19 pandemic and a continued shift from coal to less carbon intensive natural gas and renewables though was shown to rebound. Of the major sectors nationwide, transportation accounts for the highest volume of GHG emissions at approximately 27 percent of the total, followed by electricity, industry, commercial and residential, and agriculture contributing 25 percent, 24 percent, 13 percent and 11 percent of the total, respectively (USEPA 2022a).

In 2020, the State of California emitted approximately 369.2 million metric tons of CO_{2e}. Similar to trends seen nationwide, California experienced decreases in emissions from 2019 to 2020 due to the COVID-19 Pandemic, with the largest decreases from the transportation sector at approximately 27 million metric tons of CO_{2e} compared to 2019, a 16 percent decrease. Commercial, residential, and agricultural emissions have stayed consistent from 2000 to 2020 in California, with decreases largely from residential emissions starting in 2011 and onwards which is largely attributable to a series of warmer winters which required less need for residential space heating in winter months. The agricultural sector contributed approximately 8.6 percent of statewide GHG emissions in 2020, mainly from methane and nitrous oxide sources. Approximately 71 percent of agricultural sector GHGs are emitted by livestock in California and were 18 percent higher in 2020 compared to 2000 levels. California increased its usage of electricity generated using hydroelectric, wind, and nuclear energy sources from 2000 to 2020, such that in 2020 approximately 45 percent of total electricity generation came from non-fossil fuel sources. As of 2020 only 16 percent of statewide GHG emissions were from electricity generation, a decrease compared to previous years (SOC 2022).

The State of California has an intricate framework of policy, regulations, and laws which are driving the state toward its ultimate goal of net-zero GHG emissions (i.e., carbon neutrality) by the year 2045 (SOC 2018). The Local climate change goals from the City of Oakland are included in the City's Equitable Climate Action Plan which targets achieving net-zero carbon emissions (i.e., carbon neutral) by the year 2040 (COO 2020).

3.15 Noise and Vibration

3.15.1 Regulatory Setting

Federal Noise Standards

In 1972, the Noise Control Act (42 U.S.C. § 4901 *et seq*.) was passed by Congress to promote limited noise environments in support of public health and welfare. It also established the United States Environmental Protection Agency (USEPA) Office of Noise Abatement and Control to coordinate federal noise control activities. The USEPA established guidelines for noise levels that would be considered safe for community exposure without the risk of adverse health or welfare effects. Table 21 presents the important noise exposure levels highlighted by the guidelines.

Table 21: Summary of Noise Levels Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety

Effect	Level	Area
Hearing loss	< 70 dBA[a] (L_{eq}, 24 hour)	All areas
Outdoor activity interference and annoyance	< 55 dBA (Ldn)	Outdoor residential areas and farms, other outdoor areas where people spend varying amounts of time, and places where quiet is a basis for use
Outdoor activity interference and annoyance	< 55 dBA (Leq, 24 hour)	Outdoor areas where people spend limited amounts of time, such as school yards or playgrounds
Indoor activity interference and annoyance	< 45 dBA (Ldn)	Indoor residential areas
Indoor activity interference and annoyance	< 45 dBA (Leq, 24 hour)	Other indoor areas with human activities, such as schools

Notes:
[a] Yearly average equivalent sound levels in decibels; the exposure period that results in hearing loss at the identified level is 40 years.
dBA = A-weighted decibel
L_{dn} = day-night average sound level
L_{eq} = equivalent continuous sound level
Source: USEPA 1974

The USEPA found that, to prevent hearing loss over the lifetime of a receptor, the yearly average L_{eq} (equivalent continuous sound level) should not exceed 70 A-weighted decibels (dBA), and the L_{dn} (day-night average sound level) should not exceed 55 dBA in outdoor activity areas or 45 dBA indoors to prevent interference and annoyance (USEPA 1974). Further definition of dbA, L_{eq} and L_{dn} are provided in Section 3.15.4.

Additionally, federal noise standards directly regulate noise related to the operation of a project with regard to noise exposure of workers. The United States Occupational Safety and Health Administration has established worker noise exposure limits that vary with the duration of the exposure; and requires implementation of a hearing conservation program if employees are exposed to noise levels in excess of 85 dBA.

Federal Transit Administration Vibration Standards

The Federal Transit Administration (FTA) has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. The vibration damage criteria adopted by FTA are shown in Table 22**.**

Table 22: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
I. Reinforced concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12
Notes: in/sec = inches per second PPV = peak particle velocity Source: U.S. DOT and FTA 2018	

3.15.2 Noise Conditions

Airborne Noise

Noise is generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level that is measured in decibels (dB). Pressure waves traveling through air exert a force registered by the human ear as sound. A sound at 0 dB corresponds roughly to the threshold of human hearing and 120 to 140 dB corresponds to the threshold of pain. Airborne sound pressure levels are typically measured to be between 30 and 110 dB.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. The typical human ear has decreased sensitivity to extremely low and extremely high frequencies. When assessing potential noise impacts, sound is measured in units of dBA following standard methodology typically applied to community noise measurements that involves deemphasizing frequencies to which the human ear is not sensitive (i.e., A-weighting). All noise levels presented in Section 3.15 and Section 6.15 are A-weighted unless otherwise stated.

An individual's noise exposure is a measure of noise over time. Community noise varies continuously over time with respect to the contributing sound sources of the community noise environment. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, or sirens), which are readily identifiable to the individual. These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over time to legitimately characterize a community noise environment. The equivalent continuous sound level (L_{eq}) is used to describe noise over a specified period of time and may be considered the "average sound level." The maximum instantaneous noise level experienced during a given period of time is referred to as the L_{max}. The average A-weighted noise level during 24-hours (L_{dn}) is referred to as the "day-night average noise level" (DNL). The L_{dn} or DNL is obtained after 10 dB are added to each hourly L_{eq} noise level measured between 10 p.m. and 7 a.m. to account for nighttime noise sensitivity. Consequently, the DNL is always greater than the individual daytime and nighttime average hourly L_{eq}s.

Underwater Noise

Underwater sound pressure levels are commonly expressed in dB. However, all underwater sound levels are in dB referenced to 1 micro-Pascal (μPa), whereas airborne sound pressure levels are referenced to 20 μPa. The speed of sound relates primarily to the temperature and density of a medium. The speed of sound in sea water at a standard temperature of 21 degrees Celsius is equal to 4.4 times the speed of sound in air at standard temperature and pressure. Therefore, underwater and airborne sound pressure levels are not interchangeable. While airborne sound pressure levels are typically measured to be between 30 and 110 dB, underwater sound pressure levels are typically measured to be between 100 and 210 dB. Underwater noise would be generated from construction activities associated with the action alternatives, these sound levels are characterized and their effects evaluated in the "Wildlife" and "Special Status Species and Protected Habitats" Sections (6.5 and 6.6).

Noise Sources and Levels

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of airborne noise in the urban environment. However, noise levels on roadways, like all areas, can be affected by intervening development, topography, or landscaping. Howard Terminal, on the north side of the Inner Harbor Turning Basin, is approximately 1,300 feet south of I-880. Observations during a site reconnaissance conducted for this study indicated that local truck noise is prominent and traffic along the I-880 corridor is only audible during the quietest periods, due to the presence of intervening structures and distance from Howard Terminal.

Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities. Primary noise sources in the study area include locomotive and railcar activity along the UPRR tracks, including horn soundings at the two at-grade crossings north of the Inner Harbor Turning Basin; heavy-duty container truck traffic in the Port's Inner and Outer Harbor terminals and roadways, including but not limited to Embarcadero West north of Howard Terminal; and the heavy metal recycling center (Schnitzer Steel). Underwater ambient noise is generated by the operation of vessels in the Oakland Harbor channels and turning basins.

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. Table 23 presents a summary of the noise data collected during the noise monitoring effort. Long-term noise monitoring locations (see Figure 25) were selected based on the proximity of potential residential locations to different noise sources: UPRR rail tracks, Schnitzer Steel recycling operations, and vessel maneuvering in the Inner Harbor Turning Basin. Additional information pertaining to the noise monitoring locations and data collection is presented in Appendix A8. Based on the data in Table 23 and technician observations during the monitoring effort, the greatest contributing noise source in the Inner Harbor Turning Basin surrounding area is UPRR rail operations including horn blasts and warning signals at at-grade crossings. The noise environment of more northern receptors near the Inner Harbor Turning Basin are also substantially influenced by elevated sections of I-880 and Bay Area Rapid Transit.

Table 23: Monitored Noise Environments within the Project Area

<table>
<tr><th rowspan="2">Long-Term Noise Monitoring Location</th><th rowspan="2">Day-Night Average Noise Level (DNL)[1]</th><th colspan="2">Noise Levels in dBA</th></tr>
<tr><th>Daytime Hourly Average L_{eq}</th><th>Nighttime Hourly Average L_{eq}</th></tr>
<tr><td>LT-1 Residential Uses on Barbers Point Road, Inner Harbor Turning Basin – Alameda Side</td><td>67</td><td>63</td><td>60</td></tr>
<tr><td>LT-2 Residential Uses on Mosley Avenue, Inner Harbor Turning Basin – Alameda Side</td><td>58</td><td>55</td><td>50</td></tr>
<tr><td>LT-3 Residential Uses on Mitchell Avenue, Inner Harbor Turning Basin – Oakland Side</td><td>60</td><td>58</td><td>52</td></tr>
<tr><td>LT-4 Terminus of Clay Street adjacent to Port Offices, Inner Harbor Turning Basin – Oakland Side</td><td>77</td><td>73</td><td>70</td></tr>
<tr><td>LT-5 Southeastern End of Howard Terminal Wharf, Inner Harbor Turning Basin – Oakland Side</td><td>65</td><td>59</td><td>58</td></tr>
<tr><td>LT-6 Howard Terminal Adjacent to Schnitzer Steel, Inner Harbor Turning Basin – Oakland Side</td><td>75</td><td>69</td><td>69</td></tr>
<tr><td>LT-7 Southeastern End of Matson Terminal Wharf, Inner Harbor Turning Basin – Oakland Side</td><td>70</td><td>66</td><td>63</td></tr>
<tr><th>Short-Term Airborne Noise Monitoring Location</th><th>Max 1-Minute Average Noise Level L_{eq} with Vessel in Turning Basin</th><th colspan="2">1-Minute Average Noise Level L_{eq} with no Vessel in Turning Basin</th></tr>
<tr><td>ST-1 Southwestern End of Howard Terminal Wharf During Vessel Turn in Inner Harbor Turning Basin – Oakland Side</td><td>69 (vessel at 68 meters)[2]</td><td colspan="2">59</td></tr>
<tr><td>ST-2 Middle Harbor Shoreline Park, Outer Harbor Turning Basin Area</td><td>NA</td><td colspan="2">58</td></tr>
<tr><td>ST-3 Northern End of TraPac Terminal Wharf During Vessel Turn in Outer Harbor Turning Basin</td><td>70 (vessel at 200 meters)[3]</td><td colspan="2">65</td></tr>
</table>

Short-Term Underwater Noise Monitoring Location	Max Underwater Recorded Sound Pressure Level (dB) with Vessel in Turning Basin	RMS Underwater Sound Level (dB) with Vessel in Turning Basin
ST-1 Southwestern End of Howard Terminal Wharf During Vessel Turn in Inner Harbor Turning Basin – Oakland Side	174	151
ST-3 Northern End of TraPac Terminal Wharf During Vessel Turn in Outer Harbor Turning Basin	175	141

Notes:
[1] The average A-weighted noise level during a 24-hour day (DNL or L_{dn}) is obtained after 10 dB are added to each hourly L_{eq} noise level measured between 10 p.m. and 7 a.m. to account for nighttime noise sensitivity. Consequently, the DNL is always greater than the individual daytime and nighttime average hourly L_{eq}s.
[2] Average noise level over the entirety of the 25-minute vessel turn = 66.5 dBA.
[3] Monitored noise levels are influenced substantially by ground-based trucks and service equipment on the TraPac Terminal and do not represent the sole contribution of the turning vessel.
dB = decibel
dBA = A-weighted decibel
DNL = day-night average noise level
L_{eq} = equivalent-continuous sound level
Port = Port of OaklandRMS = root mean square

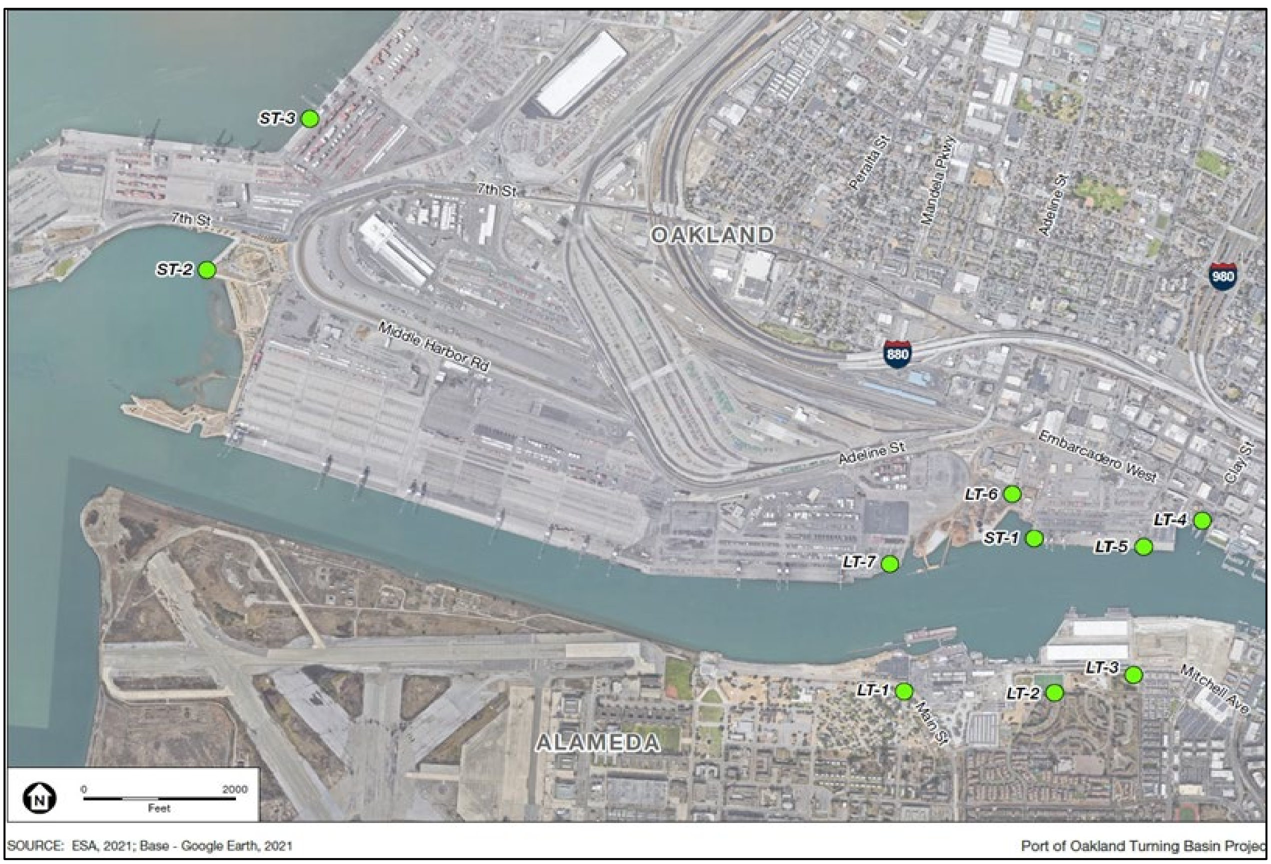

Figure 25: Noise Monitoring Locations

3.15.3 Vibration

As described in the FTA's Transit Noise and Vibration Impact Assessment (U.S. DOT and FTA 2018), ground borne vibration can cause buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Common sources of ground borne vibration are trains, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment.

Several different methods are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts on buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body and is commonly measured in vibration decimals (VdB). Typically, ground borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and the sick), and vibration-sensitive equipment.

Primary sources of vibration in the study area include Amtrak and freight railroad operations, approximately 3,000 feet north of the Inner Harbor Turning Basin. FTA has published generalized ground-surface vibration curves for locomotive-powered passenger and freight trains, which are presented in Table 24. It should be noted that most freight activity terminates at the Port. Amtrak trains stop at the Oakland Station and, given that there are several at-grade crossings in the area, train speeds along the rail line are generally in the range of 5 to 20 miles per hour.

The only other source of ground borne vibration near the turning basins is heavy-duty vehicular travel (e.g., refuse trucks and haul trucks) on local roadways. Trucks traveling a distance of 50 feet typically generate ground borne vibration velocity levels of approximately 0.006 in/sec PPV, and these levels could reach approximately 0.016 in/sec PPV where trucks pass over discontinuities in the roadway (U.S. DOT and FTA 2018).

Table 24: Generalized Vibration Levels from Locomotive-Powered Passenger or Freight Trains (Peak Particle Velocity)

Train Speed	Distance from Tracks				
	30 Feet	50 Feet	100 Feet	150 Feet	200 Feet
10 mph	0.051 PPV	0.040 PPV	0.019 PPV	0.016 PPV	0.013 PPV
20 mph	0.085 PPV	0.066 PPV	0.031 PPV	0.026 PPV	0.022 PPV
30 mph	0.12 PPV	0.092 PPV	0.043 PPV	0.037 PPV	0.03 PPV
50 mph	0.17 PPV	0.13 PPV	0.060 PPV	0.024 PPV	0.043 PPV

Notes:
mph = miles per hour
PPV = peak particle velocity in inches per second.
Source: U.S. DOT and FTA 2018

3.15.4 Sensitive Noise Receptors

Receptors occupying certain land uses are considered more sensitive to noise than others due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities in which those receptors are typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and auditoriums generally have receptors that are more sensitive to noise than are receptors at commercial and industrial land uses. Land uses with potentially sensitive noise receptors within 2,000 feet of the generalized Inner Harbor Turning Basin and Outer Harbor Turning Basin expansion construction boundaries were identified. A 2,000-foot distance was selected as the radius based on the potential for impact pile driving as a construction method. At 2,000 feet, noise from pile driving would be attenuated by distance and intervening structures to noise levels commensurate with existing ambient noise levels of the surrounding urbanized areas. The sensitive receptors are summarized below and presented in Section 6.15 , along with their approximate distance from the Inner Harbor Turning Basin and Outer Harbor Turning Basin expansion construction boundaries.

With respect to the Inner Harbor Turning Basin, the sensitive receptors on the Oakland (north) side include the potential live-aboards at the Jack London Square Marina and future residential uses planned for Howard Terminal in Oakland. Sensitive receptors on the Alameda (south) side of the Inner Harbor Turning Basin consist of a multi-family residential neighborhood at the western terminus of Mitchell Avenue, multi-family residences south of Mosley Avenue, and former Navy housing to be redeveloped with multi-family housing south of Main Street in Alameda.

There are no residential receptors within 2,000 feet of the Outer Harbor Turning Basin. Middle Harbor Shoreline Park and Port View Park are approximately 2,000 feet south of the Outer Harbor Turning Basin, but recreational users at the park are not considered sensitive noise receptors. The nearest noise-sensitive land use to the Outer Harbor Turning Basin would be single-family residences on Pine Street, approximately 5,000 feet to the east.

Chapter 4: Plan Formulation

Plan formulation for the Oakland Harbor Study followed the six-step planning process described in *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (U.S. Water Resources Council, 1983) and the *Planning Guidance Notebook* (USACE, 2000b).

To formulate alternative plans, the study team identifies problems and opportunities (Section 4.1), establishes the planning goals and objectives (Section 4.2), identifies the planning constraints and key uncertainties (Section 4.3), and then identifies measures which are developed into an array of alternatives that can be evaluated and compared. This evaluation and comparison ultimately lead to a tentative selection of an alternative, which is reviewed by the public, resource agencies, stakeholders, and agency technical reviewers. Once input obtained through review is addressed and incorporated, the Recommended Plan can be finalized.

The period of analysis for this study is 50 years, from 2030 – the estimated end of a project's construction – to 2079. The characteristics of the design vessel (below) are used to inform the channel dimensions and alignment needs for the study's period of analysis. Further refinement of the dimensions and alignment of the channels is expected through application of ship simulations during the Preconstruction Engineering and Design phase. The study team, with the endorsement of the USACE Deep Draft Navigation Planning Center of Expertise, utilized current and future vessel fleet forecast to create a design vessel for this study. The specifications of the design vessel are:

- 1,310 feet length overall
- 193 foot in beam
- 52.5-foot maximum summer load line draft
- 19,000 TEUs nominal intake

Per the 1983 Principles and Guidelines by the U. S. Water Resources Council, the federal objective of water and related land resources project planning is to "contribute to NED consistent with protecting the Nations' environment, pursuant to national environmental statutes, applicable EOs, and other Federal planning requirements" (U.S. Water Resources Council, 1983). The 1983 Principles and Guidelines recommends that plans are formulated in consideration of four criteria and four accounts. The four criteria and four accounts are used iteratively in the plan formulation process as the alternatives are developed, and as they are evaluated and screened, to help in the selection of an alternative for recommendation. The identification and evaluation of measures and components, further described below, were informed by discussions with the San Francisco Bar Pilots and stakeholders.

4.1 Problem Identification and Opportunities

As discussed in Section 2, large container vessels are subject to operational restrictions and experience significant operational inefficiencies, including extended periods of idling and delays for the large container vessels that exceed the design width of the turning basin and smaller vessels transiting the harbor. Multiple discussions with the San Francisco Bar Pilots revealed that the existing widths of turning basins are the source of operational inefficiencies, not the depth of the turning basins. As a result, the San Francisco Bar Pilots have adopted operational restrictions as standard practice when handling PPX Gen IV vessels at the Port since 2016. The limited width of the turning basins results not only in navigation inefficiencies but may also increase the risk of groundings which could result in safety and environmental risks, such as oil spills.

Fleet and commodity forecasts show annual TEU, the sizes of vessels, and the frequency of port calls increasing from the current year through 2050 in the future without project condition. Because fleets ae transitioning to larger vessels, altering the configuration of the turning basins would improve the efficiency of vessel operations within the Oakland Harbor. Altering the turning basins would present the opportunity to indirectly benefit the environment through decreased emissions with improved vessel transit efficiencies. The harbor is adjacent to the West Oakland community which is disadvantaged and already disproportionally impacted by poor air quality. Therefore, reducing such emissions would also support the Assistant Secretary of the Army for Civil Works' (ASA(CW)) directive on Implementation of Environmental Justice and the Justice40 Initiative which states "USACE shall work to meet the needs of disadvantaged communities by reducing disparate environmental burdens" (ASA(CW) 15 March 2022).

Another key opportunity for navigation projects in San Francisco Bay is beneficial use of dredged material. San Francisco Bay's wetlands and mudflats are the first line of defense from sea level rise for many of the San Francisco Bay's shoreline communities and for critical infrastructure. They are resilient and adaptive to sea level rise, and they provide both cost-effective protection and many essential ecological and recreational benefits for the people of the Bay Area. There is broad scientific consensus that for much of the Bay's shoreline, wetlands provide the most effective and beneficial method to protect infrastructure from sea level rise and storm surge.

Bay wetlands and mudflats can grow vertically as sea level rises, which is what makes them so resilient. However, they need enough sediment (dirt carried by the tides) to do so. As sea level rises, the amount of sediment needed to maintain wetlands (current and restored) and mudflats at the right elevation will increase. New reports estimate that more than 450 million cubic yards of sediment will be necessary between now and 2100 to maintain existing wetlands and mudflats and to restore these habitats at areas purchased and slated for restoration (Dusterhoff, S., McKnight, K., Grenier, L., and Kauffman, N. 2021). Even with an optimistic future of a wetter climate providing high sediment supply, under current watershed management approaches natural sediment supply will likely not come close to meeting the amount needed to maintain wetlands and mudflats through the end of the century. There is an opportunity to beneficially use the suitable dredged material created from the implementation of any turning basin improvement project this study recommends; this would keep sediment in the ecosystem and improve resilience.

In summary, the existing federal navigation channel was designed for a 6,500 TEU vessel; this vessel is 1,139 feet long, 140 feet wide, and has a static draft of 48 feet. The vessels routinely calling on the Oakland Harbor today have nearly triple the capacity as the -50-foot Project's design vessel. When these vessels call, vessel movements are heavily restricted and require extensive coordination as described in Section 2. Because the existing turning basins are insufficiently sized for vessels exceeding the design vessel length to operate efficiently and provide little to no margin for error during turning operations, these larger vessels have a greater risk of marine casualty and have resulted in operational limitations for other vessels within the Oakland Harbor. Smaller vessels have less space to maneuver within the harbor and must adjust their transit times based on the needs of vessels that exceed the design width. These problems and inefficiencies are projected to continue and to increase in the future as a larger share of the cargo shifts to the larger vessel fleet, and these vessels call Oakland more often. The largest vessels in the fleet will continue to be delayed due to restrictions and cause delays for the rest of the fleet that must accommodate them.

The overall problems and opportunities experienced in the turning basins are found in Table 25.

Table 25: Problems and Opportunities

PROBLEMS	OPPORTUNITIES
• Size of existing turning basins is not sufficient for vessels exceeding the design width to operate efficiently. • Operational restrictions for large vessels result in delays for smaller vessels. • Larger vessels have a greater risk of marine casualty due to insufficient turning basin width.	• Increase navigation efficiencies. • Benefit the economy and realize economies of scale. • Beneficially use dredged material • Minimize impacts to surrounding communities, including historically disadvantaged communities. • Reduce emissions and environmental risks. • Increase navigation safety for all vessels.

4.2 Planning Goal and Objectives

The goal of the project is to improve navigation in the Oakland Harbor. Plans are formulated to achieve planning objectives during the 50-year period of analysis from 2030 – the estimated end of a project's construction – to 2079. Objectives provide a clear statement of the study purpose. In support of this project's goal, the planning objectives are:

- <u>Improve the efficiency of operations of containerships within the Oakland Harbor.</u> This will be measured through decreased transportation costs from in-harbor transit time savings. For example, an improvement made as part of this project may decrease the amount of time it takes for a vessel to transit to and from the Oakland Harbor and its desired berth; that time saved equates to a project benefit. Additionally, this would result in a decreased risk of groundings and decreased emissions from reduced transit time, thus resulting in benefits to the environment and the surrounding communities.
- <u>Allow more efficient use of containerships.</u> An improvement made as part of this project would allow larger vessels, which are projected in future without project fleet transitions, to call the Port more efficiently realizing economies of scale. These larger vessels can hold more cargo per trip and are more efficient; this efficiency equates to a decrease in transportation costs and is considered a project benefit.
- Take advantage of the opportunity to contribute to the USACE National Ecosystym Restoration mission through beneficial use of dredged material.

4.3 Planning Constraints and Considerations

Constraints are restrictions that limit the extent of the planning process. They can be divided into universal constraints and study-specific constraints. For brevity, only project-specific constraints are included here. The study's constraints are:

- the project cannot increase shoreline erosion

Considerations are issues or matters that should be accounted for during the planning process, but do not necessarily limit the extent of the process. The following considerations are taken into account:

- impacts to surrounding communities, including historically disadvantaged communities
- impacts to structures and bulkheading on-land facilities
- impacts to environmental and cultural/historic resources
- impacts to existing utilities
- impacts to the other navigation traffic in the Oakland Harbor
- impacts to proposed land development
- impacts to businesses
- exposure to existing hazardous, toxic, and radioactive waste

4.4 Key Uncertainties and Planning Decisions

During the formulation process, there are planning decisions and uncertainties that must be considered and documented. This study uses many sources of existing data for the analysis.

The study team assumed existing bathymetric and geotechnical data are sufficient to distinguish between the alternatives considered. Collecting new data was deferred to the next phase, Preconstruction Engineering and Design (PED). The Oakland Harbor has been thoroughly studied. The availability of existing data enables the study team to work more efficiently, however, existing data may not be tailored exactly to the study team's needs, and assumptions or interpolations may be made to cover any gaps in existing data. The decision to use existing bathymetric and geotechnical data obtained from maintenance dredging surveys and data as well as other previous studies may result in less accurate dredged material quantity and cost estimates.

The study team elected to defer ship simulation, hydrodynamic, and sediment transport modeling to the PED phase because they determined that, given the array of alternatives being considered, the results of this modeling would not impact plan selection. As part of PED, ship simulation shall be completed at the USACE Engineer Research and Development Center (ERDC)'s Coastal and Hydraulics Laboratory Ship/Tow simulator in Vicksburg, MS with assistance from the San Francisco Bar Pilots. Pilots will simulate navigating a vessel at the ERDC facility to determine whether the proposed turning basin widenings are sufficient for a range of weather, current, tide, and traffic scenarios. Hydrodynamic modeling will be used to support the ship simulation as well as inform design efforts of the expanded turning basins and future sedimentation and sediment transport patterns in the navigation channel and turning basins.

The San Francisco Bay Regional Dredged Material Management Plan (RDMMP) is a long-term plan spanning 20 years. It predicts how much dredging will be needed in the future, explores different ways to manage dredged material, and recommends a preferred plan (referred to as the "Federal Standard"). The plan covers Oakland Harbor and involves analyzing gaps in data to find opportunities for using dredged material beneficially, particularly in areas affected by rising sea levels.

In 2021, the San Francisco Estuary Institute published "Sediment for Survival," summarizing the current understanding of sediment supply to the Bay and its importance for adapting to sea level rise. This highlighted the need to use dredged material from navigation channels and explore other options like reconnecting watersheds to marshes. Building on this, various organizations are working together to analyze data and identify priority locations for beneficial use of dredged material. They aim to quantify the environmental, social, and economic benefits of different placement sites and methods.

These efforts are in response to identified data gaps by stakeholders like local, state, and federal agencies, ports, and the dredging industry. Specific tasks include sediment transport modeling, regional analysis, ecological modeling, and developing a sediment monitoring framework. Additionally, there are ongoing developments in benefits analysis and a decision support tool.

The plan aims to have a recommended plan by the first quarter of Fiscal Year 2024, alongside an Environmental Assessment. This is to ensure approval of a regional base plan for federal navigation projects within the San Francisco District for the dredging program spanning from Fiscal Year 2025 to 2034. Further updates to the RDMMP may occur as new placement sites and methods become available, guided by the Water Resources Development Act (WRDA) of 2020.

Detailed sediment testing and characterization was deferred to the PED phase because the study team was able to estimate material suitability for placement sites, potential impacts, and mitigation costs using existing information, and local proxies. The study team conducted limited sediment and geophysical sampling to validate the assumptions on which these estimates were based. This limited geophysical sampling identified the presence of debris between the Schnitzer Steel and Howard Terminal sites. Debris may slow dredge operations, and will increase costs for removal of material in this area. . The study incorporated the potential for debris within the project footprint in its cost schedule risk analysis (CSRA). The overall increase associated with this debris found in this area is unlikely to have an impact on cost and is sufficiently addressed by the project cost contingency, which is applied across all construction costs.

The decision to use existing information may result in environmental effects and mitigation costs that differ from those estimated herein; actual which would be identified in the PED phase based on detailed sediment sampling and testing. This uncertainty was minimized through limited sediment sampling and testing which validated assumptions made using existing data.

The commodity and fleet forecast developed for the study also contains uncertainty. Commodity flows are subject to the ups and downs of the business cycle, individual commodity markets, and political influence.

Total container cargo throughput is expected to increase in the future. Past TEU volumes have grown at an average rate of 2.1% per year, and that rate of growth is expected to persist throughout the forecast period, which ends in 2050. This will roughly double the TEU volumes handled by the Port of Oakland by the end of the forecast period. The commodity growth was limited to twenty years after the base year of the project, consistent with USACE practice for long-term commodity forecasts, and due to the uncertainty surrounding such long-term forecasts

There is also uncertainty with the model used to calculate benefits, HarborSym. Port and individual operations are subject to change based on various conditions including weather, congestion, labor availability, schedule, pilot practices, and other factors leading to variability. The HarborSym model included variations or ranges for many of the variables involved in the vessel costs, loading, distances, speeds, etc. Sea level change is also an uncertainty that presents the potential for more frequent occurrences of extreme water levels. USACE Engineering Regulation (ER) 1100-2-8162 "Global Changes: Incorporating Sea Level Changes in Civil Works Programs" (USACE 2019) provides guidance on determining the direct and indirect physical effect of future sea level change on all USACE planning studies and engineering designs. It requires planning studies and engineering designs to evaluate the entire range of possible future rates of sea level change, represented by three scenarios of "low", "intermediate", and "high" sea-level change. The three scenarios presented in the ER incorporate new information, including projections by the Intergovernmental Panel on Climate Change and National Research Council (IPCC 2007, NRC 2012). Sea level change varies by region, this is due to the direction and magnitude of the local vertical land movement and how it relates to the global sea level change rate. At any location, changes in local relative sea level reflect the integrated effects of global mean sea level change plus local or regional changes of geologic, oceanographic, or atmospheric origin.

ER 1100-2-8162 recommends that a National Oceanic and Atmospheric Administration (NOAA) water level station should be used with a period of record of at least 40 years. The water level station used for this study is NOAA Station 9414750 Alameda, CA, which has a period of record from 1939 to present. Utilizing the USACE Sea-Level Change Curve Calculator (Version 2021.12) and the relative sea level trend of 0.87 mm/yr (.00285 ft/yr) from NOAA station 9414750 Alameda, California (Figure 26), a projection can be made for each of the three SLC scenarios from the base year of 1992. The low USACE scenario represents historical trend, uses 1992 as a base year, and estimates relative sea level change using 0.00285 ft/yr. Projected rates for all three scenarios (low, medium, and high) from 1992 to 2130 are shown in Figure 27 and Table 26. The relative sea level trend rate of 0.87 mm/yr (.00285 ft/yr) was computed by NOAA and reflects data from 1939 through 2020. A description of how the trend is calculated is provided in the Coastal Engineering Appendix. Since 2020, there has been only a minor decrease in trend rate, which has no impact on the RSLR computations for the project.

With respect to deep draft navigation channel depth, sea level rise is seen as a net positive due to the increased channel depth and reduced channel maintenance needs. However, risks from sea level change on the Port's operability could occur if land side facilities and bulkhead elevations are exceeded due to extreme water levelsand as a result of increased sedimentation due to rainfall runoff and wildfire activity. These climate risks are discussed further in the Coastal Engineering Appendix B4.

Table 26: Predicted Relative Sea Level Change Alameda, CA, (NOAA Gage - 9414750)

	USACE Low	USACE Int	USACE High
1992	0	0	0
2000	0.02	0.03	0.05
2010	0.05	0.08	0.17
2020	0.08	0.15	0.37
2030	0.11	0.24	0.64
2040	0.14	0.34	0.99
2050	0.17	0.46	1.41
2060	0.19	0.61	1.91
2070	0.22	0.76	2.48
2080	0.25	0.94	3.12
2090	0.28	1.13	3.84
2100	0.31	1.35	4.63
2110	0.34	1.57	5.5
2120	0.37	1.82	6.44
2130	0.39	2.09	7.45

Epoch: 1983 to 2001.
All values are expressed in feet relative to local mean sea level.

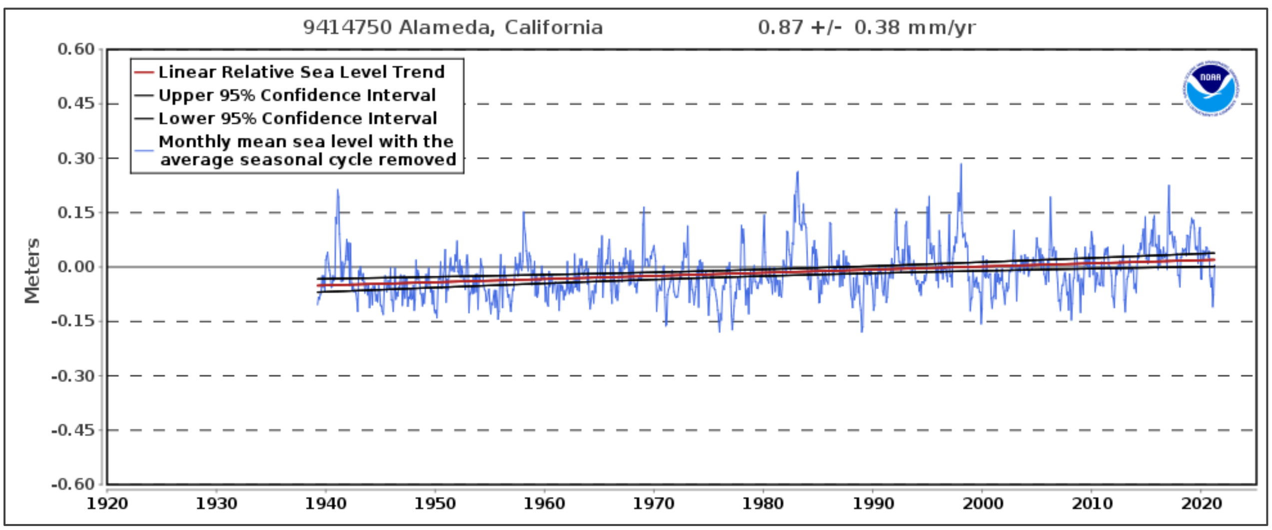

Figure 26: Relative Sea Level Trend Alameda, CA (NOAA Gage - 9414750)

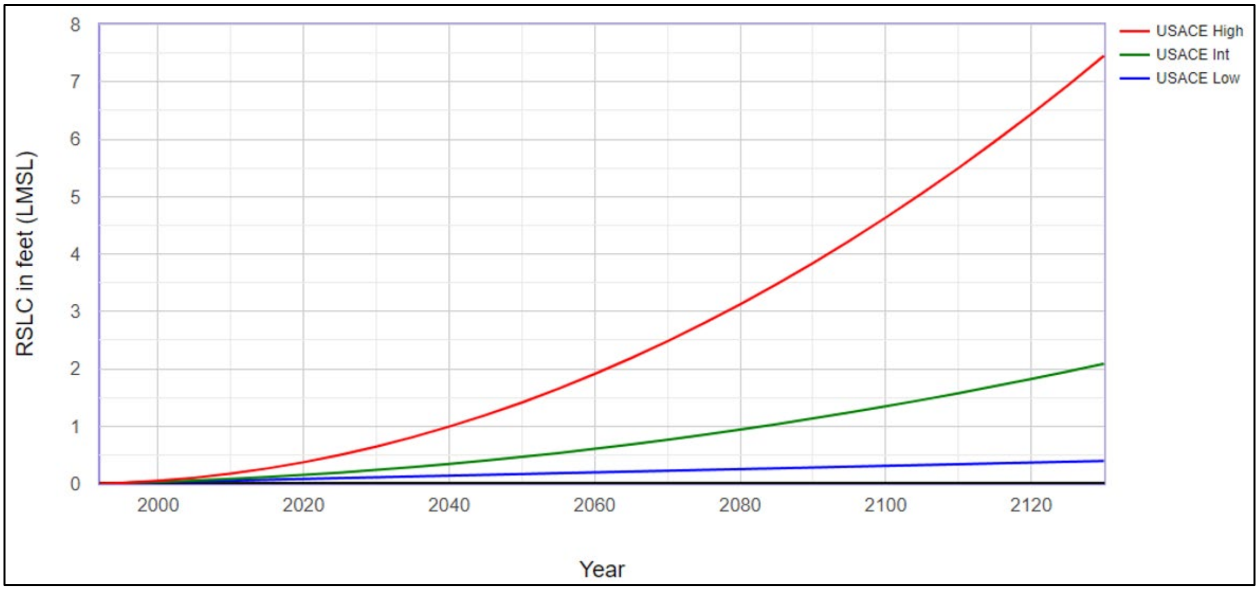

Figure 27: Relative Sea Level Rise Projections, Alameda, CA, (NOAA Gage – 9414750)

In Figure 28 projections begin in 1992, the midpoint of the last tidal epoch (1983-2001). The project base year is 2030, the 50-year economic period of analysis is 2030-2080 and the 100-year adaptation horizon is 2030-2130.

4.5 Management Measures and Components

Measures are types of actions that accomplish the study objectives when implemented. A variety of structural and physical modification and nonstructural and operational measures were considered to satisfy the study objectives and constraints in consultation with the Port and San Francisco Bar Pilots. Consideration of the various measures was conducted consistent with federal water resources policies and practices. Measures were evaluated for compatibility with local conditions and relative effectiveness in meeting planning objectives. They are presented below by category. A summary of the analysis is presented in Table 27.

4.5.1 Nonstructural and Operational Measures

The implementation of nonstructural and/or operational measures has the potential to improve navigation within the Oakland Harbor without the physical modification of the channels. The nonstructural measures considered are listed below. Since many of these nonstructural measures are already being implemented within the Oakland Harbor, only limited further benefits could be realized. These measures were therefore not carried forward.

- Alternative sites for, or means of, commerce delivery: This non-structural measure generally refers to an alternative site either within or outside the port. Existing sites within the port are already being used for other types of cargo transportation (e.g., bulk cargo). Additionally, if container vessels were to travel to and from other terminal locations within the port, they would still be subject to the inefficiencies of the port and the narrow turning basins. Sites outside the port would require transportation back to the region by other means. The scope of this study considers the land and the function of all container terminal sites in the port, including existing, expanded, and planned terminals. No alternative terminal sites have been identified. Therefore, no additional port terminal sites have been identified or proposed for cargo routing or handling. Accordingly, this measure has not been included for further analysis.

- Increase tugboat assistance: Tugboats are used to improve the maneuverability of vessels that have reduced speed during channel transits, to turn vessels, and to dock and undock vessels. The standard operating practices in Oakland Harbor for tug assistance are sufficient for vessels currently using the channel. The Port of Oakland is already utilizing additional tugs in the turning basins and when vessels back out of a channel. Additional tug assistance would not improve the efficiency of vessels transiting the channel and this measure was not carried forward.
- Timing of vessel transits: Improving vessel scheduling and timing of transits is typically used to reduce delays and inefficiencies related to transit restrictions. However, vessel calls and transit are already monitored and scheduled and it is unlikely that further improvements in vessel scheduling and timing of transits can be achieved in the busy Port. Therefore, this measure does not meet the planning objectives and is not carried forward.

4.5.2 Structural Measures

Structural measures are those measure that modify the physical attributes of the navigation channels. Since the vessels currently calling at the port are constrained by the dimensions of the turning basin channel width, one structural measure was carried forward.

- Turning basin and channel widening: Turning basin and channel widening consists of increasing the size of the federal navigation channel for improved navigation when turning. Widening the turning basins would allow for more efficient operation of the vessels within the Oakland Harbor and for the ULCVs to call the Port of Oakland more frequently. This measure would address the problems of width limitations and objectives. Therefore, this measure was carried forward.
- Channel deepening: This measure would involve deepening the existing federal navigation channels beyond the currently maintained depth of -50 feet MLLW. Channel deepening would not address the problems nor objectives because the Port of Oakland is not depth constrained for ULCVs. Therefore, this measure is not carried forward.

Table 27: Measure Analysis Summary

MEASURE	ANALYSIS SUMMARY	MOVES FORWARD?
NON-STRUCTURAL MEASURES		
Alternative sites for commerce delivery	No additional sites identified	No ×
Increase tugboat assistance	Already implemented	No ×
Timing of vessels transits	Already implemented	No ×
STRUCTURAL MEASURES		
Turning basin and channel widening	Addresses problems, likely federal interest	Yes ✓

Channel deepening	Does not address problems or objectives	No ×

4.6 Alternative Plan Formulation and Screening*

The plan formulation strategy for this study was conducted in three phases, as described in the following sections. Throughout the plan formulation process, a broad range of measures and footprints were considered, and then certain measures and footprints were eliminated from further consideration to arrive at the focused array of alternatives. The focused array of alternatives went through a final screening to develop the final array of alternatives, which were carried forward for the NEPA effects analysis. Key assumptions included during the formulation of alternatives are provided below. Additional assumptions are presented in the Economics Appendix (Appendix C).

The period of analysis is 50 years, beginning with the base year of 2030, the first year after project completion, to 2079. The Fiscal Year 2024 (October 2023) Federal discount rate of 2.75% is used to discount benefits and costs.

The study assumes that in a future without project condition (i.e., if no project is constructed), that all non-structural measures that are currently implemented remain in place over the period of analysis. For example, should the turning basin dimensions remain unchanged, large vessels will continue to require all additional harbor pilot and assist tug operations.

The study also considers that the completed improvements to Port facilities and any additional plans underway that are included in the future without project conditions as described in Section 2.2.1. This includes terminal upgrades, crane raisings, crane upgrades, and wharf upgrades. Additional plans to improve truck traffic flows in and out of the Port are ongoing and scheduled to be completed by the end of 2023. These changes will increase the Port's container throughput capacity over the study period of analysis, in a future without project.

4.6.1 Developing and Preliminary Screening Footprint Variations

Since the only retained measure is turning basin widening, all plans evaluated consist of different combinations of Inner and Outer Harbor widened turning basin footprint variations. The study team conceptually developed the footprints presented in this section to assess the feasibility of different turning basin locations based on their ability to meet objectives, avoid constraints, and their anticipated benefits compared to costs. In total, six different variations for the Inner Harbor Turning Basin and two different variations for the Outer Harbor Turning Basin were developed.

Inner Harbor Variation : Shifted East

Inner Harbor Variation 1 is a circular turning basin that is shifted East and overlays the existing turning basin (Figure 28). Inner Harbor Variation 1 minimizes impacting anticipated contaminated fast land on the Oakland side. This variation uses a turning basin multiplier of 1.4 (e.g., 1.4 times the length of the design vessel). The variation would impact approximately 10.0 acres of total fast land at Alameda and Howard Terminal and would require installation of about 2,645 feet of bulkheading along Alameda and Howard Terminal.

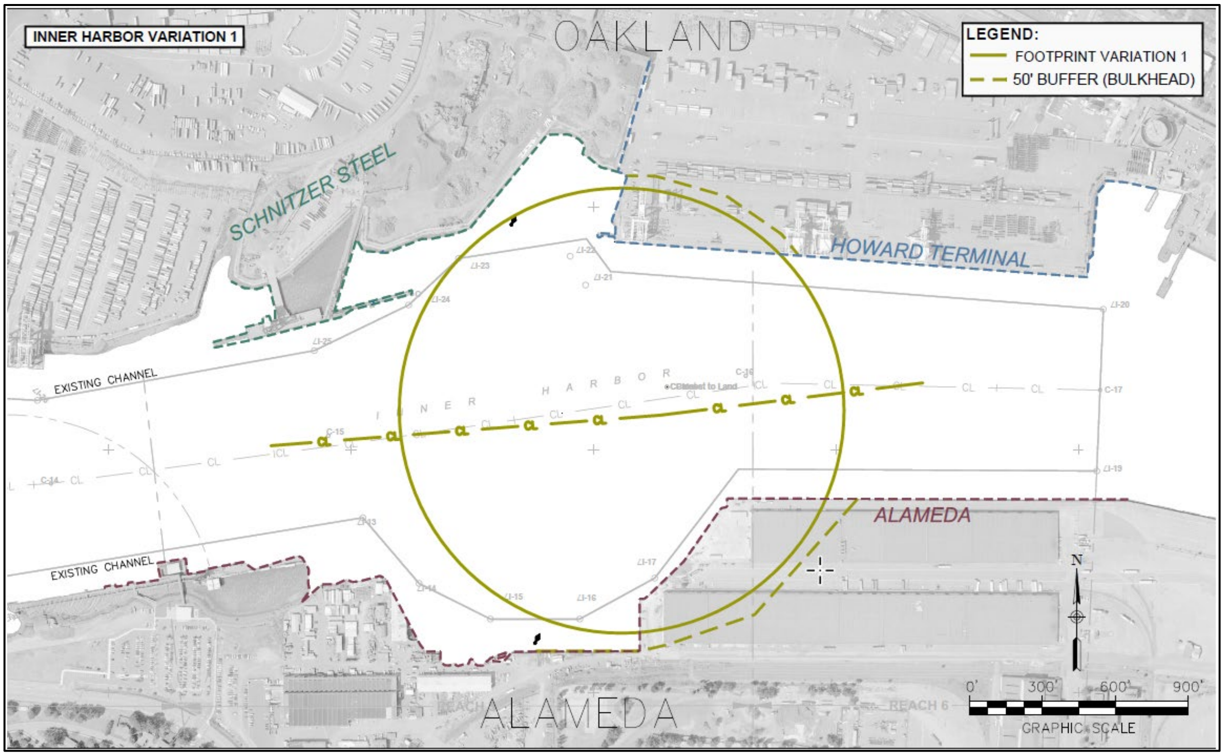

Figure 28: Inner Harbor Variation 1 - Shifted East

Inner Harbor Variation 1 would require a significant amount of dredging and excavating; this would result in a significant cost. This variation avoids anticipated contaminated materials in Oakland fast lands, which can be costly and environmentally risky to remove and properly dispose of. The structural demolition required for the warehouses at Alameda (Annex Terminals) would be significant. Inner Harbor Variation 1 would impact five warehouse bays. Additional Alameda businesses that would be impacted include Centerline Logistics - a tug and barge company- and Marine Express. If this footprint were to be implemented, the Alameda warehouses, Centerline Logistics, and Marine Express would require modifications to their operations which would likely have a negative impact to jobs.

It is assumed that Inner Harbor Variation 1 would provide a high amount of NED benefits. This is assumed because Inner Harbor Variation 1 is within the vicinity of the existing Inner Harbor turning basin east of all marine terminals and would require only a minor modification to the existing channel centerline.

While the amount of land required to implement Inner Harbor Variation 1 is significant and modifications to local business' operations would be required, this footprint is unlikely to prohibit future operations of any business assuming impacted businesses can either consolidate or shift operations. Combined with the high amount of anticipated NED benefits, Inner Harbor Variation 1 was carried forward for further analysis.

Inner Harbor Variation 2: Shifted North

Inner Harbor Variation 2 is a circular turning basin that is shifted North and overlays the existing turning basin (Figure 29). Inner Harbor Variation 2 minimizes impacting fast land on the Alameda site but impacts land at Howard Terminal and Schnitzer Steel. This variation uses a turning basin multiplier of 1.4. The variation would impact a total of about 10.1 acres of fast land at Schnitzer Steel and Howard Terminal and would require the installation of about 2,500 feet of bulkheading at Howard Terminal and Schnitzer Steel.

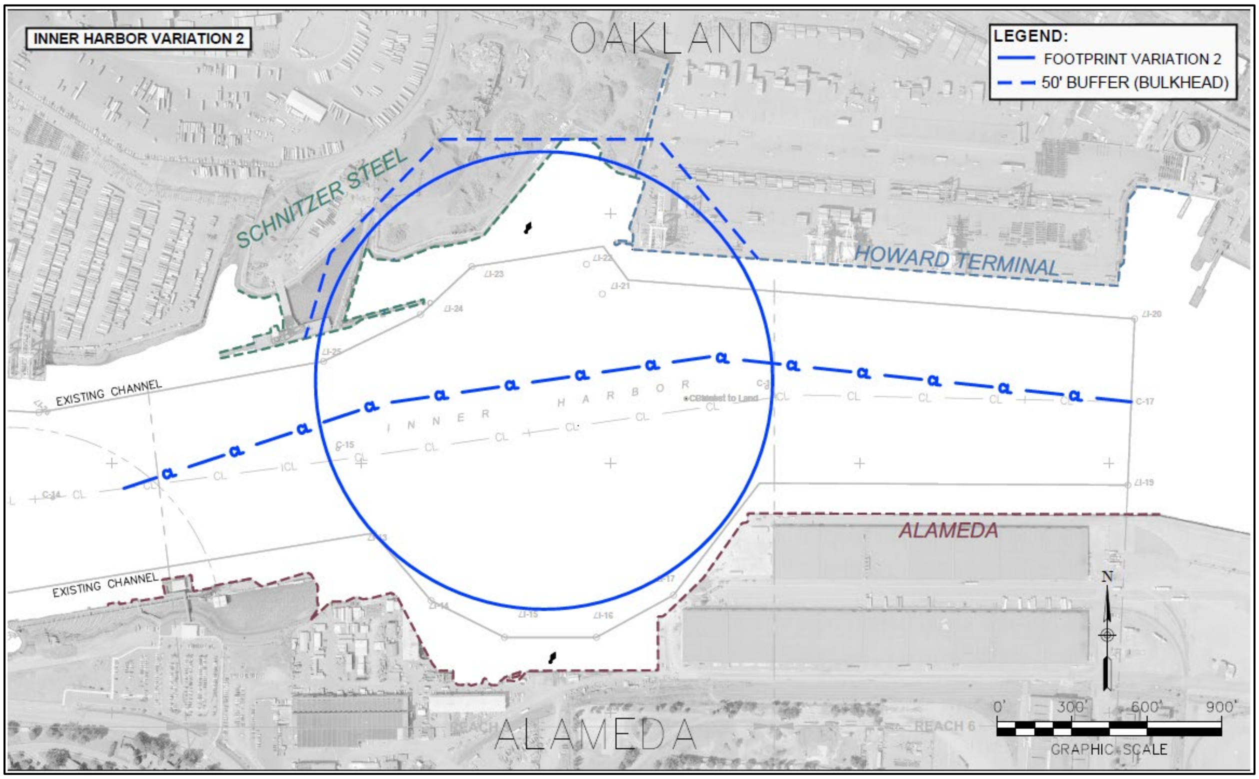

Figure 29: Inner Harbor Variation 2 - Shifted North

Inner Harbor Variation 2 requires the majority of Schnitzer Steel's property, including the wharf structure imperative to Schnitzer Steel's operations. This footprint would impact Schnitzer Steel's business significantly, with the possibility of ending Schnitzer Steel's operations entirely. The impacts would require the wharf structure to be relocated or rebuilt, and compensation for business loss would be a significant cost. Additionally, the sediment on the fast lands at Schnitzer Steel is assumed to be contaminated; this increases the cost of the placement of the material and total project cost.

It is assumed that Inner Harbor Variation 2, similarly to Inner Harbor Variation 1, would provide a high amount of NED benefits because this variation is within the vicinity of the existing inner harbor turning basin east of all the terminals and would require only a minor modification to the existing channel centerline.

Compared to Inner Harbor Variation 1 and 3, Inner Harbor Variation 2 is estimated to have similar benefits but higher costs, resulting in it being less economically competitive. Therefore, this footprint did not move forward for further evaluation.

Inner Harbor Variation 3: Centered

Inner Harbor Variation 3 is a circular turning basin that is centered over the existing Inner Harbor turning basin (Figure 30). This variation was designed to minimize the total amount of fast land impacted. While Inner Harbor Variation 3 impacts the least amount of land, it impacts three properties: Howard Terminal, Schnitzer Steel, and Alameda. This variation uses a turning basin multiplier of 1.4. It is estimated this variation would impact about 6.5 acres of fast land and would require the installation of about 2,380 linear feet of bulkheading.

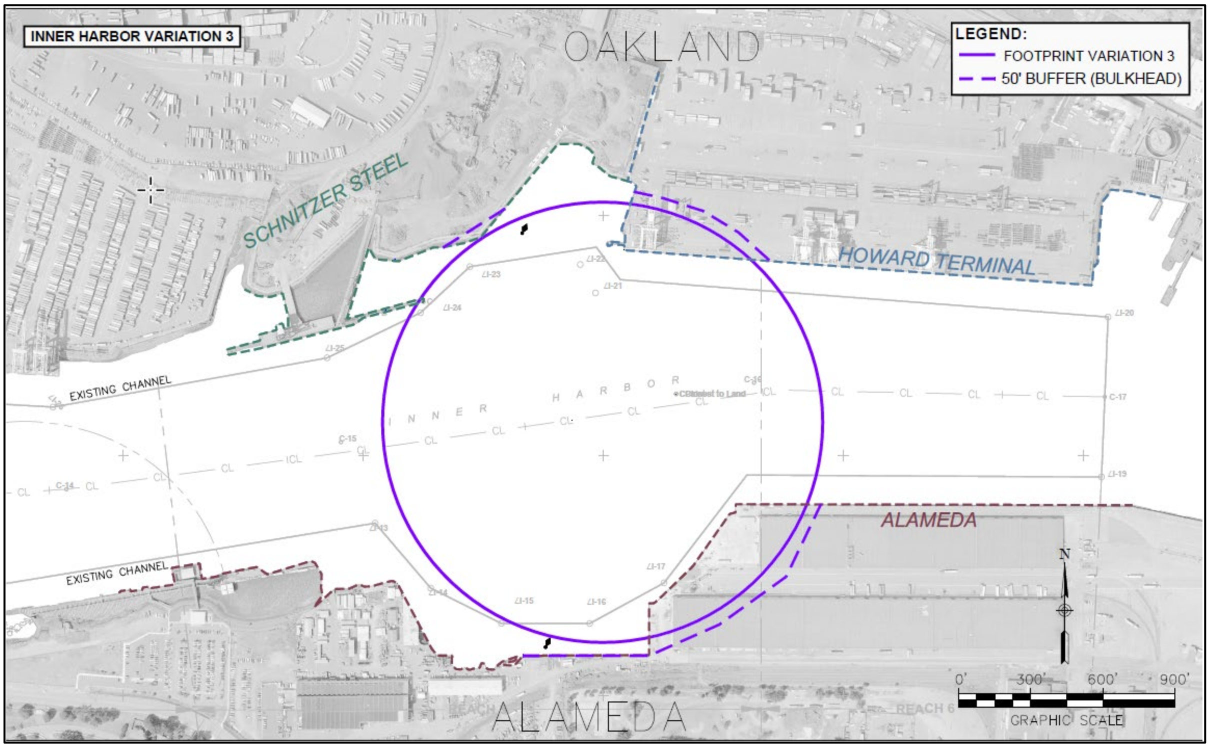

Figure 30: Inner Harbor Variation 3 – Centered

Compared to Inner Harbor Variations 1 and 2, it is estimated Inner Harbor Variation 3 would impact approximately 3.5 acres less fast land but require about 500 linear feet more bulkheading. This footprint would impact three bays of the Alameda warehouses. The impacts to Howard Terminal, Schnitzer Steel, and Alameda would require modifications to their business operations and may result in loss of jobs but would likely not be prohibitive to their operations assuming impacted business can consolidate or shift operations.

It is assumed that Inner Harbor Variation 3, similarly to Inner Harbor Variation 1 and 2, would provide a high amount of NED benefits because this variation is within the vicinity of the existing inner harbor turning basin East of all the terminals, and would not require a change to the existing channel centerline.

This footprint impacts the least amount of land compared to the other inner harbor footprint variations and, while it would impact local business's operations, this variation would not prevent operations from continuing. Therefore, Inner Harbor Variation 3 was carried forward for further analysis.

Inner Harbor Variation 4: Non-Circulator Turning Basin

Inner Harbor Variation 4 is non-circular turning basin that impacts land at Howard Terminal while minimizing impacts to fast land at Alameda and Schnitzer Steel (Figure 31). The footprint for this variation is based on ship simulation modeling the Port of Oakland conducted with the San Francisco Bar Pilots at CSU Maritime Academy (CSU Maritime Academy, 2019). It is estimated this variation would impact approximately 12 acres of land at Alameda and Oakland, including Howard Terminal and Schnitzer Steel, and is estimated to require the installation of 2,400 feet of bulkheading.

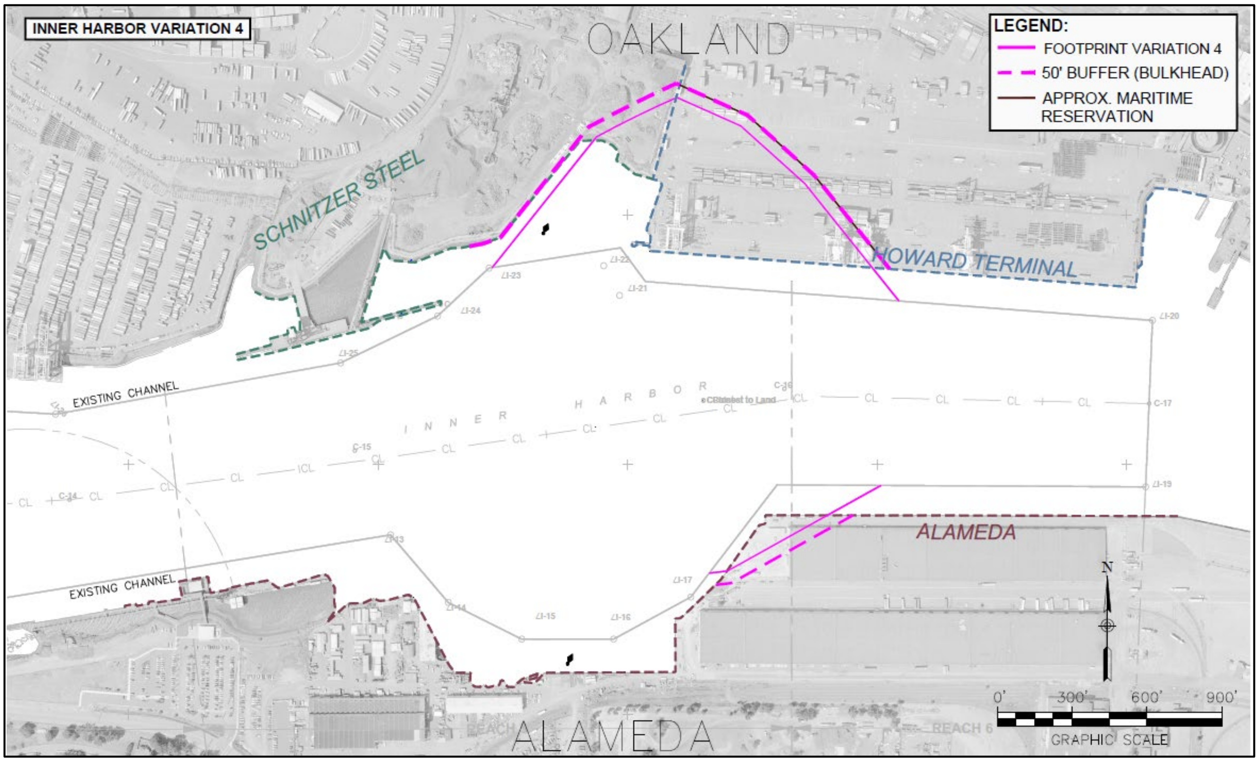

Figure 31: Inner Harbor Variation 4 - Non-Circular

The majority of the land impacted by this alternative would be Port of Oakland-owned property at Howard Terminal, with additional land being required at Alameda and Schnitzer Steel.

Inner Harbor Variation 4 is anticipated to provide a moderate amount of NED benefits. The non-circular configuration would create challenges for the pilots that would not otherwise be anticipated as compared to a circular turning basin option. This variation would require ULCVs to make a multipoint turn, maneuver in a tight space, and would restrict the turning direction of a ULCV. It is estimated the time required to turn a vessel within the Inner Harbor Variation 4 turning basin would be greater than the time required to turn in a circular turning basin. This variation is therefore estimated to produce less benefits than Inner Harbor Variations 1, 2, and 3.

Inner Harbor Variation 4 was carried forward for further analysis because of cost uncertainties and the likely support from local businesses.

Inner Harbor Variation 5: New Location West of Existing

Inner Harbor Variation 5 is a circular turning basin located west of the existing Inner Harbor turning basin in the Middle Harbor, across from the Oakland International Container Terminal (Figure 32). It impacts the land designated as open space at the former naval base in Alameda. This variation uses a turning basin multiplier of 1.4. It is estimated this variation would impact approximately 54 acres of fast land and would require the installation of about 4,100 feet of bulkheading.

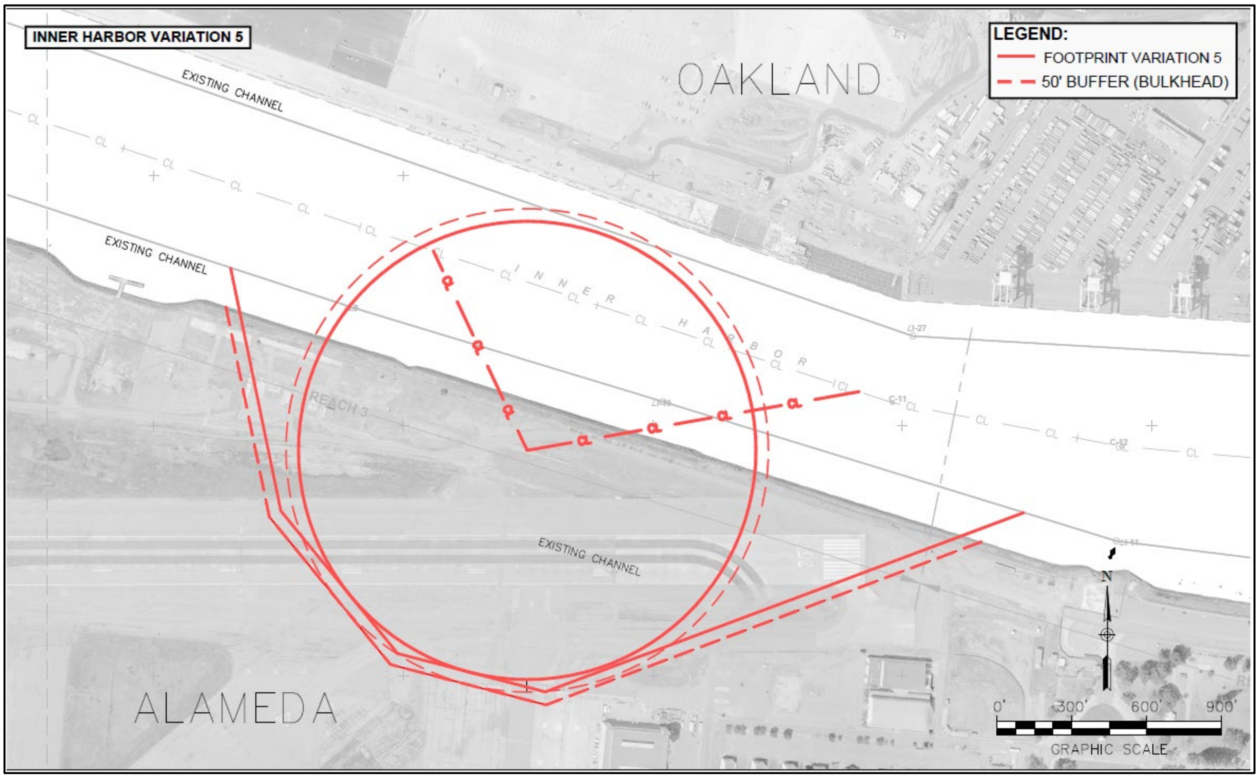

Figure 32: Inner Harbor Variation 5 - New Location West of Existing

Although the cost to acquire land to implement Inner Harbor Variation 5 would be less per acre than acquiring land adjacent to the existing Inner Harbor variations, Inner Harbor Variation 5 would require four to eight times the amount of land as Variations 1 through 4.

Inner Harbor Variation 5 would result in limited benefits because it is located west of the existing Inner Harbor turning basin and would therefore still require vessels calling terminals east of Oakland International Container Terminal to back down the Inner Harbor channel, a cause of in-harbor transit inefficiencies. Additionally, the location of Variation 5 adds restrictions to adjacent deep-water berths (berths 58 and 59), such as limiting vessel size and operations at these berths to accommodate ULCV transits, resulting in further reduced benefits. Variations 1 through 4 do not add these new berth limitations.

Due to the large amount of fast land impacts and associated costs for Inner Harbor Variation 5, combined with the berth restrictions that would be required at Oakland International Container Terminal and limited potential for gaining NED benefits, Inner Harbor Variation 5 was not carried forward for further consideration.

Inner Harbor Variation 6: New Location Outside Middle Harbor

Inner Harbor Variation 6 is a non-circular turning basin located west of the Inner Harbor Channel off Alameda Point and nearby Middle Harbor Shoreline Park. This variation is an elongated circle or oval to account for the currents and winds that would put forces on the vessels. The Variation 6 footprint would not have any fast land impacts, but would likely require additional features, such as a breakwater, to mitigate the forces the current and wind would place on ULCVs as they used the turning basin. Without detailed hydrologic and hydraulic modeling, those additional features that may be required are unknown and therefore are not included in Figure 33.

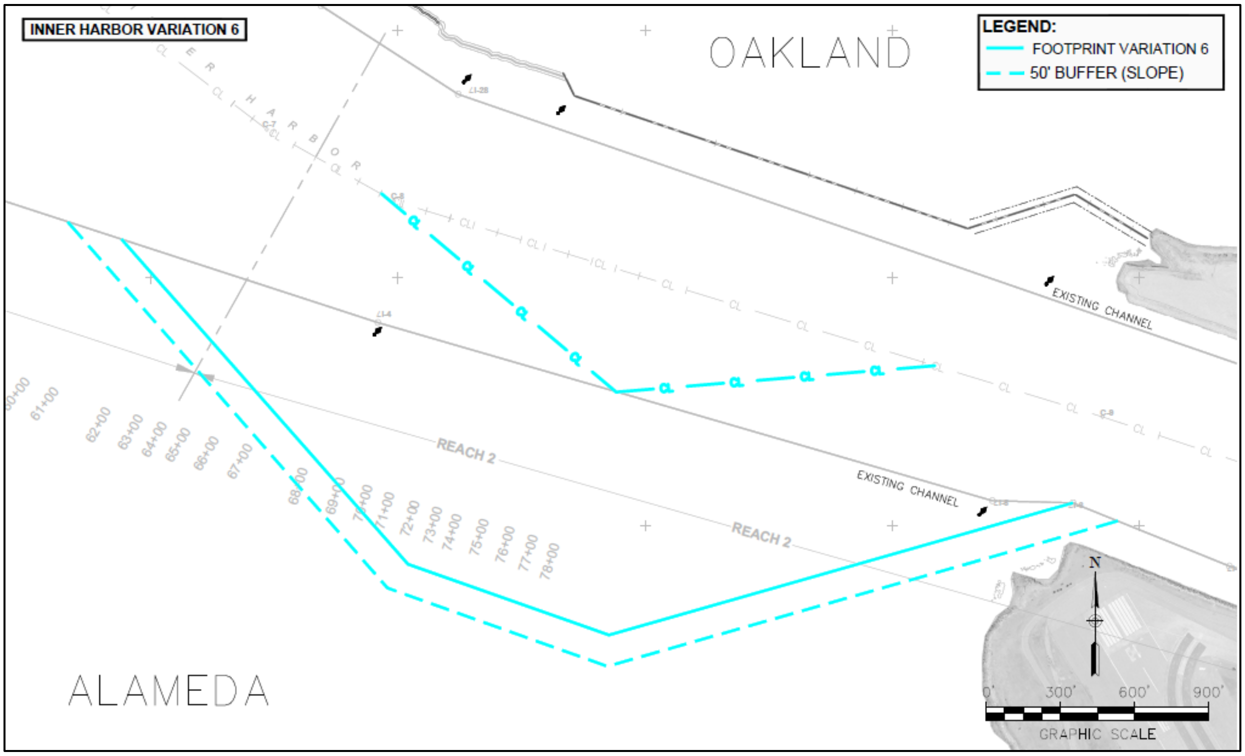

Figure 33: Inner Harbor Variation 6 - New Location Outside Middle Harbor

USACE and the Port of Oakland met with the San Francisco Bar Pilots to discuss the possibility of a turning basin located outside of the Inner Harbor. The San Francisco Bar Pilots stated a turning basin in this location would not be beneficial to the majority of ULCVs, would leave vessels exposed to the elements requiring additional operational restrictions, and would block the channel for other vessel traffic. Additionally, Inner Harbor Variation 6 would likely require additional efforts and maintenance costs due to the currents increasing the sedimentation rate.

Due to anticipated significant costs and minimal to nominal benefits, the Inner Harbor Variation 6 was removed from further consideration.

Outer Harbor Variation 7: Shifted East

Outer Harbor Variation 7 is shifted east of the existing Outer Harbor turning basin (Figure 34). This variation uses a turning basin multiplier of 1.5 to account for currents experienced in the Outer Harbor. This variation would not impact fast land nor require bulkheading.

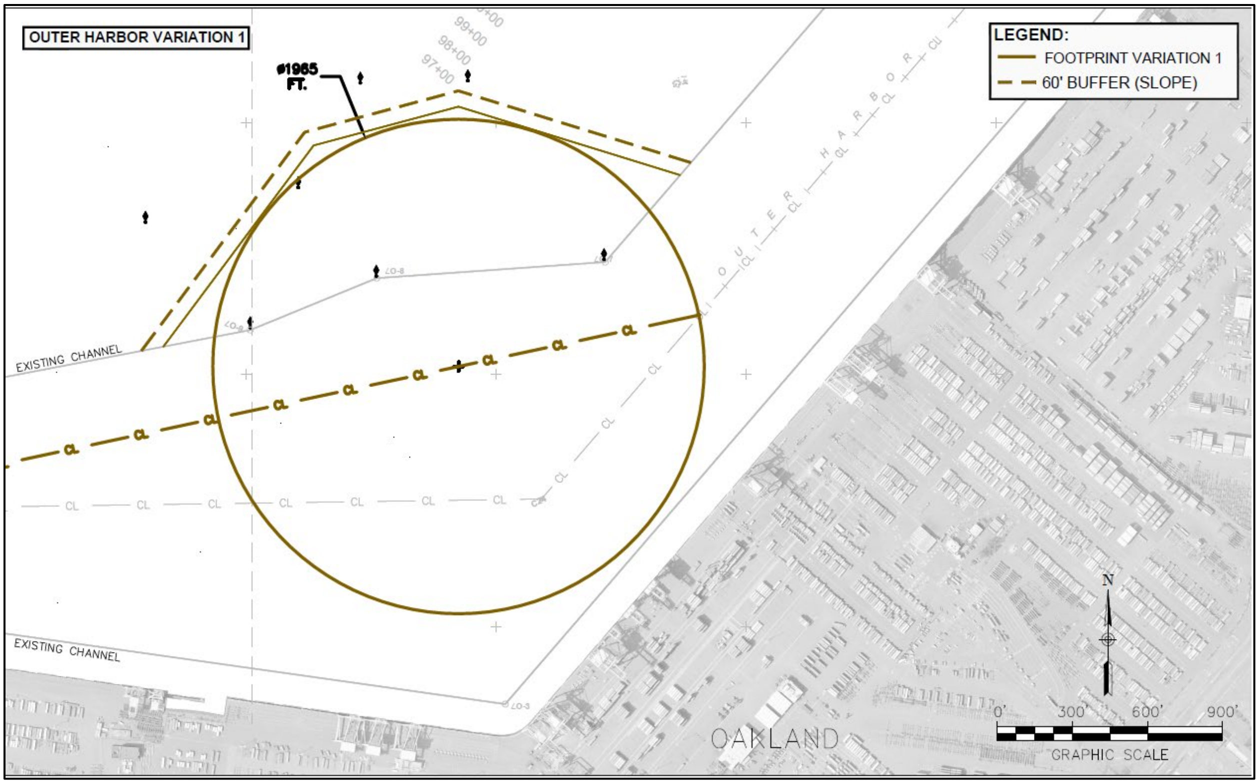

Figure 34: Outer Harbor Variation 7 - Shifted East

Outer Harbor Variation 8: Centered

Outer Harbor Variation 8 is a circular turning basin that is centered over the existing turning basins in the bend of the Outer Harbor (Figure 35). This variation uses a turning basin multiplier of 1.5 to account for currents. This variation would not impact fast land nor require bulkheading.

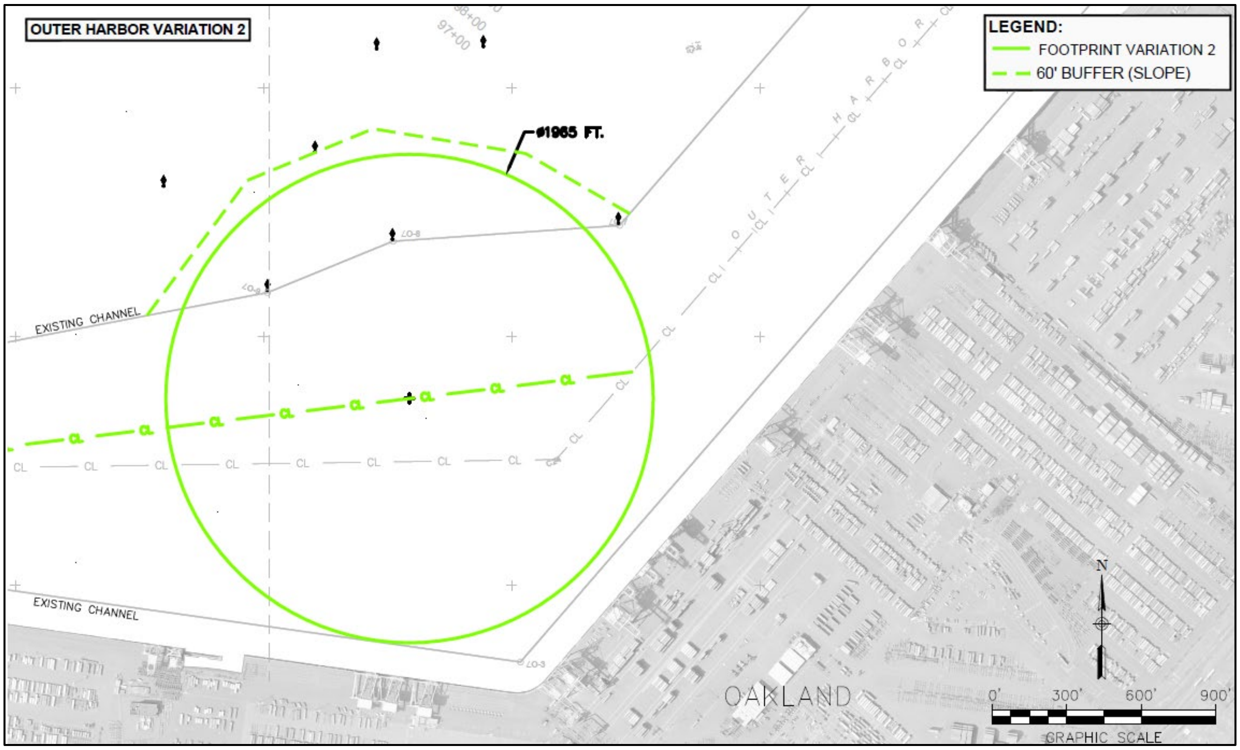

Figure 35. Outer Harbor Variation 8 - Centered

Outer Harbor Variation 8 keeps the proposed centerline of the channel close to the existing centerline given the required design standards; this is ideal for the San Francisco Bar Pilots. Also, compared to Outer Harbor Variation 7, it limits the amount of dredged material that would need to be removed. This footprint was therefore kept for further consideration.

Summary

After the preliminary screening of footprint variations, three Inner Harbor Variations and one Outer Harbor variation were kept for further consideration. Table 28 summarizes the results.

Table 28: Summary of Preliminary Screening of Footprint Variations

FOOTPRINT VARIATION	KEPT FOR FURTHER CONSIDERATION?
Inner Harbor Variation 1: Shifted East	✓ Yes.
Inner Harbor Variation 2: Shifted North	× No. Estimated to have detrimental impacts to Schnitzer Steel that may prevent Schnitzer Steel's operation at the location.
Inner Harbor Variation 3: Centered	✓ Yes.
Inner Harbor Variation 4: Non-Circular	✓ Yes.
Inner Harbor Variation 5: New Location West of Existing	× No. Estimated to have greater costs and have less benefits than other Inner Harbor variations moving forward.
Inner Harbor Variation 6: New Location Outside Middle Harbor	× No. The existing channel would be blocked for other vessels.
Outer Harbor Variation 7: Shifted Northeast	× No. Estimated to be more costly and have more environmental impacts than Outer Harbor Variation 8.
Outer Harbor Variation 8: Centered	✓ Yes.

4.6.2 Development of Focused Array of Alternative Plans

For the three Inner Harbor footprint variations and the one Outer Harbor footprint variation moving forward for further consideration (Figure 36), preliminary quantities of materials used in the construction of the footprint and costs were calculated for screening purposes. The preliminary costs used to screen these four footprints do not include real estate nor environmental mitigation. A preliminary analysis of the four footprints moving forward is presented in Table 29.

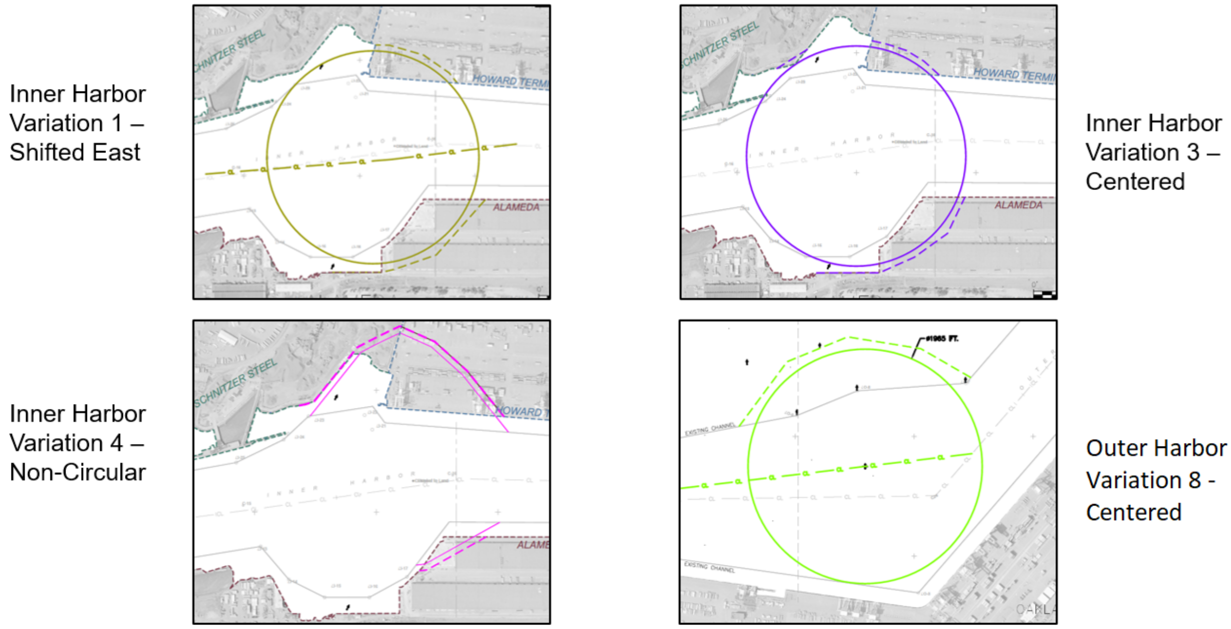

Figure 36. Footprints Moving Forward for Preliminary Cost Calculations

The footprints' costs, benefits, environmental impacts, and impacts to businesses were considered. No footprints are anticipated to have substantial environmental impacts because all avoid sensitive habitat.

Considering costs and benefits, Inner Harbor Variation 4 is estimated to have the highest cost as well as the least amount of benefits due to the extra time needed for ULCVs to maneuver within a non-circular turning basin as compared to a circular turning basin. This would not efficiently meet the objectives of the study. Therefore, Inner Harbor Variation 4 was not kept for further consideration. Inner Harbor Variation 1 is anticipated to cost $10 million more than Inner Harbor Variation 3 and is anticipated to have more substantial impacts to local business operations in Alameda. Additionally, while Inner Harbor Variation 1 and 3 are anticipated to produce similar benefits, Inner Harbor Variation 3 is more favorable and efficient because the channel centerline would stay the same while Inner Harbor Variation 1 would require the channel centerline to shift. Inner Harbor Variation 3 is estimated to cost less, produce more benefits, and impact less businesses in Alameda; therefore, Inner Harbor Variation 1 was removed from further consideration. Outer Harbor Variation 8 does not require acquiring land, does not negatively impact businesses, and is anticipated to be economically justified. Therefore, Outer Harbor Variation 8 was kept for further consideration.

Table 29: Preliminary Analysis of Four Footprints that Moved Forward

	FOOTPRINT			
	INNER HARBOR			OUTER HARBOR
	1 – Shifted East	3 – Centered	4 - Non-Circulator	8 - Centered
Preliminary First Cost	$160 million	$150 million	$170 million	$47 million
Benefits / NED	$$$ – ideal	$$$ – ideal	$$ – not ideal	$$$ – ideal
Environmental impacts	No major impacts	No major impacts	No major impacts	No major impacts
Minimized impacts to any one business	No ×	Yes ✓	Yes ✓	Yes ✓
Moves to alternatives?	No ×	Yes ✓	No ×	Yes ✓

Material Placement

The turning basin widening footprints carried forward into the focused array of alternatives would require dredging and placement or disposal of substantial amounts of aquatic sediment. During plan formulation, the study team identified the Federal Standard Base Plan (Base Plan), which is the least costly alternative for placement of dredged material, consistent with sound engineering practices and meeting all federal environmental standards. The Base Plan includes site-specific impacts and sets the financial basis for cost sharing anything that costs more. The federal Base Plan is based on the least cost disposal for this specific project and does not change the federal standard of San Francisco's Dredged Material Management Plan (DMMP) for operation and maintenance dredging of authorized federal channels.

The DMMP, is a management plan for the disposal of dredged material generated from the maintenance and new work projects in the Bay. The DMMP serves as one method to meet the goals of the San Francisco Long Term Management Strategy, which are to:

- maintain in an economically and environmentally sound manner those channels necessary for navigation in San Francisco Bay and Estuary and eliminate unnecessary dredging activities in the Bay and Estuary;
- conduct dredged material disposal in the most environmentally sound manner;
- maximize the use of dredged material as a resource; and
- establish a cooperative permitting framework for dredging and dredged material disposal applications.

The dredged material placement locations in Table 30 meet the Base Plan requirements and the DMMP requirements.

The Base Plan for this study identifies the least cost disposal or placement option for quantities of both excavated land and dredged material based on estimated suitability associated with the expected chemical and physical characteristics of the material. Some of the material encountered may require class I (hazardous) and class II (non-hazardous) landfill disposal. Only terrestrial soils are expected to require class I landfill disposal, and neither class I nor II landfill material may be used as beneficial placement. Therefore, landfill disposal was identified as the least cost placement option for those materials. Most of the material anticipated to be encountered was estimated to be suitable to go to an upland wetland restoration beneficial use site as foundation material but was not expected to be suitable for upland wetland restoration beneficial use as clean cover material or for unconfined aquatic disposal. For this material, the Base Plan (least cost) placement option was identified as beneficial placement as wetland foundation material.

Dredged material will be sampled in PED to make suitability determinations of material placement within San Francisco Bay in accordance with the Dredged Material Management Program. Clean material anticipated to be encountered would be dredged material eligible for either placement at the San Francisco Deep Ocean Disposal Site (SFDODS) or for an upland wetland restoration beneficial use site to be used as cover material. As described in Section 3.12.2, clean material is sediment that is found to contain chemical constituent concentrations and bioaccumulation characteristics at or below aquatic or wetland cover material screening criteria. While placement at SFDODS was identified as the Base Plan dredged material placement option, it is not considered beneficial use of dredged material. Table 30 displays the Base Plan for all classes of materials.

Table 30: Federal Base Plan for Anticipated Types of Material to be Encountered

MATERIAL	FEDERAL BASE PLAN
Materials requiring Class I landfill placement -Potentially classified as hazardous -Terrestrial soils only, not aquatic dredge sediments	Kettleman Hills landfill
Materials requiring Class II landfill placement - Non-hazardous but not suitable for beneficial use foundation or aquatic disposal	Keller Canyon landfill
Materials not suitable for aquatic placement at San Francisco Deep Ocean Disposal Site - Also unsuitable for cover material at upland wetland restoration beneficial use site	Upland wetland restoration beneficial use site, foundation
Materials suitable for either unconfined aquatic disposal at San Francisco Deep Ocean Disposal Site or cover material at upland beneficial use site - Clean material	San Francisco Deep Ocean Disposal Site

After identifying the Base Plan, the study team assessed beneficial use opportunities beyond the Base Plan to determine whether there would be appropriate match of sources and uses of dredged material. Only the cleanest material would be suitable for beneficial use as wetland cover material in lieu of its Base Plan placement option (SFDODS). For this study, the additional (i.e., incremental) cost of placing this cleanest material at an upland beneficial use site beyond the cost of placing it at SFDODS, was estimated to be $8 per cubic yard. Using Section 204(d) of WRDA 1992 (“Beneficial Uses of Dredged Material”), this additional cost was found to be reasonable for the environmental benefits the placement would provide[16]. These benefits include keeping sediment in system, accelerating wetland accretion, and

[16] In FY19 and FY21, the California State Coastal Conservancy contributed slightly over $13 per cubic yard to redirect material to beneficial use for the Redwood City Operation and Maintenance project.

creating habitat for endangered species. Therefore, it was determined that in this case, the incremental cost to place materials as cover material at an upland beneficial use site as compared to placement at SFDODS was reasonable in relation to the environmental benefits to be achieved.

The Base Plan is carried forward as part of the focused array for cost comparison and alternative evaluation. The other alternatives in the focused array that include material estimated to be suitable for placement at SFDODS assume beneficial placement of that material as wetland restoration cover material instead, consistent with Section 204(d) of WRDA 1992. In a memorandum dated 6 September 2022, the ASA(CW) approved federal cost-share for such beneficial use (BU) of all suitable dredged material as part of this study's navigation solution.

Dredge Type: Diesel and Electrical

Initial formulation of alternatives assumed the use of diesel dredges to excavate and transport all dredged material. However, diesel emissions are of particular concern in West Oakland. Particulate emissions from diesel-fueled engines are designated by California as toxic air contaminants (TACs): pollutants that may cause an increase in mortality or serious illness. Health risk from ambient concentrations of Diesel Particulate Matter (DPM) are much higher than the risk associated with any other TAC routinely measured in the West Oakland region.

Furthermore, the Port of Oakland has undertaken, and continues to undertake, efforts to reduce air pollution from its operations and improve air quality in the surrounding communities. Since 2009, the framework for the Port's Seaport-related air quality efforts has been the Maritime Air Quality Improvement Plan (MAQIP), which established a vision, goals, strategies, and targets to reduce emissions from Seaport-related equipment sources. The MAQIP sought to "Reduce excess cancer health risk related to exposure to diesel particulate matter (DPM) emissions by 85% from 2005 to 2020" (Port of Oakland Resolution No. 09057) (Port of Oakland, 2019).

Given this, electric dredges were identified as a construction method that would provide benefits in the form construction emission reductions. Additional information about potential benefits of using electric dredges instead of diesel dredges for construction of the project can be found in the "Environmental Quality (EQ)" subsection of Section 4.6.4 and the "Importance of Avoided Air Quality Emissions and their Associated Health Impacts" subsection of Section 5.4.1.

Focused Array of Alternatives

The focused array of alternatives was developed with different combinations of economically competitive components from the preliminary analysis. Various combinations of these components (footprints) make up the focused array of alternatives. Additionally, a comprehensive benefits plan (Alternative D-2) was developed in accordance with the Assistant Secretary of the Army for Civil Works (ASA(CW)) policy directive dated January 5, 2021.

The focused array of alternatives is presented in Table 31. Alternatives B, C, D-1, and D-2 assume beneficial placement of dredged material in compliance with Section 204(d) of

WRDA 1992. Alternative D-0 includes the Federal Standard Base Plan and includes the least cost placement of suitable material at SFDODS. Except for Alternative D-2, all alternatives assume the use of diesel dredges.

Table 31: Focused Array of Alternatives

ALTERNATIVES	
A	No Action
B	Inner Harbor Only (Inner Harbor Variation 3), with beneficial placement of eligible material
C	Outer Harbor Only (Outer Harbor Variation 8), with beneficial placement of eligible material
D-0	Inner and Outer Harbor (Inner Harbor Variation 3 and Outer Harbor Variation 8), with Base Plan placement of eligible material
D-1	Inner and Outer Harbor (Inner Harbor Variation 3 and Outer Harbor Variation 8), with beneficial use placement of eligible material
D-2	Inner and Outer Harbor (Inner Harbor Variation 3 and Outer Harbor Variation 8), with beneficial use placement of eligible material and the use of electric dredges in lieu of diesel dredges

4.6.3 Evaluation of the Focused Array of Alternatives

Meeting Objectives and Avoiding Constraints

Alternatives were evaluated based on their ability to make significant contributions to the planning objectives and sufficiently avoid the planning constraints. The evaluation of the alternatives relative to each other is presented in Table 32.

Alternative A – No Action does not meet the study objectives. Alternatives B, C, D-0, D-1, and D-2 all contribute to meeting the objectives of improving the efficiency of operations of containerships within Oakland Harbor and allowing for more efficient use of containerships. Alternatives B and C, may be considered as separable elements of Alternative D-0, D-1, and D-2, in that both alternatives provide benefits without implementation of the other, however, Alternative B and C only improve efficiency for vessels transiting to either the Inner Harbor or Outer Harbor; therefore, they are given a 'medium' rank, since they do not fully meet the objective of improving the efficiency of containership movement in the entire Oakland Harbor. Alternatives, D-0, D-1, and D-2 improve the efficiency of vessels transiting to both the Inner Harbor and Outer Harbor, therefore getting a 'high' rank. No alternatives contribute to an increase in shoreline erosion. Additionally, all alternatives stay within the land dedicated for turning basin expansion at Howard Terminal. All the alternatives were formulated to avoid these constraints.

Table 32: Alternatives' Ability to Meet Objectives and Avoid Constraints

	ALTERNATIVES					
	A – No Action	B	C	D-0 (NED Plan)	D-1	D-2 (Recommended Plan)

OBJECTIVES						
Improve efficiency of containership operations within Oakland Harbor	Low	Medium	Medium	High	High	High
Allow more efficient use of containerships	Low	Medium	Medium	High	High	High
CONSTRAINTS						
Cannot increase shoreline erosion	High	High	High	High	High	High
Stay within the dedicated land reserved at Howard Terminal for turning basin expansion	High	High	High	High	High	High

4.6.4 Principles and Guidelines Accounts

Per the 1983 Principles and Guidelines by the U.S. Water Resources Council, the federal objective of water and related land resources project planning is to "contribute to NED consistent with protecting the Nations' environment, pursuant to national environmental statutes, applicable EOs, and other Federal planning requirements" (U.S. Water Resources Council, 1983).

The 1983 Principles and Guidelines Accounts and Criteria were used to evaluate and compare the focused array of alternative plans for their beneficial or adverse effects to the four accounts identified in the Principles and Guidelines (1983): NED, environmental quality, regional economic development, and other social effects.

National Economic Development (NED)

NED effects are changes in the economic value of the National output of goods and services. This is calculated as the NED benefits of the project. NED benefits are shown in Table 33. For the evaluation of the Focused Array of Alternatives, costs and benefits were refined and estimates of real estate and environmental mitigation costs were incorporated.

In the case of Oakland Harbor, which has an existing -50-foot channel project, this study assessed the federal interest in expanding the turning basins in the inner and outer harbor to allow ships to more efficiently navigate the harbor and seeks to maximize economic benefits.

Generally, the NED plan for any dredging project consists of two components: the dredging action itself and the disposal of the dredged material. Under the NED plan, dredged material from the project would be placed at the least cost disposal alternative, which is defined as the Federal Base Standard Plan (Base Plan) in USACE regulations.

Alternative D-0, widening of the inner and outer harbor utilizing the Base Plan disposal option, was identified as the NED plan as it maximizes economic outputs. In addition to economic outputs, this project identified the potential to place eligible dredged material for beneficial use, at a site that is not part of the Base Plan, as a part of Alternative D-1 and D-2. Alternative D-1 and D-2 build on the NED plan, adding a beneficial use increment to place this material at a wetland restoration site. Additionally, Alternative D-2 would utilize electric dredges to reduce impacts to the surrounding communities, however, this is considered a betterment to be paid at 100% non-federal cost. To realize the opportunity to use the clean material for habitat restoration, rather than dispose of the material utilizing the Federal Base Standard, the study requested a policy exception to recommend a plan other than the NED plan. This policy exception was approved by the Secretary's Office on September 6, 2022.

Of the alternatives, Alternative D-0 provides the most AAEQ net economic benefits of $27.4 million, without the costs for beneficial placement or the use of electric dredges. Because Alternative D-0, D-1, and D-2 would all widen both turning basins, they provide the same total Average Annual Equivalent (AAEQ) benefits. Despite having higher AAEQ costs, the costs associated with the economic benefits of the project are the same. While Alternative D-1 and D-2 have a higher AAEQ cost, the additional cost provides non-economic benefits associated with wetland restoration provided by beneficial use. Alternative D-1 and D-2 provide AAEQ benefits of $49.2 million and net economic benefits of $27.4 million and assume beneficial use of dredged material in compliance with Section 204(d) of WRDA 1992. Alternative D-1 is the same as Alternative D-0 except with beneficial use plan instead of the Federal Base Standard Plan, and Alternative D-2 includes beneficial use and electric dredges. Alternative D-2 was identified by the study team as the comprehensive benefits plan.

As described in Chapter 5, after the release of the initial draft IFR/EA, the use of electric dredges as a construction method under the comprehensive benefit plan was identified as being more appropriately classified as a local mitigation measure, in which federal cost share participation was not warranted. As a result, electric dredging in Alternative D-2 is now being treated as a betterment, which will be funded at 100% non-federal cost. Therefore, the cost of electric dredging is not a part of the AAEQ net benefits calculation for Alternative D-2, and thus its cost, net benefits, and benefit cost ratio are shown as equivalent to D-1 in Table 33.

Table 33: Summary Economics of Focused Array of Alternatives

	ALTERNATIVES					
	A (No Action)	B	C	D-0 (NED Plan)	D-1	D-2 (Recommended Plan)
Economic Cost [1]	No Effect	$419,967	$115,480	$557,770	$557,770	$557,770
AAEQ Cost [2]	No Effect	$16,215	$5,238	$21,765	$21,765	$21,765
AAEQ Benefits	No Effect	$29,228	$20,874	$49,186	$49,186	$49,186
AAEQ Net Benefits	No Effect	$13,013	$15,636	$27,421	$27,421	$27,421
Benefit Cost Ratio	No Effect	1.8	4.0	2.3	2.3	2.3

Costs displayed in $1,000's
October 2023 price level and discount rate of 2.75%
[1] Includes first cost, interest during construction, and associated costs
[2] Includes operation and maintenance

Regional Economic Development (RED)

Regional Economic Development (RED) effects are the impact of project spending, either directly or indirectly, on the local economy. For all actionable alternatives, there is an anticipated increase in regional economic development due to significant short-term increases in jobs and income during construction activities as workers are brought to the area. There may also be some negative impacts to regional economic development resulting from the implementation of the alternatives. Alternative C does not require the acquisition of any fast land nor properties and would not be expected to have any negative impact to regional economic development. Alternatives B, D-0, D-1, and D-2 would impact properties in Oakland and Alameda: Howard Terminal, Alameda, and Schnitzer Steel. At Alameda, 6.0 acres and three warehouse bays would be impacted. At Schnitzer Steel, no acres of fast land would be impacted. At Howard Terminal, 2.8 acres of fast land would be impacted. Minimal negative impacts are anticipated to regional jobs and income associated with losses at Alameda and Oakland businesses from land acquisition. Impacts to businesses will be evaluated as more information becomes available.

The expenditures associated with Oakland Turning Basin Expansion Project are estimated to be $538,831,000 over the three-year construction period from 2027-2029. Of this total expenditure, $338,415,433 will be captured within the San Francisco Metropolitan Statistical Area (MSA). The remainder of the expenditures will be captured within the state impact area and the nation. These direct expenditures generate additional economic activity, often called secondary or multiplier effects. The direct and secondary impacts are measured in output, jobs, labor income, and gross regional product (value added) as summarized in Table 34 below. The regional economic effects are shown for the local, state, and national impact areas. In summary, the construction costs support a total of 5,108 full-time equivalent jobs, $348,121,798 in labor income, $263,177,704 in the gross regional product, and $589,081,430 in economic output in the local impact area. More broadly, these expenditures support 7,505 full-time equivalent jobs, $596,860,871 in labor income, $735,923,218 in the gross regional product, and $1,245,073,828 in economic output in the nation.

Table 34:Summary RECONS Model Results by Area

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$338,415,433	3,623.6	$319,388,928	$209,541,091
Secondary Impact		$250,665,997	1,484.7	$28,732,870	$53,636,613
Total Impact	$338,415,433	$589,081,430	5,108.3	$348,121,798	$263,177,704
State					
Direct Impact		$359,301,112	3,811.0	$319,888,320	$210,040,483
Secondary Impact		$356,992,375	1,775.1	$30,367,066	$75,729,386
Total Impact	$359,301,112	$716,293,486	5,586.2	$350,255,386	$285,769,870
US					
Direct Impact		$440,845,546	4,098.7	$346,949,259	$302,990,382
Secondary Impact		$804,228,282	3,406.4	$249,911,612	$432,932,837
Total Impact	$440,845,546	$1,245,073,828	7,505.0	$596,860,871	$735,923,218
*** Jobs are presented in full-time equivalence (FTE)**					

Environmental Quality (EQ)

Environmental Quality (EQ) is the non-monetary beneficial effects on significant natural and cultural resources. Some of the main categories that make up environmental quality are considered for each alternative in Table 37. Detailed discussion can be found in Chapter 6. Other than D-0 (NED Plan), all alternatives involving the inner harbor turning basin assume beneficial placement of suitable dredged material as wetland cover material in compliance with Section 204(d) of WRDA 1992 to deliver EQ benefits.

The study team assessed beneficial use opportunities beyond the Base Plan to determine whether there would be appropriate matches of sources and uses of dredged material. Of the various tidal restoration sites available for project dredged material, only two are currently permitted to accept the quality of material that the project is expected to produce: Cullinan Ranch and Montezuma Wetlands. Of those two sites, Montezuma Wetlands is the only currently permitted site which accepts non-cover quality material, the predominant material expected to be generated by the project. Beneficial placement at these two sites were analyzed further.

Montezuma Wetlands 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 San Francisco Estuary including to the federally proposed as endangered longfin smelt (Spirinchus thaleichthys) and the 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 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. 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.

Cullinan Ranch is a tidal restoration project site on about 1,500 ac located on the north side of San Pablo Bay and 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 the federally endangered salt marsh harvest mouse (Reithrodontomys raviventris) and California clapper rail (Rallus longirostris 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. The original 1 mcy capacity has been increased to 4 mcy to address sea level rise concerns, of which 1 mcy remains at this time. 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. Given the anticipated rate of placed material scheduled for this location, it's unlikely that sufficient capacity remains to accommodate the material from the project, given the current project construction schedule.

Given this capacity constraint, Montezuma Wetlands appears to be the most effective location for beneficial use material. However, the incremental costs of placing material there still must be evaluated and deemed "reasonable" by USACE standards. Since the Federal share of the incremental cost of beneficial placement is both less than 25% of the Base Plan cost, and under $10 million, they are judged to be "reasonable" in accordance with Section 125(a)(2)(C) of WRDA 2020, an not requiring a detailed incremental analysis. The cost comparison in FY2024 prices are shown in Table 35.

Table 35: Beneficial Use Cost Limit Comparison

DREDGE VOLUME (MCY)	Base plan disposal cost	MW disposal plan cost	Incremental cost of MW plan	Federal share (65%) of MW plan	WRDA 2020 cost limit (25% Base Plan)
.464	$15,312,000	$18,292,000	$2,980,000*	$1,937,000	$6,021,500
*Difference between D0 (NED Plan) and D2 (Recommended Plan)					

The incremental cost to place material at an upland beneficial use site compared to placement at SFDODS was reasonable on USACE guidance, the incremental costs, and the environmental benefits to be achieved. Therefore, the alternatives, where applicable, include the additional beneficial use.

Although Alternatives D-1 and D-2 are similar, Alternative D-2 includes electric dredges thereby creating more environmental benefits than Alternative D-1. Alternative D-2 would benefit air quality because electric dredges would reduce construction related emissions (relative to Alternative D-1) benefiting Alameda and the West Oakland community that is disproportionally impacted by air quality. The incremental cost for electric dredges will be paid by the non-federal sponsor, the Port of Oakland, without federal cost share.

Additionally, due to the use of electric dredges, Alternative D-2 would have less noise from construction for nearby sensitive receptors in Alameda and West Oakland as compared to Alternative D-1. Using the definitions in Table 36, the categories that make up environmental quality are considered for each alternative in Table 37.

The alternatives in the focused array would affect the environment, but these effects would be less than significant with avoidance, minimization, and mitigation measures. Effects and associated significance determinations are discussed in detail in Chapter 6. The effects summarized here were used to comparatively assess the EQ of the different alternatives.

Alternatives involving the Inner Harbor (Alternatives B, D-1, and D-2) would impact about 8.9 acres of subtidal aquatic habitat in the Inner Harbor. With subtidal mitigation, the impacts are anticipated to be less than significant. Pile driving that would be required for construction in the Inner Harbor would cause terrestrial and aquatic vibration and noise that would be attenuated with best management practices such as vibratory hammers, bubble curtains, dampening blocks. It is also anticipated that aquatic material containing contaminants would be encountered in the Inner Harbor. Silt curtains would be deployed to minimize aquatic resuspension and aquatic work would be conducted within established work windows (in-water work windows March 1 through April 30, and September 1 through September 30) for the project location to avoid or minimize any potential effects to species during sensitive life stages. It is anticipated that fast lands may also have HTRW requiring placement at an appropriate class I landfill facility, as may be required.

Alternatives involving the Outer Harbor (Alternatives C, D-1, and D-2) would impact about 22.9 acres of subtidal habitat. The Outer Harbor is in proximity to eelgrass which is considered a component of essential fish habitat. With the avoidance and minimization measures included in Chapter 6, potential impacts to subtidal habitat and eelgrass would be less than significant.

Table 36: Defining Criteria for Scale of Impacts

IMPACT SCALE	CRITERIA
No Effect	The resource area would not be affected and there would be no impact.
Negligible	Changes would either be non-detectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and could have either localized or regional scale impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures could be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences on regional levels. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Table 37: Scale of Focused Array's Impacts to Environmental Quality and Resources

	ALTERNATIVES					
	A – No Action	B – Inner Harbor Only with BU	C – Outer Harbor Only	D-0 (NED Plan)	D-1	D-2 (Recommended Plan)
Water resources & quality	No Effect	Moderate & Beneficial (wetland creation)	Minor & Beneficial (wetland creation)	Minor & Beneficial (wetland creation)	Moderate & Beneficial (wetland creation)	Moderate & Beneficial (wetland creation)
Vegetation [1]	No Effect	Minor	Minor	Minor	Minor	Minor
Aquatic and Essential Fish Habitat	No Effect	Minor	Moderate	Moderate	Moderate	Moderate
Species [1]	No Effect	Moderate	Moderate	Moderate	Moderate	Moderate
Cultural resources	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Construction related air emissions	No Effect[2]	Moderate	Moderate	Moderate	Moderate	Minor
Topography/ Bathymetry	No Effect	Minor	Minor	Minor	Minor	Minor
HTRW	No Effect	Moderate	Minor	Moderate	Moderate	Moderate

[1] The action alternatives (B through D2) would all have some indirect benefits to this resource due to wetlands creation from beneficial reuse of dredged material.
[2] The No Action alternative would have no construction related impacts to air quality, but would have negative operational air quality impacts throughout the period of analysis because it would not improve navigational efficiencies and therefore would not lessen ship idling nor transit and maneuvering times which results in operational emissions.

Although the No Action plan (Alternative A) would result in no new impacts to open waters or air quality, there would continue to be marine navigation inefficiencies within Oakland Harbor caused by width limitations in the turning basins, therefore this alternative does not meet the overall project purpose. While Alternative C would result in less impact to the environment than D-2, it would not address the inefficiencies and limits on maneuverability in the Inner Harbor mentioned above and would not meet the overall project purpose. Under the No Action plan and Alternative C, vessels calling at the Port would continue to face delays in maneuvering. These delays result in increased emissions from cargo ships and tugs or other supporting vessels. There is also an increased safety risk to both human and aquatic life under the No Action plan and Alternative C due to the additional maneuvering of vessels." No wetlands would be impacted under any alternative. Alternative D-2 contributes the most to the environmental quality to the beneficial reuse of dredged material and the use of electric dredges to reduce air-pollutant emissions during construction and subsequently reduce health-related impacts. Alternative D-2 would minimize air-pollutant emissions, benefiting the West Oakland community which has high cumulative air pollution exposure as well as many sensitive receptors and designated disadvantaged communities. Alternative

D-2 would also have less noise from construction for nearby sensitive receptors in Alameda and West Oakland as compared to Alternative D-1.

Other Social Effects

Other Social Effects (OSE) include the effects that are not covered in the NED, RED, and EQ. This account includes items such as community impacts, health and safety, and displacement. The criteria presented in Table 38 were also used to evaluate the Focused Array of Alternatives' other social effects. All the actionable alternatives would result in a decreased risk of a marine casualty because the widenings would result in an increased margin for error during vessel turning operations. The alternatives are not anticipated to have an impact on cultural identity nor recreation. Alternatives that include modifications to the Inner Harbor turning basin, are anticipated to have a minor impact to aesthetics as they would require modifying fast lands.

Alternative B, D-0, and D-1, which include construction activities in the inner harbor, are anticipated to have a moderate impact on environmental justice communities. Alternative C, which includes construction activities only in the outer harbor is not anticipated to have these impacts to environmental justice communities. While the footprints of these alternatives would only impact commercial properties, the dredging would be conducted with diesel-powered dredges that would produce air-pollutant emissions, particularly DPM – a toxic air contaminant – in the surrounding communities that are already disproportionately impacted by air pollution and associated health impacts from that pollution. Alternative D-2 would have minor effects to environmental justice communities because dredging would be conducted with electric dredges, minimizing construction related air-pollutant emissions. This effect would be important to the West Oakland community which already has high cumulative air pollution exposure as well as many sensitive receptors (see Section 3.13.2), and designated disadvantaged communities. West Oakland residents are exposed to air concentrations of diesel pollution that are almost three times higher than average in the Bay Area (CARB, 2008).

Table 38: Scale of Focused Array's Impacts to Socioeconomic Resources

	ALTERNATIVES					
	A – No Action	B – Inner Harbor Only with BU	C – Outer Harbor Only	D-0 (NED Plan)	D-1	D-2 (Recommended Plan)
Recreation	No Effect	Negligible	Negligible	Negligible	Negligible	Negligible
Aesthetics	No Effect	Minor	Negligible	Minor	Minor	Minor
Environmental Justice	No Effect	Moderate	Minor	Moderate	Moderate	Minor
Noise and Vibration	No Effect	Moderate	Minor	Moderate	Moderate	Moderate (reduced effects relative to D-1)

Alternative D-2 contributes the most to other social effects of the alternatives that meet the purpose and need of the project due to the beneficial reuse of dredged material and the use of electric dredges to reduce air-pollutant emissions during construction and subsequently reduce health-related impacts. While Alternative C does provide the least impacts to socioeconomic resources, it does not meet the purpose and need of the project which is to improve navigation efficiency at the Port. Alternative D-2 would minimize air-pollutant emissions, benefiting the West Oakland community which has high cumulative air pollution exposure as well as many sensitive receptors and designated disadvantaged communities. Alternative D-2 would also have less noise from construction for nearby sensitive receptors in Alameda and West Oakland compared to Alternative D-1.

4.6.5 Principles and Guidelines Criteria

The 1983 Principles and Guidelines also requires that plans are formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. The study team carefully analyzed and compared all the alternatives for completeness, their effectiveness at alleviating navigation inefficiencies, their benefits and costs, and their legality (Table 39).

Completeness is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions to the objective. All the alternatives in the focused array were evaluated with consideration of necessary investments and other actions. The plans in the focused array were looked at for environmental, vessel traffic, and cultural resource impacts, as well as the costs associated with mitigating those impacts and acquiring the required real estate for implementation. Therefore, all actionable alternatives considered as part of the focused array are complete.

Effectiveness is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities. All the actionable alternatives in the focused array alleviate, to varying degrees, the problem of inefficiencies due to turning basin width limitations and achieve the study objectives to improve navigational efficiencies related to width limitations in the existing federal navigation channel. Therefore, all actionable alternatives considered as part of the focused array are effective (see Table 39).

Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment. Efficiency was measured through a comparison of benefit cost ratios, improved navigation efficiencies, and benefits from the project. This preliminary analysis indicated that Alternatives B, C, D-0, D-1, and D-2 are efficient because they are estimated to produce more benefits than they cost to implement and maintain. While Alternative D-0 provides the greatest net economic benefits (see Table 39), Alternatives D-1 and D-2 provide the same economic benefits as D-0 and provide additional wetland restoration benefits. The beneficial use of dredged material represents a relatively minor tradeoff in economic benefits to provide wetland restoration. As discussed in Section 4.6.2, the additional cost for the Beneficial Use Plan, which is a part of Alternatives D-1 and D-2 is considered justified and the incorporation of BU was approved by the ASA(CW). Acceptability is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies. The study team formulated the alternatives in accordance with applicable laws and regulations. All alternatives considered as part of the focused array are acceptable.

Table 39: Summary Principles and Guidelines Criteria on the Focused Array of Alternatives

	ALTERNATIVES					
	A – No Action	B	C	D-0 (NED Plan)	D-1	D-2 (Recommended Plan)
Complete	Y	Y	Y	Y	Y	Y
Effective	N	Y	Y	Y	Y	Y
Efficient	N	Y	Y	Y	Y	Y
Acceptable	Y	Y	Y	Y	Y	Y

4.7 Identification and Comparison of the Final Array of Alternatives

Based on the above evaluation of the focused array of alternatives, the study team identified a final array of alternatives and considered how well each alternative performed relative to others. As related to planning objectives, planning constraints, the Principles and Guidelines accounts, and the Principles and Guidelines criteria. Alternative D-0 (NED) is carried into the final array for cost comparison and evaluation purposes. the study team established that the incremental cost, $8 per cubic yard, to place material at an upland wetland restoration beneficial use site rather than placement at SFDODS was reasonable based on the environmental benefits to be achieved. The ASA(CW) approved the additional cost for such beneficial placement in a September 6, 2022 memorandum.

Table 40 presents the final array and summarizes each alternative's performance as related to planning objectives, planning constraints, the Principles and Guidelines accounts, and the Principles and Guidelines criteria on a subjective scale of Low-Medium-High.

Table 40: Comparison of Final Array of Alternatives

	ALTERNATIVES					
	A (No Action)	B	C	D-0 (NED Plan)	D-1	D-2 (Recommended Plan)
Meets Objectives	Low	Medium	Medium	High	High	High
Avoids Constraints	High	High	High	High	High	High
Principles and Guidelines Criteria	Low	Medium	Medium	High	High	High
Principles and Guidelines Accounts	Low	Medium	Medium	High	High	High

Of the alternatives in the Final Array, Alternatives D-1 and D-2 meet the objectives of improving efficiency the most because they include improving both the Inner Harbor and the Outer Harbor. They both would result in the same navigation efficiency benefits and essentially contribute to Principles and Guidelines Accounts equally. Alternatives D-1 and D-2 provide the most benefits to NED and Regional Economic Development because they include improving both the Inner Harbor and the Outer Harbor. Alternative D-1 was determined to have slightly higher net benefits than Alternative D-2 at the time of formulation, because the additional cost of electric dredges was included in the cost for Alternative D-2. Therefore, Alternative D-1 was determined to be the NED plus BU plan. Alternative D-2 would result in the same navigation efficiency benefits as D-1, but was considered to contribute the most to the environmental quality and other social effects accounts because the electric dredges would reduce air-pollutant emissions during construction and subsequently reduce health-related impacts in an environmental justice community disproportionately impacted by poor air quality. Therefore, the study team identified Alternative D-2 as the maximum net benefits plan.

After careful consideration of the tradeoffs between the alternatives, USACE and the Port of Oakland selected Alternative D-2, Inner and Outer Harbor modifications, as the Tentatively Selected Plan (TSP).

4.7.1 Optimization of the Tentatively Selected Plan After Initial Draft IFR

After identifying Alternative D-2 as the comprehensive benefit plan and TSP, USACE released the initial Draft IFR/EA for public, resource agency, and internal USACE technical and policy review on December 17, 2021. The public comment period closed February 14, 2022. USACE received extensive public and agency comments on the study, including multiple comments regarding minimizing impacts to businesses on the Alameda side of the Inner Harbor. Additionally, reviewers expressed concern about encountering potential HTRW materials at the Schnitzer Steel site. These comments prompted the study team to reevaluate and optimize the proposed inner harbor turning basin footprint, ultimately resulting in a slight shift to the now proposed inner harbor turning basin footprint.

At a May 12, 2022, Agency Decision Milestone meeting, the USACE study team and vertical decisionmakers confirmed the comments received during reviews and the resulting shift of the turning basins did not change the NED Plan or the identified TSP (plan D-2). The TSP was endorsed to be carried forward as the Recommended Plan. As the team proceeded with optimization and feasibility-level design of plan D-2, the team also shifted the outer harbor turning basin footprint and found that shifting the Inner Harbor turning basin footprint would result in the need for in-water pile driving and in-water fill for slope stability purposes. These project features were not presented in the initial Draft Integrated Report and would result in additional potential environmental effects. As such, the USACE re-released a revised Draft IFR/EA with the refined TSP, now called the Recommended Plan, to disclose these potential additional effects and provide the opportunity for further public review and comment.

Chapter 5: Recommended Plan

The study team and non-federal sponsor, the Port of Oakland, identified Alternative D-2 – Inner and Outer Harbor Modifications with Beneficial Use and Electric Dredges (Figure 37) as the comprehensive benefit plan and Tentatively Selected Plan (TSP), now referred to as the Recommended Plan. Because this plan (D-2) was not the NED Plan (D-0), in October 2021, the study team requested USACE Headquarters forward a policy exception request to the Assistant Secretary of the Army for Civil Works (ASA(CW)), as required by USACE policy, to allow USACE to recommend D-2 (the identified Comprehensive Benefits Plan) as the navigation solution for Oakland Harbor. Subsequently, the study team released the original draft IFR in December 2021; received and reviewed internal, public, and external agency comments; and in February 2022, USACE requested an exception to the National Economic Development plan to allow for recommendation of a Comprehensive Benefits Plan that included additional costs beyond the NED Plan. In May 2022 the study team held an agency decision milestone (ADM) meeting to affirm the TSP (D-2) as the Recommended Plan to carry forward for feasibility level design. As described previously in this report, design refinements to the plan have necessitated the release of a revised draft IFR and EA.

In September 2022, prior to release of the revised draft report, the ASA(CW) provided a final response to the policy exception request that approved federal cost-share for beneficial use of all suitable dredged material but did not approve federal cost-share for electrification of dredging. The ASA(CW) found the use of electric dredges would be more appropriately classified as a mitigation measure, but that the proposed project would meet all federal air quality standards and therefore could not recommend altering federal cost share to include electrified dredging. However, the ASA did state support for the use of electric dredges as approach a construction method that could be implemented if requested by the non-federal sponsor and if the sponsor is willing to assume the additional costs associated with using those dredges. The non-federal sponsor, the Port of Oakland, stated in a letter to USACE in September 2022 that they support the use of electric dredging as a betterment of the plan and acknowledging this would be at 100% non-federal cost. Given this, plan D-2 is better characterized as widening both turning basins with BU, and an additional betterment of electric dredging requested and funded by the non-federal sponsor. This plan (D-2) is carried forward as the environmentally preferred plan recommended under NEPA in Chapter 6.

The revised draft IFR and EA was released in April 2023. The study team had a subsequent ADM meeting in August 2023, during which Plan D-2 was reaffirmed as the Recommended Plan.

5.1 Recommended Plan Description

The Recommended Plan (see Figure 38) would widen both the Inner and Outer Harbor Turning Basins. The diameter of the Inner Harbor Turning Basin will increase from 1,500 feet to 1,834 feet (334 feet total). The diameter of the Outer Harbor Turning Basin will increase from 1,650 feet to 1,965 feet (315 feet total).

These improvements will allow vessels to operate within the Oakland Harbor more efficiently and allow large vessels to call more frequently. The increase in cargo per vessel call yields economic benefits by allowing for more efficient use of containerships.

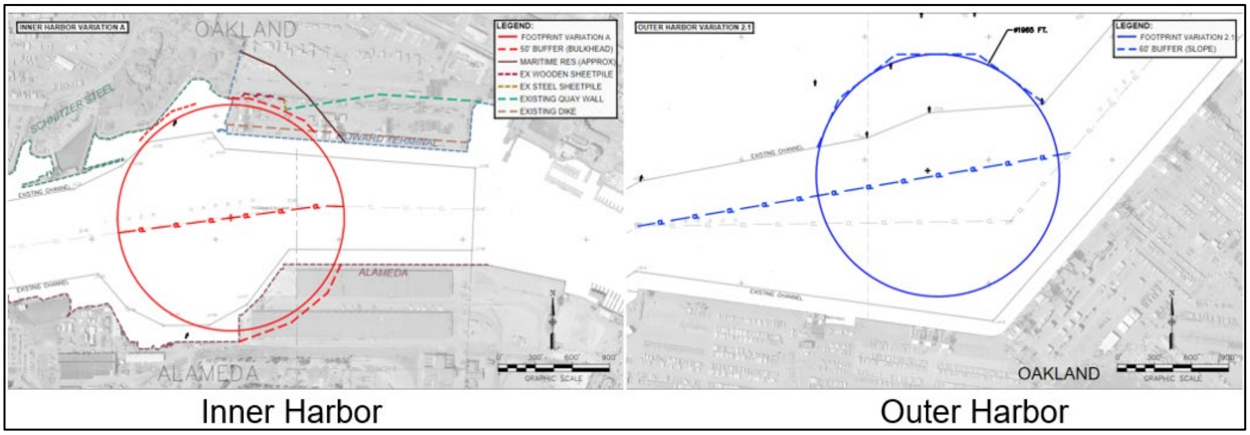

Figure 37: Recommended Plan

Widening the Inner Harbor Turning Basin will impact approximately 4.6 acres of fast land at the Alameda Site and approximately 2.8 acres of fast land at Howard Terminal. 4,500 existing piles will be demolished, and and a total of 2,380 linear feet of bulkhead will be constructed at Schnitzer Steel, Howard Terminal, and the Alameda Site. Four warehouse bays at the Alameda property would be impacted. Terrestial soils from the Inner Harbor will be transported to Class I or Class II landfill placement at Kettleman Hills landfill and Keller Canyon landfill, respectively.

Plan D-2 requires the removal and placement of approximately 2,400,000 cubic yards of aquatic dredged and terrestrial excavated material. An estimated 0.8 million cubic yards of material will be dredged from the Inner Harbor Turning Basin and 1.3 million cubic yards of material from the Outer Harbor Turning Basin. The Recommended Plan will beneficially place all eligible dredged material in compliance with 33 U.S.C. § 2326 (WRDA 1992 § 204(d)). Eligible dredged and excavated material will be transported to a beneficial use site, either Montezuma Wetlands Site or Cullinan Ranch, for the protection, restoration, or creation of aquatic wetland habitats, as either non-cover (wetland foundation or sub-surface material) or cover (wetland surface material) (Table 42). The opportunity to use dredged material for placement as cover material at a beneficial use site represents an increase in cost for the project. The beneficial use of dredged material beyond the Base Plan benefits the environment by keeping sediment in system, accelerating wetland accretion, and creating habitat for endangered species. The non-federal sponsor, The Port of Oakland, supports the beneficial placement of dredged material and is willing to share in the incremental cost above the Base Plan. As discussed above, the ASA(CW) approved the federal cost-share for beneficial use of all suitable dredged material as part of the navigation solution for the Oakland Harbor.

The Recommended Plan will beneficially place approximately 2.1 million cubic yards of dredged and excavated material contributing to the creation of approximately 205 acres of wetland. This would be consistent with placement at a deeply subsided restoration site, such as the currently permitted Montezuma Restoration Site. If another less subsided site becomes available and ready to accept material prior to construction, then the beneficial placement of material from Plan D-2 could accomplish a larger acreage of wetland restoration at a shallower placement depth. If other beneficial use sites become available and are permitted, they will be considered during preconstruction engineering and design.

Additionally, the Port of Oakland has requested to have electric dredges used for construction of the project, as a betterment to plan D-2, and are willing to pay 100% of the additional cost associated with this betterment. Electric dredges will decrease air-pollutant emissions in communities already disproportionately affected by air pollutant emissions. The USACE is fully supportive of the use of electric dredges as a construction betterment.

Consistent with current Port of Oakland practice, the turning basins are anticipated to be maintained by dredging every year. It is estimated the implementation of this plan to widen both the inner and outer turning basins would require an additional 93,000 cy of material to be removed every year as regular operation and maintenance of the turning basins.

Table 41: Dredge Volumes and Locations

Location	Estimated Volume (CY)
Inner Harbor Turning Basin	
Inner Harbor Area	143,000
Howard Terminal	212,000
Alameda	480,000
Total	835,000
Outer Harbor Turning Basin	
Outer Harbor	1,220,000
Total	1,220,000

Table 42: Recommended Plan Excavated and Dredged Sediment Quantities and Placement Assumptions

Material	Preliminary quantity (CY)	Placement location
Materials requiring Class I landfill placement -Inner Harbor materials potentially classified as hazardous -Terrestrial soils only, not aquatic dredge sediments	11,000	Kettleman Hills landfill
Materials requiring Class II landfill placement - Inner Harbor materials that are non-hazardous but not suitable for beneficial use foundation nor aquatic disposal at SFDODS	187,000	Keller Canyon landfill
Materials not suitable for aquatic placement at SFDODS - Also unsuitable for cover material at upland beneficial use site - Includes 370,000 CY Inner Harbor materials and 1,342,000 CY Outer Harbor materials	1,712,000	Upland wetland restoration[1] beneficial use site, foundation
Recyclable Materials - Excavated material, removed piles, and debris from warehouse demolition	343,000	Recycler
Materials suitable for unconfined aquatic disposal at SFDODS or cover material at upland beneficial use site - Clean material with chemical constituent concentrations and bioaccumulation characteristics at or below aquatic or wetland cover material screening criteria	454,000	Upland wetland restoration[1] beneficial use site, cover
TOTAL	2,707,000	

Material	Preliminary quantity (CY)	Placement location
[1]An upland beneficial use site is an approved aquatic ecosystem restoration site for the restoration of wetlands. An upland site, by definition, is a site located outside of the coastal zone and/or not within the proximity of a channel.		

5.2 Costs

The project first cost is used as the basis for providing the cost of the project for which authorization is sought. The project first cost includes the preconstruction engineering and design costs; construction costs, including mitigation costs; lands, easements, rights-of-way, and relocations; and contingencies. This cost does not include the cost of components treated as a betterment, such as the electrified dredging in plan D-2, because those costs are assumed by the non-federal sponsor. The economic cost is the monetary equivalent cost used in determining the benefit-cost ratio. The economic cost includes the project first cost and the opportunity costs of using the resource. Project first costs for Alternative D-0 – Base Plan and diesel dredges (NED Plan), Alternative D-1 – beneficial use and diesel dredges, and the Recommended Plan (D-2 – beneficial use and electric dredges) are shown in Table 43. The NED Plan for material placement is included in Table 43 for comparison against Alternatives D-1 and D-2. It is important to note that because the use of electric dredges as part of plan D-2 is considered an additional betterment requested and funded by the non-federal sponsor, those costs are non-project costs and excluded from the cost of plan D-2 and as such, the costs of plan D-2 are equivalent to the costs of plan D-1 in Table 43. The AAEQ costs for the Recommended Plan are presented in Table 44.

Table 43: First Cost of NED, Alternative D-0, Alternative D-1, and Alternative D-2

ACCOUNT		D-0 (NED Plan)	D-1	D-2[1] (Recommended Plan)
01	Lands and Damages	$61,790,000	$61,790,000	$61,790,000
02	Relocations	$1,706,000	$1,706,000	$1,706,000
06	Fish and Wildlife Facilities	$4,309,000	$4,309,000	$4,309,000
12	Navigation Ports and Harbors	$379,988,000	$382,403,000	$382,403,000
18	Cultural Resource Preservation	$0	$0	$0
30	Planning, Engineering and Design	$63,978,000	$64,374,000	$64,374,000
31	Construction Management	$27,060,000	$27,229,000	$27,229,000
Total Project First Costs		$538,831,000	$541,811,000	$541,811,000
Economic Costs[2]		$557,770,000		
October 2023 Price Level and discount rate of 2.75% [1] Note that D-2 does not present the $16,616,040 additional cost associated with the electric dredge betterment, which will be assumed by the non-federal sponsor. Therefore, the costs of alternative D-1 and D-2 are equivalent. [2]Includes first cost, interest during construction, and associated costs for NED Plan. Does not include placement costs of beneficial use or electric dredging.				

Table 44. Recommended Plan AAEQ Costs

	COST
Average Annual Equivalent Operation and Maintenance Cost	$1,105,000
Total Average Annual Equivalent Costs	$21,765,000
October 2023 Price Level and discount rate of 2.75%	

5.3 Economic Benefits

The Recommended Plan (D-2) involves widening the Inner Harbor turning basin and the Outer Harbor turning basin and would allow for more efficient operation of currently calling vessels and for the fleet to transition to larger vessels. This decreased transportation cost yields economic benefits. Because the use of electric dredges as part of Alternative D-2 is now considered an additional betterment requested and funded by the non-federal sponsor, those costs are a non-project cost excluded from the cost of plan D-2 and do not factor into the benefit cost ratio (BCR). The incremental costs of the beneficial use of dredged material also do not factor into the benefit cost ratio. As such, the AAEQ costs, AAEQ benefits, AAEQ net benefits, and BCR of plan D-2 would be equivalent to those of plan D-0. Plan (D-2) is estimated to produce $49.2 million in AAEQ benefits and $27.4 million in AAEQ net benefits with a benefit cost ratio of 2.3 (Table 45).

Table 45: AAEQ Benefits and Benefit-Cost Ratio

	COST OR BENEFIT
Total Average Annual Equivalent Costs	$21,765,000
Average Annual Equivalent Benefits	$49,186,000
Average Annual Equivalent Net Benefits	$27,421,000
Benefit Cost Ratio	2.3
October 2023 Price Level and discount rate of 2.75%	

5.4 Regional Economic Development, Environmental Quality and Other Social Effects

As discussed in previous sections, Plan D-2 would provide significant environmental quality benefits from the beneficial use of all suitable dredged material. The use of electric dredges as a betterment would further avoid construction-related air-pollutant emissions and the health risks associated with such emissions. These benefits are particularly important in the context of the West Oakland communities that surround the Port of Oakland and the proposed project areas which are disadvantaged and already disproportionally impacted by poor air quality. Moreover, the beneficial use associated with plan D-2 would result in hundreds of acres of wetland restoration and sea level rise resiliency benefits, avoided greenhouse gas emission reductions from operational efficiency gains at the Port, and short-term increases in local job opportunities during construction. Plan D-2 would deliver all this while providing average annual net benefits of approximately $27.4 million.

5.4.1 Importance of Avoided Air Quality Emissions and their Associated Health Impacts

The West Oakland community and its residents have endured poor air quality and poor health for decades. West Oakland has a significant number of sensitive receptors and a high cumulative air pollution exposure burden (see Section 3.13.2).

In addition to high air pollution exposure, the areas surrounding the Port of Oakland experience high incidences of poverty and high minority populations, making these locations communities of concern for environmental justice. An analysis of racial and income indicators from the United States Census Bureau's 2015-2019 American Community Survey was conducted for this feasibility study and found 12 of 14 (or 85% of) census tracts intersecting a one-mile radius of the proposed project areas are considered minority or minority and low-income environmental justice communities of concern. These census tracts all have greater than 50% minority population and two-thirds (8 tracts) also have meaningfully greater (10% points or higher) low-income population than the percentage of Alameda County as a whole. Similarly, based on data from the California Communities Environmental Health Screening Tool (2021), the West Oakland community is 75% non-white, with approximately 74% of the population living two times below the federal poverty level; 50% of the population over age 25 having less than a high school education; and in some CTs, up to 14% percent of the population over the age of 16 that is eligible for employment but unemployed.

Diesel emissions are of particular concern in West Oakland as health risks from ambient concentrations of DPM are much higher than the risks associated with any other TAC routinely measured in the West Oakland region.

The Port of Oakland has and continues to undertake efforts to reduce air pollution from its operations and improve air quality in the surrounding communities. Since 2009, the framework for the Port's Seaport-related air quality efforts has been the Maritime Air Quality Improvement Plan which established a vision, goals, strategies, and targets to reduce emissions from Seaport-related equipment sources. The Port and the maritime industry undertook large-scale emissions reductions programs and projects in pursuit of this goal and as a result, DPM emissions at the Port have decreased 81% since 2005, according to the Port's 2017 Seaport Emissions Inventory (Port of Oakland, 2019). In 2019, the Port published its Seaport Air Quality 2020 and Beyond Plan. The purpose of the "2020 and Beyond Plan" is to provide a common framework of goals and strategies to address air quality, community health risk, and climate change while moving towards a zero-emissions Seaport. The 2020 and Beyond Plan notes that, at present, diesel equipment operating at the Seaport is one of the sources of DPM emissions affecting West Oakland and contributes to greenhouse gas emissions. A primary goal of the plan is to reduce the combustion of diesel fuel from Seaport operations to address a source of health risk for people living nearby. It is intended to complement concurrent plans by regulatory agencies and organizations including *The West Oakland Community Air Action Plan*.

Given the disproportionate pollution exposure burden currently borne by the West Oakland community, and the efforts of the Port to continue reducing air quality, community health, and climate change impacts, the value of the avoided construction-related emissions from electric dredges as a construction betterment under plan D-2 cannot be overstated. The use of electric dredges as opposed to diesel powered dredges would result in substantially fewer emissions during construction of the project when compared to D-0 and D-1, including an estimated reduction in emissions of:

- Fine particulate matter ($PM_{2.5}$) by 50% (from 4 to 2 total tons);
- Particulate matter (PM_{10}) by 50% (from 4 to 2 total tons);
- Nitrous oxides (NO_x) by 31% (from 111 to 77 total tons); and
- Reactive organic gasses (ROG) by 67%. (from to 12 to 4 tons)

These reductions are not inconsequential. The tons of construction-related emissions avoided under Plan D-2 (relative to D-0 and D-1) would avoid the equivalent of years of emissions from the 1.4 million annual truck trips made by Oakland Seaport trucks, including:

- Over 8 years of DPM emissions by Seaport trucks 17
- An entire year of PM_{10} emissions by Seaport trucks;
- Over 2 years of $PM_{2.5}$ emissions by Seaport trucks; and
- Over a year of ROG emissions by Seaport trucks

Finally, these avoided emissions would also represent a very real benefit in terms of avoided health risk for surrounding communities and sensitive receptors. A Health Risk Assessment (HRA) conducted by the Port of Oakland is included as Appendix A04b of this IFR/EA. The Port's HRA was used to evaluate the estimated incremental increase in health risks from exposure to emissions of TACs and $PM_{2.5}$ associated with construction of the alternative plans under consideration. This assessment found that the Recommended Plan (D-2) provides substantially lower health risks (based on health hazard indicies associated with TACs such as lifetime cancer risk and chroninc and accute health hazard indicies) than Alternative D-1 (see Appendix A04b and Section 6.1 of this report). The reduced incremental health risks from the Recommended Plan (D-2) have associated economic value as well, including but not limited to the value of avoided medical costs and income loss.

5.4.2 Importance of Beneficial Use

The Recommended Plan (D-2) includes the placement of all suitable dredged material to restore hundreds of acres of wetlands around San Francisco Bay. These restoration benefits are of critical importance to the region in the context of resiliency to rising sea levels and consistent with the Administration's climate change priorities as described in EO 14008: Tackling the Climate Crisis at Home and Abroad and EO 13990: Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (2021). Beneficially using dredged material keeps sediment in the system to feed mudflats and marshes that ring the Bay. San Francisco Bay's wetlands and mudflats are the first line of

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17 Emissions have been adjusted from the re-released draft IFR/EA due to changes in equipment size and specifications such as horsepower, equipment age, and equipment turnover due to new regulations related to harbor craft such as tugs, dive boats, and barges; as well as changes in the equipment hours and horsepower related to tugs and dive boats based on additional discussions with equipment operators.

defense from sea level rise for many of the Bay's shoreline communities and for critical infrastructure. They are more resilient and adaptive than levees and seawalls, and they provide both cost-effective protection and many essential ecological and recreational benefits for the people of the Bay Area. The economic assets (like highways, sewage treatment plants and buildings) of the San Francisco Bay shoreline at risk from flooding due to climate change are valued at $100 billion dollars. There is broad scientific consensus that for much of the Bay's shoreline, wetlands provide the most effective and beneficial method to protect infrastructure from sea level rise and storm surge (Goals Project, 2015).

Bay wetlands and mudflats can grow vertically as sea level rises, which is what makes them so resilient. However, they need enough sediment (material carried by the tides) to do so. As sea level rises, the amount of sediment needed to maintain wetlands (current and restored) and mudflats at the right elevation will increase. New reports estimate that the Bay's wetlands and mudflats will need more than 450 million cubic yards of sediment between now and 2100 to maintain those we currently have, and areas purchased and slated for restoration. Even with an optimistic future of a wetter climate providing high sediment supply, under current watershed management approaches natural sediment supply will likely not come close to meeting the amount needed to maintain wetlands and mudflats until the end of the century. Much of the needed sediment for the wetlands could come from material dredged from the Bay's navigation channels (Dusterhoff et al., 2021). In a sediment starved system, beneficially reusing dredged material from federal channels for wetland restoration is mimicking a natural process that has been artificially impaired. This Engineering with Nature approach is a way to successfully execute the District's navigation missions while achieving multiple benefits for social and environmental outcomes.

While alternatives B, D-1, and D-2 assume beneficial placement of all suitable dredged material to protect, restore, or create aquatic wetland habitats in compliance with Section 204(d) of WRDA 1992, Alternative D-1 and the Recommended Plan (D-2), are estimated to provide the largest restoration benefit with the potential to restore approximately 205 acres of wetlands. This would be consistent with placement at a deeply subsided restoration site, such as the currently permitted Montezuma Restoration Site. If another less subsided site becomes available and can accept material prior to construction, then the beneficial placement of material from these plans could accomplish a larger acreage of wetland restoration at a shallower placement depth.

5.5 Comprehensive Benefits

As described at the beginning of this chapter, in February 2022 USACE requested an exception to the NED plan to allow the study to recommend the alternative that the study team identified as the Comprehensive Benefits Plan (CBP). The request included additional costs beyond the NED Plan for the use of electric dredges during construction to avoid air pollution and associated health effects in support of the Justice 40 Initiative established by EO 14008. It also included beneficial use of dredged material for ecosystem restoration.

The ASA(CW) partially granted this request in September 2022. The ASA(CW) approved the beneficial use of dredged materials for ecosystem restoration for federal cost share. However, the ASA(CW) did not approve cost share for the use of electric dredges during construction, finding that the use of electric dredges is more appropriately classified as a mitigation measure not required by federal law (because Federal Clean Air Act air quality standards are met without the use of electric dredging). The ASA(CW) did support the use of electric dredges as an approach that can be implemented if requested by the non-federal sponsor and if the sponsor is willing to assume the additional costs associated with using electric dredges. The Port of Oakland has indicated their desire to have electric dredges used for construction of the project as a betterment of plan D-2 and that they are willing to pay the additional costs associated with this betterment.

Therefore, plan D-2 is better characterized as widening both turning basins with cost-shared beneficial use of all suitable dredged material, and an additional betterment of electric dredging requested and funded by the non-federal sponsor. This plan (D-2) is carried forward as the environmentally preferred plan recommended under NEPA in Chapter 6.

5.6 Environmental Operating Procedures

The Environmental Operating Principles are an essential component of USACE's risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure. The Environmental Operating Principles are:

- Foster sustainability as a way of life throughout the organization
- Proactively consider environmental consequences of all USACE activities and act accordingly
- Create mutually supporting economic and environmentally sustainable solutions
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the USACE, which may impact human and natural environments
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE's actions in a collaborative manner
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities

Plan selection considered these principles to ensure the sustainability and resiliency of the Recommended Plan while considering the environmental consequences of implementation. In addition to the construction best management practices described in Chapter 6, such as those proposed for handling and transport of dredged material to maintain water quality standards, other opportunities to implement sustainable measures that are cost effective and comply with USACE construction standards will be further evaluated during the pre-construction engineering and design (PED) phase. If out-of-kind mitigation (e.g., vegetated wetlands) is warranted, planting plans will utilize native vegetation that support pollinator species, have a lower susceptibility to disease or pests, and are more adaptable to climate change. The study team considered avoiding and minimizing adverse impacts to existing environmental resources and cultural resources within the project area to the extent practicable during the plan formulation process. Where impacts to these resources are unavoidable, compensatory mitigation will be performed.

Continuous coordination with the Port of Oakland, the state of California, federal resource agencies, and the public occurred throughout the study to ensure an open and transparent process that respects views of individuals and groups. The project will be constructed in compliance with all applicable environmental laws and regulations.

5.7 Evaluation of Potential for Induced Growth

The Recommended Plan is designed to improve both the efficiency and safety of vessel movements, thereby creating the savings that are the main driver of national economic development benefits. However, this design does not include any elements that can a) remove any barriers to growth, b) shift cargo from one port to another, or c) increase the Port's container handling capabilities. Accordingly, waterway improvements like the one proposed here would not increase cargo throughput or induce growth.

For a container port, throughput is the amount of cargo that can pass through a port, measured in the amount of twenty-foot equivalent units (TEUs). A port's maximum practical throughput is called the terminal's container handling capacity, that is how many containers the terminal could handle given its size, configuration, and equipment. A terminal's capacity can be limited by 1) the number of vessels it can accept at a time ("berth-constrained") or 2) by how much cargo its landside facilities (e.g., container yard, truck gate, pumps, pipelines, and storage tanks) can handle ("yard-constrained").

The Recommended Plan's design to widen two turning basins would not address either of those two limiting factors because it cannot change the number of vessels able to berth at a single time, nor change the constraints of the yard. It is the landside developments, which would require project-specific environmental review, that would impact a port's container handling capacity. The Recommended Plan does not include those landside elements; therefore, the Port's capacity remains constant at approximately 5.6 million TEUs with this proposed project (Economics Appendix C).

Further, current landside operations include an appointment system and a comprehensive truck management plan to aid in the administration of cargo movement inside the Port. The Recommended Plan does not include plans to modify these systems, which are designed to enhance and support efficiencies in container deliveries and pickups (e.g., truck movements) and thereby, aiding reduction in truck related emissions on the local community.

As for commodity movement, the San Francisco Bay Conservation and Development Commission (BCDC) commissioned the development of the 2020 Tioga Report, incorporated by reference, to analyze future cargo expectations and the ability of the Bay Area ports', including the Port of Oakland, to modify capacity in service of future commodity demand. As explained in the 2020 Tioga Report, projected cargo volumes at the Port are determined by economic activity, specifically the volume of consumers served by the Port and the amount of goods that people buy and consume, both in the Bay Area itself and in the broader Central and Northern California market.

While the Port benefits from its geographic location near California's agricultural production centers, the Southern California ports have larger local and regional markets and greater rail network capacity for accessing the rest of the country. The Northwest and British Columbian ports have shorter distances to North Asia. This results in the Port of Oakland being a preferred gateway for exporters and supports its primary dominance as a last port of call before ships return to Asia. These geographical positions, with their advantages and disadvantages, are fixed despite any individual port improvements.

Further, the Port of Long Beach and Pacific Northwest Ports have recently begun plans for waterway improvements to improve both transit efficiencies and safety of large vessels. It is general practice for ships to visit multiple West Coast ports before leaving U.S. waters. For the reasons stated, the general practice and service rotation is for ships to visit Oakland after discharging large volumes of non-regional import cargo at other West Coast ports. The Port of Oakland, unlike its sister ports, is only maintained to 50ft MLLW, which limits the largest ships' ability to fully load cargo. Thus, only a fraction of a vessel's capacity is handled at Oakland, as exports are a much smaller percentage of international trade. This trend is expected to continue as the Port's geographic position is unchanged with the Recommended Plan.

The 2020 Tioga Report explains that import volumes are significantly affected by the development of new distribution centers such as Target and Walmart. Should companies like these choose to expand their centers in Northern California, which would require project-specific environmental review, it may drive cargo toward the Port rather than the Southern California ports. These business decisions are influenced by a confluence of factors but are generally driven by customer location. For exports, those are most heavily impacted by internationally trade issues, like tariffs or in the case of agriculture, environmental factors. Ultimately, the 2020 Tioga Report emphasized that the most impactful factors to either imports or exports are larger economic forces such as recessions, trade conflicts, and global events like the novel Coronavirus. Altering the size of the turning basin would not induce commodity movement and, as such, were not included in the 2020 Tioga Report's economic analysis.

In addition to not inducing commodity movement (i.e., growth), the Recommended Plan also does not impede it. Under a moderate growth scenario, by 2050, the 2020 Tioga Report forecasted that vessel calls would reach 29 weekly calls with a maximum container vessel size of 25,000 TEUs, similar to the current average of 28 weekly vessel calls. However, if the maximum vessel size was limited to 14,000 TEU, which is the current limit in the Inner Harbor Turning Basin, albeit with restrictions, the 2020 Tioga Report concludes that there would be 40 weekly vessel calls. This illustrates that the throughput accommodated by the Port can remain the same even in a future without project scenario. The number of vessel calls required to move the forecasted cargo would be expected to increase from 29 to 40 in a future without project scenario. Currently, the 2020 Tioga Report shows that the Port's terminals can accommodate all 40 vessel calls a week, or even 43 under the strong growth scenario. However, managing 40-43 vessel calls a week would max out berth availability, causing significant inefficiencies and delays, such as increased wait times for ships. Therefore, the Recommended Plan is neither growth inducing nor growth limiting because the Port could still manage to accommodate this level of future growth with a 14,000 TEU maximum vessel size future, albeit with restrictions, delays, and suboptimal navigational and environmental impacts.

This scenario also illuminates how the Recommended Plan produces efficiency when compared to the future without project scenario. The Port's ability to continue to handle less than 30 vessels a week rather than attempt to accommodate 40-43, allows for improved planning of ship and cargo movements. Even under the Report's low growth scenario for the Port, the Recommended Plan would still result in a reduction of idle times.

With greater transit windows (the time a vessel can depart or arrive at a berth) for container vessels exceeding 6,500 TEU, transit delays from larger vessels (which can impact the movement of all vessels) are minimized. As a result, a future with project can reasonably be expected to result in less emissions than a future without project.

Chapter 6: NEPA Environmental Effects Analysis*

This chapter presents the study's detailed environmental effects analysis, a primary component of the NEPA environmental assessment. The plan formulation process outlined in the preceding chapters of this document included the identification of a purpose and need for action (Chapter 1), the formulation, evaluation, and screening of a range of alternative measures and plans, and the identification of a final array of alternatives to be carried forward for further study. The alternatives in the final array are listed in 4.6.2 and include the no-action alternative (Alternative A); modification of the Inner Harbor Turning Basin (Alternative B); modification of the Outer Harbor Turning Basin (Alternative C); and modification of both turning basins (Alternative D). Alternative D has three sub alternatives that were carried forward for analysis under NEPA, D-1 involves the use of diesel dredges and D-2 involves the use of electric dredges. All action alternatives include the beneficial use of suitable dredged material for wetland restoration. Alternative D-2 is the agency's Proposed Action.

Alternatives Considered but not Carried Forward for Further NEPA Analysis

During plan formulation, the study team identified the NED Base Plan, D-0, which included disposal at the San Francisco Deep-Ocean Disposal Site (SFDODS) for materials that were estimated to be suitable for either unconfined aquatic disposal or cover material at upland beneficial use site. Approximately 455,000 cubic yards of the 2.4 million cubic yards proposed for removal would fall into this category. These materials would be from the Inner Harbor, as all Outer Harbor material is expected to be only suitable for beneficial use foundation and unsuitable for SFDODS or beneficial use cover. Materials suitable for beneficial use foundation are not suitable for SFDODS disposal.

Generally, placement at SFDODS is less costly than cover placement at upland beneficial use. However, it was established that the incremental cost, $8 per cubic yard, to place material at an upland beneficial use site as compared to placement at SFDODS was reasonable based on the environmental benefits to be achieved. The Assistant Secretary of the Army, Civil Works, approved the additional cost for beneficial placement in a September 6, 2022, memorandum.

For analysis of environmental considerations associated with disposal at SFDODS, Alternative D-0, see the EPA's Final Environmental Impact Statement for the Designation of a Deep Water Ocean Dredged Material Disposal Site off shore of San Francisco, California (August 1993) and the Final Environmental Assessment/ Environmental Impact Report for the Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay Fiscal Years 2015-2024, incorporated by reference. Should beneficial use placement become unavailable and SFDODS disposal becomes necessary, additional NEPA and other environmental compliance measures will be pursued, as appropriate. Therefore, D-0 is not further evaluated in this chapter.

Additionally, in response to comments received on the initial draft IFR/EA, an alternative of widening the outer harbor only with the use of electric dredges was considered, but ultimately eliminated from further analysis. This proposed alternative was not carried forward because Alternative C (outer harbor only) with diesel dredges or electric dredges, would not maximize navigational efficiencies. Moreover, from the Environmental Justice perspective, an Outer Harbor Only alternative, regardless of dredging method, would potentially leave those communities adjacent to the Inner Harbor out of the localized air quality benefits stemming from more efficient ship traffic.

The West Oakland communities are closer to the Inner Harbor, where the Port has 11 container berths. Port configuration and the location of terminal operators often determines which ships utilize which berths, therefore, regardless of their size, ships are generally contractually obligated to use either the Inner or Outer berths based on their cargo. The Port does not have meaningful flexibility in directing ships to either the Inner or Outer based on their size. Thus, it is important to address the vessel movement inefficiencies at both turning basins. Expected benefits from addressing those inefficiencies include reductions in marine air pollution sources that would be caused by ships idling and waiting resulting in longer transit times in absence of the proposed project.

Environmental Effect Analysis

The analysis in this chapter includes evaluation of the potential effects to the environment associated with the Proposed Action (Alternative D-2) and the other action alternatives in the final array, in comparison to the no Action alternative. The objective of the environmental effects analysis is to analyze whether the implementation of the action alternatives would significantly affect the quality of the environment. Analysis of the no action alternative is required under NEPA to provide a comparative baseline against which other alternatives can be evaluated. In this case, under the no-action alternative, there would be no modifications to any turning basin to address navigation inefficiencies. This would be expected to over time result in the future without-project transportation and economic conditions described in Chapter 2:of this Integrated Report. The existing conditions of the environmental resources in the study areas are described in Chapters 2 and 3 of this integrated report. Unless otherwise noted below in the description of the no action alternative within a given resource section, the existing conditions of the environmental resources in the study areas would be expected to persist under the no action alternative as future without-project conditions. This assessment uses the following categories to ascribe significance to the potential impacts of the action alternatives:

- No impact would result if there is no overlap between the resource and areas impacted by project activities;
- A beneficial impact would generally be regarded as an improvement over the no action alternative;
- A negligible impact would cause a slight adverse change in the environment, but one that generally would not be noticeable;
- A less-than-significant impact would cause an adverse change in the environment that would likely be noticeable but does not meet or exceed the defined significance criteria; or an impact that would be potentially significant, but avoidance and minimization measures or mitigation developed for the project would reduce such impacts to a less than significant level.

The scope of the effects analysis is limited in time and space by the reasonably foreseeable impacts of the alternatives. The primary action areas for this analysis include the existing

Inner Harbor Turning Basin, Outer Harbor Turning Basin, and adjacent aquatic areas; fast lands in the vicinity of the Inner Harbor Turning Basin (including at Howard Terminal and a portion of the Alameda waterside); and the proposed construction staging areas and access routes. For certain potential effects, such as those related to ambient noise and air quality conditions, the analysis extends to the surrounding communities of West Oakland and Alameda. Construction activities associated with the action alternatives are expected to take place over a maximum of three years. This analysis assumes that three-year period would range from 2027 to 2029.

The action alternatives would not change the projected cargo throughput that would come into the Port; the throughput would remain the same as forecasted under future without-project conditions (as described in Section 2.2**.** And Section 5.7). Similarly, maintenance dredging under the action alternatives would remain wholly similar to current maintenance dredging for the federal channels at Oakland Harbor. For analysis of environmental considerations associated with USACE O&M dredging of Federal channels in San Francisco Bay, including Oakland Inner and Outer harbors, see the Final Environmental Assessment/ Environmental Impact Report for the Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay Fiscal Years 2015-2024 (USACE, 2015) which is incorporated by reference (2015 EA/EIR). The annual O&M dredging volume for the federal channels at the Port of Oakland (including Inner and Outer Harbors and their turning basins) is described in the 2015 EA/EIR as up to 1,055,000 cy per year (USACE, 2015). However, average annual O&M dredging for the Port of Oakland is generally between 500,000 and 700,000 cy. The analysis for this study forecasts an additional approximately 93,000 cy of O&M material would need to be dredged annually if both turning basins are widened. This is less than 10% of the maximum annual volume of O&M material from Oakland Harbor analyzed in the 2015 EA/EIR. Based on the average annual volume range (500,000-700,00) and the maximum conservatively assumed in the 2015 EA/EIR, the total annual O&M dredging volume at the Port of Oakland with the addition of the maintenance volume from widening both turning basins would remain well within the range analyzed in the EA/EIR. Therefore, maintenance dredging at Oakland Harbor, and the effects of that dredging, would remain the same as described in the 2015 EA/EIR. While the 2015 EA/EIR provides coverage for the USACE O&M dredging program through 2024, a new multi-year EA/EIR will be prepared for coverage of the USACE O&M dredging program for 2025 – 2034 and will be completed prior to construction of a project authorized in accordance with this study.

Given that cargo throughput would not be changed by the action alternatives and that addition O&M dredging volume is well within the range considered and covered under the existing 2015 EA/EIR (USACE, 2015), operational effects associated with cargo throughput and maintenance dredging are not discussed further in this NEPA analysis.

6.1 Environmental Justice

Section 3 identified census tracts within a 0.5-mile and 1-mile radius of each of the turning basins defined as environmental justice communities based on their minority population and income characteristics.

In conducting the environmental justice analysis, the project team has held a series of meetings, inviting the local West Oakland communities to discuss the Recommended Plan and obtain their input. USACE and the Port held community stakeholder engagement meetings in August 2021, and January 2022. In addition, the team presented to the Prescott and Acorn neighborhood councils and held question and answer sessions with attendees in March and April 2022. The EPA hosted teleconference with the West Oakland Environmental Indicators Project Group and USACE in May 2022. An in-person/virtual hybrid meeting focused on environmental justice input from the community was held in West Oakland in February 2023 and a virtual public meeting was held in May 2023 after the re-release of the revised draft IFR/EA. Another virtual meeting with the West Oakland Environmental Indicators Project Group, the Port, and USACE occurred in September 2023. . The Port held additional meetings with the community as part of the CEQA process. In-person CEQA meetings were held October 25, 2023 and November 14, 2023. Virtual meetings were held November 6 and November 7, 2023. Information and input from thesemeetings are integrated into the analysis below.

This environmental justice effect analysis evaluates whether the action alternatives would result in a disproportionately high, significant adverse effect on environmental justice communities of concern.

An alternative would have a significant impact on environmental justice communities if it resulted in:

- Substantial adverse human health or environmental resource impacts that disproportionately harm low-income communities and/or minority environmental justice communities.[18]

Expansion of either of the turning basins would improve operational efficiency for vessels entering and exiting the Port, but there would be no change in the Port's overall volume of freight from projected volumes under the future without-project condition (as described in Section 2.2). Given this, the environmental justice effect analysis herein focuses on the short-term effects from construction activities associated with the action alternatives.

The potential for construction activities to result in adverse environmental justice impacts depends on the geographic relationship of the construction impacts to the environmental justice communities of concern. To evaluate potential environmental justice impacts, this environmental justice analysis summarizes the findings of other impact analyses completed for the study and the potential for those impacts to be both substantial (significant) and disproportionately borne by environmental justice communities. These analyses are described in detail in subsequent sections of this Chapter.

The primary environmental resources with impacts that have the potential to effect environmental justice communities in study area are air quality (Section 6.13), noise/vibration (Section 6.15), and transportation (Section 6.10). When considering resource impacts such as those to air quality that may contribute to conditions over a wider area, the nine CTs within 1-mile of the turning basin sites that were determined to be environmental justice communities in Chapter 3 are relevant. Additionally, as discussed in Section 3.13.2, air pollutants can contribute to human health impacts. To further analyze the potential health

[18] Disproportionate effects, as defined by EO 12898, describe situations where there exists significantly higher and more adverse health and environmental effects on minority populations, low-income populations or indigenous peoples.

effects of the action alternatives, a Health Risk Assessment (HRA) was prepared by the Port in accordance with CEQA and is included as Appendix A04b to this IFR/EA for informational purposes. It should be noted that based on input on the re-released draft IFR/EA, some modifications in modeling assumptions used for air emissions calculations and associated products such as the Port's HRA were made.[19]

Adverse impacts to other resources are expected to occur immediately within or adjacent to the construction areas and otherwise would not pose a potential disproportionate impact to environmental justice communities (e.g., biological resources, sediments and soils, and water quality), therefore they are not discussed further in this section. While recreation and cultural resources are relevant resources for the identified environmental justice communities, no potentially significant cultural or recreational impacts from the project were identified (see Sections 6.7 and 6.9); consequently, no resulting environmental justice impacts for these resources would occur and they are also not analyzed further in this section. Lastly, no residential relocations within the identified environmental justice communities are expected to occur as a result of the proposed action. Impacts to housing are discussed in Section 6.2 and will not be analyzed further in this section.

6.1.1 Inner Harbor Turning Basin Expansion

As described in Section 3.1.2, two of the four CTs within a 0.5-mile radius of the Inner Harbor Turning Basin were identified as environmental justice communities of concern. West Jack London Square (CT 9820) is a minority environmental justice community of concern and West Alameda (CT 4827) is considered both a low-income and minority environmental justice community of concern. Nine additional CTs within 1 mile of the Inner Harbor Turning Basin are environmental justice communities. The following analysis evaluates whether expansion of the Inner Harbor Turning Basin (Alternative B) would result in a substantial adverse impact that disproportionately effects these environmental justice communities of concern.

Air Quality

Expansion of the Inner Harbor Turning Basin would involve both dredging and landside construction to widen the Inner Harbor Turning Basin (see Figure 37 in Chapter 5); under this alternative, dredging would be conducted using diesel-fueled equipment. As described in Section 6.13, construction emissions under this alternative would not exceed federal Clean Air Act *de minimis* thresholds for ozone precursors or particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), the two criteria pollutants for which the Bay Area is classified

19 Changes to the air emissions modeling and associated products include: (1)Changes in equipment size and specifications such as horsepower, equipment age, and equipment turnover due to new regulations related to harbor craft such as tugs, dive boats, and barges; (2) Changes in the equipment hours and horsepower related to tugs and dive boats based on additional discussions with equipment operators; (3) Refinements to emissions allocations and spatial changes in air dispersion modeling in the HRA; (4) Refinement in future operational emissions; and (5) Inclusion of emissions associated with electrical dredging to avoid brown-outs for Alternative D-2.

as being in nonattainment[20,21] with respect to federal ambient air quality standards. Under the federal Clean Air Act Conformity regulations, when an action's emissions are below the applicable *de minimis* levels for the area in which it will take place, it is considered not to substantially contribute to air quality degradation nor conflict with a State Implementation Plan to achieve National Ambient Air Quality Standards. Therefore, the air quality impacts of this alternative are considered less than significant with respect to the federal Clean Air Act.

The finding that this alternative would have less than significant $PM_{2.5}$ emissions is particularly relevant in the context of environmental justice effects because, as discussed in Section 3.13.2, West Oakland experiences a high cumulative air pollution exposure burden to DPM and other air pollutants, such as $PM_{2.5}$, which contribute to human health impacts. The HRA prepared by the Port is included as Appendix A04b to this IFR/EA for informational purposes and its resulats are summariezed herein.

The HRA estimates exposure to $PM_{2.5}$ as well as excess lifetime cancer risk and chronic and accute non-cancer Hazard Indicies (HI) associated with TACs (including DPM) across the study area under each of the action alternatives. The HRA maps the distribution of $PM_{2.5}$ concentration and excess lifetime residential cancer risk in three general work areas: the Outer Harbor near Berth 26 and Berth 10; Howard Terminal at the northern portion of the Inner Harbor; and Alameda near the southern portion of the Inner Harbor.

For each alternative, the HRA also describes the estimated lifetime excess cancer risk at maximally exposed existing or planned residential receptors. On the Oakland side of alternatives involving widening of the Inner Harbor Turning Basin (B, D-1, and D-2), this location is estimated to occur near Howard Terminal at the existing Phoenix Lofts. On the Alameda side of alternatives involving widening of the Inner Harbor Turning Basin the HRA evaluates lifetime excess cancer risk at both a maximially exposed existing residential location at Mosley Avenue and Monterey Circle and at a maximally exposed planned residential construction at Bay 37. For the Outer Harbor Turning Basin only widening alternative (C), this maximally exposed residential receptor is estimated to occur at an existing residence at 9th Street and Pine Street. Similarly, the HRA describes the estunated PM 2.5 concentration at the maximially exposed location under each alternative. For alternatives involving widening of the Inner Harbor Turning Basin, this location is at Berth 10 near the Outer Harbor, and for the Outer Harbor Turning Basin only widening alternative, it occurs at Berth 26 near the Outer Harbor. Finally the HRA describes the worker lifetime excess cancer risk and the chronic and accute health hazard index levels at maximially exposed locations under each alternative. For alternatives involving widening of the Inner

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[20] The USEPA classifies air basins (or portions thereof) as "attainment" or "nonattainment" for each criteria air pollutant, based on whether the National Ambient Air Quality Standards have been achieved. The nonattainment designation applies to any area that does not meet (or that contributes to air quality conditions in a nearby area that does not meet) the national primary or secondary air quality standard for a National Ambient Air Quality Standard.

[21] On January 9, 2013, USEPA issued a final rule, determining that the San Francisco Bay Area Air Basin (SFBAAB) has attained the 24-hour $PM_{2.5}$ national standard. This rule suspends key State Implementation Plan requirements as long as monitoring data continue to show that SFBAAB attains the standard. Despite this USEPA action, SFBAAB will continue to be designated as "nonattainment" for the national 24-hour $PM_{2.5}$ standard until the Bay Area Air Quality Management District submits a "redesignation request" and a "maintenance plan" to USEPA, and USEPA approves the proposed redesignation.

Harbor Turning Basin, this loction is on the Alameda side of the Inner Harbor, all at the Alamada warehouses immediately adjacent to the turning basin and for the Outer Harbor Turning Basin only widening alternative these locations are immediately adjacent to that turning basin between Berths 26 and 10.

All of these locations fall in census tracts identified as environmental justice communities of concern (West Jack London Square (CT 9820) on the Oakland side of the inner harbor, West Alameda (CT 4287) on the Alameda side of the the Inner Harbor, and West Clawson (CT 4017) at the Outer Harbor), however it should be noted that the portion of the West Clawason CT within a mile of the Outer Harbor is non-residential Port industrial area. The HRA compares the values for lifetime excess cancer risk, $PM_{2.5}$, and health hazard indicies at these locations against BAAQMD local thresholds for lifetime excess cancer risk, chronic and accute (non-cancer) health hazard indexs, and $PM_{2.5}$ to evalutate the potential health effects.[22]

For the Inner Harbor Turning Basin expansion (Alternative B), the HRA analyzed both an unmitigated emissions scenario, and a mitigated scenario including use of Tier 4 engines for off-road construction equipment (as described in section 6.14 and Appendix A7). For the unmitigated scenario, the lifetime excess cancer risk at the maximally exposed individual residential receptor and exposed worker loactions on the Oakland and Alameda sides of the Inner Harbor described above are shown in Table 11 and Figure 11 in Appendix A04b. The maximum chronic health index value (Table 17 and Figure 15 in Appendix A04b), maximum acute health index value (Table 18 and Figure 16 in Appendix A04b) and maximum $PM_{2.5}$ concentration (Table 8 and Figure 19 in Appendix A04b) at the aforementioned maximum exposure locations associated with Inner Harbor Turning Basin widening are described as well. Under this uncontrolled (i.e., unmitigated or without reduction measures) emission scenario, lifetime excess cancer risk, maximum chronic health index, and maximum $PM_{2.5}$ at all the maximum exposed locations were estimated to be abovethe respective BAAQMD local thresholds, while the maximum accute health index was below the BAAQMD local threshold. Figure 11 in Appendix A04b depicts boundaries corresponding to where lifetime excess cancer risk is estimated to be above certain levels. The area of estimated exposure level above the BAAQMD's local significance threshold for lifetime cancer risk of 10 in a million is shown in dark teal on the figure. The figure shows that excess lifetime cancer risk rapidly decreases as receptors are located farther from the proposed construction activity associated with this alternative. The area exceeding this threshold in the unmitigated scenario extends into both the West Alameda (CT 42870) and West Jack London Square (CT9820) environmental justice census tracts. Figure 19 in Appendix A04b shows the distribution of $PM_{2.5}$ concentration under this unmitigated scenario and shows a similar pattern of decrasing concentration with distance from the proposed construction activity, but with a more limited area around the Inner Harbor experiencing $PM_{2.5}$ concentrations above the BAAQMD threshold of 0.3 migrograms/cubic meter (ug/m^3) and nonresidential areas of the West Clawson CT at the Outer Harbor also exceeding the threshold.

[22] There are no criteria recommended by the USEPA for the evaluation of cancer risk and health impacts; however, the HRA is provided for informational purposes.

While the HRA evaluated the unmitigated scenario, as described in section 6.14 and Appendix A7, all alternatives would incorporate minimization measures for fugitive dust and require use of Tier 4 engines for off-road construction equipment. The HRA analyzed emissions for the Inner Harbor Turning Basin expansion (Alternative B) with the Tier 4 engine minimization measure as well. Under this mitigated scenario, lifetime excess cancer risk at the maximally exposed individual residential receptor and exposed worker loactions on the Oakland and Alameda sides of the Inner Harbor are shown in Table 12 and Figure 12 in Appendix A04b. The maximum chronic health index value (Table 17 and Figure 15 in Appendix A04b), maximum acute health index value (Table 18 and Figure 16 in Appendix A04b) and maximum PM2.5 concentration (Table 8 and Figure 20 in Appendix A04b) at the aforementioned maximum exposure locations associated with Inner Harbor Turning Basin widening are described as well.

Under this mitigated scenario, lifetime cancer risk and $PM_{2.5}$ exposure, and chronic and acute helth indicies levels are substantially reduced at the maximally exposed receptor locations, as are the extents of the zones where lifetime cancer risk and $PM_{2.5}$ exceed the respective local thresholds. Lifetime excess cancer risk at the Phoenix Lofts (Oakland side of the Inner Harbor) and for exposed workers would be reduced to below and just at the local BAAQMD threshold respectively, and both the chronic and accute health index values at the maximum exposed location on the Alameda side would be below their BAAQMD thresholds under this scenario. Lifetime excess cancer risk at the exisitng residential receptor on the Alameda side would be reduced to just above the threshold and the excess cancer risk at the planned residences at Bay 37 on the Alameda side would be reduced from the unmitigated scenario, but remain higher than the BAAQMD threshold. Similarly, the maximum $PM_{2.5}$ at Berth 10 would be greatly reduced from the unmitigated scenario, but remain above the local BAAQMD threshold. Importantly, as shown in Figure 12 and Figure 20 in Appendix A04b, the extent of the zones where lifetime excess cancer risk and $PM_{2.5}$ are estimated to be above the respective BAAQMD local thresholds would be greatly reduced under this mitigated scenario. The extent of $PM_{2.5}$ exceedence would be limited to non-residential areas immediately adjacent to the turning basins and the extent of lifetime excess cancer risk above the threshold would be similarly limited to mostly non-residential areas as well, particularly in West Jack London Square. Moreover, these emission impacts would be temporary, and would cease at the completion of construction.

While the HRA evaluates short-term construction emissions, this alternative would also produce long term vessel operation efficiencies when compared to the future without project scenario. As a result of reducing transit delays under this alternative, vessel idling would be reduced compared to the No Action Alternative, and therefore emissions associated with some of the vessel idling that would have otherwise occurred without the Project, would be avoided. For example, according to Table 66 idling hours from tugs and containerships under this alternative would be 225 hours less over the lifetime of the Project relative to the future without project condition. A beneficial reduction in emissions from this reduced idling under the action alternatives relative to the No Action Alternative is illustrated with GHG emissions in the GHG analysis presented in Section 6.14. Similarly, as an illustrative example, assuming a container ship produces 1.1 tons of Diesel PM_{10} per day[23], a reduction of 225 hours of idling could correspond to a reduction of approximately 10.3 tons of Diesel PM_{10} relative to the no action alternative over the life of the project.[24] Additionally, a reduction in air pollutant emissions from vessel operations can be expected due to changes in vessel fleet and resulting decrease in ship calls. This reduction in DPM would be expected to have associated health benefits in the vicinity of the Port and surrounding communities.

Given that air pollutant emissions from construction, including $PM_{2.5}$ would be below *de minimus* thresholds and temporary, and the potential health effects would be further reduced by the Tier 4 engine requirement and fugitive dust minimization measures that would be applied to this alternative, and considering the long-term operational air pollutant emission reduction from vessel transit efficiencies, environmental justice impacts related to air quality would be less than significant for the Inner Harbor Turning Basin Expansion Alternative.

Noise and Vibration

The Inner Harbor Turning Basin Expansion could result in increased noise levels in the West Alameda (CT 42870) and West Jack London Square (CT9820) environmental justice communities. However, the magnitude of these impacts would be less than significant and would not constitute a substantial impact. Moreover, vibration effects are expected to be less than significant.

Noise-sensitive receptors are identified in Section 3.15.4 and occur between 200 and 2,000 feet from the proposed new perimeter of the Inner Harbor Turning Basin. These receptors fall in the above-mentioned environmental justice communities. Beyond 2,000 feet, project-related construction noise levels would generally decrease to ambient urban noise levels due to distance and intervening structures.

Section 6.15.2 describes the noise effects of the Inner Harbor Turning Basin Expansion Alternative and concludes that daytime construction noise levels at the nearest sensitive receptors would remain below the Federal Transit Administration's construction noise criteria for residential receptors. More specifically, noise from project construction activities would not exceed the 90-dBA (A-weighted decibel) daytime criterion or the 80-dBA nighttime criterion (during nighttime dredging activities) at the nearest sensitive receptors. Further, since this is an active Port and turning basin, the noise impacts are not expected to significantly different than the baseline. Additionally, traffic noise would remain below designated traffic noise significance thresholds without mitigation in all areas except along one portion of main street in Alameda. Exceedance of this threshold would be mitigated by a limit on haul trucks to no more than 23 truck trips per hour for hauling operations entering or egressing the Alameda work site. With this mitigation, construction noise impacts would be less than significant. The vibration analysis in Section 6.15.2 also determined that this alternative's construction vibration impacts would be well below Federal Transit Administration criteria for damage to structures and therefore are determined to be less than significant. Given that no substantial adverse noise or vibration effects would occur in

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23 Emission factor from CARB Draft Technology Assessment: Ocean-Going Vessels (2018) Table II-11for container vessels.

24 Calculated as (225 hours of idiling reduced)/(24hours/day)*(1.1 tonsof Diesel PM_{10} emitted/day)

environmental justice communities, this alternative's noise and vibration effects on environmental justice would be less than significant.

Transportation

There would be a temporary increase in traffic on local roads in and around the Port during the 2.5-year construction period for the Inner Harbor Turning Basin expansion alternative. As further discussed in Section 6.10, the increase is expected to be minor relative to existing daily traffic. Traffic increases would only represent approximately 1 percent to 18 percent of the existing average daily traffic on all roadway segments along the proposed access routes. This would add a maximum of approximately 110 vehicles per hour during the peak hour. Construction traffic would not exceed existing capacity on any roadways. The increase in traffic is also not expected to substantially affect overall circulation. There may be local effects along the roadways closest to the construction sites. The project would implement a construction traffic control plan to minimize the effects of project-related construction traffic on traffic, transit, bicycle, and pedestrian circulation, as well as emergency access. By doing so, there would be less than significant traffic impacts throughout the study area, including to the environmental justice communities

6.1.2 Outer Harbor Turning Basin Expansion

One of the two census tracts within the 0.5-mile radius study area from the Outer Harbor Turning Basin, West Clawson (CT 4017), was identified as an environmental justice community of concern. No additional census tracts fell in the 1-mile radius (see Section 3.1). The following analysis evaluates whether expansion of the Outer Harbor Basin (Alternative C) would result in a substantial adverse impact that disproportionately effects this environmental justice communities of concern.

Air Quality

The Outer Harbor Turning Basin expansion (Alternative C) would involve dredging to widen the existing turning basin; no land areas would be impacted. Based on the air quality analysis in Section 6.13, construction emissions under this alternative would not result in ozone precursor, $PM_{2.5}$ precursor, or direct $PM_{2.5}$ emissions that exceed the corresponding *de minimis* levels. Therefore, the air quality impacts of this alternative are less than significant with respect to the federal Clean Air Act.

As described in the "Air Quality" subsection for the Inner Harbor Turning Basin Expansion (Section 6.1.1, above), the HRA analyzed lifetime excess cancer risk, $PM_{2.5}$, and health hazard indicies under both an unmitigated and mitigated emission scenairo for the Outer Harbor Turning Basin expansion (Alternative C). Lifetime excess cancer risk is described in Table 13 and Figure 13 in Appendix A04b for the unmitigatged scenario and in Table 14 and Figure 14 for the mitigated scenario. Maximum $PM_{2.5}$ concentration for this alternative is shown in Table 8 for both the unmitigated and mitigated scenairos and mapped in Figure 21 (umitigated) and Figure 22 (mitigated) in Appendix A04b. Maximum chronic health index is shown in Table 17 and Figure 15 in Appendix A04b and maximum acute health index value is depicted in Table 18 and Figure 16 in Appendix A04b.

The maximum exposure locations associated with Outer Harbor Turning Basin are adjacent to the turning basin at or near Berth 26 and at an existing residential receptor at 9th Street and Pine Street. The HRA found that while values would be lower with the Tier 4 engine mitigation, under both the mitigated and unmitigated scenarios, this alternative would not be expected to exceed local BAAQMD thresholds for excess lifetime cancer risk at maximal residential and worker locations or the chronic and accute non-cancer health hazard indicies at the maximum exposed location. Both secnarios would exceed the $PM_{2.5}$ threshold at the maximum exposed location at Berth 26, but only very minimally under the mitigated scenario. The area indicating where estimated exposure level exceeds the BAAQMD's local significance threshold for lifetime cancer risk is shown in dark teal on Figure 13 in Appendix A04b for the unmitigated scnario and extends into the West Clawson CT, but only in an area of Port industrial property where community members would not reside. The area is further reduceced in Figure 14 under the mitigated scanario and remains completely offshore of the West Clawson CT. The extent of $PM_{2.5}$ exceedence shown in Figure 21 (unmitigated) and Figure 22 (mitigated) would be limited to offshore or a very small non-residential zone immediately onshore of Berth 26 under both the scenarios for this alternative.

As with all the alternatives, these emission impacts would be temporary, and would cease at the completion of construction.

Like the Inner Harbor Turning Basins expansion, this Alternative would produce long term vessel operation efficiencies when compared to the future without project scenario. According to Table 66, idling hours from tugs and containerships under this alternative would be 1,626 hours less over the lifetime of the project relative to the future without project condition. Using the same illustrative example described above for Alternative B, this decrease in idiling hours could result in a reduction of approximately 74.5 tons of Diesel PM_{10} relative to the no action alternative over the life of the project. Similarly, a reduction in air pollutant emissions from vessel operations can be expected due to changes in vessel fleet and resulting decrease in ship calls. This reduction in DPM would be expected to have associated health benefits in the vicinity of the Port and surrounding communities.

Given that air pollutant emissions from construction, including $PM_{2.5,}$ would be below *de minimus* thresholds and temporary, the HRA assessment metrics other than for $PM_{2.5}$ would be below local thresholds, the $PM_{2.5}$ exceedances would be very low under the mitigated scenario and limited to a small industrial area just onshore of Berth 26, and with the long-term operational air pollutant emission reduction from vessel transit efficiencies, environmental justice impacts related to air quality would be less than significant for the Outer Harbor Turning Basin Expansion Alternative.

Noise and Vibration

Construction activities for the Outer Harbor Turning Basin would only require dredging, and no pile driving activity is proposed. The nearest noise-sensitive land use to the Outer Harbor Turning Basin would be single-family residences on Pine Street, approximately 1 mile to the east where noise from dredging activity would not be perceptible. Thus, there would be no noise or vibration impacts from construction of this alternative and no environmental justice impacts from noise or vibration under this alternative.

Transportation

Overall land-based transportation impacts would be substantially less than those of the Inner Harbor Turning Basin expansion (Alternative B) because there is no landside construction activity. Worker commute trips may use local roads through residential areas during the 8 month total construction period, but these trips would be negligible in the context of area average daily traffic volumes. This alternative would include the same traffic control plan minimization measure as described for the Inner Harbor Turning Basin expansion alternative. Thus, expansion of the Outer Harbor Turning Basin would not result in significant effects on land-based transportation. Consequently, the corresponding environmental justice impacts resulting from traffic generated by construction activities would be less than significant under this alternative.

6.1.3 Inner Harbor and Outer Harbor Turning Basin Expansion

The environmental justice communities of concern for alternatives involving the expansion of both turning basins (Alternatives D-1 and D-2) would be the same as those described individually for the Inner and Outer Harbor Turning Basin only alternatives including West Jack London, West Alameda, and West Clawson. The following analysis evaluates whether alternatives involving expansion of the Inner and Outer Harbor Turning Basins (D-1 and D-2) would result in a substantial adverse impact that disproportionately effects these environmental justice communities of concern.

Air Quality

Sub-alternative D-1 involves expansion of both the Inner and Outer Harbor Turning Basins with dredge equipment powered by diesel fuel whereas Sub-alternative D-2 (Proposed Action) involves expansion of both turning basins with dredge equipment powered by electricity. Because the difference in power source would cause a difference in emissions, potential air quality effects to environmental justice communities are described separately for each sub-alternative. However, the results for carbon monoxide in Table 68 of the GHG section of the Report and table 3.3-10 of the October 2023, Oakland Harbor Turning Basins Widening, Draft Environmental Impact Report (EIR), published by the Port of Oakland, show air pollutant emissions reductions from in-water vessel calls in all criteria pollutants for a future with project when compared to a future without project. Specifically, the Draft EIR found that in 2050, a future with project would amount to, in tons per year, 96 Reactive Organic Gases compared to 111, 196 CO compared to 218, 1,531 NO_x compared to 1,721, 87.0 SO_x compared to 95.9, 17 DPM compared to 19, 28 PM_{10} compared to 31, and 25.9 $PM_{2.5}$ compared to 28.5. Therefore, both D-1 and D-2 would reduce air quality impacts from marine vessels.

6.1.4 Diesel Dredging Variation (Alternative D-1)

Construction emissions under Sub-alternative D-1 would not result in the emissions of ozone precursors or $PM_{2.5}$ that exceed the corresponding *de minimis* levels. Therefore, the air quality impacts of this alternative are less than significant with respect to the federal Clean Air Act.

Dredging activities associated with the expansion of the Outer Harbor Turning Basin would 1) result in very minimal increase in lifetime health impacts to the nearest Outer Harbor sensitive receptors, 2) would take place more than 1 mile from the sensitive receptors impacted by the Inner Harbor Turning Basin expansion, and 3) would minimally contribute to the health risk effects at these Inner Harbor turning receptors. Therefore, the health risk impacts of Sub-alternative D-1 are most like those described for the Inner Harbor Turning Basin expansion (Alternative B) above. However, the HRA treated Sub-alternative D-1 as the unmitigated scenario for Sub-alternative D-2 and therefore only evaluated a scenario for Sub-alterative D-1 without the implimentation of the Tier 4 engine mitigation measure. Thus, the values in the HRA for Sub-alternative D-1, are reflective of the unmitigated scenario for Alternavie B (Inner Harbor Turning Basin Widening) with additon from the unmitigated Alternative C (Inner Harbor Turning Basin Widening).

As with the Inner Harbor Turning Basin Widening (Alternative B), under Sub-alternative D-1, the maximally exposed existing and planned residential receptor locations for lifetime excess cancer risk were those on the Oakland and Alameda sides of the Inner Harbor (Table 15 and Figure 9 in Appendix A04b), the maximum worker excess cancer risk and non-cancer health indicies were at the Alameda warhouses (Table 17 and Figure 15 for chronic and Table 18 and Figure 16 for accute in Appendix A04b), and the maxim $PM_{2.5}$ concentration is at Berth 10 by the Outer Harbor (Table 8 and Figure 17 in appendix A04b). Because the HRA treated Sub-alternative D-1 as an unmitigated scenario, the values for the evaluated HRA metrics at these locations are generally slightly higher or equal to the metric values for the unmitigated Inner Harbor Turning Basin Widening (Alterative B) scenario. The only metric that does not follow this trend is $PM_{2.5}$ concentration which is slightly lower under the Sub-alternative D-1 scenario than under the unmitigated Alternative B scenario. All metrics except the acute health index were found to exceed the local thresholds. Under this combined alternative that expands both the Inner and Outer Harbor Turning Basins without mitigation measures, the boundary indicating where estimated lifetime excess cancer risk exceeds the BAAQMD's local significance threshold (shown in dark teal on Figure 9 in Appendix A04b) extends further from both the Inner and Outer Harbors and mearges in between the two, exending further into the West Jack London and West Alameda CTs and covering much of the non-residential portion of the West Clawson CT. Figure 17 in appendix A04b shows that the area of $PM_{2.5}$ exposure above the local threshold under Alternative D-1 is similar in area and location to that under Alternative B. While it wasn't expressly evaluated in the HRA, a mitigated scenario for D-1 would incorporate use of Tier 4 engines for off-road construction equipment. With this minimization measure, lifetime excess cancer risk, non-cancer health indices, and $PM_{2.5}$ concentration would be reduced as would the extent of the zones where lifetime cancer risk and $PM_{2.5}$ concntration exceed the local thresholds. The reduced values would be expected to be equal to or slightly higher than those of the mitigated Inner Harbor Turning Basin Widening (Alternative B) scenario. Moreover, these emission impacts would again be temporary, and would cease at the completion of construction.

This Alternative would also produce long term vessel operation efficiencies when compared to the future without project scenario. According to Table 66, idling hours from tugs and containerships under this alternative would be 1,483 hours less over the lifetime of the project relative to the future without project condition. The beneficial effect of this reduction on lowering emssions is illustrated in the GHG analysis presented in Section 6.14. Using the same illustrative example as described above for Alternative B, this could result in a reduction of approximately 68 tons of Diesel PM_{10} relative to the no action alternative over the life of the project. Similarly, a reduction in air pollutant emissions from vessel operations can be expected due to changes in vessel fleet and resulting decrease in ship calls from a future without project. This reduction in DPM would be expected to have associated health benefits in the vicinity of the Port and surrounding communities .

The short-term construction emission impacts of this alternative would be very similar to those of the mitigated Alternative B, but alternative D-1 would result in a greater reduction of air pollutants from vessel operational efficiencies. Like Alternative B, the environmental justice impacts related to air quality would be less than significant under Alternative D-1.

6.1.5 Electric Dredging Variation (Alternative D-2)

The use of an electric-powered dredge under Sub-alternative D-2 would result in a decrease in criteria pollutant emissions from construction compared to those associated with Sub-alternative D-1 and would be well below the General Conformity *de minimis* levels. Therefore, the air quality impacts of this alternative are less than significant with respect to the federal Clean Air Act.

While this sub-alternative would require electrical infrastructure improvements near Berth 26 at the Outer Harbor and at Howard Terminal to facilitate electric dredging, these improvements would only involve a minor amount of ground disturbance and construction activity, and the minimal construction emissions from this activity would be substantially offset by the reduction in construction emissions resulting from the use of electric dredging. For conservative purposes, this alternative assumes that in the event of a call for electricity reduction to prevent potential brownouts, diesel dredging may temporarily occur up to 240 hours per year, and thus includes emissions associated with such dredging, but this limited diesel dredging would not occur if no electricity reductions are required.

As modeled in the HRA, Sub-alternative D-2 (Proposed Action) includes electric dredges and is a mitigated scenario including the use of Tier 4 engines for off-road construction equipment as an emission minimization measure. The maximally exposed receptors and locations are the same as those described for Sub-Alternative D-1 above and the values at these locations are described in Table 16 and Figure 10 (lifetime excess cancer risk), Table 17 and Figure 15 (chronic health hazard index), Table 18 and Figure 16 (acute health hazard index) and Table 8 and Figure 18 ($PM_{2.5}$ concentration) in appendix A04b.

The HRA results for Sub-alternative D-2 (Proposed Action) are similar to but slightly higher than those of the mitigated Inner Harbor Turning Basin Expansion (Alternative B) scenario given the additional emmissions associated with widening the Outer Harbor Turning Basin as well as the Inner. Under Sub-alternative D-2, lifetime excess cancer risk at the Phoenix Lofts (oakland side of the Inner Harbor) as well as the chronic and accute health index values at the maximum exposed location on the Alameda side were estimated to be below their respective BAAQMD thresholds. Lifetime excess cancer risk at the exisitng residential receptor on the Alameda side was estimated to be just above the threshold, and exposed worker lifetime excess cancer risk would be slightly higher than that. The excess cancer risk at the planned residences at Bay 37 on the Alameda side would remain higher than the BAAQMD threshold. Similarly, $PM_{2.5}$ at Berth 10 would be slightly higher than that of the mitigated Inner Harbor Turning Basin Expansion (Alternative B) and above the local BAAQMD threshold. As shown in Figure 10 in Appendix A04b, the extent of the zones where lifetime excess cancer risk is estimated to be above the respective BAAQMD local thresholds would be limited to the Inner Harbor Turning Basin area and primarily include non-residential areas immediately adjacent to the turning basin on the Oakland side and very limited residential area on the Alameda side. Moreover, as Figure 18 shows, the extent of $PM_{2.5}$ above the threshold would be limited to mostly over water and immiediately adjacent industrial area in the Inner Harbor and non-residential areas of the Port at the Outer Harbor. As with all alternatives, these emission impacts would be temporary, and would cease at the completion of construction.

The use of an electric dredge in this Alternative reduces DPM emissions from project construction by approximately 71% and would reduce cancer risk and health impacts from construction of this alternative on environmental justice communities in the study area. The reduced health impacts resulting from electric dredge use would confer important benefits in the existing air pollution exposure burden borne by environmental justice communities in the area. Moreover, this alterative would confer the same reduction in idiling as Alternative D-1 relative to the No Action Alternative and as illustrated by example for D-1, could reduce approximately 68 tons of Diesel PM_{10} relative to the no action alternative due to long term vessel operation efficiency gains. This would result in reduction in GHG and other air pollutatnt emissions. Accordingly, air quality environmental justice impacts would be less than significant under Sub-alternative D-2.

Noise and Vibration

As described above, expansion of the Outer Harbor Turning Basin would result in no construction-related or operational noise or vibration impacts on sensitive receptors. Therefore, the noise and vibration and associated environmental justice impacts of the Inner and Outer Harbor Turning Basin expansion sub-alternatives (D-1 and D-2) are the same as those identified for expansion of the Inner Harbor Turning Basin expansion (Alternative B) and are less than significant.

Transportation

The Inner and Outer Harbor Turning Basin expansion Sub-alternatives (D-1 and D-2) would result in the impacts described above for both the individual Inner Harbor Turning Basin and Outer Harbor Turning Basin expansion alternatives (Alternative B and Alternative C, respectively). The land-based traffic effects of the alternatives involving both turning basins (Alternatives D-1 and D-2) would only be marginally higher than those of the Inner Harbor Turning Basin Expansion Alternative (Alternative B), due to concurrent construction activities for both turning basins during an 8-month total period (spread over 2028 and 2029) and associated added worker commute trips for the Outer Harbor Turning Basin during this period. In addition, under Sub-alternative D-2, electrical infrastructure improvements that would be constructed at the Outer Harbor near Berth 26 would result in a maximum of 20 daily worker trips and a maximum of 12 total truck trips each day during a 3-month period (in 2027), which would have a negligible impact on local traffic volumes. Therefore, impacts on transportation from either Sub-alternative would be less than significant as would the associated environmental justice impacts.

6.1.6 No Action Alternative

Because the No Action Alternative does not involve any changes from existing conditions, there would be no construction-related effects on the land uses, activities, or resources at the project sites or in the surrounding project area. The future without project condition would be realized. Containerships would still be required to operate under multiple restrictions creating delays of two to four hours per transit. If ULCV's cannot utilize the turning basins, the Port will see an increase in vessel traffic to accommodate increasing cargo volumes. Ineffficiencies at the Port would continue, and the delays from restrictions and vessel traffic would result in a continuation, and eventual increase, in emissions from the vessel restrictions. As a result, the environmental justice communities in the area would continue to be negatively effected by vessel emissions and other inefficiencies at the Port.

6.2 Socioeconomics

The socioeconomic study area extends to the city and county economies that serve or are dependent on Port operations and neighboring land uses including the cities of Oakland and Alameda as well as Alameda County.

An alternative would have a significant impact on socioeconomics if it resulted in:

- A measurable and prolonged decrease in local job supply or a decrease in revenue from leading industries; or
- A measurable and prolonged decrease in local housing supply or decrease in housing affordability.

The socioeconomic impacts are the same for all action alternatives in the focused array.

6.2.1 Socioeconomic Impacts for All Action Alternatives

Expansion of one or both turning basins would improve operational efficiency and navigational safety for vessels entering and exiting the Port by way of decreasing restrictions imposed on larger container vessels and accommodating the Port's projected future volume of freight containers with less total annual vessel visits. Long-term impacts related to the construction of the action alternatives would be limited to relatively minor, if any, reductions in adjoining land uses, which would be mitigated by financial consideration for project-related loss or impairment to the affected properties and their use. Given the absence of any future operational and long-term project-related socioeconomic impacts, the subsequent socioeconomic analysis is primarily focused on the short-term impacts resulting from construction activities.

Relocation

The USACE has been in coordination with the Port of Oakland per requirements under the Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970, as amended, 42 U.S.C. 4601 *et seq*. (P.L. 91-646, "the Uniform Act") to provide relocation assistance to qualifying residences and businesses within the project area that are displaced because of USACE project implementation. There are no residences located within the footprint of the Recommended Plan. Thus, no replacement housing would be required for this project. However, fee estate would be acquired by the Port within the expansion of the turning basin in Alameda. A private landowner of four warehouse bays in Alameda could be impacted, which may result in possible displacement and relocation for the tenant. The Port has been advised of P.L. 91-646 requirements and is prepared to provide assistance if needed. Additional information regarding real estate and relocations can be found in Appendix D.

Employment

The potential socioeconomic effects of the action alternatives are associated with short-term job creation during construction. A significant number of temporary jobs would be created during construction of any of the action alternatives. The duration of these temporary jobs would be no more than 2.5 years (the maximum duration of any alternative); jobs for the Outer Harbor Turning Basin expansion only alternative (Alternative C) would be shorter (i.e., approximately 8 months total), given the lesser degree of construction activity compared to the other action alternatives. Such construction-related employment would have a beneficial impact on the local economy and workforce by providing new job opportunities. The labor force needed for the construction of any alternative is expected to be relatively small and would likely be obtained from local workers who are currently Alameda County and Bay Area residents.

Construction activities would not have any adverse impact on existing industry revenues because none of those activities are expected to permanently alter their operations. As stated above any reductions in adjoining land uses from project construction would be mitigated by financial consideration for project-related loss or impairment to the affected properties and their use. Therefore, the action alternatives would not result in an adverse, prolonged decrease in the local job supply or a decrease in revenue from leading industries. As indicated above, all action alternatives would have a beneficial impact on employment.

Demand for Housing

As discussed above, the labor force needed for the construction of any action alternative is expected to be relatively small and would likely be obtained from local workers who are currently Alameda County and Bay Area residents. As a result, construction activities would not induce workers to relocate to the region and there would be no effect associated with the action alternatives on the supply of local housing available or local housing affordability.

6.2.2 Socioeconomic Impacts for the No Action Alternative

Because the No Action Alternative does not involve any changes from existing conditions, there would be no effects on the land uses, activities, or resources at the project sites or in the surrounding project area. The projected growth of 2.1% is independent of the project and as a result, no related or resulting socioeconomic impacts would occur.

6.3 Geology, Soils, and Seismicity

The proposed action alternatives would not introduce elements that would increase potential risks related to rupture of a known earthquake fault; seismic shaking; or seismic-related ground failure, including liquefaction; or landsides. Similarly, the action alternatives would not involve activities that would cause geologic units or soils to become unstable, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, or collapse; this excludes minor erosion of the turning basins' side slopes from sloughing that may occur after the areas are dredged. Any new bulkhead or sheet pile shoreline structures that would be installed as part of the action alternatives would comply with applicable seismic standards. Placement of dredged material at permitted beneficial reuse sites or landfills would not be expected to result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse because the placement of dredged material at these sites are managed and monitored to avoid such impacts. Thus, the action alternatives would have no effect on seismicity or geologic resources. Additionally, the action alternatives would not affect minerals. Effects associated with HTRW in terrestrial soils and contaminants in dredged material are discussed in Sections 6.11 and 6.12 respectively.

Because the No Action Alternative would result in no construction and no changes to the turning basins, bulkheads, or other Port infrastructure elements, there would be no effect on existing geologic, seismic, or soil conditions.

6.4 Water Quality

For the purposes of this analysis, an effect on water quality may be considered significant if an alternative would do any of the following:

- Substantially degrade water quality through long-term alteration of physical and chemical characteristics (i.e., temperature, salinity, pH, and dissolved oxygen)
- Substantially degrade water quality because of long-term increased turbidity
- Violate any water quality standards
- Substantially degrade surface or groundwater water quality because of mobilization of contaminated sediments or release of hazardous materials.

6.4.1 Inner Harbor Turning Basin Expansion

Surface Water

<u>Physical and Chemical Characteristics</u>

The Inner Harbor Turning Basin Expansion (Alternative B) would involve both upland construction activities such as demolition, landside excavation, sheet pile and pile installation and removal, as well as in-water construction activities such as mechanical (clamshell) dredging, sheet pile and pile installation, and rock replacement. Eroded soils, if generated from upland construction, and construction-related wastes from upland construction have the potential to degrade water quality if they enter runoff and flow into waterways, potentially altering the temperature, salinity, pH, and dissolved oxygen content. Upland construction under this alternative would be managed to avoid adverse effects to waterbodies through implementation of the avoidance and minimization measures described in Appendix A7. These measures include requiring the construction contractor to obtain coverage under and adhere to the National Pollutant Discharge Elimination System (NPDES) Construction General Permit through preparation and implementation of a stormwater pollution prevention plan (SWPPP) with best management practices (BMPs) to minimize discharges, limit erosion, and prevent releases of construction wastes and hazardous materials, as well as inspection, monitoring, and reporting requirements.

The proposed dredging also has the potential to temporarily alter physical and chemical characteristics in the Inner Harbor waters. The USACE (1976a) found that changes in temperature, salinity, or pH were localized to the immediate dredging area 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 disturbance (USACE 1998). Dredging may temporarily change the pH of waters because excavated material is typically more acidic, due to anaerobic conditions, than the surrounding waters; however, pH has shown to remain relatively constant throughout the San Francisco Bay regardless of maintenance dredging projects that have occurred (USACE et al. 2009).

Dredging activities can resuspend in situ sediments and expose anoxic material to the water column, both of which can temporarily reduce dissolved oxygen concentrations in the immediate vicinity on the order of 1 to 2 mg/L. However, ambient dissolved oxygen conditions are shortly regained following settlement of the suspended sediment (USACE 1976a). In areas in the San Francisco Bay Estuary that are more tidally influenced (such as the Oakland Harbor), nutrients that can reduce dissolved oxygen concentrations would be diluted and flushed out of the dredging area by tidal currents and freshwater flow (USACE et al. 2009). Hydroplan et al. (2015) also indicated that there is no risk to the ecosystem due to increased nutrient loading caused by dredging activities and that sediment disruption caused by dredging activities does not pose an environmental risk related to decreased dissolved oxygen concentrations.

Based on the temporary, localized, and minor effects on surface water physical and chemical characteristics as well as the avoidance and minimization measures described above, implementation of this alternative would have less than significant effects on surface water characteristics.

<u>Suspended Sediments/Turbidity</u>

Eroded soils, if generated from upland construction, could degrade water quality if they enter waterways, increasing suspended sediment and turbidity levels. As described above construction contractor adherence to the NPDES Construction General Permit and implementation of a SWPPP would be required as an avoidance measure for turbidity impacts under this alternative.

During mechanical clamshell dredging operations, the interaction of the dredge equipment with aquatic material would resuspend sediment into the water column via the impact and withdrawal of the clamshell bucket from the substrate, washing of material out of the bucket as it moves through the water column, and loss of water as the sediment is loaded onto the barge (Hayes et al. 1984; Nightingale and Simenstad 2001). Removal and installation of piles and sheet piles within the aquatic environment, and other bottom disturbing activities such as rock removal and placement, may temporarily disturb benthic sediments and increase turbidity and suspended sediment levels in the immediate vicinity of the activity. However, increases in turbidity and suspended sediment levels from removal and installation of piles or other in water infrastructure would be substantially less than similar effects from dredging because they involve less sediment disturbance and do not involve transporting sediments through the water column. Therefore, turbidity impacts from these activities are not discussed further in this section.

Avoidance and minimization measures for dredging activities, as described in Appendix A7, would minimize potential turbidity impacts during construction vessel transport by establishing load lines on barges and having fill levels inspected prior to transport. Therefore, 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 dredging to expand the Inner Harbor Turning Basin are anticipated to be like those from existing dredging. The degree of sediment re-suspension depends on the physical composition of the material, with fine-grained material remaining suspended longer, and sandy material resettling much faster. Sediment in the Oakland Harbor is predominately fine-grained (USACE 2019), although coarser sand substrates may be present in areas 25 feet deep or shallower (City of Oakland 2021). Dredging fine silt or clay material typically results in suspended sediment (solids) 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). Much lower concentrations (50 to 150 mg/L at 150 feet) are expected at locations with coarser sediment. These concentrations would decrease rapidly with distance due to settling, mixing, and dispersion from tides, wind and waves.

USACE monitored turbidity plumes 500 feet downstream of dredging during clamshell maintenance dredging operations in Oakland Harbor in 2016 and 2017 (USACE 2019). Periodic temporary exceedances of the applicable turbidity standard (50 Nephelometric Turbidity Units (NTU) or no greater than 10 percent of the baseline NTU if that is greater than 50) were observed. Turbidity plumes from Inner Harbor Turning Basin dredging would be similarly localized and affect a relatively small area in relation to surrounding San Francisco Bay waters. In the Inner Harbor where ambient turbidity is elevated from natural conditions and vessel traffic, turbidity plumes would be quickly diluted to near or within ambient particulate concentrations (USACE and SFRWQCB 2015).

To minimize effects from suspended sediments and turbidity from dredging operations, the avoidance and minimization measures detailed in Appendix A7 would be implemented. This includes, but is not limited to, avoiding dredged material spillage (outside of incidental spillage), implementation of a hoist speed restriction to reduce the likelihood of material loss from the bucket while being raised through the water column, and use of silt curtains where specific site conditions demonstrate that they would be practicable and effective. In addition, any turbidity monitoring or other associated measures included as conditions of applicable regulatory permits obtained for implementation of this alternative, such as a Water Quality Certification from the SFRWQCB, would be conducted as required for permit compliance.

In consideration of the localized and temporary effects of dredging-induced turbidity, ambient turbidity levels in the Inner Harbor, and the implementation of minimization measures to avoid or reduce potential turbidity effects from upland and aquatic construction activities, potential impacts to surface waters from increased turbidity and suspended sediments under this alternative would be less than significant.

<u>Contaminants</u>

Both land-based and in-water construction activities associated with the Inner Harbor Turning Basin expansion (Alternative B) 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 released into waters directly during dredging and nearshore construction. Shoreline construction, including demolition, excavation, and sheet pile or pile removal and installation, could also result in increased contaminant loading to San Francisco Bay waters via surface run-off. Excavated landside material, removed piles, and debris from warehouse demolition at Alameda site would be hauled off site for disposal at a landfill or recycling facility as required. Implementation of a SWPPP and avoidance measures to prevent accidental spills of hazardous materials, would be required under this alternative to prevent contaminants and disturbed sediments from reaching storm drains or being directly discharged into Bay waters.

There may be minor, permanent alterations to upland drainage patterns at Howard Terminal and the Alameda site as a result of Inner Harbor Turning Basin expansion, but these would not result in adverse water quality impacts. Alterations 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 minimize the pollutant load in stormwater discharges and to manage runoff flows.

Dredging may resuspend COCs in the water column if they are present in aquatic sediments. As detailed in Section 3.12, although fully-represenatavite sampling and analysis has not been conducted in the subtidal areas in the Inner Harbor Turning Basin expansion footprint specifically for this study, based on existing sampling and analysis from prior investigations in the immediate vicinity and limited sampling for validation of project planning and cost assumptions, most of the aquatic material is not expected to contain elevated COCs that would preclude beneficial reuse at an upland wetland restoration site as non-cover or potentially cover material under this alternative.

The exception is the basin between Howard Terminal and Schnitzer Steel, where some sediment proposed for dredging may be contaminated with heavy metals requiring landfill disposal. Soils and sediments that would be excavated or dredged as part of this alternative would be tested prior to construction activities. The results of aquatic sediment testing would be reviewed by the DMMO to identify appropriate placement site options based on the characteristics of the sediment and the screening criteria for each placement location. If landfill disposal is required for some sediments, they would be removed and appropriately re-handled and dried out at the Port of Oakland's Berth 10 facility, which is an authorized material rehandling location, before being hauled to the landfill.

Potential effects resulting from release of COCs could occur if dredging in locations where sediments are found to have contaminants. However, most contaminants are tightly bound to sediments and are not easily released during short-term resuspension (e.g., metals) or are generally not very soluble in water (e.g., pesticides, PCBs, and polyaromatic hydrocarbons). Generally, plumes created during dredging and disposal activities are short-lived; and given the tight bounding of COC to sediments, the potential for release of COCs into the water column is expected to be minor (USACE et al. 2009). Avoidance and minimization measures detailed in Appendix A7 would be implemented, including use of silt curtains where specific site conditions demonstrate that they would be practicable and effective, to further minimize any potential effects from contaminants. Additionally, any applicable conditions required by applicable regulatory permits that will be obtained for implementation of this alternative, such as a Water Quality Certification from the SFRWQCB, would be adhered to minimize the potential for water quality degradation.

Given the analyses above, with implementation of proposed avoidance and minimization measures to protect water quality, the Inner Harbor Turning Basin expansion (Alternative B) would not be expected to substantially increase contaminant concentrations in the water column above baseline conditions or result in violation of a water quality standard. Impacts under this alternative would be less than significant.

<u>Aquatic Fill</u>

Construction of the Inner Harbor Turning Basin widening alternative (Alternative B) would require the placement of a variety of fills into waters of the U.S. including:

- Installation of approximately 26,100 cubic yards of rock fill for bank stabilization;
- Installation of approximately 246 batter piles to support the new bulkhead;
- Installation of approximately 400 linear feet of sheetpile bulkhead to support the slope next to Schnitzer Steel.

No dredged material would be placed in waters of the United States under this alternative as all the material to be dredged from the Inner Harbor Turning Basin expansion areas is estimated to be suitable for beneficial use as wetland non-cover, cover, or to require landfill placement. The fill placed in the waters of the U.S. under this alternative would be the minimum fill necessary to ensure the future structural integrity and seismic safety of the portion of the rock dike, bulkhead, and piles being replaced. Additionally, this alternative would involve the removal of substantial amounts of existing fill including existing rock fill, piles and bulkhead, resulting in net expansion of open waters of the U.S. Moreover, as described in Section 5.4, under this alternative, approximately 900,000 cubic yards of dredged material from the Inner Harbor would be beneficially used contributing to the creation of approximately 82 acres of wetlands.

Because this alternative (B) and others (D-1 and D-2) would require placement of fill in waters of the U.S., the USACE completed a 404(b)(1) analysis in accordance with the Clean Water Act. The 404(b)(1) analysis is included as Appendix A3.

Groundwater

Project construction would not use groundwater, and shallow groundwater underlying the proposed project sites is not used as a source of drinking water. The Inner Harbor Turning Basin expansion would not construct any new or expanded impermeable surface areas, and therefore would not impede groundwater infiltration. Although new dredging can increase saltwater intrusion into groundwater, these effects are anticipated to be minimal given the relatively small size of the Inner Harbor Turning Basin expansion area, and the project's location in the Central Bay, where impacts to freshwater flow regimes are typically minimal.

Any dewatering operations would be temporary and short term. Groundwater beneath the Howard Terminal and Alameda sites is brackish due to proximity to the Inner Harbor and therefore is not designated by the SFRWQCB as a drinking water beneficial use.

Groundwater removed during construction would be replenished with groundwater infiltration from the Inner Harbor and surrounding greater East Bay Plain groundwater basin. The quantity of groundwater dewatered during construction would not be substantial relative to the volume of adjacent sources and would not result in a net deficit in the groundwater aquifer.

As described in Section 3.4.4, the Howard Terminal portion of the proposed Inner Harbor Turning Basin expansion area is within an active DTSC regulated site, and ground-disturbing activities in this area have the potential to adversely affect groundwater if improperly managed. The Howard Terminal site is subject to ongoing monitoring; investigations and other remedial actions may be performed on a voluntary basis. It is also subject to a Land Use Covenant that prohibits any use that disturbs or interferes with the existing cap and requires a DTSC approval for any cap disturbance.

All ground-disturbing activities at Howard Terminal would occur in coordination with DTSC to ensure that adverse impacts associated with existing contamination would be avoided to protect human health and the environment, including groundwater. Project plans would be developed to avoid impeding existing abatement orders and effects on existing monitoring wells in or near the proposed footprint. All dewatered groundwater is to be contained in storage tanks, tested, and discharged/disposed of at an appropriate location or facility. It should be noted that the proposed Inner Harbor Turning Basin 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 into San Francisco Bay.

Under the proposed Inner Harbor Turning Basin expansion (Alternative B), removal of terrestrial soils from Howard Terminal may provide an indirect benefit to groundwater quality by removing contaminated sediments that could leach into the groundwater table. Impacts associated with existing contaminated groundwater and potential conflicts with the existing Land Use Covenant or ongoing cleanup activities would be avoided through coordination with DTSC. At the Alameda site, as stated in Sections 3.4.4 and 3.12, there is no indication of the presence of contaminants above regulatory thresholds in groundwater or in soils in contact with groundwater. Therefore, impacts to groundwater from this alternative would be less than significant.

As described above, the Inner Harbor Turning Basin expansion (Alternative B) would not exceed any of the thresholds of significance identified for water quality and therefore the overall impacts of this alternative on water quality would be less than significant with the implementation of the applicable avoidance and minimization measures discussed above and described in Appendix A07.

6.4.2 Outer Harbor Turning Basin Expansion

The proposed Outer Harbor Turning Basin expansion (Alternative C) would result in dredging-related effects to water quality that are like those described for Inner Harbor Turning Basin expansion (Alternative B). However, this alternative would not result in any effects related to upland excavation, alterations to existing upland facilities, or groundwater because there would be no removal of lands and no land-based construction activities associated with the Outer Harbor Tuning Basin expansion. Upland staging at Berth 10 would be managed to avoid adverse effects to waterbodies through implementation of the avoidance and minimization measures described in Appendix A07.

Surface Water

Physical and Chemical Characteristics

Dredging to expand the Outer Harbor Turning Basin has the potential to alter physical and chemical characteristics in project area waters, including temperature, salinity, pH, and dissolved oxygen. These effects would be like those described in detail for the Inner Harbor Turning Basin expansion in the preceding section. As with the Inner Harbor Turning Basin expansion, potential impacts to surface water physical and chemical characteristics from expansion of the Outer Harbor Turning Basin would be less than significant.

Suspended Sediments/Turbidity

Dredging to expand the Outer Harbor Turning Basin expansion would resuspend sediment into the water column which would result in the same related effects to water quality as described in detail for the Inner Harbor Turning Basin expansion in the preceding section. These effects would be temporary and localized to the dredging area and would impact a relatively small area in relation to surrounding San Francisco waters. The sediment suspension and turbidity minimization measures described for the Inner Harbor Turning Basin expansion and detailed in Appendix A07, including use of silt curtains (where specific site conditions demonstrate that they would be practicable and effective) and standard practices to minimize resuspension of sediments, would be employed during dredging for all action alternatives to minimize these potential effects. Furthermore, in the naturally turbid San Francisco Bay, turbidity plumes would be quickly diluted to near or within ambient particulate concentrations (USACE and SFRWQCB 2015).

In consideration of the localized and temporary effects of dredging-induced turbidity, ambient turbidity levels in the San Francisco Bay, existing activities in the Outer Harbor, and the implementation of the proposed minimization measures, potential impacts to surface waters from increased turbidity and suspended sediments would be less than significant for the Outer Harbor Turning Basin expansion (Alternative C).

Contaminants

As described in detail for the Inner Harbor Turning Basin expansion alternative, construction activities in the aquatic environment have the potential for the accidental discharge of contaminants into surface waters and dredging may resuspend COCs in the water column if they are present in aquatic sediments. The measures identified for the Inner Harbor Turning Basin expansion to avoid accidental discharges of contaminants from construction equipment to surface waters would be employed under all action alternatives. Although sampling and analysis has not been conducted in the subtidal areas in the Outer Harbor Turning Basin expansion footprint specifically for this study, based on existing sampling and analysis from prior projects and maintenance dredging in the immediate vicinity, the aquatic material is not expected to contain elevated COCs that would preclude beneficial reuse at an upland wetland restoration site as foundation material. Sampling and testing of material during the pre-construction phase as well as the contaminant minimization measures described above for the Inner Harbor Turning Basin expansion, would be implemented under all action alternatives to minimize the potential for water quality degradation.

Thus, the Outer Harbor Turning Basin expansion (Alternative C) would not be expected to substantially increase contaminant concentrations in the water column above baseline conditions, or result in violation of a water quality standard, and its associated effects would be less than significant.

As described above, the Outer Harbor Turning Basin expansion (Alternative C) would not exceed any of the thresholds of significance identified for water quality with the implementation of the applicable avoidance and minimization measures discussed in Appendix A7, and therefore the overall impacts of this alternative on water quality would be less than significant.

Aquatic Fill

Construction of the Outer Harbor Turning Basin widening alternative (Alternative C) would not involve placement of fill into waters of the U.S. All dredged material under this alternative is estimated to be suitable for beneficial use as wetland non-cover. This alternative would result in the beneficial use of approximately 1,342,000 cubic yards of dredged material which would contribute to the creation of 122.5 acres of new wetland habitat (see Section 5.4).

6.4.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins. Sub-alternative D-1 involves the use of dredge equipment powered by diesel fuel whereas sub-alternative D-2 is the Proposed Action (Recommended Plan) and involves the use of dredge equipment powered by electricity and the installation of electrical switchgear near Berth 26. All other elements of these sub-alternatives would be the same. From a water quality perspective, the effects of these two sub-alternatives involving expansion of both the Inner and Outer Harbor Turning Basins would be the same.

The potential water quality impacts of sub-alternatives D-1 and D-2 would be a combination of the impacts from the Inner Harbor Turning Basin expansion (Alternative B) and the Outer Harbor Turning Basin expansion (Alternative C). Potential water quality effects from impacts related to land removal or construction activities would be identical to those described for the Inner Harbor Turning Basin expansion. Minor subsurface work, to a depth of 4 feet below ground surface, would be required for the installation of electrical switchgear near Berth 26 under sub-alternative D-2. This depth of excavation would not be expected to reach groundwater. Upland construction for the switchgear installation would be managed to avoid adverse effects to waterbodies through implementation of the avoidance and minimization measures described in Appendix A7. These measures include adherence to the NPDES Construction General Permit through preparation and implementation of a SWPPP with BMPs to minimize discharges, limit erosion, and prevent releases of construction wastes and hazardous materials.

Aquatic fill associated with sub-alternatives D-1 and D-2 would be the same as that of Alternative B (Inner Harbor Turning Basin Expansion) given that the Outer Harbor Turning Basin Expansion does not involve fill in Waters of the U.S.. However, sub-alternatives D-1 and D-2 would result in the combined contribution of approximately 2,249,000 cubic yards of dredged material to a beneficial use wetland restoration and contribute to the creation of approximately 204.5 acres of new wetland habitat (see Section 5.4).

Although the No Action Alternative would result in no new consruction impacts to open waters or air quality, there would continue to be marine navigation inefficiencies within Oakland Harbor caused by width limitations in the turning basins, therefore this alternative does not meet the overall project purpose. Under the No Action Alternative, vessels calling at the Port would continue to face delays in maneuvering. These delays result in increased emissions from cargo ships and tugs or other supporting vessels. There is also an increased safety risk to both human and aquatic life under the No Action plan due to the additional maneuvering of vessels.

Similarly, Alternatives B and C also do not cumulatively provide the necessary short and long-term benefits associated with widening both the Inner and Outer Harbor Turning Basins. While Alternative C may seem attractive for its limited impacts to WOTUS, especially considering the construction impacts to the West Oakland Community, it fails to meet the goals of the project because the Inner Harbor would remain impacted by its limited width. Due to the fixed nature of landside infrastructure at the Port of Oakland, there is no meaningful way to direct ship traffic based on size. Therefore, vessels larger than the design for the Inner Harbor would still need to access the Inner Harbor berths, resulting in continued inefficiency impacts to the Port and the West Oakland community. Ships needing to utilize the Inner Harbor would still be subjected to long wait times, requiring them to anchor rather than being able to utilize shore power. In addition, being unable to effectively turn, would prevent ships from being able to position themselves for plug in to shore power.

Although sub-alternatives D-1 and D-2 are similar, sub-alternative D-2 contributes the most to the environmental quality and other social effects benefits because the electric dredges reduce air-pollutant emissions during construction and subsequently reduce potential health-related impacts. While both sub-alternatives would have less than significant effects on environmental justice communities, those of sub-alternative D-2 would be reduced relative to sub-alternative D-1 because dredging would be conducted with electric dredges, minimizing the air-pollutant emissions. This effect would be important to the West Oakland community which already has high cumulative air pollution exposure. Additionally, due to the use of electric dredges, sub-alternative D-2 would have less noise from construction for nearby sensitive receptors in Alameda and West Oakland as compared to sub-alternative D-1.

Construction-related in-water work activities associated with the Outer Harbor Turning Basin expansion would be conducted at the same time as a portion of the in-water work for the Inner Harbor Turning Basin expansion for 1 month during the 2027 in-water work window (September 1 through September 30). Compared to the single turning basin expansion alternatives, the relatively larger dredging area under the sub-alternatives involving both turning basins would result in a proportional increase for potential impacts related to altered physical and chemical characteristics, accidental discharge, suspended sediment/turbidity, and resuspension of COCs in the water column. However, based on the localized nature of project impacts as described in the above sections and the distance (greater than four miles over water) and landforms between the Inner Harbor Turning Basin and Outer Harbor Turning Basin, the impacts on water quality from expanding both turning basins would not combine to create a more significant level of impact. Given this, both sub-alternative D-1 and the Proposed Action (sub-alternative D-2) would not exceed any of the thresholds of significance identified for water quality and therefore the overall effects of either alternative on water quality would be less than significant.

6.4.4 No Action Alternative

Under the No Action Alternative, neither the Inner Harbor Turning Basin nor Outer Harbor Turning Basin would be expanded. The No Action Alternative would result in no new construction impacts related to surface water or groundwater. Existing contaminated fills if present at upland sites in the Inner Harbor Turning Basin expansion area, or contaminated sediments in the dredge footprint, would not be removed and the potential risk of that contamination adversely affecting groundwater or surface water would remain.

6.5 Wildlife

Based on the biological resources present or potentially occurring in the study area, for the purposes of this analysis, an effect may be considered significant if the alternative would do any of the following:

- have a substantial adverse effect, either directly or through habitat modifications, on any terrestrial or pelagic species;
- interfere substantially with the movement of resident or migratory fish or wildlife species; or
- cause substantial adverse, long-term effects to the benthic community directly or through habitat loss.

6.5.1 Inner Harbor Turning Basin Expansion

Terrestrial Wildlife

As described in Section 3.5.2, terrestrial wildlife in the Inner Harbor Turning Basin expansion (Alternative B) project area is limited to common species that are adapted to inhabiting developed areas. All terrestrial areas that would be impacted by the expansion of the Inner Harbor Turning Basin are heavily developed, and any wildlife present would be able to relocate to other nearby areas of similar habitat in the vicinity. Therefore, impacts to terrestrial wildlife would be negligible.

Pelagic (open water) Resources

The Inner Harbor Turning Basin expansion (Alternative B) project area includes open waters that serve as habitat for aquatic wildlife such as fish, marine mammals, and birds. Effects to special status fish, marine mammals, and migratory birds are discussed in Section 6.6. Therefore, this analysis focuses on common (non-special status) species.

The duration of in-water construction and dredging associated with this alternative would be approximately 6 months, conducted during the 2027, 2028, and 2029 in-water work windows for Oakland Harbor (June through November). Dredging activities have the potential to incidentally remove organisms from the aquatic environment along with the dredged material, a process referred to as entrainment. Entrained fish are likely to suffer mechanical injury or suffocation during dredging, potentially 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 bucket and result in a low risk of entraining fishes (Reine and Clarke 1998, USACE 2019). 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.

Underwater noise generated from dredging activities has the potential to affect fish and cause behavioral changes, neurological stress, and temporary shifts in hearing. The Inner Harbor Turning Basin is an active marine waterway and existing vessel activities produce underwater noise. Ambient underwater noise levels in the Inner Harbor Turning Basin were monitored for this study at half the depth of the water column during an active turning event for a large container vessel (*One Aquila*) with three assist tugboats and were found to generate a peak underwater sound exposure level up to 175 decibels (dB). During clamshell dredging, the most intense sound impacts are produced by the bucket's impact with substrate. Reine et al. (2002) found peak sound exposure levels of 124 dB measured 150 meters (approximately 500 feet) from the bucket strike location. Thus, underwater noise from clamshell dredging would not be expected to exceed ambient levels experienced in the turning basins when vessels are turning. Similarly, the transport barges carrying dredged material are not expected to generate underwater noise that is different or greater than existing vessel traffic.

Underwater noise generated from pile removal and installation also has the potential to affect fish. Pile removal would occur via vibratory means, and pile installation would utilize vibratory or impact driving. Vibratory techniques are often employed as a minimization measure to reduce the underwater sound pressure that transmits into the water. Based on the current conceptual design and construction phasing, most pile driving would be conducted with vibratory methods through land and would not result in underwater noise impacts. In-water pile installation, where required, would be conducted with a vibratory driver to the extent feasible, but impact pile driving may be necessary. See Section 6.6.1 for an analysis of the potential effects that pile removal and installation noise would have on fish. As indicated by this analysis, substantial adverse effects are not expected with the implementation of avoidance and minimization measures described in Appendix A7.

Sediment suspension from mechanical dredging and in-water pile removal and extraction would generate turbidity plumes that could interfere with the ability of pelagic organisms to receive sunlight, respirate, and find food (Wilber and Clarke 2001); although turbidity generated from pile removal and installation would be considerably less than that from dredging. Turbidity impacts would be localized and temporary, and adult and juvenile fish would be mobile enough to avoid turbidity plumes. Turbidity can be of particular concern to certain species' life stages, such as spawning Pacific Herring which are known to breed on in-water structures and use habitat along the Oakland-Alameda Estuary waterfront.

However, as stated in Section 3.6.3, herring spawning has not been observed in the Inner Harbor Channel during surveys conducted since 2012. Waters in the project area are also naturally turbid due to resuspension of sediments from wind, waves, tides, and frequent vessel traffic. Implementation of the dredge-related minimization measures described in Appendix A7, such as the use of silt curtains (where specific site conditions demonstrate that they would be practicable and effective), limitations on decant water and overflow, and increasing the cycle time as needed, would reduce potential impacts to pelagic resources from increased turbidity during construction of this alternative.

The avoidance and minimization measures for dredging activities would also minimize potential turbidity impacts during vessel transport by establishing load lines on barges and having fill levels inspected prior to transport. Therefore, movement of the dredge, transport scows, and other construction vessels would not be expected to increase turbidity above ambient ranges generated by natural hydrologic processes, weather, and existing vessel traffic. Suspending sediments can circulate contaminants if they are present in disturbed sediments. Such contaminants have the potential to become biologically available to organisms either in the water column or through food-chain processes.

The subtidal areas in the Inner Harbor Turning Basin expansion footprint are generally not expected to contain contaminants at levels that would preclude beneficial reuse at an upland wetland restoration site as non-cover or potentially cover material except between Howard Terminal and Schnitzer Steel, where sediment may be contaminated with heavy metals. Studies suggest that there is no significant transfer of metal concentrations into the dissolved phase during dredging, even when total metals associated with the suspended matter may be large (Jabusch et al. 2008). Additionally, organic contaminants such as pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) 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). The minimization measures described in Appendix A7, including use of silt curtains when dredging sediments containing contaminants at levels in excess of applicable regulatory thresholds, would be implemented under this alternative to further minimize the potential for suspension of sediments and contaminants that could impact aquatic organisms.

Fish and aquatic organisms can also be impacted by the introduction of nonnative species. Work barges and vessels may come from outside of the San Francisco Bay Area to conduct construction associated with this alternative, and thus there is the potential that nonnative species could be introduced by these vessels. Larval forms of nonnative species can be carried in the ballast water of vessels, and if ballast water is released in San Francisco Bay, larvae can be introduced into the San Francisco Bay ecosystem. 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 to 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. All water-based vessels associated with construction of this alternative would be required to comply with these regulations, as applicable, to avoid the spread of invasive nonnative species and any associated impacts. Therefore, project activities would not be expected to substantially increase the spread of invasive nonnative species.

Expansion of the Inner Harbor Turning Basin would not involve addition of structures that would serve as a barrier to migratory fish. Construction-related effects such as noise and turbidity may cause fish and wildlife to avoid the immediate construction area temporarily, however, this would not substantially limit available habitat or movement of fish and seabirds relative to available open water habitat in Oakland Harbor and the greater San Francisco Bay. These effects would be negligible. Moreover, the expansion of the turning basin would create more open water habitat for fish to move through in the long term.

Based on the above analysis, in-water construction activities associated with this alternative would not have a substantial adverse impact on pelagic species or pelagic aquatic habitat and the project would not permanently or substantially interfere with the movement of aquatic organisms. Therefore, the effects of this alternative on pelagic resources would be less than significant.

Benthic Fauna

Expansion of the Inner Harbor Turning Basin (Alternative B) would result in the dredging of previously un-dredged areas down to the edge of the existing turning basin at -50 feet MLLW. 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 aquatic portions of the expansion footprint. Organisms immediately adjacent to the turning basin expansion footprint also may be lost because of smothering or burial from sediments resuspended in the water column during dredging (USACE 2019). These effects may also occur due to pile removal and installation, although to a much lesser degree.

Benthic habitat in the federal channel and turning basins, and their margins, is regularly disturbed under baseline conditions because of annual maintenance dredging and the propeller wash of ship traffic. Following sediment-disturbing activities such as dredging, disturbed areas are usually recolonized quickly by benthic organisms (Newell et al. 1998). Recovery in deep-water channels may be slower, and as a result, there is potential for some loss of habitat for fish species that forage in these deeper areas. This potential for habitat loss is minimized in the project area due to deep-draft vessel use of the navigation channel and turning basin which results in benthos that are in a constant state of disruption. 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). Benthic disturbance associated with this alternative would be spread over three years, during the 2027, 2028, and 2029 in-water work windows for Oakland Harbor (June through November). Following dredging, disturbed areas are recolonized, beginning with mobile and opportunistic species (Oliver et al. 1977, Lenihan and Oliver 1995). However, colonizing species composition may be different than prior to dredging, and recolonizing species may include nonindigenous species common to the San Francisco Bay (USACE and SFRWQCB 2015).

Most dredging under this alternative would occur in places that are already heavily disturbed by operations and maintenance at the Port. The newly dredged areas would be subject to more frequent disturbance from operations and maintenance activity. The USFWS considers this aquatic habitat type to be Resource Category 4 (i.e., the less valuable and most common kinds of habitat) due to its regional abundance, regular disturbance, and medium value to fish and wildlife. In their Draft Fish and Wildlife Coordination Act (FWCA) report for this study, USFWS determined that although restored tidal wetland is different than subtidal benthic habitat, the beneficial reuse of suitable sediments at a wetland restoration site, as proposed under this alternative, would meet the Resource Category 4 mitigation goals for minimizing loss of habitat value resulting from the project's impact to subtidal benthic habitat (see Appendix A2). Given the generally disturbed nature of the benthic habitat in the project area, along with implementation of the general and dredge-related minimization measures described in Appendix A07, and offsetting effects to habitat with the beneficial reuse of available suitable material for wetland restoration, potential impacts to benthic fauna and subtidal benthic habitat would be less than significant.

As described above, the Inner Harbor Turning Basin expansion (Alternative B) would not exceed any of the thresholds of significance identified for wildlife with the implementation of the avoidance and minimization measures discussed above and described in Appendix A7, and therefore the overall impacts of this alternative on wildlife would be less than significant.

6.5.2 Outer Harbor Turning Basin Expansion

Terrestrial Wildlife

No terrestrial areas would be modified by expansion of the Outer Harbor Turning Basin (Alternative C), so no effect to such resources would occur.

Pelagic (open water) Resources

Under this alternative, potential impacts to pelagic species and habitat would be like those described for the Inner Harbor Turning Basin expansion (Alternative B). However, the total duration over which this alternative would occur would be shorter, taking approximately 6 months completed in 2027 (June-November) This alternative would only involve dredging, so impacts described above related to pile removal and installation would not occur with expansion of the Outer Harbor Turning Basin. The same applicable avoidance and minimization measures for dredging proposed under the Inner Harbor Turning Basin expansion would be used under this alternative. Given the similarity of effects to those of the Inner Harbor Turning Basin expansion, and that this alternative would be shorter in duration and would not involve pile removal and installation, the effects of Outer Harbor Turning Basin expansion (Alternative C) to pelagic resources would be less than significant.

Benthic Fauna

Expansion of the Outer Harbor Turning Basin (Alternative C) would result in the dredging of previously un-dredged areas down to the edge of the existing turning basin at 50 feet MLLW. Overall, the magnitude and duration of the potential impacts to benthic fauna and habitat due to dredging the expanded Outer Harbor Turning Basin would be like the impacts described for the Inner Harbor Turning Basin expansion, but the duration of impacts would be shorter, lasting approximately 6 months over one dredging window. The USFWS similarly determined that restoration of tidal wetland through the beneficial reuse of suitable sediments at a wetland restoration site, as proposed under this alternative, would meet their goals for minimizing loss of habitat value resulting from the project's impact to subtidal benthic habitat (see Appendix A2). With implementation of the general and dredge-related measures described for the Inner Harbor Turning Basin expansion, and beneficial reuse of suitable material at a wetland restoration site, potential impacts to benthic fauna and habitat under the Outer Harbor Turning Basin expansion would be less than significant.

Based on the above analysis, the Outer Harbor Turning Basin expansion (Alternative C) would not exceed any of the thresholds of significance identified for wildlife and therefore, with the implementation of the applicable avoidance and minimization measures discussed in Appendix A7, the overall impacts of this alternative on wildlife would be less than significant.

6.5.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. All other elements of these sub-alternatives would be the same, except for landside electrical infrastructure improvements required for electrical dredging under Sub-alternative D-2. However, these electrical improvements would occur in an area that is completely developed, paved, and devoid of wildlife habitat; therefore, the effects of these two sub-alternatives on wildlife would not differ. The potential impacts of these alternatives would be a combination of those impacts presented above for the Inner and Outer Harbor Turning Basin individual expansion alternatives. Construction-related in-water work activities associated with the Outer Harbor Turning Basin expansion would be conducted at the same time as a portion of the in-water work for the Inner Harbor Turning Basin expansion during a period of approximately 6 months (expected during the 2027 in-water work window). Based on the localized nature of project impacts and the distance and landforms between the Inner and Outer Harbor Turning Basins, as well as the proposed minimization measures and beneficial reuse of dredged material, the impacts on wildlife from expanding both turning basins would not combine to create a more significant level of impact under sub-alternative D-1 or D-2. Thus, the effects of the Proposed Action (Sub-alternative D-2) and of Sub-alternative D-1 on wildlife would be less than significant.

6.5.4 No Action Alternative

Under this alternative, the two turning basins would each remain at their existing dimensions, and there would be no construction activities. Thus, there would be no effect to wildlife.

6.6 Special Status Species and Protected Habitats

Based on the special status species and habitats present or potentially occurring in the study area, for the purposes of this analysis, an effect may be considered significant if the alternative would do any of the following:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species listed as threatened or endangered under, or otherwise protected by, the federal ESA;
- Have a substantial adverse effect on critical habitat, EFH, mudflats, or eelgrass beds;

- Cause levels of harm to marine mammals that that exceed the thresholds for acquiring an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act of 1972 (MMPA); or
- Harm populations of migratory birds through direct impact or impacts to their feeding, nesting, or migration consistent with the requirements of the Migratory Bird Treaty Act of 1918.

The complete Final Biological Assessment is Appendix A1a.

6.6.1 Inner Harbor Turning Basin Expansion

Threatened and Endangered Fish

Federal ESA listed fish species and critical habitats with the potential to occur in the project area are described in Section 3.6.2 and include multiple runs of steelhead and Chinook Salmon, and Green Sturgeon. Although Longfin Smelt was recently proposed for listing under the federal ESA, as stated in Section 3.6.2, there is a low likelihood of Longfin Smelt occurring in the project area. However, if Longfin were present in the action area during construction, the potential impacts to the species would be like those described for the listed fish species in this section and the avoidance and minimization measures referenced in the following analysis would also serve to minimize impacts to Longfin Smelt. Potential impacts to federally listed fish species associated with the Inner Harbor Turning Basin expansion (Alternative B) would be from the same impact pathways described for non-listed pelagic fish resources in Section 6.6.1 including entrainment, underwater noise, turbidity, and resuspended contaminated sediments.

As described in Section 6.5.1, the potential for clamshell dredging to entrain or physically injure or kill listed fish species is considered low and in-water construction would be limited to the June 1 through November 30 work window established for maintenance dredging under the LTMS, when listed salmonids (steelhead and Chinook Salmon) are less likely to be present. Green Sturgeon may be present in the Central Bay during the in-water construction period, but only in low densities, and juveniles and adults would be mobile enough to avoid the clamshell bucket.

In-water construction would result in underwater noise primarily from mechanical dredging and pile removal and installation. Underwater noise has the potential to alter the behavior of fish and, if sufficiently loud, can cause temporary shifts in hearing ability or injury to internal organs. The interagency Fisheries Hydroacoustic Working Group has established interim criteria for noise impacts from pile driving on fishes; although these criteria are not formal regulatory standards, they are generally accepted as viable criteria for underwater noise effects on fish. A peak sound exposure level (SEL) of 206 dB is considered injurious to fishes. Cumulative SELs (cSELs) of 187 dB for fishes greater than 2 grams, and 183 dB for fishes below that weight, are considered to cause temporary shifts in hearing, resulting in temporarily decreased fitness (i.e., reduced foraging success and reduced ability to detect and avoid predators; Caltrans 2020). Because larvae, juveniles, and adults of some fish species managed under the relevant FMPs may be present in the Inner Harbor, both the 183 dB criterion for fish of less than 2 grams and the 187 dB criterion for fish greater than 2 grams would apply. There are no formal SEL thresholds for fish established for nonimpulse noise, such as vibratory pile driving.

As noted in Section 6.5.1, the Inner Harbor Turning Basin is an active marine waterway and ambient underwater noise levels were found to have a peak underwater sound pressure level of 174 to 175 dB when large vessels are turning in the basin. In comparison, peak sound pressure levels from a clamshell bucket striking the substrate were found to be on the order of 124 dB at 150 meters (approximately 500 feet) from the bucket. These dredging sound pressure levels are well below the peak and cumulative SEL thresholds for fish. Moreover, the mechanical dredging sound pressure levels are below 150 dB, which is the threshold NMFS has used for triggering behavioral effects (e.g., avoidance) in fish from both impulse and continuous noise. Although underwater sound produced by a given activity may be audible to fish beyond this point, overall sound levels less than 150 dB are not expected to adversely affect fish behavior.

Expansion of the Inner Harbor Turning Basin involves the removal and installation of sheet piles and steel pipe piles. The removal and installation of piles into as well as immediately adjacent to water has the potential to generate underwater noise. Vibratory techniques are often employed as a minimization measure to reduce the underwater sound pressure that transmits into the water from pile driving. Pile removal would occur via vibrating out piles. Extraction of existing sheet piles, piles (concrete and steel), or other in-water structures would also generate underwater noise, though at lower sound pressure levels than would be experienced during pile installation. In-water pile installation, where required, would be conducted with a vibratory driver to the extent feasible, but impact pile driving may be necessary. It is anticipated that sheet pile installation would be accomplished via a vibratory driver but the installation of 24-inch steel batter piles may require use of an impact driver.

In support of this study, an underwater noise analysis was performed to assess underwater sound pressure levels using reference observation data from the Caltrans Technical Guidance for the Assessment of Hydroacoustic Effects of Pile Driving on Fish (Caltrans 2020) and NMFS hydroacoustic worksheets.Table 46 and Figure 38 and Figure 39 identify the distance over which underwater noise thresholds may be exceeded during installation and removal of piles and sheet piles for expansion of the Inner Harbor Turning Basin.

Table 46. Summary of Underwater Noise Effects to Fish

Description of Work	Pile Type	Installation Method	Estimated Days Work[3]	Distance to Fish Thresholds (meters)			
				cSEL		206 dB Peak Threshold	150 dB RMS Threshold
				187 dB [1]	183 dB [1]		
Extraction of steel sheet piles at the Alameda site	12 or 24-inch-wide steel sheet piles	Vibratory	50	NA[2]	NA[2]	0	63
Extraction of steel pipe piles at the Alameda site	24-inch-diameter steel pipe piles	Vibratory	116	NA[2]	NA[2]	0	29
Extraction of concrete piles at the Howard Terminal site	24-inch-diameter concrete piles	Vibratory	40	NA[2]	NA[2]	0	29
Installation of steel sheet piles at the Alameda site, in-water near Schnitzer Site, and at Howard Terminal	24-inch-wide steel sheet piles	Vibratory	54	NA[2]	NA[2]	0	63/2,154
Installation of steel pipe batter piles at the Alameda site, in-water near Schnitzer Steel, and at Howard Terminal	24-inch-diameter steel pipe piles	Vibratory or impact hammer	11	NA[2]/341	NA[2]/341	0/9[5]	63/2,154

Notes:

[1] This calculation assumes that single-strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet).

[2] SEL thresholds are for impulse noise only and are not applicable for vibratory driving.

[3] In-water piles only

[4] Vibratory hammer will be the primary method for installation of these piles. Some impact driving is expected to be required. The analysis used only impact driving in a conservative approach to determine the greatest level of potential impact.

[5] This radius is similar in size to the area where the water would be agitated by a bubble curtain.

dB = decibel
RMS = root mean square
cSEL = cumulative sound exposure level

Figure 38: Estimated Distance to In-Water Sound Pressure Criteria for Fish for Impact Driving

Figure 39: Estimated Distance to In-Water Sound Pressure Criteria for Fish for Vibratory Driving

As described in the Proposed Action's avoidance and minimization measures for pile driving (Appendix A07), a bubble curtain or similar attenuation system would be used if the installation of impact-driven piles is required; such a system is assumed to provide 7 dB of noise attenuation (a 7 dB reduction) to the source values. With the use of bubble curtain or similar attenuation, installation of the 24-inch piles is not expected to generate underwater noise above the 206 dB peak noise injury threshold outside of the area agitated by the bubble curtain. During pile driving activities, fish are not expected to be present within a zone of 6 to 8 feet of the piles, because the movement of the piling through the water and initial contact with the San Francisco Bay seafloor would result in fish quickly leaving the immediate area. The project also includes "soft-start" techniques if impact pile driving is required, to allow aquatic species to disperse from the pile driving area. Therefore, no physical injury to fish (barotrauma) is expected.

In areas where the 187 dB and 183 dB cSEL thresholds would be exceeded, fish could experience temporary shifts in hearing thresholds. These effects would be confined to the relatively small 86 meter (282 foot) radius from the source and the 11 estimated work days for installation of steel pipe piles. The cessation of pile driving at the end of each work day would allow cumulative noise levels to reset before driving continues the following day. Due to the limited potential impact area and short duration of this activity, this is not considered a substantial disruption. In addition, implementing the general and pile-driving-related avoidance and minimization measures detailed in Appendix A07—such as confining in-water work to the June 1 through November 30 salmonid construction window; monitoring; preferential use of vibratory hammers for pile installation; and use of a bubble curtain during impact pile driving—would further minimize the potential for impacts to fish.

Behavioral effects that could occur during pile removal or installation include the temporary cessation of feeding or movement out of the area of effect during active pile driving. As detailed in the preceding analysis of dredging noise effects on fish, background underwater noise levels in Inner Harbor are elevated due to frequent ship traffic, and fish that frequent the area may be habituated to increased noise and thus less likely to exhibit a behavioral response differing from existing conditions (Caltrans 2020).

Section 6.5.1 describes how dredging, pile removal and installation, and other in-water construction activities would result in increased turbidity from suspended sediments and the potential effects on fish species. While early life stage individuals tend to be more sensitive to turbidity than adults, Chinook salmon, steelhead and Green Sturgeon do not spawn in the study area so their eggs or larval life stages would not be present. 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. Suspending sediments can also suspend contaminants into the water column, if they are present in disturbed sediments, which could affect listed fish species. However, as discussed in Section 6.5.1, a study on the short-term water quality impacts of dredging and dredged material placement on sensitive fish species in San Francisco Bay concluded that direct short-term effects on sensitive fish by contaminants associated with dredging plumes are minor (Jabusch et al. 2008). Moreover, turbidity plumes would be local, quickly disperse, and would be minimized by measures proposed under this alternative, such as the use of silt curtains (where specific site conditions demonstrate that they would be practicable and effective) and limitations on decant water.

Benthic habitat can also provide important foraging areas for special status fish species, especially for Green Sturgeon, which primarily forage in the benthos at depths up to 33 feet. Steelhead and Chinook Salmon are primarily drift feeders, but also occasionally forage in the benthos typically in waters less than 30 feet deep. 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, negligible in the context of the forage habitat available in the Oakland-Alameda Estuary, and areas disturbed by dredging would be expected to recolonize within months to years.

Based on the above analysis, and with implementation of the minimization measures described in Appendix A07, impacts to federally listed threatened and endangered fish species and their designated critical habitats from the Inner Harbor Turning Basin expansion (Alternative B) would be less than significant.

California Least Tern

As described above, dredging and shoreline construction activities could temporarily increase turbidity, which may affect California least tern foraging. Increased turbidity may decrease foraging success by decreasing prey abundance or by making it more difficult for least terns to detect prey. This bird species forages in the upper few feet of the water column. 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 within the Middle Harbor Enhancement Area. Mapped eelgrass areas in the Oakland Harbor are also greater than 250 meters (820 feet) from the proposed Inner Harbor Turning Basin expansion footprint. Suitable foraging habitat for this species is widely available outside of the proposed construction limits, including along the southern Alameda shoreline and the Bay Farm borrow pits to the south of Alameda.

Similarly, noise from construction activities would not substantially disrupt foraging activities of California least tern. Birds currently residing in the vicinity are accustomed to ambient noise from existing truck and train traffic, ferry operations, cargo handling at the Port, heavy metal recycling at the Schnitzer Steel site, and shipping operations. Typically, birds will avoid disturbance areas and move to preferable environments and in this case would be able to forage in similar shoreline waters elsewhere in the Oakland-Alameda Estuary away from construction activities.

The LTMS program maintenance dredging work window for California least tern in the project vicinity is August 1 through March 15 each year. Because in-water construction is proposed to occur partially outside of this work window (i.e., in June and July) under all action alternatives, the USACE initiated ESA consultation with USFWS to conduct work outside this window without adversely affecting the species. The consultation history is described in the subsequent section. With this, implementation of the turbidity minimization measures described in the preceding sections, and the use of vibratory pile removal and installation to the extent feasible to limit noise, impacts to California least tern would be less than significant.

Consultation History

A Biological Assessment (BA) was prepared and is included in environmental appendix A1. The BA was submitted to both NMFS and USFWS. On May 19, 2023. USFWS issued a Letter of Concurrence (LOC) on June 16, 2023 concurring with USACE's determination the the proposed project may affect but is not likely to adversely affect the endangered California least tern and the longfin smelt, which is proposed for listing as endangered. NMFS issued a LOC on August 24, 2023 concurring with USACE's determination that the proposed project is not likely to adversely affect salmonids, CCC DPS steelhead, green sturgeon or any critical habitat. The resulting Letters of Concurrence are located in Appendix A01.

Marine Mammals

The marine mammals with potential to occur in the project area primarily include Pacific harbor seal, to a lesser extent California sea lion, and infrequently harbor porpoise. The NMFS has established thresholds regarding the exposure of marine mammals to high-intensity noise that may be considered a take under the MMPA (NMFS 2018). The injury (Level A Harassment) threshold for such continuous noise is specific to the species hearing group (i.e., high-frequency cetaceans [harbor porpoise] and low-frequency phocids [Pacific harbor seal] and otariids [California sea lion]). The behavioral harassment (Level B; non-injurious) threshold is 160 db for impulse noise (e.g., impact pile driving) and 120 dB for continuous noise (e.g., vibratory pile extraction and driving) for all marine mammals. Table 47 summarizes these underwater noise thresholds for marine mammals.

Table 47: Marine Mammal Injury and Behavioral Disruption Thresholds for Underwater Noise

Hearing Group and species considered	Underwater Continuous Noise Thresholds (e.g., vibratory pile-driving)		Underwater Impulse Noise Thresholds (e.g., impact pile-driving)		
	Level A cSEL Threshold	Level B RMS Threshold	Level A Peak Threshold[1]	Level A cSEL Threshold[1]	Level B RMS Threshold
Phocids (Pacific harbor seal)	201 dB	120 dB	218 dB	185 dB	160 dB
Otariids (California sea lion)	219 dB	120 dB	232 dB	203 dB	160 dB
High-Frequency Cetaceans (harbor porpoise)	173 dB	120 dB	202 dB	155 dB	160 dB

Notes:
[1] Level A threshold for impulse noise is a duel criterion based on peak pressure and cSEL. Thresholds are based on the NMFS Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing.
cSEL = cumulative sound exposure level
dB = decibel
RMS = root mean square

As described above, noise from dredging activities proposed under the Inner Harbor Turning Basin expansion is comparable to ambient noise from shipping vessels and therefore is not expected to cause harassment of marine mammals.

Pile extraction and installation, by either vibratory or impact hammer, has the potential to impact marine mammals. The nearest haul-out for harbor seals is located approximately 1.5 miles away, on the opposite side of Alameda Island, and would not be impacted by airborne noise from project construction activities.

In support of this study, an underwater noise analysis was performed to assess underwater sound pressure levels on marine mammals that would result from expansion of the Inner Harbor Turning Basin. To approximate the areas over which the marine mammal thresholds summarized may be exceeded, the pile driving source levels and assumptions described above under "Threatened and Endangered Fish" were utilized in the practical spreading model. The results of that analysis are summarized in Table 48 and shown in Figure 40, Figure 41, Figure 42, and Figure 43.

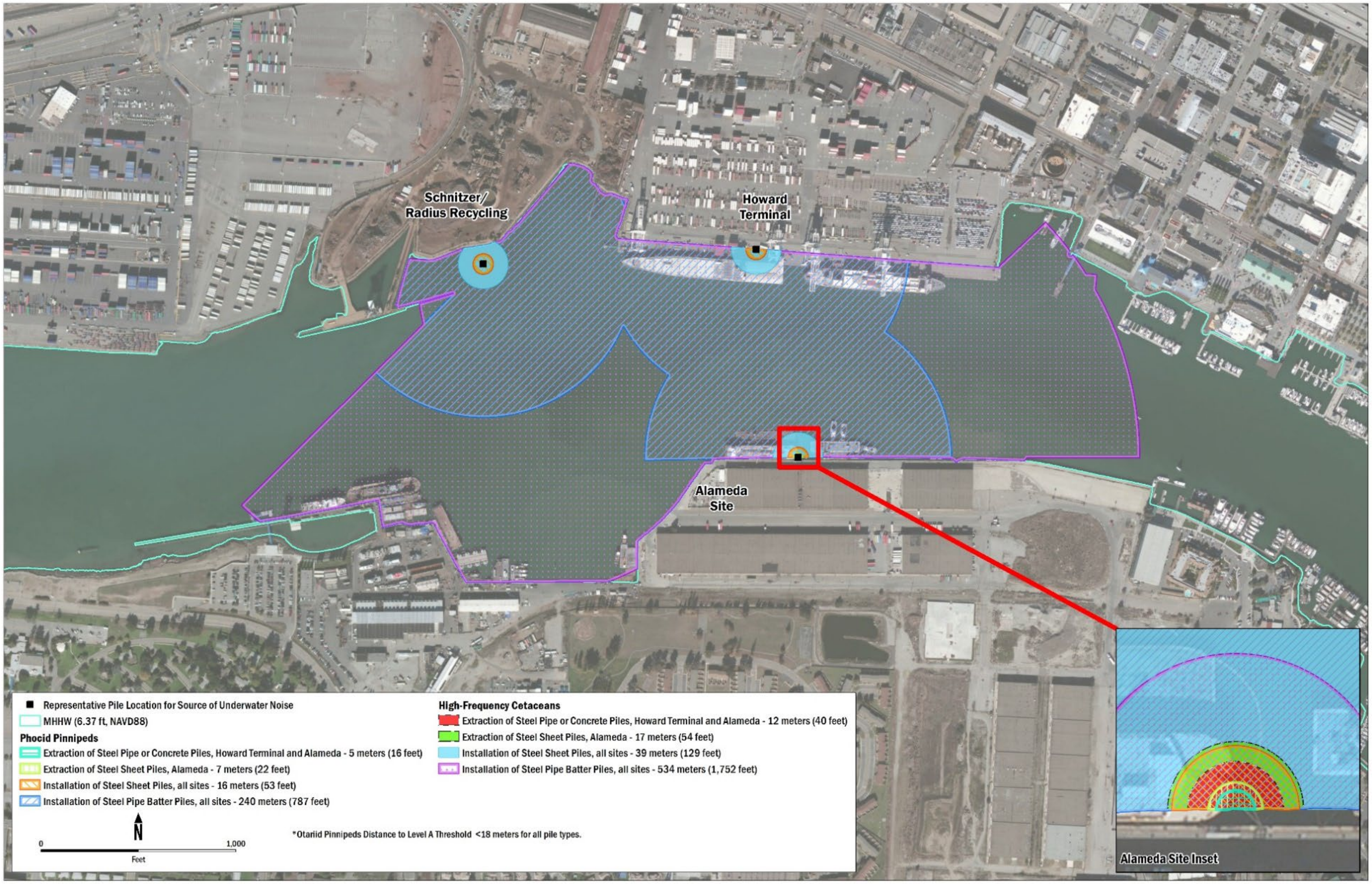

Figure 40: Source and distance of underwater noises

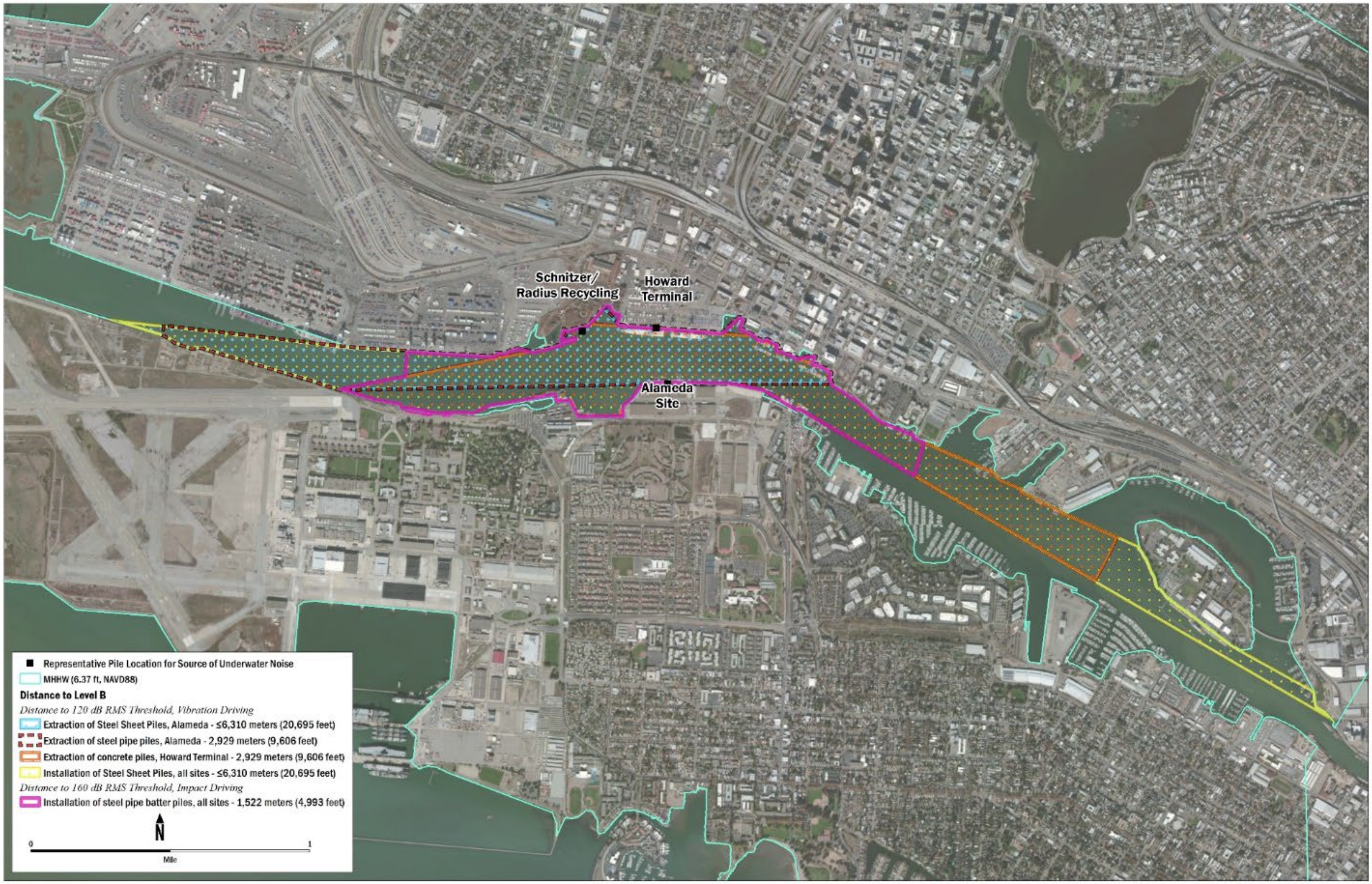

Figure 41: Distances to 120 dB

Table 48. Expected Pile-Driving Noise Source Levels and Distances of Marine Mammal Level A and B Threshold Exceedance

Description of Work	Pile Type	Source Levels (dB RMS)*	Distance to Level B Threshold (meters/feet)		Distance to Level A Threshold[1,2] (meters/feet)		
			120 dB RMS threshold (vibratory driving)	160 dB RMS threshold (impact driving)	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
Extraction of steel sheet piles at the Alameda site	12 or 24-inch-wide steel sheet piles	162 dB RMS	6,310/20,695	NA	17/54	7/22	1/2
Extraction of steel pipe piles at the Alameda site	24-inch-diameter steel pipe piles	157 dB RMS	2,929/9,606	NA	12/40	5/16	<1/1
Extraction of concrete piles at the Howard Terminal site	24-inch-diameter concrete piles	157 dB RMS	2,929/9,606	NA	12/40	5/16	<1/1
Installation of steel sheet piles at the Alameda site, in-water near Schnitzer Site, and at Howard Terminal	24-inch-wide steel sheet piles	162 dB RMS	6,310/20,695	NA	39/129	16/53	1/3
Installation of steel pipe batter piles at the Alameda site, in-water near Schnitzer Steel, and at Howard Terminal	24-inch-diameter steel pipe piles	185 dB RMS / 173 dB SEL	NA	464/1,522	464/1,752	240/787	18/59

Notes:
* As measured 10 meters/33 feet from the source.
[1] Level A thresholds are based on the NMFS 2018 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing; cSEL threshold distances are shown.
[2] All distances to the peak Level A thresholds are less than 10 meters/33 feet.
Distances are rounded to the nearest foot or to "<1.0 (0)" for values less than 1 foot.
cSEL = cumulative sound exposure level
dB = decibels
SEL = sound exposure level
RMS=Root Mean Square

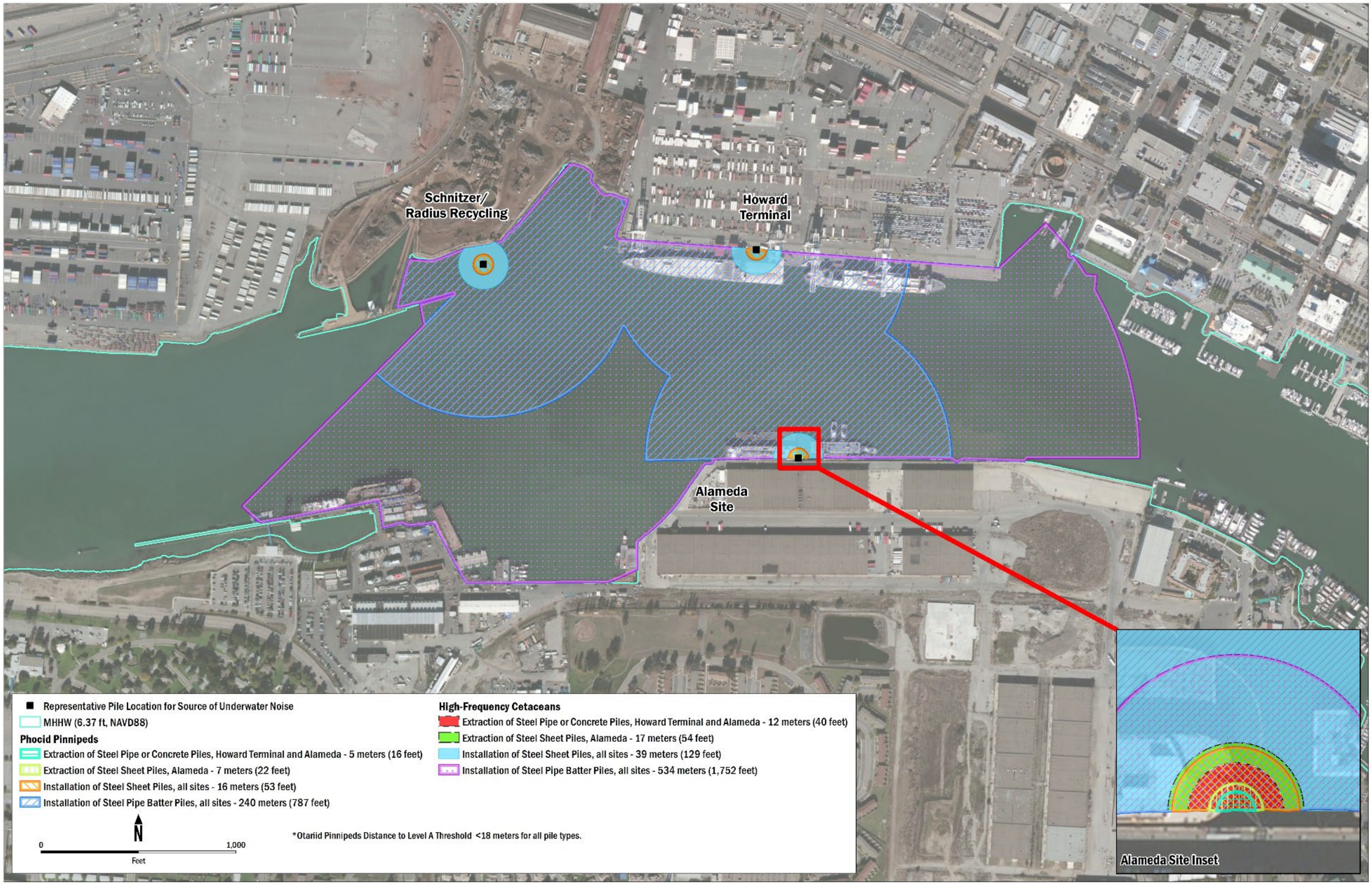

Figure 42: Distance to Level A Threshold for Marine Mammals

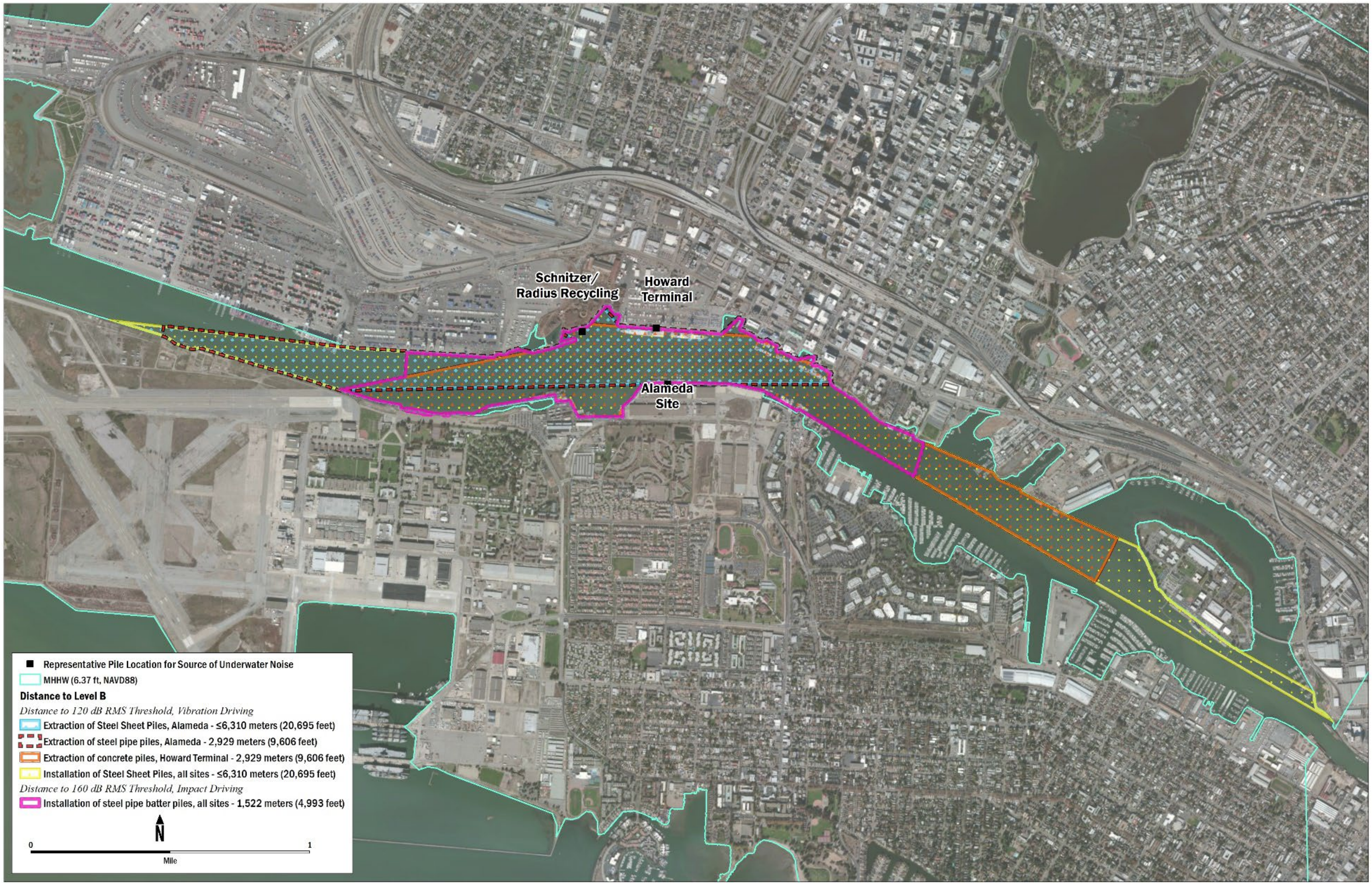

Figure 43: Distance to Level B Threshold for Marine Mammals

Marine mammals use hearing and sound transmission to perform vital life functions. The introduction of noise into their environment could disrupt those behaviors. Sound (hearing and vocalization/echolocation) serves four primary functions: (1) providing information about the environment; (2) communication; (3) prey detection; and (4) predator detection. The distances to which the construction noise are audible depend on source levels, frequency, ambient noise levels, the propagation characteristics of the environment, and the sensitivity of the receptor.

With both vibratory extraction and vibratory and impact pile driving, exposure to noise above the Level B thresholds could result in temporary, short-term changes in the typical behavior of marine mammals and/or avoidance of the affected area. The distances provided in Table 48 are calculated distances from the source based on the modeling methods which do not account for the presence of land and configuration of the Inner Harbor Channel; therefore, the expected extent of Level B threshold exceedance is as shown in Figure 43.

Depending on the rate at which the piles are installed and removed, pile extraction and driving is expected to occur 40 days during 2027, 155 days during 2028, and 76 days during 2029. During these periods, behavioral effects that could result include the temporary cessation of feeding or movement out of the area of effect during active pile driving. Other potential behavioral changes could include increased swimming speed, increased surfacing time, and decreased foraging in the affected area. As noted above, background underwater noise levels in Inner Harbor are elevated due to frequent ship traffic, and marine mammals that frequent the area may be habituated to increased noise and thus less likely to exhibit a behavioral response (Caltrans 2020).

To avoid injury to marine mammals during vibratory pile installation and removal and impact pile driving, USACE would require the construction contractor to station a marine mammal monitor during construction. Should a marine mammal enter the areas over which the Level A thresholds may be exceeded (Table 48), the monitor would direct the pile vibration or impact driving work to immediately and safely shutdown (see Appendix A7). Only pile vibration or impact driving work associated with construction would be shutdown, the shutdown would not affect any vessel traffic or other construction activities. Once a shutdown occurs, work would be allowed to resume when either 1) the monitor verifies the mammal has left the shutdown zone, or 2) 15 minutes has passed without re-detection of the animal.

While none of the marine mammals with potential to occur in the study area are ESA-listed species, based on this analysis, an incidental harassment authorization (IHA) in accordance with the requirements of the MMPA is likely to be required for the project. However, a greater level of detail will be necessary to obtain an IHA, such as exact locations, numbers, and means (vibratory or impact) of piles being driven. This information will not be developed until the preconstruction engineering and design (PED) phase, which occurs after the feasibility phase if a project is authorized and appropriated. Therefore, the study team prepared a project risk assessment and is seeking USACEHQ concurrence to obtain an MMPA IHA in PED but prior to construction. The project risk assessment and pertinent correspondence was submitted to USACEHQ in January 2024 with the final feasibility report/NEPA document.

Increased turbidity may temporarily reduce foraging opportunities for marine mammals 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 can avoid areas of temporarily increased turbidity and dredging disturbance. Additionally, the turbidity minimization measures identified in prior sections would lessen the effects of turbidity on marine mammals as well.

With implementation of measures to reduce effects from pile installation and removal activities and reduce construction related turbidity, impacts to marine mammals would be less than significant.

Species Protected under the Migratory Bird Treaty Act and EO 13186

Nesting areas for migratory birds are not expected be impacted by expansion of the Inner Harbor Turning Basin, because they are not present in the proposed expansion area. Peregrine falcons have nested on the easternmost crane on the Howard Terminal waterfront since approximately 2015; these cranes are moved along the Howard Terminal waterfront and would not be present in the expansion area at the time of construction. Dredging related turbidity and construction related noise would have similar effects on migratory birds that may forage in the project area as described above for the California least tern and those effects would be reduced by the same proposed minimization measures. The project would not cause mortality to migratory birds, or their eggs and chicks. Impacts to migratory birds would be negligible.

Essential Fish Habitat

An Essential Fish Habitat (EFH) Assessment was completed in accordance 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 was reviewed during 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. NOAA's NMFS EFH response was received on 24 Aug 2024 and while NMFS determined the proposed action would adversely affect EFH for various life stages of fish species managed under time Pacific Groundfish, Coastal Pelagic Species, and Pacific Coast Salmon Fishery Management Plans (FMPs) concluded that NMFS had no additional practical EFH conservation recommendations to provide the EFH consultation is included in Appendix A1.

Areas of San Francisco Bay below MHHW are designated as EFH under the Pacific Coast Groundfish, Coastal Pelagic Species, and Pacific Salmon FMPs. Because both open waters and substrates are included in the EFH designations, the potential impacts described in Section 6.5.1 for pelagic and benthic fauna are applicable to EFH as well. As described in the EFH Assessment for salmon habitat, effects to Pacific Coast Salmon EFH are expected to be localized and minimal in nature. For Pacific Groundfish Coastal Pelagic Species EFH, the habitat at time Inner Harbor and Outer Harbor turning basins will be adversely affected due to conditions of increased emitraimmient risk during dredging. benthic disturbance and alteration, and by the temporary degraded water quality, and increased underwater sound during project activities. Dredging would remove benthic invertebrates in the dredge footprint, and the project will result in the addition of, and deepening of, aquatic habitat which may result in modifications to forage opportunities. The area is expected to be re-colonized by benthic organisms following construction and dredging, and the area temporarily unavailable for foraging represents a relatively small portion of the foraging habitat in the San Francisco Bay. Placement of dredged material at a beneficial reuse site will occur within diked areas and isolated from tidal waters, therefore impacts from disposal will not affect EFH. The use of dredged material at a beneficial reuse site will ultimately benefit EFH through the restoration of tidal habitat. The degraded water quality, in the form of increased turbidity and sediment suspension, is anticipated to be temporary and will not result in any longtenn or permanent impacts to EFH. The removal of piles and other man-made hard substrates would result in the alteration of EFH in the project footprint as well because hard-substrate habitat would be removed and replaced with soft-substrate area and new hard-substrate surfaces (e.g., new bulkhead walls and piles). Overall, expansion of the Inner Harbor Turning Basin would result in an increase of open waters and soft-substrate bottom, increasing the extent of EFH in the project area. It should be noted however, that the newly created soft-substrate bottom will not have the same value to most aquatic species as undisturbed bay bottom since there will be frequent disturbance from vessel traffic that would alter the benthic invertebrate population.

Implementation of the previously identified minimization measures (see Appendix A7) for the protection of water quality and wildlife would reduce potential construction related impacts to EFH to less than significant and the long-term gain in aquatic area would be a beneficial effect to EFH. No additional EFH conservation recommendations were received by NMFS.

Vegetation, Wetlands, and Submerged Aquatic Vegetation

Expansion of the Inner Harbor Turning Basin (Alternative B) would require additional dredging on the perimeter of the existing basin, as well as modification of the existing adjacent uplands to accommodate the expansion. This alternative would result in the removal of existing fill such as concrete piles and sheet piles as well as conversion of terrestrial areas to Bay waters.

There are no wetlands or significant upland vegetation in the footprint or in the vicinity of the Inner Harbor Turning Basin, aside from some landscaped areas adjacent to buildings and roadways. The natural vegetation present is limited to ruderal growth along the shoreline fill adjacent to Schnitzer Steel. These areas do not provide significant habitat value to special status species potentially occurring in the project area.

Eelgrass beds and mudflats are considered special aquatic sites and are subject to jurisdiction under Section 404(b)(1) of the CWA and the CZMA. Eelgrass beds are also considered "habitat areas of particular concern" by NMFS with regard to EFH consultations required by the MSA. There are no mudflats in the project area. There are no eelgrass beds within 250 meters (820 feet) of the proposed Inner Harbor Turning Basin expansion area; the nearest patch occurs approximately 500 meters (1,640 feet) to the west of the existing Inner Harbor Tuning Basin (Merkel and Associates 2021). When dredging occurs more the 250 meters from eelgrass, potential impacts from dredge-induced turbidity would be minimal (USACE, EPA, and LTMS 2009). Implementation of the general and dredging-related minimization measures described in Appendix A7 including the use of silt curtains (where specific site conditions demonstrate that they would be practicable and effective), would further reduce potential impacts to eelgrass so that they are to be negligible.

6.6.2 Outer Harbor Turning Basin Expansion

Threatened and Endangered Fish

Potential impacts to listed fish species under the Outer Harbor Turning Basin expansion (Alternative C) would be like those of the Inner Harbor Turning Basin expansion (Alternative B). However, there would be no pile removal and installation (or associated underwater noise). Other potential impacts arising from dredging activities, such as removal of benthic habitat and increased turbidity, would be similar, and the associated minimization measures proposed for the Inner Harbor Turning Basin expansion would be implemented for this alternative as well. Therefore, the impacts to federally listed threatened and endangered fish species from construction of the Outer Harbor Turning Basin expansion would be less than significant.

Federally Endangered California Least Tern

Potential impacts to the California least tern under the Outer Harbor Turning Basin expansion (Alternative C) would be the same as those described for the Inner Harbor Turning Basin expansion (Alternative B). The same minimization measures and consultation under ESA to work outside the least tern work window established for maintenance dredging as described for the Inner Harbor Turning Basin expansion would be implemented as part of this alternative. Impacts to least tern would be similarly less than significant.

Marine Mammals

The Outer Harbor Turning Basin expansion (Alternative C) would involve dredging activities but would not involve any pile removal or installation and therefore, impacts to marine mammals would be less than those described for the Inner Harbor Turning Basin expansion. Underwater noise generated by dredging would not cause harassment of marine mammals. Increased turbidity could temporarily reduce foraging opportunities for marine mammals in the project area, but turbidity minimization measures would reduce this effect and marine mammals could avoid areas of temporarily increased turbidity to forage in habitat of equal or greater value throughout the Bay. Therefore, impacts on marine mammals from expansion of the Outer Harbor Turning Basin would be less than significant.

Species Protected under the Migratory Bird Treaty Act and EO 13186

Nesting areas for migratory birds would not be impacted by expansion of the Outer Harbor Turning Basin, because none are not present in the expansion area. Dredging activity would have similar effects on migratory bird foraging in the Outer Harbor Turning Basin expansion area as that described for the Inner Harbor Turning Basin expansion. Impacts to migratory birds under this alternative would be negligible.

Essential Fish Habitat

Potential impacts to EFH would be like those described for the Inner Harbor Turning Basin expansion, although no shoreline modification would occur and there would be no changes to substrate type from removal of piles or other hard substrates. Expansion of the Outer Harbor Turning Basin would not result in any net gain or loss of EFH. Implementation of the previously identified minimization measures (see Appendix A07) would reduce potential construction related impacts to EFH to less than significant.

Vegetation, Wetlands, and Submerged Aquatic Vegetation

Expansion of the Outer Harbor Turning Basin (Alternative C) would not require any shoreline modification. Construction methods would be limited to dredging.

No terrestrial, emergent, or submerged aquatic vegetation would be directly impacted by construction or operations of the expanded Outer Harbor Turning Basin. 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 in adjoining areas. One small patch of eelgrass is approximately 167 meters (548 feet) northeast from the proposed Outer Harbor Turning Basin expansion footprint (Merkel and Associates 2021). As evidenced by pre- and post-dredging surveys of eelgrass conducted in the Oakland and Richmond harbors before and after maintenance dredging, dredging is not anticipated to adversely affect existing eelgrass populations (Merkel and Associates 2011 and 2012; USACE and SFRWQCB 2015). Furthermore, this alternative includes implementation of eelgrass-related minimization measures (see Appendix A07) such as pre- and post-construction surveys in the project area, evaluation of project impacts, and as-needed compensatory mitigation in compliance with the California Eelgrass Mitigation Policy and Implementation Guidelines. Implementation of these measures and the general and dredging-related minimization measures described in Appendix A07, would further reduce potential impacts to eelgrass so that they are less than significant under this alternative.

6.6.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. All other elements of these sub-alternatives would be the same, except for landside electrical infrastructure improvements associated with electrical dredging under Sub-alternative D-2. However, these electrical improvements would occur in an area that is completely developed and paved and devoid of wildlife habitat; therefore, and the effects of these two sub-alternatives on special status species and habitats would not differ. The potential impacts of these alternatives would be a combination of those impacts presented above for the Inner and Outer Harbor Turning Basin individual expansion alternatives. Construction-related in-water work activities associated with the Outer Harbor Turning Basin expansion would be conducted at the same time as in-water work for the Inner Harbor Turning Basin expansion is ongoing for a period of approximately 8 months (expected during the 2028 and 2029 in-water work windows). Based on the localized nature of the impacts, the between the Inner and Outer Harbor Turning Basins, and because expansion of the Outer Harbor Turning Basin does not require pile removal and installation, the impacts on special status species and habitat from expanding both turning basins would not combine to create a more significant level of impact. Thus, the effects of the Proposed Action (Sub-alternative D-2) and of Sub-alternative D-1 on special status species and habitats would be less than significant.

6.6.4 No Action Alternative

Under this alternative, the two turning basins would each remain at their existing dimensions, and there would be no construction activities. Thus, there would be no effect to special status species and protected habitats.

6.7 Cultural Resources

This assessment discusses the potential effects of the proposed alternatives on cultural resources (i.e., archaeological and historic architecture and built-environment resources) and addresses obligations under Section 106 of the National Historic Preservation Act (NHPA).

For the purposes of this analysis, an alternative may have a significant effect on cultural resources if it would:

- Result in a substantial adverse change in the significance of a historical resource (National Register of Historic Places [NRHP] listed or eligible).
- There are four evaluation criteria to determine a cultural resource's eligibility to the NRHP, in accordance with the regulations identified in 36 C.F.R. § 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 C.F.R. § 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:

- Resources that are associated with events that have made a significant contribution to the broad patterns of our history; or
- Resources that are associated with the lives of persons significant in our past; or
- 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
- Resources that have yielded, or may be likely to yield, information important in prehistory or history (36 C.F.R. § 60.4).

Potential effects to cultural resources are evaluated within an area of potential effects (APE) which 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" (36 C.F.R. § 800.16(b)). The APE for the Oakland Harbor Turning Basins undertaking comprises all areas of the proposed project where project implementation could have direct impacts to cultural resources, should there be any present.

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" (36 C.F.R. § 800.16(b)). The APE for the current undertaking as it pertains to both archaeological and historic architectural resources comprise all areas of the proposed project where project implementation could have direct impacts to cultural resources, should there be any present. The APE is depicted on Figure 44.

Horizontal Area of Potential Effect

The horizontal extent of the APE for the proposed undertaking includes 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 Inner and Outer Harbor Turning Basins.

Construction staging (temporary staging of equipment and supplies) would occur in parking lots and other developed areas adjacent to the proposed construction areas at Howard Terminal, the Alameda site, and at Berth 10. Existing roads would be used to provide ingress and egress to the project area. No construction or ground disturbance is proposed at these staging areas, therefore no effects would occur as a result of their temporary use, and they are not included in the APE.

Figure 44 depicts the APE which includes the proposed limits of construction of the expanded turning basins. For the Outer Harbor under Alternative D-2, a small landside area is included to address the need for the installation of electrical infrastructure improvements for the Inner and Outer Harbor Turning Basin Expansion Alternative with electric dredging.

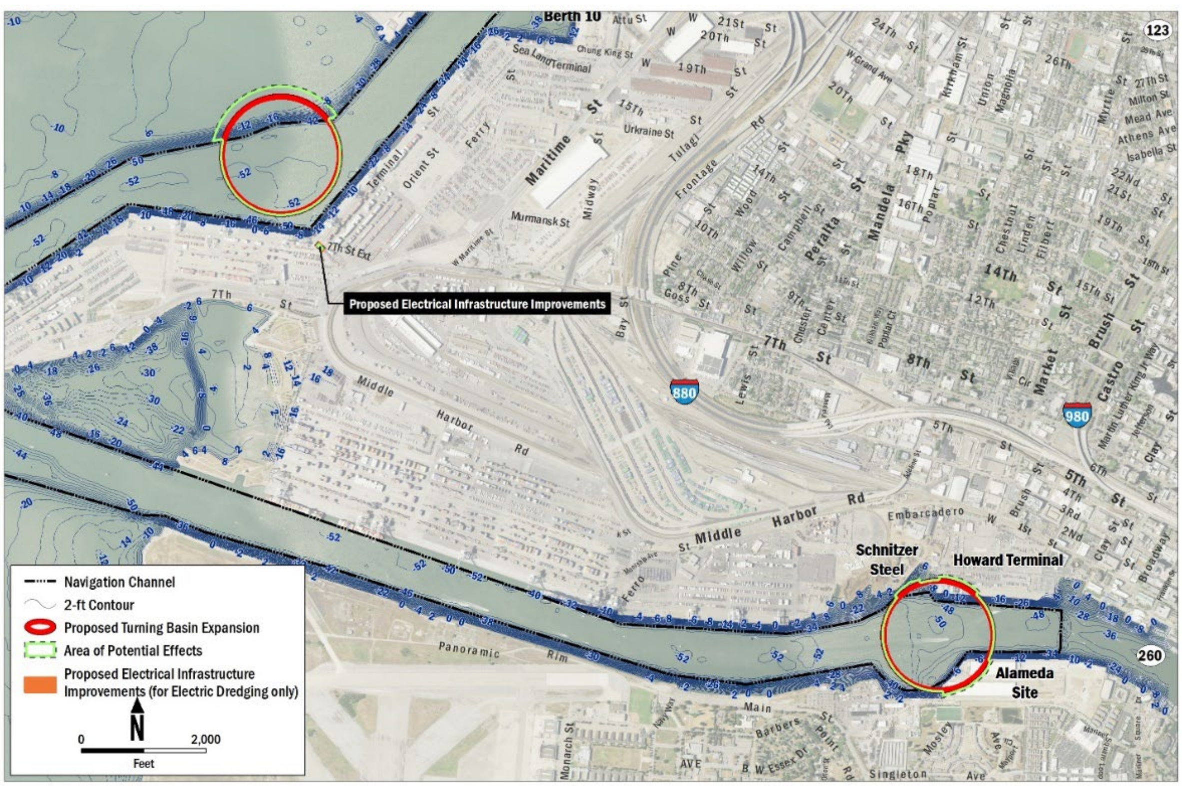

Figure 44. Areas of potential effect at the proposed expanded turning basin footprints (in green)

Vertical Area of Potential Effect

As implementation of the proposed project has the potential to impact buried and or submerged archaeological resources, the vertical extent of the APE must also be defined. At Howard Terminal and the Alameda site, existing piles of up to 125 feet in length would be extracted. The new bulkhead walls for the Inner Harbor Turning Basin would require installation of sheet piles 70 feet in length. The expansion of both the Inner Harbor Turning Basin and Outer Harbor Turning Basin include excavation and dredging of the expansion areas to a depth of -50 feet MLLW, consistent with the depth of the existing turning basins, which equates to roughly 45 feet or less of actual sediment dredging in presently inundated areas. The maximum depth of the vertical APE for the current undertaking is 70 feet below existing current surface (i.e., the length of a sheet pile) whether that be in the developed locations at Howard Terminal and Alameda or the inundated sediments in the channel, which corresponds to the installation of sheet piles for constructing the new bulkhead walls for the Inner Harbor Turning Basin.

Inventory of Cultural Resources in the APE

Several tasks were completed to identify cultural resources in the APE. These included:

- A records search at the Northwest Information Center (NWIC), California Historical Resources Information System, Sonoma State University (File No. 202678), the official state archive and repository of cultural resources site records and studies for Alameda County;
- Review of the shipwreck database maintained by the California State Lands Commission (SLC) in concert with the results of previously conducted geophysical surveys;
- A Sacred Lands File (SLF) review as well as a list of Native American contacts for the study area from the California Native American Heritage Commission (NAHC); Consultation with Native American Tribes;A windshield reconnaissance of the APE delineated for the project; and
- A review of the results of previously conducted geophysical surveys that covered the current APE.

Completion of these efforts did not result in the identification of extant cultural resources in the APE. As described below and in the inventory report, a portion of one cultural resource, the Todd-United Engineering Company Shipyard, a previously determined NRHP-eligible resource (i.e., a historic property) had occurred within the section of the APE delineated for the Inner Harbor Turning Basin. The portions of this historic property that occurred within the APE were demolished for previous USACE and Port of Oakland undertakings. Although no portion of the resource remains in the current APE, the files of the NWIC do not reflect the current conditions of the resource and as such, the shipyard is discussed here and in the inventory report so that the current conditions of the resource as they relate to the current undertaking can be documented.

The results of the inventory efforts (AECOM 2023) and the potential effects and impacts to both archaeological and historic architectural resources as they pertain to each alternative are presented below.

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 agency meetings to discuss the project (Appendix A06). These meetings, conducted virtually due to the COVID-19 pandemic, were held in October 2020, May 2021, August 2021, and September 2022, all being attended by Cultural Representatives of Indian Canyon Mutsun Band of Costanoan Ohlone People.

In July 2021, a list of Native American contacts as well as results of a SLF review for the study area were obtained from the NAHC. 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. In September 2021, a second letter was sent out by USACE and the Port to all of the groups identified in the July 2021 response from the NAHC, and requested 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 A6). One response was received from cultural representatives of the Indian Canyon Band of Costanoan Ohlone People expressing interest in consulting regarding the study area. The USACE has continued to consult on the study area and proposed action with the Indian Canyon Band of Costanoan Ohlone People during the preparation of this Integrated Report.

State Historic Preservation Office (SHPO) Consultation

In accordance with 36 CFR Part 800.4(d)(1), USACE consulted with the SHPO, April 19, 2022, seeking concurrence with the USACE's findings for the Oakland Harbor Turning Basins Widening Navigation study on the: (1) APE, (2) Identification of historic properties, and (3) finding of "No Historic Properties Affected." The Cultural Resources Inventory Report (2021), Preliminary Adverse Effects Report (2021), and tribal outreach documents were attached to the letter. The USACE determined that no historic properties are within the APE for the proposed Oakland Turning Basins Widening Navigation Study and no historic properties would be affected. The SHPO responded on May 13, 2022, and had no comments on the APE, but requested clarifications and additional information regarding USACE's efforts to identify historic properties. In absence of the clarifications and additional information, the SHPO found it premature to comment on the USACE's finding of "No Historic Properties Affected." The USACE letter to the SHPO and the SHPO's response are included in Appendix A6. After receiving the SHPO response, the USACE determined that optimization of the Recommended Plan would result in shifts to the turning basins and features that would require re-evaluation of potential effects to historic properties. On 31 August 2023, SHPO concurred with USACE's re-determination of "No Historic Properties Affected."

6.7.1 Inner Harbor Turning Basin Expansion

The records search completed for the cultural resource inventory of the current APE revealed that the entirety of the terrestrial portions of the Inner Harbor APE, including Howard Terminal and the Bay Ship & Yacht parcel in Alameda, have been previously inventoried for cultural resources. The two structures located on the Alameda side of the Inner Harbor that fall partially inside the APE were determined to be ineligible for listing on the NRHP (JRP 1996). Corbett and Hardy (1988) did identify the Todd-United Engineering Company Shipyard Historic District (P-01-003218; Historic Resource Inventory #4501-0325-9999) within the current APE. The Todd-United Engineering Company Shipyard Historic District is the only historic property that has been identified within the undertaking's entire APE; however, as alluded to above and described below the portion of the resource that once occurred in the current APE is no longer extant having been demolished for the previous -42-Foot Channel Dredging Project and the -50-Foot Deepening Project at the Port.

The Todd-United Engineering Company Shipyard Historic District was first recorded by Corbett and Hardy (1988), then later recorded and evaluated as a historic district by Basin Research (1998). 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 construction for the Port's -42-Foot Channel Dredging Project and the -50-Foot Deepening Project demolished contributing features (Corbett and Hardy 1988; Port 1998). A Historic American Engineering Record was completed for this historic property in accordance with a Memorandum of Understanding that was prepared for the -50-Foot Deepening Project (Corbett 2001). No contributing elements to the historic district remain within the current undertaking APE.

The SLC shipwreck database identified three vessels within 0.5 miles of the Inner Harbor APE, all three vessels were plotted at same location in an area to the east, near Jack London Square.[1] None of the reported locations are within or immediately adjacent to the APE. In addition, the federal shipping channels and turning basins are subject to annual maintenance dredging. It is very unlikely that cultural resources exist within the APE.

A windshield survey of the APE was conducted in July 2021 (AECOM 2023). No new cultural resources were identified.

No historic properties are known to exist within the Inner Harbor portion of the APE. Expansion of the Inner Harbor Turning Basin (Alternative B) would not result in effects and/or impacts to known cultural resources. Implementation of this alternative would result in a USACE finding of no historic properties affected pursuant to Section 106 of the NHPA. While the potential for intact archeological resources to occur in the APE delineated for the Inner Harbor is extremely low, any alternative would include provisions for the accidental discovery of archeological resources, including human remains inadvertently exposed during construction activities. Should such an unanticipated discovery occur, all activities at the discovery site that may result in disturbance to the discovery would be required to cease until an archeologist has evaluated the finds and determined their significance. The archaeologist would evaluate the finds and determine the disposition in accordance with applicable laws and regulations. With this minimization measure, adverse effects/impacts to unidentified archeological resources would be less than significant.

[1] The SLC database does not reflect the presence of identified shipwrecks, only the purported location of a wreck generally based on historic accounts and that is why multiple wrecks can be plotted in same location as found here.

6.7.2 Outer Harbor Turning Basin Expansion

Based on the cultural resources inventory, no historic properties occur in the Outer Harbor portion of the APE which, for Alternative C (Outer Harbor Turning Basin Expansion only), , is entirely situated offshore. The records search revealed that the Carnation Mill and Elevator (P-01-011758) was recorded (Basin Research 1998; Corbett and Hardy 1988) onshore, just south of the Outer Harbor portion of the APE, but the resource has since been razed and replaced by modern container cranes. AECOM (2023) reviewed other environmental documents, cultural resources reports, and technical data that could provide insight regarding the potential for cultural resources to occur in the APE, including a recent geophysical survey conducted to identify shipping containers lost in the Outer Harbor. As seen in Appendix A6 nearly the entire Outer Harbor portion of the APE was included in the geophysical survey conducted to identify the location and aid recovery of the lost containers (marked Objects # 1, # 2, and #3 in Figure 4-3 in Appendix A06) which have since been recovered. As stated above, both existing turning basins as well as the shipping channels are subject to annual maintenance dredging. Furthermore, the sediments of the Outer Harbor Turning Basin were previously dredged for both the -42-Foot Channel Dredging Project and the -50-Foot Deepening Project. Therefore, it is unlikely that cultural resources are located within the APE. The potential for discovery of cultural resources is low.

No new cultural resources, either archaeological or historic architecture, were identified in the Outer Harbor portion of the APE during the inventory efforts completed for this undertaking (AECOM 2023).

Given that no known cultural resources exist in the Outer Harbor portion of the APE, the Outer Harbor expansion alternative (Alternative C) would not result in effects and or impacts to known cultural resources. Implementation of this alternative would result in a USACE finding of *no historic properties affected* pursuant to Section 106 of the NHPA (36 CFR § 800.4(d)(1). While the potential for intact archeological resources to occur in the APE delineated for the Outer Harbor Turning Basin is extremely low, any alternative would include provisions for the accidental discovery of archeological resources (as described in the Inner Harbor Turning Basin Expansion Section above). With this minimization measure, adverse effects/impacts to cultural resources would be less than significant.

6.7.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Both Sub-alternative D-2 and Sub-alternative D-1 would involve expansion of both the Inner and Outer Harbor Turning Basins. All elements and potential effects of these sub-alternatives would be the same except that under Sub-alternative D-2, the outer harbor APE would be expanded to include a small landside area near Berth 26 for electrical infrastructure improvements associated with electrical dredging under Sub-alternative D-2. However, these electrical improvements would occur in an area that is completely developed and paved. This portion of the APE was evaluated along with the rest of the outer harbor APE (as shown in Figure 44) and no known cultural resources were identified. As with the individual Inner Harbor and Outer Harbor Turning Basin expansion alternatives, both sub-alternatives would also result in no effects or impacts to known cultural resources. No cultural resources eligible for the National Register exist in the APE for the alternatives, and none occur in the APEs delineated for the two turning basins. Implementation of either the proposed action (Sub-alternative D-2) or Sub-alternative D-1 would result in a USACE finding of no historic properties affected pursuant to Section 106 of the NHPA (36 CFR § 800.4(d)(1)).

The potential for intact archeological resources within the APE is extremely low for any of the alternatives. In the event of a discovery, minimization measures would be implemented to reduce potential adverse effects/impacts to cultural resources from either the Proposed Action (Sub-alternative D-2) or Sub-alternative D-1 and no adverse effects would result. The impacts would be less than significant.

6.7.4 No Action Alternative

Under the No Action Alternative, there would be no construction actions and no modification of either turning basin; therefore, no effects or impacts to Cultural Resources would occur.

6.8 Aesthetics

This analysis of visual resources is based on qualitative evaluation of the extent and implications of changes to existing visual resources that would result from implementation of each alternative. Consideration was given to specific changes in the visual composition, character, and valued qualities of the affected environment.

For the purposes of this analysis, an effect on aesthetics or scenic resources may be considered significant if the alternative would do any of the following:

- Substantially damage scenic resources associated with a designated or eligible scenic highway.
- Permanently block or disrupt existing public scenic views or reduce public opportunities to view scenic resources.
- Substantially reduce the existing scenic quality from public viewpoints.
- Conflict with applicable zoning and other regulations governing scenic quality; or
- Create a new source of substantial light or glare which would adversely affect nighttime views in the area.

6.8.1 Inner Harbor Turning Basin Expansion

Temporary visual impacts would occur during construction of the Inner Harbor Turning Basin expansion (Alternative B) due to the presence of construction equipment such as barges and scows used for dredging; cranes, bulldozers, and trucks used for demolition; and cranes, excavators, and drill rigs used for installation of bulkhead and pilings. On the Oakland side of the turning basin, construction equipment and materials would be staged at Howard Terminal and on the Alameda side of the turning basin they would be staged in an upland area nearby the construction site and on work barges.

There are no federally designated National Scenic Byways in the project region (FHWA 2021) and no state-designated or eligible scenic highways that afford views of the Inner Harbor Turning Basin. Therefore, there would be no effect to visual resources associated with a scenic highway.

Views of construction activities, materials, and equipment associated with implementation of this alternative would largely be visible to private recreational boaters and San Francisco Bay Ferry passengers in the Inner Harbor Channel; recreationists along the waterfront area and the adjacent Bay Trail; and users of open space fields and parks (e.g., Alameda's Estuary Park). Views of construction on the Oakland side of the turning basin from the Oakland Ferry Terminal, ship museums, and the ground floors of hotels and restaurants in the Jack London Square area would be blocked by intervening facilities (including buildings, trucks, and shipping containers) at Howard Terminal directly to the west. However, construction work and staging on the Alameda side would be visible from these locations. From the Middle Harbor Park Complex, including the Chappell Hayes Observation Tower, views of construction in the Inner Harbor Turning Basin would be blocked by intervening Port facilities.

Although construction equipment would be visible throughout the duration of construction, the Port and other maritime facilities already sustain considerable industrial and maritime activity, which includes the use of tugboats, barges, large vessels, cranes, and trucks. In addition, maintenance dredging and sediment transport in the Inner Harbor Channel is also a routine occurrence. The dredging and construction equipment associated with the Inner Harbor Turning Basin expansion would therefore appear as an extension of existing surrounding industrial and maritime activities and would be considered visually compatible with existing uses. Their visual presence would not substantially degrade existing scenic views from public viewpoints and would not block or substantially disrupt scenic vistas of the Inner Harbor Channel, the City of Oakland skyline, or the San Leandro hills.

At the completion of construction, the expanded Inner Harbor Turning Basin would appear visually like existing conditions, except that portions of two existing concrete and wood warehouse buildings on the Alameda side would be removed. Removal of these concrete and wood metal buildings would provide a visual benefit, because the existing viewshed would be improved from public vantage points, including Alameda's Estuary Park. New bulkhead sections and pilings installed along the waterfront on both sides of the Inner Harbor Turning Basin would also be of a size, scale, mass, and color like the existing facilities. These changes would not reduce the existing scenic quality from public viewpoints.

Dredging associated with the Inner Harbor Turning Basin expansion would be conducted 24 hours per day, seven days per week. This would require the use of minor nighttime lighting on the barge (i.e., sufficient safety lighting for other vessels to determine the location of the barges as well as limited lighting necessary to safely perform dredging operations at night). Minor nighttime lighting is already required on all boats in the Inner Harbor Channel. In addition, high-mast lighting is present along the northern side of the turning basin for nighttime loading and unloading activities in the Port, facility security, as well as at Alameda's Estuary Park for use during nighttime outdoor sporting events. The minor nighttime lighting associated with the dredge would be inconsequential in relation to the existing nighttime lighting sources and would be temporary in nature. Therefore, it would not create a new source of substantial light or glare which would adversely affect nighttime views.

Because construction materials and equipment would be localized, temporary, and visually consistent with existing heavy industrial and maritime uses, they would not conflict with applicable regulations governing scenic quality. Moreover, expansion of the turning basin would be consistent with policies in the Bay Plan related to the visual appearance of new bulkhead along the waterfront (which would appear visually like existing bulkhead).

Given the above analysis, visual impacts associated with the Inner Harbor Turning Basin expansion (Alternative B) would be less than significant.

6.8.2 Outer Harbor Turning Basin Expansion Alternative

Construction of the Outer Harbor Turning Basin expansion (Alternative C) would not include any land-based activities, only water-based sediment removal from a barge-mounted dredge. Staging of materials and equipment would occur at Berth 10.

The Outer Harbor Turning Basin is visible from I-80, including the San Francisco-Oakland Bay Bridge, which is eligible for scenic highway designation. However, a barge-mounted excavator dredge would be barely visible from the bridge and the adjacent Bay Trail and Alexander Zuckerman Path, at approximately 0.5 mile away. The staging area at Berth 10 would also not be visible due to intervening buildings and shipping container storage. Scows loaded with dredged sediments traveling underneath the bridge would be consistent with existing shipping activities that occur in the Channel. Therefore, construction of the Outer Harbor Turning Basin Alternative would have negligible impact on views from designated or eligible scenic roadways.

Views of construction activities, materials, and equipment associated with implementation of this alternative would largely be visible to recreational and commercial boaters in the Outer Harbor and users of Judge John Sutter Regional Shoreline Park (Gateway Park), including the observation pier and the Bridge Yard Building Event Center and observation deck. Construction equipment and materials at Berth 10 would be visible from the Bay Trail to the north, however, neither the proposed staging area at Berth 10 nor the Outer Harbor Turning Basin are visible from the Bay Trail along Maritime Street or the 7th Street Pedestrian/Bicycle Path, due to the presence of intervening industrial buildings and other equipment. Similarly, the proposed staging area at Berth 10 and the Outer Harbor Turning Basin are not visible from the Middle Harbor Park Complex or the Chappell Hayes Observation Tower which is not tall enough to afford views of the Outer Harbor Turning Basin.

Existing land uses on the southern side of the Outer Harbor Turning Basin are heavy industrial in nature and is dominated by large, mechanized cranes and cargo ships. Because dredging in the Outer Harbor Channel is a routine occurrence, the presence of a barge-mounted dredge, and occasional scow trips, would be visually consistent with existing shipping activities that occur. The area around the proposed staging area at Berth 10 is also heavy industrial in nature, consisting of shipping containers, soil stockpiles, industrial buildings and warehouses, metal fencing, paved roadways, construction equipment, and truck parking. Construction materials would be consistent in form, size, mass, and color with existing equipment and materials that are occasionally stored in the Berth 10 area. Thus, construction equipment and materials, although visible, would not block or substantially disrupt scenic vistas of the Outer Harbor Channel or the San Leandro Hills and their visual presence would not substantially degrade existing scenic views from public viewpoints.

Dredging in the Outer Harbor Turning Basin with a barge-mounted excavator would be conducted 24 hours per day, seven days per week. This would require the use of minor nighttime lighting on the barge. Such nighttime lighting is required on all boats in the Outer Harbor Channel and nighttime lighting is present at all landside facilities along the channel and immediately adjacent to the Outer Harbor Turning Basin. The minor nighttime lighting associated with the dredge would be inconsequential in relation to the existing nighttime lighting, would be temporary in nature, and would not create a new source of substantial light or glare that would adversely affect nighttime views in the area.

Because construction materials and equipment would be localized, temporary, and visually consistent with existing heavy industrial and maritime uses, their visual presence would not substantially conflict with applicable regulations governing scenic quality. At the completion of construction, the expanded Outer Harbor Turning Basin would appear visually the same as existing conditions.

Based on the above factors, visual impacts associated with the Outer Harbor Turning Basin expansion (Alternative C) would be less than significant.

6.8.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively, in addition to the construction of the additional electric infrastructure occurring at Howard Terminal Components will be visually consistent with existing equipment at the terminal. The same effects related to aesthetics and scenic resources described above for the Inner Harbor Turning Basin expansion (Alternative B) and Outer Harbor Turning Basin expansion (Alternative C) would occur under sub-alternatives D-1 and D-2, apart from landside electrical infrastructure improvements that would occur at the Outer Harbor under sub-alternative D-2. An electrical switchgear would be constructed adjacent an existing substation, located approximately 270 feet southeast from the water's edge at Berth 26, and underground conduits would be installed from the new switchgear to existing utility vaults and the substation. Bollards and fencing would be installed along the perimeter of the switchgear. The added aboveground components would be visually consistent with the existing industrial/maritime facilities. These changes would not reduce the existing scenic quality from public viewpoints. The Inner Harbor Turning Basin and Outer Harbor Turning Basin are not visible together from any one location; therefore, visual impacts from each turning basin expansion would be separate and would not combine to create a more significant level of impact. Therefore, impacts related to aesthetics and scenic resources under the Proposed Action (Sub-alternative D-2) and under Sub-alternative D-1 would be less than significant.

6.8.4 No Action Alternative

Under the No Action Alternative, the two turning basins would each remain at their existing dimensions. There would be no adverse temporary, construction-related effects to scenic resources. Because large portions of the concrete and wood warehouses at the Alameda site would not be removed under this alternative, the visual benefit to the viewshed in the southwestern portion of the Inner Harbor Turning Basin would not occur.

6.9 Recreation

Effects to recreational facilities were evaluated by considering the potential for construction methods and equipment, and the nature of project operation, associated with each alternative to modify or alter the nearby recreational resources described in detail in Section 3.9. For the purposes of this analysis, an effect on recreational resources may be considered significant if it would:

- Result in a permanent, substantial decrease or loss of public access to any waterway or public recreational land;
- Create an additional demand for recreational facilities that is beyond their capacity; or
- Increase the use of recreational facilities to such a degree that substantial physical deterioration would occur.

6.9.1 Inner Harbor Turning Basin Expansion

Construction activities associated with the Inner Harbor Turning Basin expansion (Alternative B) may result in temporary effects from increased noise and dust at the City of Alameda's Estuary Park, potentially temporarily displacing some users to other parks further from the construction area. However, the park would remain open during construction of this alternative. Furthermore, given that Estuary Park is surrounded by existing heavy industrial and maritime uses on the northwestern, northern, and northeastern sides, and by traffic on Mosley Avenue to the south, the construction sounds would be similar in nature to these ambient sources and the increase in noise in the vicinity of the park would be minor.

Similar temporary increases in noise from water-based construction equipment would occur for recreational boaters and passengers aboard the San Francisco Bay Ferry boats traveling through the Inner Harbor Turning Basin. However, given that the harbor is part of a working port, the construction sounds would be similar in nature to other commercial vessel traffic and port operations and any localized increases in noise would be minor. The presence of water-based construction equipment in the turning basin may necessitate localized areas of the channel be closed off from public waterway access. However, the turning basin and Inner Harbor Channel are wide enough that recreational boaters and San Francisco Bay Ferry boats would have ample room to traverse through the turning basin, as dictated by construction activities. Any localized closure would be temporary and be expected for a maximum of approximately 6 months at a time, coinciding with the in-water work window. The turning basins would remain open to all ship traffic, including the turning of vessels, during construction.

Given the distance from the project site, recreationists at the USS Potomac, Lightship Relief, and Alameda Landing Waterfront Park are unlikely to be affected. Similarly, the Alameda Ferry Terminal and the Bay Ship & Yacht Company property are between recreationists at the Main Street Dog Park/Bay Trail and the southern portion of the Inner Harbor Turning Basin; although the tops of cranes and the barge-mounted excavator would be visible in the middle ground during construction, this would not affect recreational use. No other parks in the vicinity would be affected by project-related construction activities.

While temporary effects for recreationists at the City of Alameda's Estuary Park and boaters in the Inner Harbor Turning Basin would occur, other nearby parks are available for landside recreation use, and boaters would be able to transit through the Inner Harbor. The potential minor, temporary displacements of recreationists from Estuary Park and from portions of the Inner Harbor Turning Basin during construction would not create an additional demand at other parks or boating areas that is beyond their capacity or increase the use of other recreational facilities to such a degree that substantial physical deterioration would occur. After construction, the Inner Harbor Turning Basin would be fully available for boater use and like existing conditions but would provide a slightly expanded open-water area for use. Moreover the expansion of the inner harbor turning basin is not expected to impact future planned actions in the area by the City of Alameda and their partners, including a pedestrian bridge between Jack London Square and West Alameda, and plans to increase water transit opportunities between Alameda and Oakland. Therefore, effects on recreation from the Inner Harbor Turning Basin Expansion (Alternative B) would be less than significant.

6.9.2 Outer Harbor Turning Basin Expansion

Recreationists on the Bay Trail north of the proposed staging area at Berth 10 may experience increased noise during the construction period for this alternative. However, given that this portion of the Bay Trail is surrounded by existing heavy industrial/maritime uses on all sides, including City of Oakland container storage yards and tugboat berths along with traffic on Burma Road and I-80 to the north, the noise level in the vicinity of this portion of the Bay Trail is already high. The temporary noise increase associated with use of the staging area would not be high enough to displace Bay Trail users.

Similar temporary effects from increased noise would occur for recreational boaters traveling near the Outer Harbor Turning Basin. The presence of water-based construction equipment in the Outer Harbor Turning Basin, could necessitate localized portions be closed off from public waterway access. However, the turning basin is sufficiently wide that boaters would have ample room to traverse through the turning basin, as dictated by construction activities. These effects to boaters would occur for a maximum of approximately 6 months at a time, coinciding with the in-water work window and approximately 8 months in total, the duration of construction of this alternative.

While temporary effects would occur for recreationists at Judge John Sutter Regional Shoreline Park (Gateway Park) and along a small portion of the Bay Trail as well as boaters in the Outer Harbor Turning Basin, other nearby parks and areas of the Bay trail would remain available for use, ample room to traverse the turning basin would be provided during construction, and all of the waterways outside of the turning basin would continue to be available for recreational use. These temporary effects during construction would not create an additional excessive demand on other recreational facilities or increase the use of other recreational facilities to such a degree that substantial physical deterioration would occur. Therefore, effects on recreation from the Outer Harbor Turning Basin Expansion (Alternative C) would be less than significant.

6.9.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. While Alternative D-2 would include landside electrical infrastructure improvements that would occur at the Outer Harbor, this electrical switchgear would be constructed adjacent to an existing substation located at Berth 26, not in the proximity of recreational areas. Therefore, the effects of these two sub-alternatives on recreation would not differ from one another The potential impacts of these alternatives would be a combination of those effects presented for the Inner and Outer Harbor Turning Basin individual expansion alternatives. Construction-related in-water work activities associated with the Outer Harbor Turning Basin expansion would be conducted at the same time as a portion of the in-water work for the Inner Harbor Turning Basin expansion for a total duration of approximately 8 months. Construction equipment would be present in both turning basins during this time. Because more area would potentially be restricted at the same time from public boat transit during construction, these sub-alternatives would have a slightly greater level of impact during construction than would be experienced under either the Inner Harbor Turning Basin expansion (Alternative B) or the Outer Harbor Turning Basin expansion (Alternative C) alone. However, as previously discussed, there would be ample room for boaters to pass through both turning basins, as dictated by construction activities.

For the reasons described above, impacts related to recreation under the Proposed Action (Sub-alternative D-2) and under Sub-alternative D-1 would be less than significant.

6.9.4 No Action Alternative

Under the No Action Alternative, the two turning basins would each remain at their existing dimensions, and no construction would take place. There would be no effect to recreational resources or uses.

6.10 Navigation and Transportation

As described in Sections 4.1**.** and 5.7, turning basin expansion would improve operational efficiency for vessels entering and exiting the Port, but would not change the Port's projected freight volumes from the future-without-project condition. Therefore, there would be no increase in the total number of trucks required to transport cargo from the Port under any of the future with project alternatives. However, there would be land-based traffic associated with construction activities under the action alternatives, such as dump trucks hauling excavated soil and other materials to recycling facilities or landfills. This section estimates the land-based traffic associated with each of the action alternatives and evaluates the potential impacts. Additionally, potential waterway navigational effects during construction are discussed and evaluated.

For the purposes of this analysis, an effect on land-based transportation or waterway navigation may be considered significant if the alternative would do any of the following:

- substantially impact vehicular traffic circulation by increasing average daily traffic (ADT) such that it exceeds roadway capacity or increases typical daily traffic by 25% or more;
- substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access;
- eliminate or substantially inhibit public transit, bicycle, or pedestrian circulation; or

- change vessel traffic patterns in a manner resulting in regularly-occurring extended delays, adverse change in freedom of movement, increased safety risks, or introduction of safety hazards.

It should be noted that none of the proposed action alternatives involve physical changes to the land-based transportation and circulation system. As a result, none of the alternatives include any geometric design features or introduce incompatible uses that could substantially increase hazards for land-based transportation. Similarly, all construction-related traffic would utilize existing roadways and would not eliminate or substantially inhibit the existing or planned public transit, bicycle, or pedestrian circulation routes described in Section 3.10.2. In addition, as described in Section 6.10.1, USACE would require the project construction contractor to develop a comprehensive construction traffic control plan that includes measures to minimize the effects of project-related construction traffic on overall circulation, including traffic, transit, bicycle, and pedestrian routes. As such, these two significance criteria are not discussed further in the alternative effect evaluations below.

6.10.1 Traffic Methodology and Assumptions

Traffic estimates were developed for each action alternative based on three primary trip types:

- Commute trips generated by construction workers (laborers and equipment operators)
- Deployment and withdrawal of equipment and machinery
- Dump truck trips to recycling facilities and landfills

Traffic associated with each action alternative was calculated as a set of ADT values for labor, equipment, and truck hauling for each week of the construction schedule. These calculations assume land-based work associated with the action alternatives would take place 5 days a week, with one shift lasting 8 to 10 hours/day. In contrast, dredging activities would be conducted 24 hours per day and 7 days a week.

Specific assumptions for each trip type/purpose are described in more detail below.

Construction Worker Commutes

Each laborer and equipment operator are assumed to make two trips per day: a morning commute trip to the site and an afternoon commute trip from the site. This includes equipment operators for water-based equipment such as barges, dredges, and tugboats, who are conservatively assumed to commute to the site (as opposed to residing onboard the vessels) and then access the water-based equipment from landside. Dump truck drivers were not included in the laborer and equipment operator trip tally, as they would not commute in a personal vehicle to and from the project sites. The trip estimation methodology conservatively assumes 100 percent of worker commute trips to the site are via personal vehicle with no public transit use, biking, or walking, and an average vehicle occupancy of one person, with no reductions for carpooling. While it is likely that at least some workers commuting to the site may carpool, use public transit, or walk/bike, the assumptions made for this analysis are being used to conservatively bound the traffic impacts.

Equipment and Machinery Deployment and Withdrawals

To calculate the total number of equipment and machinery deployments and withdrawals, the analysis assumed two trips for each piece of equipment (one for deployment at the beginning of the corresponding construction phase and one for withdrawal at the end of the construction phase). Therefore, equipment deployment and withdrawal are absolute values (and not daily values) because the equipment is assumed to remain at the site for the duration of the given construction phase. Water-based equipment (i.e., barges, dredging vessels, and tugboats) were excluded from this analysis because they are not deployed from land.

Dump Trucks and Hauling

The total number of truckloads required for construction was estimated based on the volume of material (e.g., excavated soil and piles, concrete pavement, building debris, etc.), with the total number of truck trips conservatively estimated as twice the number of required truckloads (one outbound trip to carry material to the disposal location and a return trip empty back to the project site). Dump trucks are assumed to move two to four truckloads (i.e., two to four roundtrips, or four to eight one-way truck trips) per day depending on the specific construction phase. Dump trucks are planned to be loaded at a rate of one truck approximately every 7 to 8 minutes at two stockpile locations. This results in an effective loading rate of one truck every 3 to 4 minutes. Each dump truck is assumed to hold 10 cubic yards of material. Once loaded, the dump trucks will haul material either to a concrete and asphalt recycling facility (e.g., Argent Materials in Oakland), Keller Canyon Landfill (a Class II landfill) in Pittsburg, California, or to Kettleman Hills Landfill (a Class I landfill) in Kettleman City, California.

Traffic Estimates

The maximum trips by type and peak total construction ADT estimates are presented for each alternative in the following alternative specific sections. The reported maximum ADT values for each alternative represent the maximum ADT estimated for worker commutes, equipment deployment, equipment withdrawal, or haul truck trips in any given week over the *entire* construction duration of the project. These maximum values for each trip type (purpose) are independent maximums and do not necessarily occur in the same week during the construction schedule. When an alternative involves multiple construction areas that trips would be made to/from, maximum ADT values by trip purpose are reported for each construction area separately (to facilitate comparison to traffic levels on these different routes expected under the No Action Alternative). Additionally, the peak ADT[1] values experienced at each construction area are reported. The peak total ADT values should generally be considered conservative because the primary contributor to construction traffic is dump trucks, which will only be active during certain phases. Therefore, the ADT to each site on most days (e.g., days or phases without hauling activity) would be much lower than the peak ADT values reported below.

[1] Peak ADT values represent the highest total ADT expected for a site (total across all trip purposes) in any single week across all weeks in the entire construction schedule.

6.10.2 Inner Harbor Turning Basin Expansion

Land-Based Transportation

Construction traffic estimates for expansion of the Inner Harbor Turning Basin (Alternative B) are summarized in Table 49. There would be a temporary increase in vehicle traffic (ADT) on local roadways serving the construction sites during the construction period associated with the Inner Harbor Turning Basin expansion alternative (Alternative B). The highest peak construction ADT across all Inner Harbor construction sites is 562 trips and is associated with the Howard Terminal construction site. Given the phasing of construction, the 562 peak ADT is also the maximum peak ADT for the entire construction duration. The values in Table 49 demonstrate that the largest contributing trip type for construction traffic to all work site locations except for Inner Harbor Turning Basin dredging is dump trucks. A dump truck ADT of 454, for example, corresponds to approximately 114 trucks making two roundtrips (or four one-way trips, two to the recycling facility or landfill and two back to the site) daily. Spreading these 454 trips across an 8-hour workday results in a peak-hour volume of approximately 57 haul trucks.

Table 49. Construction Average Daily Traffic Estimates – Inner Harbor Turning Basin Expansion

Construction Area/ Site	Maximum weekly ADT by Trip Type[1]				Combined (All Trip Types) Peak weekly ADT[2]
	Worker Commutes	Equipment Deployment	Equipment Withdrawal	Dump Trucks	
Howard Terminal	104	30	24	454	562
In-Water Retaining Structure by Schnitzer Steel	16	6	6	4	26
Alameda	120	24	24	380	524
Inner Harbor Sediments – Dredging	52	2	2	—	52
Inner Harbor Sediments – Berth 10 Loading / Hauling	56	4	4	152	164

[1] Maximum weekly ADT value for a trip type over the *entire* construction duration. Values for each trip type and site are independent maximums, they do not necessarily occur in the same week of the construction schedule.

[2] Peak ADT values represent the highest total ADT expected for a site (sum across all trip purposes) in any single week across all weeks in the entire construction schedule.

In general, construction-related traffic on a given roadway would dissipate with distance from the construction sites as traffic is distributed across multiple local street networks. Construction workers, for example, would be distributed throughout the region and can be expected to arrive at and depart from the sites using multiple possible local street routes. Construction trucks (those delivering/ withdrawing equipment or hauling material) would be less dispersed and would be expected to approximately follow the truck routes described in Section 3.10.2 and depicted in the Figures below to access the proposed Howard Terminal (Figure 45); Berth 10 (Figure 46); and Alameda (Figure 47) action areas. These routes are designed to connect with designated citywide local truck routes quickly and efficiently, which are typically wider, higher-capacity arterial roadways and/or are in industrial areas where the effects of additional truck traffic would be substantially lower than for narrower, lower-capacity streets.

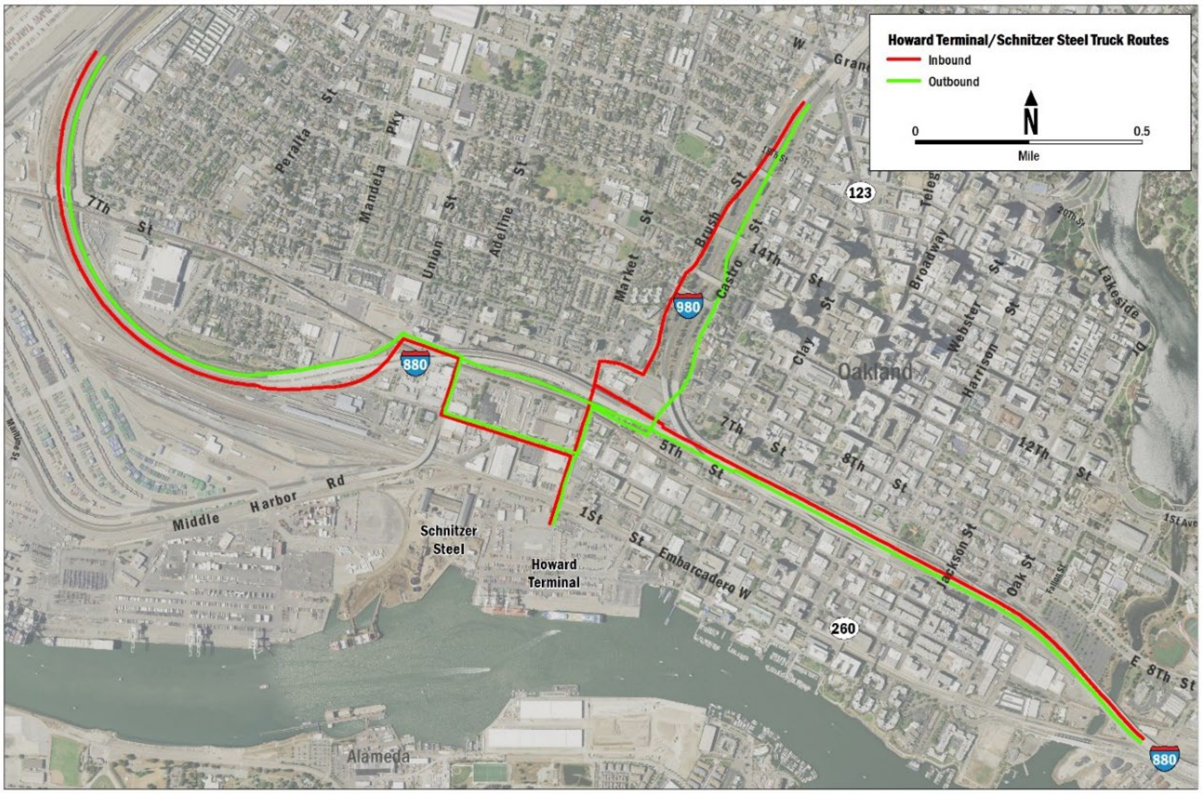

Figure 45. Truck routes to Howard Terminal

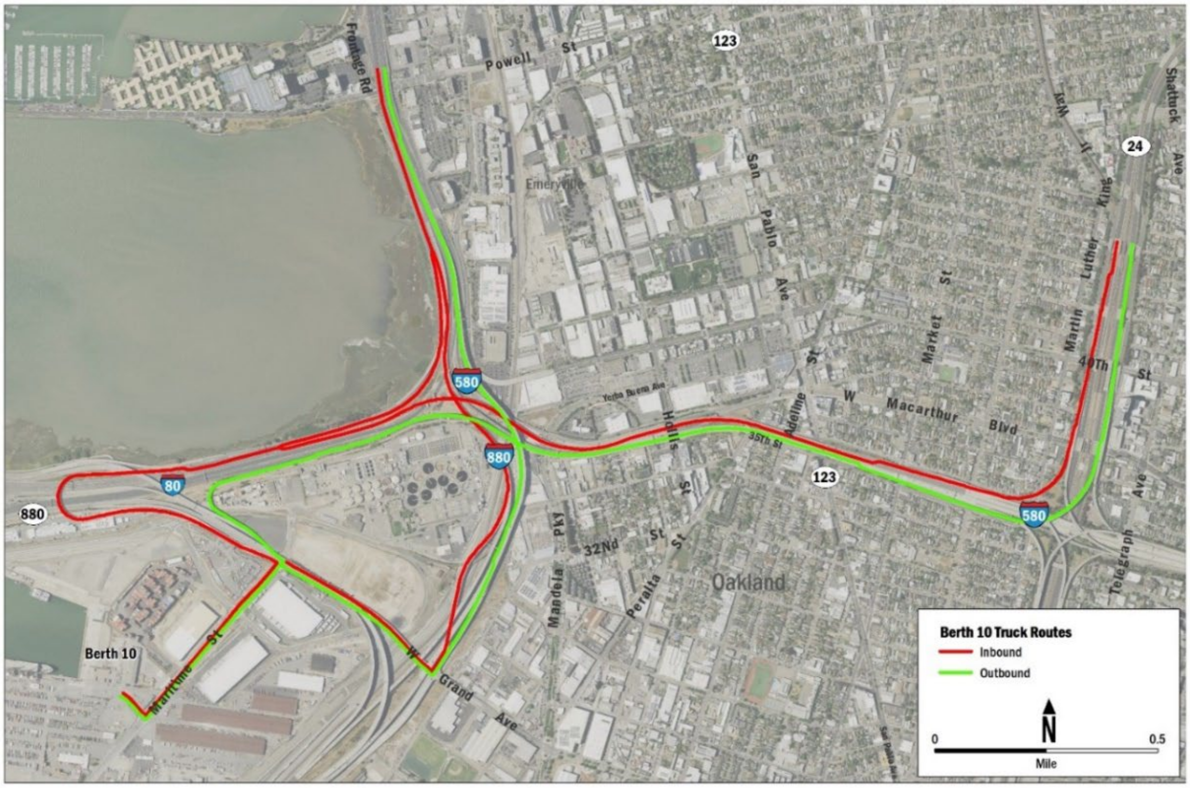

Figure 46. Estimated Truck routes to Berth 10

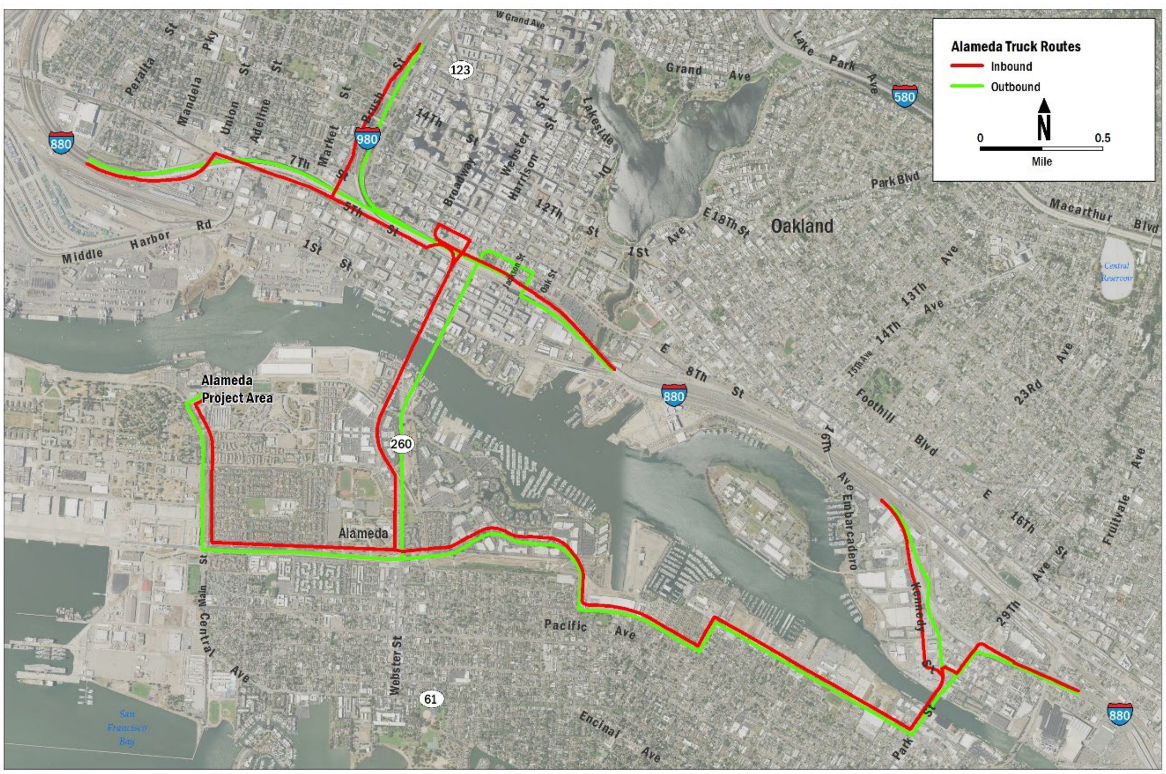

Figure 47: Estimated truck routes to the Alameda Site

Table 50 summarizes the typical daily capacity and existing ADT for key segments of local streets along the expected truck routes to/from each site, focusing on those locations closest to the project sites, where project-related construction traffic and associated effects would be most concentrated. The typical daily capacity is estimated as an hourly capacity of 900 vehicles per lane times the number of lanes on a roadway and multiplied by a typical traffic peaking factor of 10 times the hour capacity (Transportation Research Board 2016). As indicated in Table 50, the existing ADT in all cases is also below the existing capacity of the roadway.

Table 50. Capacity and Existing ADT along Expected Truck Routes

Site	Roadway Segment	Lanes	Typical Daily Capacity[1]	Existing ADT	% Increase in ADT w Peak Site ADT[2]
Howard Terminal	Market St. south of 3rd St.	4	36,000	3,400	17%
	Market St. north of 3rd St.*	4	36,000	3,100	18%
	3rd St. west of Market St.*	2	18,000	10,300	5%
	Adeline St. south of 5th St.*	4	36,000	8,900	6%
Berth 10	Maritime St. south of Burma St.	4	36,000	4,600	4%
	West Grand Ave. east of Maritime St.*	4	36,000	14,700	1%
Alameda	Main St. north of Willie Stargell Ave.	2	18,000	6,000	9%
	Main St. south of Willie Stargell Ave.	2	18,000	4,500	12%
	Ralph Appezzato Memorial Pkwy. west of Webster St.*	4	36,000	13,600	4%
	Via Webster/Posey Tubes				
	Webster St. north of Atlantic Ave.*	4	36,000	20,700	3%
	Via Park St. Bridge				
	Atlantic Ave. east of Constitution Way*	2	18,000	8,300	6%
	Sherman St. north of Buena Vista Ave.*	2	18,000	13,900	4%
	Buena Vista Ave. east of Sherman St.*	2	18,000	12,900	4%
	Buena Vista Ave. west of Grand St.*	2	18,000	11,100	5%
	Grand St. north of Buena Vista Ave.*	2	18,000	4,900	11%
	Clement Ave. east of Grand St.*	2	18,000	5,500	10%
	Clement Ave. west of Park St.*	2	18,000	5,300	10%

Site	Roadway Segment	Lanes	Typical Daily Capacity[1]	Existing ADT	% Increase in ADT w Peak Site ADT[2]
	Park St. north of Blanding Ave.*	4	36,000	29,700	2%

[1] Typical daily capacity is calculated as 900 vehicles/lane multiplied by the number of lanes and by a factor of 10.
[2] Calculated as peak ADT by site divided by existing ADT.
*ADT values are order-of-magnitude estimates derived from weekday peak-hour turning movement counts.
Source: Alameda County Transportation Commission, 2018; City of Alameda, 2017; City of Oakland, 2021

Conservatively assuming that the peak construction ADT values associated with the Howard Terminal, Berth 10, and Alameda construction sites (as shown in Table 49) are assigned, respectively, to each roadway segment in Table 50 above, the traffic increase would only represent approximately 1 percent to 18 percent of the existing ADT on these segments. This would add a maximum of approximately 110 vehicles per hour during the peak hour. In no case would the addition of the construction ADT on a segment, cause that segment to exceed its existing capacity. In the case of major regional roadways such as freeways, construction traffic would represent an even smaller fraction of the overall existing ADT. For example, I-880 has an existing ADT on the order of 123,700 vehicles of which the peak construction ADT across all sites (562) would represent 0.5 percent. Furthermore, because the peak construction ADT associated with a site is a conservative value taken over the alternative's entire construction timeline, the actual contribution of project construction traffic to the existing traffic levels on these roadways would be much lower on most days. Thus, even with the addition of this alternative's peak construction ADT values to regional roadways, those roadways would still be expected to operate well below their capacities and their traffic circulation would not be substantially impacted by increased construction-related daily traffic. Added ADT associated with the alternative would drop to zero upon completion of construction (the overall construction duration is estimated at approximately 2.5 years).

As described in Section 3.10.2 of this report, neither the proposed Oakland nor the proposed Alameda action areas are in the immediate vicinity of any emergency service providers. As described above, construction-related ADT would not cause a substantial increase in existing ADT along roadways or cause an exceedance of roadway capacity, and thus would not materially affect emergency access to, from, or through the study area (such as by increasing response times).

With any increase in traffic, some localized effects along roadways closest to the construction sites may be expected. To minimize these effects, in accordance with minimization measures identified in Appendix A7, USACE would require the project construction contractor to develop a comprehensive construction traffic control plan (TCP) that includes measures to minimize the effects of project-related construction traffic on overall circulation, including traffic, transit, bicycle, and pedestrian routes, safety, and emergency access.

Measures in the construction TCP would include, but would not necessarily be limited to:

- signage/striping and temporary traffic control devices to minimize conflicts, encourage use of detour or alternative routes (to avoid construction traffic), and ensure safety for all roadway users, particularly during periods of heavy hauling activity;
- identification and enforcement of designated truck haul routes;
- advance notification of neighboring residents, businesses, and other property owners, as well as affected jurisdictions and key stakeholders of any substantial increases in construction traffic (e.g., ramping up of hauling activity);
- maintenance of adequate emergency access at the project sites and general access for neighboring properties, at all times; and
- construction worker parking and transportation demand management (e.g., carpool/ vanpool programs, and leased parking in remote/offsite parking facilities).

Based on the preceding analysis, with implementation of a TCP for construction, expansion of the Inner Harbor Turning Basin (Alternative B) would have less than significant effects on land-based transportation.

Waterway Navigation

As described in Chapter 4, expansion of the Inner Harbor Turning Basin would provide beneficial effects by improving maneuvering safety and operational efficiency of larger vessels serving the Port (by providing an appropriately sized turning basin) but would not induce an increase in overall vessel traffic in relation to the future without project condition. The Inner Harbor Turning Basin is generally wide enough to accommodate operation and maintenance dredging and other marine-based construction equipment and allow passage of other vessel traffic. For construction of the proposed Inner Harbor turning basin expansion (Alternative B) stationary in-water equipment would be on the perimeter of the turning basin and not in the middle of the channel which would minimize interference with vessel traffic. In addition, in-water work on the northern and southern portions of the Inner Harbor Turning Basin expansion area would be done at different times to minimize equipment present in the turning basin. Construction would be coordinated with the San Francisco Bar Pilots, Oakland marine terminal operators, and waterway users to minimize operational impacts; nevertheless, the in-water construction activities may occasionally delay some vessels. In-water construction activities would comply with applicable vessel traffic and safety requirements; notices to mariners and navigational warning markers would be used as needed to prevent navigational hazards. Dredging would add to vessel movement in the vicinity, particularly during transport of material to placement sites; however, this vessel traffic would be like that which has occurred during past annual maintenance dredging operations. Therefore, expansion of the Inner Harbor Turning Basin to allow for turning of larger vessels would not result in regularly occurring delays, adversely affect freedom of movement, increase safety risks, or introduce safety hazards.

Impacts to waterway navigation under the Inner Harbor turning basin expansion alternative (Alternative B) would be beneficial in the long-term and less than significant during construction.

6.10.3 Outer Harbor Turning Basin Expansion

Land-Based Transportation

Construction traffic estimates for expansion of the Outer Harbor Turning Basin (Alternative C) are summarized in Table 51. Because there is no landside construction, excavation, or hauling of material required for this alternative, there is no equipment deployment or dump truck component. The only trip type associated with this alternative would be for workers to commute to the Outer Harbor site, which are conservatively assumed to occur for those workers to access water-based equipment from landside. Given this, the individual maximum ADT for worker commutes is also the peak ADT for the Outer Harbor site. This peak ADT is substantially lower than that of the Inner Harbor Turning Basin Alternative.

Table 51. Construction Average Daily Traffic Estimates – Outer Harbor Turning Basin Expansion

Construction Area/Site	Maximum Construction ADT by Trip Type			
	Worker Commutes	Equipment Deployment	Equipment Withdrawal	Dump Trucks
Outer Harbor Sediments – Dredging	52	—	—	—

Effects from expansion of the Outer Harbor Turning Basin (Alternative C) to land-based transportation would be substantially less than those of the Inner Harbor Tuning Basin (Alternative B) because there is no land excavation or other landside construction activity proposed for the Outer Harbor Turning Basin expansion. The only trip type associated with this alternative would be worker commutes to the Outer Harbor staging site at Berth 10 which would have a peak construction-related ADT value of 52 trips per day. Existing ADT near West Grand Avenue is on the order of 34,500 vehicles daily (Caltrans 2021a) so the maximum construction ADT would represent approximately 0.2 percent of the total ADT on this segment. Because workers are assumed to make a morning commute trip to the site and an afternoon commute trip from the site, construction traffic associated with this alternative would add a maximum of approximately 26 vehicles per hour during those two daily commutes. Additionally, construction-related traffic associated with the Outer Harbor Turning Basin Expansion would occur over approximately 32 weeks, which is a shorter duration than that of the Inner Harbor (2.5 years).

As with the Inner Harbor Alternative, the landside action area for the Outer Harbor Alternative is not in the immediate vicinity of any emergency service providers and construction-related ADT from this alternative would not cause a substantial increase in existing ADT along roadways or materially affect emergency access to, from, or through the study area (such as by increasing response times). Similarly, the USACE would require as part of construction of this alternative a construction TCP that includes the measures described under the Inner Harbor Tuning Basin Expansion Alternative (above) to minimize the effects of project-related construction traffic on overall circulation, including traffic, transit, bicycle, and pedestrian routes, safety, and emergency access. With implementation of a TCP for construction, expansion of the Outer Harbor Turning Basin (Alternative C) would have less than significant effects on land-based transportation.

Waterway Navigation

Much of the analysis and discussion provided above for the Inner Harbor Turning Basin Alternative related to waterway navigation also applies to the Outer Harbor Turning Basin expansion. Like the Inner Harbor Turning Basin, the Outer Harbor Turning Basin is an existing turning basin currently in use at the Port and is in waters used by a variety of vessel sizes and configurations. Expansion of the turning basin would provide beneficial effects by improving both maneuvering safety and operational efficiency of larger vessels serving the Port (by providing an appropriately sized turning basin) but would not induce an increase in overall vessel traffic in relation to the future without project condition. During construction, dredging and sediment transport activities for the Outer Harbor Turning Basin expansion would take place at the outer edges of the existing basin and would comply with applicable vessel traffic and safety requirements. Construction will be coordinated with the San Francisco Bar Pilots, Oakland marine terminal operators, and waterway users to minimize operational impacts. Notices to mariners and navigational warning markers would be used as needed to prevent navigational hazards. Expansion of the Outer Harbor Turning Basin would also not change existing waterway navigation so substantially that it could result in regularly occurring delays, adversely affect freedom of movement, increase safety risks, or introduce safety hazards. Thus, impacts to waterway navigation under the Outer Harbor Turning Basin expansion alternative (Alternative C) would be less than significant during construction and beneficial in the long-term.

6.10.4 Inner Harbor and Outer Harbor Turning Basin Expansion

Construction traffic estimates for expansion of both the Inner Harbor Turning Basin and Outer Harbor Turning Basin are presented in Table 52. Because the construction traffic associated with the Outer Harbor Turning Basin Expansion Only Alternative would be much smaller than that of the Inner Harbor Only Alternative, the maximum peak ADT for the entire construction duration is the same as for expanding the Inner Harbor Turning Basin only (562 ADT).

Table 52. Construction Traffic Estimates – Inner Harbor and Outer Harbor Turning Basin Expansion

Construction Area/Site	Maximum ADT by Trip Type[1]				Combined (All Trip Types) Peak ADT [2]
	Worker Commutes	Equipment Deployment	Equipment Withdrawal	Dump Trucks	
Howard Terminal	104	30	24	454	562
In-Water Retaining Structure by Schnitzer Steel	16	6	6	4	26
Alameda	120	24	24	380	524
Inner Harbor Sediments – Dredging	52	2	2	—	52
Inner Harbor Sediments – Berth	56	4	4	152	164

Construction Area/Site	Maximum ADT by Trip Type[1]				Combined (All Trip Types) Peak ADT [2]
	Worker Commutes	Equipment Deployment	Equipment Withdrawal	Dump Trucks	
10 Loading / Hauling					

[1] Maximum weekly ADT value for a trip type over the *entire* construction duration. Values for each trip type and site are independent maximums, they do not necessarily occur in the same week of the construction schedule.

[2] Peak ADT values represent the highest total ADT expected for a site (sum across all trip purposes) in any single week across all weeks in the entire construction schedule.

Both Sub-alternative D-1 and Sub-alternative D-2 (the Recommended Plan / Proposed Action) would involve the expansion of both turning basins. Since the individual Inner and Outer Harbor Turning Basin expansion alternatives would involve construction activities taking place at distinct sites (Howard Terminal, Berth 10, and Alameda for the former and the Outer Harbor for the latter), effects under the alternatives that involve expansion of both turning basins would generally be the sum of the effects of the two component alternatives. The land-based traffic effects of the alternatives involving both turning basins (Alternatives D-1 and D-2) would only be marginally higher than those of the Inner Harbor Turning Basin Expansion Alternative (Alternative B), due to concurrent construction activities for both turning basins during a 6-month period (anticipated in 2027 during the in-water work window) and associated added worker commute trips for the Outer Harbor Turning Basin during this period. In addition, under Sub-alternative D-2, electrical infrastructure improvements that would be constructed at the Outer Harbor near Berth 26 would result in 12 worker trips daily, both ways, and approximately 12 truck trips total during a 3-month period (in 2027).

Due to the distance between the turning basins, the impact on waterway navigation during construction would be the same as described for each turning basin alternative. However, the long-term beneficial impacts to navigation of expanding both turning basins would be greater than that of either of the individual alternatives because both turning basins would be appropriately sized for the larger vessels serving the Port.

Therefore, with implementation of a TCP for construction, expansion of both the Inner Harbor Turning Basin and Outer Harbor Turning Basin would result in less than significant effects on land-based transportation and waterway navigation during construction and beneficial effects in the long term.

6.10.5 No Action Alternative

Because the No Action Alternative does not involve any changes from existing conditions, there would be no effect on land-based transportation. However, the No Action Alternative would also perpetuate the navigational inefficiencies described in Chapter 2 that result from the existing turning basin widths and would not provide any benefits to waterway navigation associated with expanding the turning basins for the larger vessels serving the Port.

6.11 Hazardous, Toxic, and Radioactive Wastes

An alternative's potential effects related to HTRW would be considered significant if the alternative would:

- Create a significant hazard to the public or the environment through the transport, use, or disposal of substantial amounts of hazardous materials or wastes; or
- Create a significant hazard to the public or the environment through reasonably foreseeable upset (e.g., failure or malfunction) and accident conditions involving the release of hazardous materials into the environment.

Dredged material associated with the action alternatives may contain contaminants at levels that make it unsuitable for beneficial use; however, no regulated HTRW (i.e., requiring Class I landfill disposal) are expected to occur in the aquatic sediments. Contaminants in dredge or fill material are discussed in the subsequent section and are not further discussed here. The non-federal sponsor is responsible for all costs associated with the disposal of HTRW.

6.11.1 Inner Harbor Turning Basin Expansion

As discussed in Section 3.11, terrestrial soils on land adjacent to the Inner Harbor Turning Basin, as well as associated groundwater, have previously been found to contain HTRW. As part of this alternative, upland areas in the proposed expansion footprint would be excavated to approximately 15 feet below ground surface including fills from ground surface to below groundwater elevations. The area with potential HTRW lies behind the existing bulkhead. The State mandated a cleanup action under RCRA, which is currently being monitored by three stilling wells that are also located behind the bulkhead. This area will not be excavated. The soil outside of the bulkhead is fill that was placed in the mid-80's and it is not expected to contain HTRW.

Effects on water quality associated with potentially HTRW-contaminated groundwater are discussed in Section 6.4.1. As noted in that section, all ground-disturbing activities at Howard Terminal would occur in coordination with DTSC, as applicable, to ensure that adverse impacts associated with existing contamination would be avoided. Project plans would be developed to avoid impeding existing DTSC or other regulatory agency cleanup and abatement orders in or near the proposed footprint. Upland excavation throughout the proposed Inner Harbor Turning Basin expansion area would have a long-term benefit by removing contaminated soils at Howard Terminal and the Alameda site. Excavated material would be tested to identify an appropriate disposal site (e.g., Class I or II landfill) and all federal, state, and local regulations regarding the storage, handling, transport, and disposal of any excavated HTRW materials would be adhered to during construction. Hauling of excavated material for transport to an authorized landfill would include appropriate training, licenses, containment procedures, such as covering transport trucks when appliable, and spill countermeasures to avoid release of any contaminated materials back to the environment.

In addition, hazardous wastes such as fuel oils, grease, and other petroleum products would be used in construction activities associated with this alternative. To avoid accidental releases of hazardous wastes generated during construction, the construction contractor would be required to develop an environmental protection plan including spill pollution control and countermeasure procedures, and appropriate HTRW storage, handling, and disposal processes. The contractor would also be required to keep onsite appropriate spill control equipment commensurate with the quantity and type of materials being generated by construction in case an accidental spill occurs. These measures would avoid or minimize hazards to the public and environment associated with accidental release of hazardous materials into the environment.

Given the proposed measures to safely excavate, store, handle, and dispose of HTRW contaminated material excavated from the upland areas around the Inner Harbor Turning Basin, effects associated with HTRW from the Inner Harbor Turning Basin expansion (Alternative B) would be less than significant. Moreover, this alternative would result in a beneficial permanent effect due to the removal of contaminated soil in the Inner Harbor Turning Basin areas.

6.11.2 Outer Harbor Turning Basin Expansion

There is no landside work proposed as part of the Outer Harbor Turning Basin expansion (Alternative C) and therefore no HTRW is expected to be encountered in soils or groundwater. Therefore, effects associated with HTRW from the Outer Harbor Turning Basin expansion (Alternative B) would be negligible.

6.11.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. All other elements of these sub-alternatives would be the same, apart from the installation of electrical switchgear at the Outer Harbor near Berth 26 under Alternative D-2. The electrical infrastructure at Howard Terminal would be subject to the same requirements per DTSC as mentioned above. There are no known elevated contaminant levels in the soils at the proposed location of the switchgear improvements. Because the expansion of the Outer Harbor Turning Basin would have negligible HTRW effects, the effects of both sub-alternatives D-1 and D-2 would essentially be the same as those of the Inner Harbor Turning Basin (Alternative B). The same avoidance and minimization measures would be employed, and the effects associated with HTRW from both sub-alternative D-1 and the Proposed Action (D-2) would be less than significant.

6.11.4 No Action Alternative

The No Action Alternative would not involve any changes to or construction at the Inner or Outer Harbor Turning Basins. There would be no beneficial removal of existing contaminated soil.

6.12 Contaminants in Dredged or Fill Material

An alternative’s potential effects related to contaminants in dredged or fill material would be considered significant if the alternative would:

- Release dredged material in a location that it is not suitable for based on receiver site screening thresholds; or
- Place new fill that would introduce contaminants into the environment.

Limited sediment sampling was performed to validate quantity and quality assumptions made in beneficial use of dredged material estimates (Section 5.1). Estimates utilized existing sampling and analysis from prior projects in the immediate vicinity, as well as eight limited validation samples taken in December 2023 between Schnitzer Steel and Howard Terminal to validate feasibility-phase planning and cost assumptions. The results from the recent sampling in December corroborated the quantity and quality estimates present in Table 42. Samples indicate all material would meet criteria for wetland foundation or cover material and would not require any special handling or disposal considerations.

6.12.1 Inner Harbor Turning Basin Expansion

Expansion of the inner harbor turning basin (Alternative B) would involve both dredging and placement of fill. Most aquatic material to be dredged under this alternative is expected (based on existing information from prior projects) to meet screening thresholds for wetland non-cover or potentially cover. However, material in the basin between Howard Terminal and Schnitzer Steel may be contaminated with heavy metals at levels that would preclude aquatic disposal and beneficial uses. As described above, very limited sampling of this area was performed during feasibility level design, prior to finalization of the IFR, to validate assumptions about the material characteristics and suitability for various placement locations and associated costs of such placement. Sediments that would be dredged as part of implementation of this alternative would be fully sampled and tested in the pre-construction engineering and design (PED) phase that follows completion of the USACE's study phase, but occurs prior to any construction activities, including dredging. A sampling and analysis plan to characterize the sediment will be coordinated with the DMMO. The results would be reviewed by the DMMO to identify appropriate placement site options based on the characteristics of the sediment and criteria for each placement location. If dredged sediments do not meet the criteria for placement at a permitted beneficial use site, they would be removed and appropriately re-handled at the Port of Oakland's Berth 10 facility, which is an authorized material rehandling location, then hauled to a facility permitted for the receipt of such material (e.g. a landfill). Additionally, all handling and placement of dredged sediments would occur in accordance with applicable permit conditions to prevent adverse impacts associated with any contaminants in dredged material.

The effect pathways, potential impacts, and minimization measures for potential impacts from contaminants in dredged material on water quality are discussed in detail in Section 6.4.1 (Water Quality; in the "contaminants" subsection). In addition, the potential effects of dredged material contaminants on biota, and proposed measures to avoid or minimize such effects, are discussed in the Wildlife (6.5), and Special Status Species and Protected Habitat (6.6). Given that material will be sampled and tested, and suitability coordinated with the DMMO, and that handling and disposal would occur in accordance with all permit conditions, along with the implementation of the measures proposed to avoid effects to water quality and species and habitats (as described in the cited sections), dredged material would not be released to sites that it is unsuitable for and effects from contaminants in dredged material would be less than significant under this alternative.

The construction of the Inner Harbor Turning Basin widening alternative (Alternative B) would require the placement of a variety of fills into waters of the United States. Fill would include:

- Installation of approximately 26,100 cubic yards of rock fill for bank stabilization;
- Installation of approximately 246 batter piles to support the new bulkhead;
- Installation of approximately 400 linear feet of sheetpile bulkhead to support the slope next to Schnitzer Steel.

No dredged material fill will be placed in waters of the United States. The fill that is placed in the waters of the U.S. would be the minimum fill necessary to ensure the future structural integrity and seismic safety of the portion of the rock dike, bulkhead, and piles being replaced. The batter piles, sheet-pile, and rock apron will use materials obtained from reputable sources that do not contain contaminants. Additionally, this alternative would involve the removal of existing fill, resulting in net expansion of open waters of the U.S. Given that fill placed in waters of the U.S. would be the minimum necessary and would consist of clean construction materials as fill, the placement of fill under Alternative B would not introduce contaminants and the effects would be less than significant.

6.12.2 Outer Harbor Turning Basin Expansion

Expansion of the Outer Harbor Turning Basin (Alternative C) would involve dredging but would not involve any fill in waters of the U.S. because all the dredged material is estimated to meet the requirements for wetland non-cover placement. As described for the Inner Harbor Turning Basin Expansion, detailed sediment sampling and analysis will be performed in PED, in coordination with the DMMO, to determine suitability for placement. Handling and placement of dredged material would occur in accordance with all permit conditions. The potential effects of contaminants in dredged material on water quality and species and habitats would be the same as described for Alternative B and the proposed measures to avoid effects to these resources (as described in Section 6.12.1) would be implemented. Therefore, dredged material would not be released to sites that it is unsuitable for and effects from contaminants in dredged material would be less than significant under this alternative.

As there would be no fill associated with this alternative, there would be no effect from contaminants in fill material.

6.12.3 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 (Proposed Action) involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. All other elements of these sub-alternatives would be the same apart from the installation of electrical switchgear at the Outer Harbor near Berth 26 under Sub-alternative D-2. This installation of switchgear would not involve dredge or fill material and therefore, in the context of contaminants in dredge or fill material, the effects of these two sub-alternatives would not differ from one another. The potential impacts of these sub-alternatives would be a combination of those effects presented for the Inner and Outer Harbor Turning Basin individual expansion alternatives in terms of effects from contaminants in dredged material, but the same as Alternative B (Inner Harbor Turning Basin Expansion) for the effects of contaminants in fill material, given that Alternative C (Outer Harbor Turning Basins Expansion) involves no fill. While the volume of material dredged would be larger under sub-alternatives D-1 and D-2, the same avoidance and minimization measures would be employed for contaminants in dredge and fill material, and would result in less than significant effects from either D-1 or the Proposed Action (D-2).

6.12.4 No Action Alternative

The No Action Alternative would not involve any changes to or construction at the Inner or Outer Harbor Turning Basins. There would be no dredge or fill material, and therefore no effect from contaminants in dredge or fill material.

6.13 Air Quality

For the purposes of this analysis, an effect on air quality may be considered significant if the alternative would:

- Substantially contribute to air quality degradation or conflict with a State Implementation Plan to achieve National Ambient Air Quality Standards; or
- Generate substantial amounts of uncontrolled fugitive dust.

While this section focuses on air pollutant emissions generated from the considered alternatives, the Port prepared a health risk assessment (HRA) evaluating the potential cancer risk, chronic non-cancer health impacts, and $PM_{2.5}$ exposure of nearby receptors s from the potential air concentrations of the emissions associated with the alternatives. This HRA is discussed in Section 6.1 and is included in Appendix A4 for informational purposes.

As described in Section 3.13, the SFBAAB is classified as nonattainment with respect to the national standards for ozone (marginal) and $PM_{2.5}$ (moderate). 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. Federal agencies conduct an applicability analysis comparing project-specific estimated annual emissions to established *de minimis* levels for each respective pollutant in order to determine if the project has a potential to cause air quality degradation or inhibit air quality goals and therefore requires a full conformity analysis. The *de minimis* levels for both ozone precursors (NO_X and VOC) and $PM_{2.5}$ is 100 tons per year.

The General Conformity criteria is used as the significance threshold under NEPA. However, the BAAQMD has also established local thresholds for air quality. The air quality analysis performed for this study did find that daily emissions of NO_x may exceed the local thresholds. The Port's draft CEQA document provides analysis of air quality relative to local metrics. To minimize air quality emissions, all action alternatives would require construction contractors to equip all heavy-duty, off-road (non -marine) construction equipment that require greater than 25 horsepower, to the extent feasible, with engines that meet the Tier 4 Final (Tier 4F) standards as certified by the EPA and CARB.

In addition to air pollutant emissions, emissions of fugitive dust would also be generated by construction activities associated with grading and earth disturbance, stockpiling, travel on paved and unpaved roads, and other activities. Studies have shown that the application of BMPs at construction sites substantially controls fugitive dust (WRAP 2006), and individual measures have been shown to reduce fugitive dust by anywhere from 30 percent to 90 percent (WRAP 2006). For all projects, the BAAQMD recommends the implementation of its *Basic Control Mitigation Measures* (BAAQMD 2017). Implementation of these dust control avoidance and minimization measures would be adequate to control impacts from construction fugitive dust. These measures would be implemented as part of any of the action alternatives and are listed in Appendix A7. They include watering exposed surfaces twice daily or more, covering trucks hauling loose materials, wet power vacuuming visible dirt on public roads daily, limiting speeds on unpaved roads, limiting idling time to 5 minutes, properly maintaining construction equipment, and posting signage with contact information for dust complaints, among others. With implementation of these measures, impacts to air quality from fugitive dust would be less than significant under any of the action alternatives.

Finally, it should be noted that this air quality effect analysis only includes detailed consideration for construction emissions from the action alternatives. As described in 5.7, the waterway improvements proposed in the future with project alternatives would not increase cargo throughput or induce growth. The with project alternatives produce vessel operation efficiencies when compared to the future without project scenario, in the form of a reduction of overall delays in vessel transit and idiling. As a result of reducing delays, change in vessel fleet mix calling at the Port and reduced number of vessel calls, the action alternatives would reduce in-water emissions from vessel calls overall compared to the no action alternative, and therefore would avoid emissions associated with the vessel calls that would have otherwise occurred without a project. This beneficial reduction in emissions from reduced idling and vessel calls under the action alternatives relative to the no action alternative is illustrated with GHG emissions in the greenhouse gas analysis presented Section 6.14. Similarly, a reduction in criteria air pollutant emissions from vessel operations under future with project conditions would occur under any of the action alternatives and would be a reasonably assumed beneficial air quality effect.

Criteria Air Pollutant Emissions Calculations

For each action alternative, the air emissions calculations are estimated based on construction schedule and phasing, proposed construction equipment lists, activity levels, and worker and construction truck trips by construction phase. Based on input on the re-released draft IFR/EA, some modifications in modeling assumptions used for air emissions calculations and associated were made, including changes in equipment size and specifications such as horsepower, equipment age, and equipment turnover due to new regulations related to harbor craft such as tugs, dive boats, and barges; changes in the equipment hours and horsepower related to tugs and dive boats based on additional discussions with equipment operators; refinement in future operational emissions; and inclusion of emissions associated with electrical dredging to avoid brown-outs for Alternative D-2. Construction equipment data have been aggregated to characterize the hours of activity by equipment and by year. For the purposes of the emissions analysis, dredging activity was assumed to occur 24 hours a day, seven days a week. Land-based construction would be limited to daytime hours (7 a.m. to 7 p.m.) on weekdays. The emissions calculations, equipment characterization and activity, and emission calculation methodology are detailed in the Air Quality General Conformity Memo in Appendix A4 and are summarized below.

Emissions Summary

The emissions for alternatives B, C, and D-1 with use of diesel-fueled dredge equipment were calculated per calendar year for use in comparing to the *de minimis* levels and to analyze the potential effects of these alternatives (Table 53). In addition, it was conservatively assumed that the federal agency (i.e., USACE) can exert control on all potential emission sources associated with the action alternatives; therefore, sub-alternative D-2 (Recommended Plan) includes the use of electric dredge equipment, which would reduce emissions. Emission estimates and comparisons to *de minimis* levels for Sub-alternative D-2 are shown in Table 54. Annual emissions within the SFBAAB for each pollutant by year for the action alternatives are provided in Sections 6.13.1. through 6.13.3. Additionally, because haul trucks would travel through the SJVAB when taking material to a permitted material placement landfill, the resulting estimated emissions within that air basin are separately calculated in Table 55**.**

The resulting estimated emissions presented in the following tables do not result in ozone precursors or $PM_{2.5}$ exceeding the corresponding *de minimis* levels for any calendar year in either the San Francisco Bay Area or San Joaquin Valley air basins. As noted in Section 3.13, under the General Conformity Rule if a *de minimus* applicability analysis demonstrates that proposed Federal actions do not exceed applicable *de minimus* thresholds, General Conformity does not apply and no additional analysis or documentation is required under the regulations to demonstrate that air emissions associated with the proposed actions do not contribute to air quality degradation or prevent achievement of state and Federal air quality goals. The results of this study's applicability analysis indicate that a conformity analysis is not required and therefore no general conformity determination was produced.

Table 53. Summary of Annual Emissions within the SFBAAB for Alternatives B, C, and D-1 Using Diesel Dredges, with Comparison to de minimis Rates

Alternative	Construction Year	Tons per year				Fraction of *de minimis*[1] (%)			
		VOC	NOx	$PM_{2.5}$[2]	CO	VOC	NOx	$PM_{2.5}$[2]	CO
Alt B - Inner Harbor Only	2027	0.23	2.60	0.62	1.95	0.23%	2.60%	0.62%	1.95%
	2028	0.83	9.59	2.86	6.79	0.83%	9.59%	2.86%	6.79%
	2029	1.32	17.67	9.43	9.40	1.32%	17.67%	9.43%	9.40%
	Alt B Total[3]	**2.38**	**29.86**	**12.92**	**18.14**	—	—	—	—
Alt C - Outer Harbor Only	2027	0.79	10.17	2.39	5.16	0.79%	10.17%	2.39%	5.16%
	2028	0.94	11.96	2.42	6.2	0.94%	11.96%	2.42%	6.20%
	Alt C Total[3]	**1.73**	**22.12**	**4.81**	**11.36**	—	—	—	—
Alt D-1 - Inner & Outer Harbor	2027	0.73	3.43	2.02	2.87	0.73%	3.43%	2.02%	2.87%
	2028	2.34	29.65	6.74	16.63	2.34%	29.65%	6.74%	16.63%
	2029	1.52	20.73	9.89	10.90	1.52%	20.73%	9.89%	10.90%
	Alt D-1 Total[3]	**4.59**	**53.81**	**18.66**	**30.40**	--	--	--	--
De minimis thresholds[4]		100	100	100	100	--	--	--	--

NOTES:

1. Alameda and San Francisco Counties are both considered marginal ozone nonattainment areas, moderate $PM_{2.5}$ nonattainment areas and maintenance areas for CO. These designations correspond to *de minimis* rates of 100 tons per calendar year for each pollutant (VOC, NOx, $PM_{2.5}$ and CO).
2. $PM_{2.5}$ values in table include both emissions from exhaust and fugitive sources.
3. Totals (in bold) may not add up due to rounding.
4. *De minimis* thresholds apply per calendar year.

CO = carbon monoxide
NOx = nitrogen oxides
PM2.5 = particulate matter less than 2.5 microns in diameter
SFBAAB = San Francisco Bay Area Air Basin
VOC = volatile organic compounds
SOURCE: Table compiled by Environmental Science Associates in 2023.

Table 54. Annual Emissions within the SFBAAB for Alternative D-2 Using Electric Dredges, with Comparison to de minimis Rates

Alternative	Construction Year	Tons per year				Fraction of *de minimis*[1] (%)			
		VOC	NOx	$PM_{2.5}$[2]	CO	VOC	NOx	$PM_{2.5}$[2]	CO
Alt D-2 - Inner & Outer Harbor	2027	0.21	1.21	1.33	0.98	1.21%	1.33%	0.98%	0.98%
	2028	1.08	12.72	2.69	8.63	12.72%	2.69%	8.63%	8.63%
	2029	0.77	10.72	7.68	6.05	10.72%	7.68%	6.05%	6.05%
	Alt D-2 Total[3]	**2.06**	**24.64**	**11.70**	**15.65**	--	--	--	--
De minimis Thresholds[4]		100	100	100	100	--	--	--	--

NOTES:

1. Alameda and San Francisco Counties are both considered marginal ozone nonattainment areas, moderate $PM_{2.5}$ nonattainment areas and maintenance areas for CO. These designations correspond to *de minimis* rates of 100 tons per calendar year for each pollutant (VOC, NOx, $PM_{2.5}$ and CO).
2. $PM_{2.5}$ values in table include both emissions from exhaust and fugitive sources.
3. Total may not add up due to rounding.
4. *De minimis* thresholds apply per calendar year.

CO = carbon monoxide
NOx = nitrogen oxides
PM2.5 = particulate matter less than 2.5 microns in diameter
SFBAAB = San Francisco Bay Area Air Basin
VOC = volatile organic compounds
SOURCE: Table compiled by Environmental Science Associates in 2023.

Table 55. Annual hauling emissions estimates within SJVAB, with Comparison to de minimis Rate

Alternative	Construction Year	Tons per year				Fraction of *de minimis*[1] (%)			
		VOC	NOx	$PM_{2.5}$	CO	VOC	NOx	$PM_{2.5}$	CO
Alt B - Inner Harbor Only	2027	0.0	0.0	0.0	0.0	0%	0%	0%	0%
	2028	0.002	0.26	0.04	0.022	0.020%	2.600%	0.06%	0.02%
	2029	0.003	0.38	0.06	0.003	0.030%	3.800%	0.09%	0.003%
	Alt 1 Total	**0.005**	**0.624**	**0.11**	**0.025**	—	—	—	—
Alt C - Outer Harbor Only[2]	2027	0.0	0.0	0.0	0.0	0%	0%	0%	0%
	2028	0.0	0.0	0.0	0.0	0%	0%	0%	0%
	Alt 2 Total	**0.0**	**0.0**	**0.0**	**0.0**	—	—	—	—
Alt D-1/D-2 - Inner & Outer Harbor	2027	0.0	0.0	0.0	0.0	0%	0%	0%	0%
	2028	0.002	0.258	0.042	0.010	0.020%	2.580%	0.06%	0.01%
	2029	0.003	0.378	0.064	0.015	0.030%	3.780%	0.09%	0.02%
	Alt 3 Total	**0.006**	**0.635**	**0.106**	**0.026**	--	--	--	--
De minimis Thresholds[3]		10	10	70	100	--	--	--	--

NOTES:

1. San Joaquin, Stanislaus, Merced, Fresno, and Kings Counties are considered extreme ozone nonattainment areas and serious PM2.5 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 PM2.5. SJVAB is designated as an attainment area with respect to the federal CO standard, which corresponds to a de minimis threshold of 100 tons per calendar year.
   No haul trips through SJVAB would occur under Alternative C.
   De minimis thresholds apply per calendar year.

CO = carbon monoxide
NOx = nitrogen oxides
PM2.5 = particulate matter less than 2.5 microns in diameter
SJVAB = San Joaquin Valley Air Basin
VOC = volatile organic compounds
SOURCE: Table compiled by Environmental Science Associates in 2023.

6.13.1 Inner Harbor Turning Basin Expansion

Annual emissions from the Inner Harbor Turning Basin expansion (Alternative B) by location of work (Howard Terminal, In-Water near Schnitzer Steel, Alameda, Inner Harbor Waterway) and emission source (off-road, on-road, and marine) are presented in Table 56. This alternative would not generate emissions exceeding the applicable *de minimis* thresholds. Therefore, since any increase in pollutants would be temporary, and would not exceed CAA conformity *de minimis* thresholds, the Inner Harbor Turning Basin expansion alternative would have a less than significant effect on air quality.

Table 56. Annual Construction Emissions in the SFBAAB from the Expansion of the Inner Harbor Turning Basin Using Diesel Dredges (Alternative B)

Source	Construction Year	Annual Emissions (tons per year)				
		VOC	NO_X	Total PM_{10}	Total $PM_{2.5}$	CO
Howard Terminal						
Off-Road	2027	0.01	0.12	0.13	0.03	0.01
On-Road	2027	0.21	1.70	2.02	0.44	0.21
Marine	2027	0.02	0.79	0.16	0.15	0.02
Off-Road	2028	0.01	0.38	0.28	0.08	0.01
On-Road	2028	0.06	0.45	0.33	0.28	0.06
Marine	2028	0.19	2.31	0.17	0.17	1.42
In-Water near Schnitzer Steel						
Off-Road	2028	0.00	0.00	0.01	0.00	0.01
On-Road	2028	0.04	0.38	0.24	0.20	0.38
Marine	2028	0.02	0.37	0.06	0.06	0.13
Alameda						
Off-Road	2028	0.03	0.60	0.60	0.16	0.31
On-Road	2028	0.32	2.37	3.01	1.21	2.91
Marine	2028	0.01	0.40	0.07	0.06	0.11
Off-Road	2029	0.03	1.80	1.25	0.34	0.25
On-Road	2029	0.36	2.77	0.38	0.32	3.02
Marine	2029	0.40	5.58	0.73	0.72	2.93
Inner Harbor Waterway						
On-Road	2029	<0.01	0.12	0.10	0.03	0.03
Marine	2029	0.09	1.06	0.12	0.12	0.67
Inner Harbor Turning Basin Alternative B Total[1]		3.2	42.7	3.6	2.4	22.1

NOTES:
< = less than
CO = carbon monoxide
NOx = nitrogen oxides
PM2.5 = particulate matter less than 2.5 microns in diameter
PM10 = particulate matter less than 10 microns in diameter
SFBAAB = San Francisco Bay Area Air Basin
VOC = volatile organic compounds
Totals may not add up due to rounding.
Source: Table compiled by Montrose in 2023.

While the emissions from this alternative would be less than significant, air pollutants have the potential for associated health effects on communities and their residents. A draft HRA was conducted for this study by the Port to evaluate the potential increase in cancer risk, non-cancer health impacts, and $PM_{2.5}$ to nearby sensitive receptors from exposure to project construction emissions under the various action alternatives. The results of the HRA for this alternative are discussed in Section 6.1.1 and the HRA is included as Appendix A04b for informational purposes. Outer Harbor Turning Basin Expansion

Expansion of the Outer Harbor Turning Basin (Alternative C) would involve dredging activities in the Outer Harbor; no land areas would be impacted. Annual emissions from this alternative by emission source (off-road, on-road, and marine) are presented in Table 57. This alternative would not generate emissions exceeding the applicable *de minimis* thresholds. Therefore, since any increase in pollutants would be temporary, and would not exceed CAA conformity *de minimis* thresholds, the Outer Harbor Turning Basin expansion alternative would have a less than significant effect on air quality. Section discuses the results of the HRA for this alternative (see also Appendix A04b).

Table 57. Annual Construction Emissions in the SFBAAB from the Expansion of the Outer Harbor Turning Basin Using Diesel Dredges (Alternative C)

Source	Construction Year	Annual Emissions (tons per year)				
		VOC	NO_X	Total PM_{10}	Total $PM_{2.5}$	CO
Outer Harbor						
Off-Road	2027	<0.01	<0.01	0.63	0.49	0.06
On-Road	2027	<0.01	<0.01	<0.01	<0.01	<0.01
Marine	2027	0.77	10.16	1.95	1.89	5.10
Off-Road	2028	<0.01	<0.01	0.07	0.02	<0.01
On-Road	2028	<0.01	<0.01	<0.01	<0.01	0.07
Marine	2028	0.94	11.95	2.47	2.39	6.13
Outer Harbor Turning Basin Alternative C Total[1]		1.73	22.12	5.17	4.80	11.36

NOTES:
< = less than
CO = carbon monoxide
NOx = nitrogen oxides
PM2.5 = particulate matter less than 2.5 microns in diameter
PM10 = particulate matter less than 10 microns in diameter
SFBAAB = San Francisco Bay Area Air Basin
VOC = volatile organic compounds
Totals may not add up due to rounding.
Source: Table compiled by Montrose in 2023

6.13.2 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 (Proposed Action) involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. Because of the differing fuel sources for dredging equipment, their air quality effects would differ.

Sub-alternative D-1 (Diesel Dredging)

Expansion of both the Inner and Outer Harbor Turning Basins with dredging activities fueled by diesel would result in combined emissions and impacts from the Inner Harbor Turning Basin expansion (Alternative B) and Outer Harbor Turning Basin expansion (Alternative C) individually. Annual emissions for this sub-alternative by location, year of construction, and emission source are presented in Table 58. This sub-alternative would not generate emissions exceeding the CAA conformity *de minimis* thresholds and any increase in emissions would be temporary, ending with construction. Therefore, this alternative would not have a significant effect on air quality.

Table 58. Annual Construction Emissions in the SFBAAB from the Expansion of the Inner Harbor Turning Basin and Outer Harbor Turning Basin with Diesel Dredging (Sub-alternative D-1)

Source	Construction Year	Annual Emissions (tons per year)				
		VOC	NO_X	Total PM_{10}	Total $PM_{2.5}$	CO
Howard Terminal						
Off-Road	2027	0.01	0.12	0.13	0.03	0.08
On-Road	2027	0.25	2.07	2.04	0.45	2.17
Marine	2027	0.02	0.79	0.16	0.15	0.14
Off-Road	2028	0.01	0.38	0.28	0.08	0.09
On-Road	2028	0.06	0.45	0.33	0.28	0.54
Marine	2028	0.35	4.65	0.85	0.82	2.31
In-Water near Schnitzer Steel						
Off-Road	2028	0.00	0.00	0.01	0.00	0.01
On-Road	2028	0.04	0.38	0.24	0.20	0.38
Marine	2028	0.02	0.37	0.06	0.06	0.13
Alameda						
Off-Road	2028	0.03	0.60	0.60	0.16	0.31
On-Road	2028	0.32	2.37	3.01	1.21	2.91
Marine	2028	0.01	0.40	0.07	0.06	0.11
Off-Road	2029	0.03	1.80	1.25	0.34	0.25
On-Road	2029	0.36	2.77	0.38	0.32	3.02
Marine	2029	0.71	10.29	2.16	2.10	4.70
Inner Harbor Waterway						
Off-Road	2029	0.00	0.12	0.10	0.03	0.03
On-Road	2029	0.00	0.00	0.00	0.00	0.00
Marine	2029	0.20	2.61	0.60	0.58	1.27

Source	Construction Year	Annual Emissions (tons per year)				
		VOC	NOx	Total PM10	Total PM2.5	CO
Outer Harbor						
Off-Road	2028	0.00	0.01	0.03	0.01	0.03
On-Road	2028	0.00	0.00	0.63	0.49	0.00
Marine	2028	0.01	0.01	0.10	0.03	0.11
Off-Road	2029	0.00	0.00	0.00	0.00	0.00
On-Road	2029	1.50	19.81	3.95	3.83	9.72
Marine	2029	0.00	0.00	0.02	0.01	0.02
Sub-alternative D-1 Total[1]		9.1	0.01	0.08	6.05	6.05

< = less than
CO = carbon monoxide
NOx = nitrogen oxides
PM2.5 = particulate matter less than 2.5 microns in diameter
PM10 = particulate matter less than 10 microns in diameter
SFBAAB = San Francisco Bay Area Air Basin
VOC = volatile organic compounds
Totals may not add up due to rounding.
Source: Table compiled by Montrose in 2023.

The HRA results for this alternative are described in Section 6.1.4 (see also Appendix A04b).

Sub-Alternative D-2 (Electric Dredging)

Sub-alternative D-2 is the NEPA Proposed Action. It would involve the use of an electric-powered dredge instead of a diesel-powered dredge. However, this sub-alternative does assume that in the event of a call for electricity reduction to prevent potential brownouts, diesel dredging may temporarily occur up to 240 hours per year, but would not occur if no electricity reductions are required.[24] Annual emissions for this sub-alternative, by location, year of construction, and emission source, are presented in Table 59. Emissions from this sub-alternative are substantially lower than those from the diesel dredging variation (Sub-alternative D-1). For example, in comparison to the diesel dredging variation, this sub-alternative would avoid a total of approximately 2 tons of VOC, 28 tons of NO_x, 5 tons of PM_{10}, and 5 tons of $PM_{2.5}$. The electrical infrastructure improvements near Berth 26 at the Outer Harbor and Howard Terminal necessary under Sub-alternative D-2 to facilitate electric dredging would only involve a minor amount of ground disturbance and construction activity near Howard Terminal, and the minimal construction emissions from this activity would be substantially offset by the reduction in construction emissions resulting from the use of electric dredging. This sub-alternative would not generate emissions exceeding the CAA conformity *de minimis* thresholds and therefore Sub-alternative D-2 (Proposed Action) would not have a significant effect on air quality.

The HRA results for this alternative are described in Section 6.1.5(see also Appendix A04b).

Table 59. Annual Construction Emissions in the SFAAB from the Expansion of the Inner Harbor Turning Basin and Outer Harbor Turning Basin with Electric Dredging (Sub-alternative D-2)

Source	Construction Year	Annual Emissions (tons per year)				
		VOC	NO_X	Total PM_{10}	Total $PM_{2.5}$	CO
Howard Terminal						
Off-Road	2027	0.01	0.12	0.13	0.03	0.08
On-Road	2027	0.05	0.16	1.97	0.38	0.59
Marine	2027	0.02	0.79	0.16	0.15	0.14
Off-Road	2028	0.01	0.38	0.28	0.08	0.09
On-Road	2028	0.01	0.04	0.31	0.26	0.15
Marine	2028	0.21	2.58	0.25	0.25	1.53
In-Water near Schnitzer Steel						
Off-Road	2028	<0.01	<0.01	0.01	<0.01	0.01
On-Road	2028	0.01	0.15	0.23	0.19	0.17
Marine	2028	0.02	0.37	0.06	0.06	0.13
Alameda						
Off-Road	2028	0.03	0.60	0.60	0.16	0.31
On-Road	2028	0.07	0.23	2.94	1.14	0.82
Marine	2028	0.01	0.40	0.06	0.06	0.11
Off-Road	2029	0.03	1.80	1.25	0.34	0.25
On-Road	2029	0.08	0.24	0.28	0.24	0.90
Marine	2029	0.41	5.72	0.76	0.74	2.98
Inner Harbor Waterway						
Off-Road	2029	<0.01	0.12	0.10	0.03	0.03
On-Road	2029	<0.01	<0.01	<0.01	<0.01	<0.01
Marine	2029	0.10	1.19	0.16	0.16	0.72
Outer Harbor						
On-Road	2027	<0.01	0.01	0.03	0.01	0.03
Off-Road	2027	<0.01	<0.01	0.63	0.49	<0.01
On-Road	2028	0.01	0.01	0.10	0.03	0.11
Off-Road	2028	<0.01	<0.01	<0.01	<0.01	<0.01
Marine	2028	0.74	8.51	0.65	0.63	5.41
On-Road	2029	<0.01	<0.01	0.02	0.01	0.02
Off-Road	2029	<0.01	0.01	6.05	6.05	0.02
Marine	2029	0.18	2.20	0.30	0.29	1.33
Sub-alternative D-2 Total[1]		2.13	25.75	17.58	12.01	16.07

< = less than
CO = carbon monoxide
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
PM_{10} = particulate matter less than 10 microns in diameter
SFBAAB = San Francisco Bay Area Air Basin
VOC = volatile organic compounds
Totals may not add up due to rounding
Source: Table compiled by Montrose in 2023

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6.13.3 No Action Alternative

Under the No Action Alternative, there would be no construction activities within the Inner or Outer Harbor Turning Basins. Therefore, there would be no construction related air quality or cancer risk and non-cancer health impacts associated with the No Action Alternative.

6.14 Greenhouse Gases

In accordance with the Interim NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change promulgated by the CEQ in 2023, this section presents estimated direct short term and indirect long term GHG emissions that would be generated by the project alternatives, as well as the net total project emissions for each with-action alternative in comparison to the baseline no-action alternative and after emissions reductions from sequestration of CO_2 due to wetland creation associated with the actions. As there are no current thresholds for determining if greenhouse gas emissions constitute a significant effect, a qualitative analysis was used which considered the quantity of greenhouse gas emissions anticipated and the potential for preventing any greenhouse gas reduction goal or climate change goal from being met to determine if greenhouse gas emissions would produce a significant effect.

6.14.1 Greenhouse Gas Emissions Calculations

The GHG emissions for this analysis were calculated using different methods based on the emission source. Emissions from off-road, mobile construction equipment sources were estimated using emission factors from the CARB's OFFROAD2011 model. Emissions from on-road construction vehicles (e.g. passenger vehicles for workers, vendor trucks, and haul trucks were calculated based on the number of trips and vehicle miles traveled identified by the USACE and Port along with default emissions factors from CARB's Mobile Source Emission Inventory Model, EMFAC2021[1]. CalEEMod defaults were used when project-specific numbers were not available for certain trip lengths (e.g., worker trips). Marine GHG emissions were calculated following the USEPA's Port Emission Inventory Guidance (USEPA 2022b), California Air Resources Board Harbor Craft Emission Methodology and the Port of Oakland Emission Inventory Methodology. These guidance documents provide direct emission factors for estimating CO2 while methane (CH4) is taken as two percent of the total hydrocarbons emitted and nitrous oxide (N2O) is calculated based on fuel consumption rates.

Electricity Use for Dredging

The use of electric dredges under Sub-alternative D-2 would increase use of electricity at the Port, resulting in indirect GHG emissions. The Port of Oakland has its own municipal electric utility (Port of Oakland Utility) that serves Oakland International Airport, the majority of the Oakland Seaport, and some portions of land along the shoreline in between. The Port of Oakland Utility fulfills 58.6 percent of its power needs from carbon free energy sources, nearly double the state average, including solar (21.9 percent), large hydropower (8.7 percent), and other eligible renewable resources (28 percent). The Port also has internal solar

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[1] In November 2022, USEPA approved the use of EMFAC2021 for use in California.

and fuel cells operating daily, further increasing its overall green energy use. Based on the 2021 California Energy Commission power content label, the GHG intensity factor for electricity supplied by the Port of Oakland Utility is 314 pounds of CO2e per megawatt hour (lbs. CO2e/MWh). Alameda Municipal Power (AMP) which may be used for some of the dredging in the inner harbor has 90 percent of its power needs from carbon free energy sources. Based on the 2021 2021 California Energy Commission power content label, the GHG intensity factor for electricity supplied by AMP is 117 pounds of CO2e per megawatt hour (lbs CO2e/MWh). For the purposes of this analysis, indirect GHG emissions from electricity use associated with electric dredging was estimated by multiplying hours of dredging at each construction location per calendar year with the GHG intensity factor for the Port of Oakland Utility or AMP.

Construction Greenhouse Gases Direct Emissions Summary

Construction GHG emissions associated with each alternative were quantified as direct emissions by source and year and are presented for each action alternative in the following sections. Emissions from dredging equipment assumed to be fueled by diesel, were calculated for alternatives B, C, and D-1. For the Proposed Action (sub-alternative D-2), dredges were assumed to be powered by electricity. For all alternatives, off-road equipment was assumed to use Tier 4 equipped engines in accordance with the minimization measures described in Appendix A7. CO_2 is the reference gas for climate change, as it is the GHG emitted in the highest volume. The effect of other (non-CO_2) GHGs on global warming is the product of the mass of their emissions and their global warming potential (GWP). The GWP of a gas indicates how much the gas is predicted to contribute to global warming relative to the amount of warming that would be predicted to be caused by the same mass of CO_2. For example, methane and nitrous oxide are substantially more potent GHGs than CO_2, with GWPs of 25 and 298 respectively. To quantify GHG emissions as a single quantity, they are converted to carbon dioxide equivalent units (CO_2e) using their GWP per 40 C.F.R. Part 98 and then added together using the equation below.

$$CO_2eq = xCO + xCO_2 + yN_2O + zCh_4$$

Where:

x = 100 year global warming potential of carbon monoxide or carbon dioxide = 1
y = 100 year global warming potential of nitrous oxide = 298
z = 100 year global warming potential of methane = 25

6.14.2 Inner Harbor Turning Basin Expansion Direct GHG Emissions

Annual GHG emissions from construction of the Inner Harbor Turning Basin expansion (Alternative B) by location of work (Howard Terminal, In-Water near Schnitzer Steel, Alameda, Inner Harbor Waterway) and emission source (off-road, on-road, and marine) are presented in Table 60.

Table 60. Annual Construction GHG Emissions from the Expansion of the Inner Harbor Turning Basin (Alternative B)

Source	Construction Year	Annual Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Howard Terminal						
Off-Road	2027	219	0.025	0.005	.53	222
On-Road	2027	103	0.001	0.014	0.07	107
Marine	2027	102	0.000	0.005	0.13	104
Off-Road	2028	70	0.007	0.001	0.13	71
On-Road	2028	316	0.001	0.047	0.08	330
Marine	2028	1512	0.004	0.05	2.09	1536
In-Water near Schnitzer Steel						
Off-Road	2028	86	0.003	0.003	0.15	87
On-Road	2028	4	0.000	0.000	0.01	4
Marine	2028	94	0.000	0.005	0.12	96
Alameda						
Off-Road	2028	925	0.037	0.007	2.64	347
On-Road	2028	532	0.002	0.074	0.28	931
Marine	2028	925	0.037	0.007	0.10	78
Off-Road	2029	1030	0.041	0.008	0.22	383
On-Road	2029	1488	0.002	0.228	0.23	1556
Marine	2029	3059	0.013	0.15	4.26	3108
Inner Harbor Waterway						
On-Road	2029	100	0.0002	0.015	0.03	105
Marine	2029	794	0.036	0.039	1.15	806
Inner Harbor Turning Basin Alternative B Total		11,010	0.14	0.68	16.5	11,232

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by Montrose in 2023.

6.14.3 Outer Harbor Turning Basin Expansion Direct GHG Emissions

Expansion of the Outer Harbor Turning Basin (Alternative C) would involve dredging activities in the Outer Harbor; no land areas would be impacted. Annual GHG emissions from construction of this alternative by emission source (off-road, on-road, and marine) are *presented in Table 61.*

Table 61. Annual Construction GHG Emissions from the Expansion of the Outer Harbor Turning Basin (Alternative C)

Source	Construction Year	Annual Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Off-Road	2027	<0.01	<0.01	<0.01	<0.01	<0.01
On-Road	2027	16	<0.01	<0.01	0.06	16
Marine	2027	3292	0.01	0.15	4.63	3344
Off-Road	2028	<0.01	<0.01	<0.01	<0.01	<0.01
On-Road	2028	19	0.001	0.001	0.07	19
Marine	2028	3959	0.02	0.19	5.56	4021
Outer Harbor Turning Basin Alternative C Total		7,287	0.03	0.34	10.31	7,400

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by Montrose in 2023.

6.14.4 Inner Harbor and Outer Harbor Turning Basin Expansion Direct GHG Emissions

Sub-alternatives D-1 and D-2 involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. Because of the differing fuel sources for dredging equipment, the GHG emissions generated would differ.

Sub-alternative D-1 (Diesel Dredging)

Expansion of both the Inner and Outer Harbor Turning Basins with dredging activities fueled by diesel would result in combined GHG emissions and impacts from the Inner Harbor Turning Basin expansion (Alternative B) and Outer Harbor Turning Basin expansion (Alternative C) individually. Annual emissions for this sub-alternative by location, year of construction, and emission source are presented in Table 62.

Table 62. Annual Construction GHG Emissions from the Expansion of the Inner Harbor Turning Basin and Outer Harbor Turning Basin with Diesel Dredging (Sub-alternative D-1)

Source	Construction Year	Annual Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Howard Terminal						
Off-Road	2027	614	0.025	0.005	1.97	618
On-Road	2027	103	0.001	0.014	0.07	618
Marine	2027	1418.86	0.01	0.07	2.09	1,442
Off-Road	2028	183	0.007	0.001	0.49	184
On-Road	2028	316	0.001	0.047	0.08	330
Marine	2028	1418.86	0.01	0.07	2.09	1,442
In-Water near Schnitzer Steel						
Off-Road	2028	134	0.003	0.003	0.34	135
On-Road	2028	4	<0.001	<0.001	0.01	4
Alameda						
Off-Road	2028	925	0.037	0.007	2.64	931
On-Road	2028	532	0.002	0.074	0.29	554
Marine	2028	77	0.000	0.004	0.10	78
Off-Road	2029	1030	0.041	0.008	2.74	1037
On-Road	2029	1488	0.002	0.228	0.23	1556
Marine	2029	2895.32	0.01	0.14	4.26	2942
Inner Harbor Waterway						
Off-Road	2029	<0.01	<0.01	<0.01	<0.01	<0.01
On-Road	2029	100	<0.01	0.015	0.03	105
Marine	2029	749.42	0.00	0.04	1.15	762
Outer Harbor						
Off-Road	2027	89.91	0.004	0.001	0.41	91
On-Road	2027	12	0.000	0.001	0.03	12
Off-Road	2028	<0.01	<0.01	<0.01	<0.01	<0.01
On-Road	2028	29	0.001	0.001	0.1	29
Marine	2028	5814.26	0.03	0.27	8.82	5905
Off-Road	2029	24	0.001	<0.001	0.08	24
On-Road	2029	7	<0.001	<0.001	0.02	7
Marine	2029	1001	0.004	0.02	0.46	1016
Sub-Alternative D-1 Total		18,266	0.15	1.04	6740	25,329

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by Montrose in 2023.

Sub-Alternative D-2 (Electric Dredging)

Sub-alternative D-2 is the NEPA Proposed Action. It would involve the use of an electric-powered barge-mounted mechanical dredge instead of a diesel-powered mechanical dredge. Annual emissions for this sub-alternative, by location, year of construction, and emission source, are presented in Table 63. Over the duration of construction, GHG emissions from this sub-alternative are approximately 10,310 metric tons CO_2e (69 percent) lower than those from the diesel dredging variation (Sub-alternative D-1), conservatively assuming 2021 GHG intensity rate for electricity supplied by the Port of Oakland Utility remains the same at the time of construction.

Table 63. Annual GHG Construction Emissions from the Expansion of the Inner Harbor Turning Basin and Outer Harbor Turning Basin with Electric Dredging (Sub-alternative D-2)

Source	Construction Year	Annual Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Howard Terminal						
Off-Road	2027	614	0.025	0.005	0.53	616
On-Road	2027	103	0.001	0.014	0.07	107
Electricity	2027	--	--	--	--	0
Marine	2027	102	0.000	0.005	0.13	104
Off-Road	2028	183	0.007	0.001	0.13	183
On-Road	2028	316	0.001	0.047	0.08	330
Electricity	2028	--	--	--	--	79
Marine	2028	958	0.004	0.05	1.27	977
In-Water near Schnitzer Steel						
Off-Road	2028	134	0.003	0.003	0.16	135
On-Road	2028	4	<0.001	<0.001	0.01	4
Electricity	2028	--	--	--	--	0
Marine	2028	94	<0.001	0.005	0.12	96
Alameda						
Off-Road	2028	925	0.037	0.007	0.75	929
On-Road	2028	532	0.002	0.074	0.29	554
Electricity	2028	--	--	--	--	0
Marine	2028	77	0.000	0.004	0.10	78
Off-Road	2029	1030	0.041	0.008	0.81	1035
On-Road	2029	1488	0.002	0.228	0.23	1556
Electricity	2029	--	--	--	--	59
Marine	2029	2089	0.01	0.10	2.70	1841.58
Inner Harbor Waterway						
Off-Road	2029	93.20	0.004	0.001	0.43	94.028
On-Road	2029	532	0.002	0.074	0.29	104.495
Electricity	2029	--	--	--	--	119.35
Marine	2029	203.53	0.001	0.01	0.28	2122
Outer Harbor						
Off-Road	2027	0.120	0.120	0.120	0.12	39
On-Road	2027	12	0.000	0.001	0.03	12

Source	Construction Year	Annual Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Off-Road	2028	<0.01	<0.01	<0.01	<0.01	<0.01
On-Road	2028	29	0.001	0.001	0.1	29
Electricity	2028	--	--	--	--	394
Marine	2028	3786	0.01	0.18	4.90	3843
Off-Road	2029	24	0.001	<0.01	0.02	24
On-Road	2029	7	<0.01	<0.01	0.02	7
Electricity	2029	--	--	--	--	26
Marine	2029	912	0.003	0.04	1.21	926
Alternative D-2 Total		14,110	0.27	0.93	14.58	15,019

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by Montrose in 2023.

6.14.5 Comparison of Annual and Total Direct GHG Emissions from Construction by Alternative

Based on the preceding analysis, each alternative's direct construction emissions of GHG is summarized in Table 64(for Alternatives B, C, and D-1) and Table 65 (for Alternative D-2). Alternative C (Outer Harbor Turning Basin Expansion only) would result in the least GHG emissions during construction followed by Alternative B (Inner Harbor Turning Basin Expansion only). The Proposed Action (Sub-alternative D-2) would produce less emissions than Sub-alternative D-1, which has the same scope for project features but would use diesel dredges rather than electric dredges. While the Proposed Action has additional direct emissions relative to the least emitting alternative (Alternative C), the expected benefits from atmospheric CO_2 reductions from the Proposed Action once constructed would be expected to offset the GHG emissions from its construction, as detailed in the subsequent sections.

Table 64. Annual and Total GHG Construction Emissions for Alternatives B, C and D-1 Using Diesel Dredges

Alternative	Construction Year	Annual Direct Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Alt B - Inner Harbor	2027	729	0.02	0.02	1.77	738
	2028	3,776	0.06	0.22	6.16	3,848
	2029	6,505	0.06	0.44	8.52	6,646
	Alt B Total	11,010	0.14	0.68	16.45	11,232
Alt C - Outer Harbor	2027	3,308	0.01	0.16	4.68	3,360
	2028	3,979	0.02	0.19	5.63	4,040
	Alt C Total	7,287	0.03	0.34	10.31	7400

Alternative	Construction Year	Annual Direct Emissions (Metric Tons per Year)				
		CO_2	CH_4	N_2O	CO	CO_2e
Alt D-1 - Inner & Outer Harbor (with Diesel Dredging)	2027	920	0.03	0.03	2.60	931
	2028	9,737	0.07	0.51	15.09	9,909
	2029	7,608	0.05	0.51	9.89	7,776
	Alt D-1 Total	18,266	0.15	1.04	30.40	18,616

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by ESA in 2023.

Table 65. Annual and Total GHG Construction Emissions for Alternative D-2 Using Electric Dredges

Source	**Construction Year**	**Annual Emissions (Metric Tons per Year)**				
		CO_2	**CH_4**	**N_2O**	**CO**	**CO_2e**
Alt D-2 - Inner & Outer Harbor (with Electric Dredging)	2027	830	0.15	0.14	0.88	878
	2028	7,132	0.07	0.37	8.02	7,724
	2029	6,147	0.06	0.42	5.68	6,417
	Alt D-2 Total	14,110	0.27	0.93	14.58	15,019

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by Montrose in 2023.

6.14.6 No Action Alternative Greenhouse Gas Emissions

Under the No Action Alternative, there would be no construction activities and therefore, no direct GHG emissions. However, long-term indirect GHG emissions from maintenance dredging and vessels like tugboats and containerships would be expected. The following section estimates and compares indirect long-term emissions expected under the No Action Alternative to those from the action alternatives.

6.14.7 Indirect Long-Term Greenhouse Gas Emissions

Differences in long-term emissions between the no-action and action alternatives across the project lifetime would stem largely from differences in vessel idling times (i.e., wait times) over the life of the 50-year project lifetime. The estimated idling times under the future with project alternatives were calculated during the economic modeling of the port to estimate economic benefits and were used for quantifying idling emissions in this GHG analysis. As described in Chapter 2, in the existing and future without project conditions, due to turning basin width limitations, larger vessels have a greater risk of marine casualty within the Oakland Harbor which results in operational limitations. Additionally, smaller vessels have less space to maneuver within the harbor and must adjust their transit times based on the needs of the ULCVs. These inefficiencies and operational limitations continue and increase in the future as a larger share of the cargo shifts to the larger vessel fleet, and these vessels call Oakland more often.

In the future with-project condition (for all action alternatives), expanded turning basins will alleviate some of these vessel transit inefficiencies while large containerships maneuver. ULCVs are expected in higher quantities in the D-1 and D-2 alternatives where both turning basins are widened, there are reduced idling hours expected due to smaller vessels waiting for the larger Post-Panamax vessels to exit and provide space to dock, though with the emission-reduction benefit of decreasing overall number of vessel calls at the Port. To integrate the estimated idling times expected from each alternative into the GHG analysis the idling hours were divided by the total number of vessels for each time period to arrive at an average idling time for each alternative for each time period. Please see Table 65 below for the idling hours expected for each alternative. The idling hours slightly increase for Alternatives D-1 and D-2 because the increased number of ULCV vessels in use for alternatives expanding both basins results in increased idling times while they wait for larger dock spaces to become available; though total emissions are still less for Alternative D compared to other alternatives due to larger vessels making less trips overall which reduces much emissions over the 50 year project timeline. See Appendix A04c for the associated GHG calculations.

Indirect long term containership barge emissions from sailing from the 3-mile jurisdictional line to the Port (approximately 17 miles) were quantified for the future without (No Action) and future with project alternatives. The fleet forecast under the No Action alternative includes containerships which are expected to be more numerous, smaller in size, and less efficient for fuel consumption compared to the quantity and type of vessels expected to visit the port in future years for the action alternatives, except for tugboats used for maneuvering ships in the turning basin which remained the same for the No Action and action alternatives. With the widening of both turning basins under Alternatives D-1 and D-2, a greater number of larger and more efficient vessels can be used. Thus, these alternatives result in the lowest long-term emissions for containerships compared to the other alternatives. As summarized in Table 66, the No Action alternative is expected to produce the most long-term emissions from containerships, more than any of the action alternatives. The reduction in emission associated with each action alternative was calculated by subtracting the total CO_2e emissions of the no-action alternative from those of each action alternative. See Appendix A04c for the detailed calculations of indirect long-term emissions.

Table 66. Indirect Long-Term Emissions from Containerships and Tugs

Long-Term Emissions from Containerships and Tugs Over the Project Lifetime (metric tons)							
Alternative	Idling Hours	CO	CO_2	CH_4	N_2O	CO_2e	CO_2e Compared to Baseline (no-action alternative)
No-Action	13,463	3,397	1,193,944	0.69	59	1,214,934	-
Alternative B	13,238	3,299	1,160,386	0.67	57	1,180,787	-34,147
Alternative C	11,837	3,002	1,079,392	0.62	53	1,098,304	-116,630
Alternative D-1 & D-2	11,980	3,014	1,061,141	0.61	53	1,079,893	-135,041

Notes:
A negative net emissions total indicates less atmospheric CO_2 after 50-year project lifetime compared to baseline.
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by USACE in 2023.

Indirect long-term emissions for O&M dredging are presented in Table 67 below shows the indirect long-term emissions from operations and maintenance dredging for the No Action alternative and the action alternatives. The O&M emissions quantified for this project incorporate by reference emissions analysis results from the Final Environmental Assessment/Environmental Impact Report for the Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay Fiscal Years 2015-2024 (USACE 2015) and use information from the EPA Ports Emissions Inventory Guidance (EPA 2022b). Due to widening of both turning basins under alternatives D-1 and D-2, these alternatives are estimated to have the greatest increase in O&M dredging volume and therefore would produce the most long-term emissions from maintenance dredging. The No Action alternative which includes no expansion of either turning basin would not increase O&M dredging volumes and would result in the least indirect long-term emissions from O&M dredging.

Table 67. Indirect Long-Term Emissions from Operations and Maintenance Dredging

Total Long-Term Emissions from O&M Dredging Over Project Lifetime (Metric Tons)						
Alternative	CO	CO_2	CH_4	N_2O	CO_2e	Net CO2e Compared to Baseline (no-action alternative)
No-Action Alternative	11.38	2,156	0.01	63	20,907	-
Alternative B	12.77	2,420	0.01	71	23,463	2,555
Alternative C	13.00	2,464	0.01	72	23,894	2,987
Alternatives D-1 & D-2	25.77	4,884	0.02	142	47,357	26,450

Notes:
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by USACE in 2023

Table 68 presents the combined indirect long-term emissions including the contribution of both the operational emissions from vessels and the O&M dredging emissions. Alternatives D-1 and D-2 have the least long-term emissions.

Table 68. Total Indirect Long-Term Emissions Over the Project Lifetime

Project Lifetime Total Long-Term Emissions (metric tons)						
Alternative	CO	CO_2	CH_4	N_2O	CO_2e	Net CO2e Compared to Baseline (No-Action)
No-Action	3,408	1,196,100	0.69	122	1,235,841	-
Alternative B	3,312	1,162,805	0.68	128	1,204,250	-31,592
Alternative C	3,021	1,086,270	0.63	125	1,126,694	-109,148
Alternative D-1 & D-2	3,045	1,070,008	0.63	195	1,131,212	-104,629

Notes:
A negative net emissions total indicates less atmospheric CO_2 after 50-year project lifetime compared to baseline.
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by USACE in 2023.

6.14.8 Total Greenhouse Gas Emissions, Emissions Reductions, and Net GHG Emissions

Wetland Carbon Sequestration

Current scientific methods also exist for estimating the CO_2 that is captured by wetlands. In the case of the action alternatives, material would be placed at an upland beneficial reuse site to construct acres of wetlands. While future sequestration rates could be reduced due to sea level rise , this analysis assumes a scenario with landward expansion of wetlands to maintain their area despite sea level rise, such that the area of wetland created remains static with time. The amount of carbon dioxide that would be sequestered over the project lifetime was therefore calculated using the below equation with results presented as part of the table below. A total sequestration of 11,851 metric tons of atmospheric CO_2 is expected over the project lifetime of 50 years from placement of excavated sediments in wetlands under alternatives D-1 and D-2. Less sequestration is expected from alternatives B and C since they include less excavation of material that can be placed in a wetland. For quantities of excavated materials please see Appendix B.1. While sequestration provides an important contribution to GHG emissions reductions, the reductions in emissions from operational efficiency gains under the with project alternatives was the greatest contributor to reductions in emissions.

$$\boldsymbol{Sequestered\ CO_2 = SR\ x\ Volume\ x\ 1/D\ x\ Time}$$

Where:

Sequestered CO_2 = the amount of CO_2 in metric tons or pounds sequestered

SR = sequestration rate of CO_2 per unit area, per unit of time = 210 grams per meter per year

Volume = volume of excavated material from expanding turning basins

D = depth of wetland to be created, estimated at approximately 9 feet

Time = the unit of time over which benefits are calculated, estimated at 50 years

Table 69. Total Emissions from Direct Short Term and Indirect Long Term Emissions, Emissions Reductions From Sequestration and Net Emissions

Part A: Total of Direct (Short Term) and Indirect (Long Term) Emissions by Project Alternative (metric tons)					
	CO	CO_2	CH_4	N_2O	CO_2e
No-Action	8,284	4,808,612	3	265	4,895,876
Alternative B	8,154	4,749,660	3	262	4,835,890
Alternative C	7,559	4,448,622	3	245	4,529,286
D-1 (diesel dredges)	7,618	4,462,511	3	262	4,548,237
D-2 (electric dredges)	7,603	4,458,355	3	262	4,544,036

Part B: Greenhouse Gas Emissions Reductions From Sequestration				
Alternative	Cubic Yards Placed In Wetland	Acres of Wetland Created	Yearly CO_2 Reduction (metric tons)	50 Year Project Lifetime CO_2 Reduction (metric tons)
B	907,450	113	96	4,781
C	1,341,853	166	141	7,070
D-1 & D-2	2,249,303	205	174	8,690

Part C: Net Greenhouse Gas Emissions Compared to Baseline (No-Action Alternative) and From CO_2 Sequestration Emissions Reductions					
Alternative	CO	CO_2	CH_4	N_2O	CO_2e
B	-130	-63,733	0	-3	-64,767
C	-726	-367,060	0	-20	-373,659
D-1 (diesel dredges)	-666	-354,791	0	-3	-356,328
D-2 (electric dredges)	-682	-358,947	0	-3	-360,530

Notes:
A negative net emissions total indicates less atmospheric CO_2 after 50-year project lifetime compared to baseline.
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
N_2O = nitrous oxide
CO_2 = carbon dioxide
CH_4 = methane
Source: Table compiled by USACE in 2023.

6.14.9 Net Emissions Summary

Table 69 above shows the total direct (short term) and indirect (long term) emissions summed together (Part A), the emission reductions from sequestration (Part B), and the net emissions with the No Action (future without project) emissions and emissions reductions from sequestration subtracted from the total emissions for each project alternative. The net emissions show the overall change in emissions expected compared to the baseline (No Action Alternative). The Proposed Action (Alternative D-2) was found to have the greatest net reduction in GHGs compared to the similar Alternative D-1, an estimated net reduction of 360,530 metric tons of CO_2e below the baseline. The other with-action alternatives also showed net reductions relative to the baseline, such that any action alternative would result in a net reduction in GHG emissions compared to the baseline (no-action) alternative.

6.14.10 Social Costs of Greenhouse Gases

The social cost of greenhouse gas emissions (SC-GHG) was calculated for each project alternative by summing the individual emissions from the major greenhouse gas pollutants CO, CO_2, CH_4, and N_2O, and then multiplying by the social cost of each pollutant for the year in which they were generated. Social costs were identified using tables from the Interagency Working Group on Social Cost of Greenhouse Gases (IWGSC) report established by Executive Order 13990 to provide interim updated social cost values. Since the IWGSC report only includes tables of social costs up to the year 2050, all social costs calculated for years 2050-2080 used the 2050 value with a 3% discount rate[1] (IWG 2021).

The below equation was used to calculate social costs:

$$SC\text{-}GHG = CO * SC\text{-}CO_2 + CO_2 * SC\text{-}CO_2 + CH_4 * SC\text{-}CH_4 + N_2O * SC\text{-}N_2O$$

Where:

SC-GHG = the social cost of greenhouse gas emissions in dollars
CO = total carbon monoxide emissions in metric tons
CO_2 = total carbon dioxide emissions in metric tons
CH_4 = total methane emissions in metric tons
N_2O = total nitrous oxide emissions in metric tons
SC-CO_2 = social cost of carbon dioxide (also used for carbon monoxide)
SC-CH_4 = social cost of methane
CH-N_2O = social cost of nitrous oxide

Table 70. Social Costs of Greenhouse Gases

Part A. Social Costs from Direct Emissions (2020 Dollars)					
Alternative	CO	CO_2	CH_4	N_2O	Total
B	$994	$666,376	$264	$14,940	$682,574
C	$614	$433,912	$56	$7,540	$442,122
D-1	$1,662	$1,102,588	$282	$23,070	$1,127,602
D-2	$880	$851,857	$517	$20,320	$873,574

[1] Discount rates are used as a method to limit how much of a resource, in this case additions of GHG emissions to the atmosphere, can be used each year to ensure future generations still have some of the resource to use. Discount rates applied to social costs of GHG emissions can be understood by thinking of how using up atmospheric capacity for GHG emissions now would necessitate changes for future generations. A high discount rate is associated with using more of the resource each year and lower social costs in the near-term and leverages higher emissions reductions for future generations. A lower discount rate would use less of the resource each year and have higher social costs in the near-term and leverage less emissions reductions on future generations.

Part B. Social Costs from Long-Term Emissions (2020 Dollars)					
Alternative	CO	CO_2	CH_4	N_2O	Total
No-Action	$578,306,549	$188,243,916,378	$3,756,046	$3,513,489,985	$192,339,468,959
B	$561,260,314	$182,724,691,145	$3,660,165	$3,410,468,944	$186,700,080,569
C	$508,971,535	$169,767,251,700	$3,403,762	$3,168,380,762	$173,448,007,758
D-1 & D-2	$511,460,300	$166,617,334,603	$3,355,567	$3,111,391,115	$170,243,541,585

Part C. Social Costs Reductions from Sequestration	
Alternative	Social Cost of CO_2 Reductions from Sequestration
B	$19,540,015
C	$28,893,963
D-1 & D-2	$35,514,022

Project Lifetime NET Social Costs (2020 Dollars)					
Alternative	CO	CO_2	CH_4	N_2O	Total
B	-$17,045,241	-$5,538,098,872	-$95,617	-$103,006,101	-$5,658,245,831
C	-$69,334,401	-$18,505,124,730	-$352,228	-$345,101,683	-$18,919,913,042
D-1	-$66,844,587	-$21,660,993,209	-$400,197	-$402,075,800	-$22,130,313,794
D-2	-$66,845,370	-$21,661,243,940	-$399,962	-$402,078,550	-$22,130,567,822

Notes:
Negative net values indicate that the alternative is expected to reduce social costs below the baseline no-action costs
CO = carbon monoxide
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
CH_4 = methane
N_2O = nitrous oxide
Source: Table compiled by USACE in 2023.

Table 70 above shows the expected social costs from each alternative. Most social costs from GHGs were from CO_2, accounting for approximately 98.4% of social costs. To calculate the net social costs, the sum of social costs from the No Action Alternative for both direct and long-term (indirect) emissions and from reductions in CO_2 emissions were subtracted from sum of social costs from total direct and long-term (indirect) emissions total for each action alternative. All action alternatives resulted in negative net social costs indicating a savings to society by building the project for any alternative chosen. The greatest savings is achieved by the Proposed Action (Alternative D-2).

6.14.11 GHG Emissions Summary and Effect Determination

As is shown in Table 70 Part C, compared to the baseline emissions from the No Action Alternative, all action alternatives are expected to result in overall emissions reductions over the project lifetime with further reductions from atmospheric CO_2 sequestration by wetlands creation. With the net reductions in GHG emissions anticipated, none of the action alternatives are expected to prevent a greenhouse gas reduction goal or climate action goal from being met. As there are no current thresholds for determining if GHG emissions constitute a significant effect, a qualitative analysis was used which considered the quantity of greenhouse gas emissions anticipated and the potential for preventing any greenhouse gas reduction goal or climate change goal from being met to determine if GHG emissions would produce a significant effect. Based on this analysis, less than significant effects from GHG emissions are anticipated from carrying out the Proposed Action (Alternative D-2) and the other action alternatives.

6.15 Noise and Vibration

For the purposes of this analysis, an effect on noise or vibration may be considered significant if an alternative would:

- exceed Federal Transit Authority (FTA) construction noise guidelines criteria of 90 dBA during daytime hours or 80 dBA during nighttime hours at residential receptors, or 100 dBA during any hour at other receptors;
- result in a readily perceivable difference in traffic noise at noise sensitive receptors by causing an increase in existing traffic noise levels of 5 dB or more; or
- result in vibration levels that exceed FTA's ground borne vibration impact criteria for damage to structures of 0.5 PPV for non-historic structures or 0.12 PPV for historic structures.

While underwater noise would be generated from construction activities associated with the action alternatives including dredging and pile removal and installation, these sound levels are characterized and their effects evaluated in the "Wildlife" and "Special Status Species and Protected Habitats" Sections (6.5 and 6.6) above, and therefore underwater noise is not further discussed in this section.

Additionally, while the action alternatives would not change the projected overall volumes of freight that would come into the Port relative to future without-project conditions, they could result in minor increases in vessel turning activity noise experienced at noise receptors due to the expansion of the turning basins reducing distance of vessel turning activity noise to those noise-sensitive receptors. Tug assist requirements for turning vessels is expected to remain unchanged after implementation of the action alternatives; therefore, the noise produced by the turning activity, which is dominated by tugboat engine noise, would reasonably be expected to remain very similar to noise generated by existing vessels turning. Given higher existing day and nighttime noise levels at existing noise sensitive receptors (Phoenix Lofts residences) on the Oakland side of the Inner Harbor Turning Basin, and the distance between these receptors and the expanded turning basin (approximately 1,300 feet), there would not be perceptible change in noise levels with wider turning basins. Similarly, on the Alameda side, noise modeling conducted for this study found the wider turning basin would only potentially increase the day-night average noise level from 58 to 59 L_{dn} at the nearest receptors (approximately 500 feet from the expanded basin). According to Caltrans (2020a) a 3 dB change in noise levels is considered a barely perceivable difference so this level of increase would be nearly unnoticeable.

Potential future multi-family residences proposed for Howard Terminal in Oakland could potentially experience the marginal increase in vessel turning activity noise with an expansion and shifting of the location of the turning basins like that which could be experienced by the Alameda receptors given the similar background noise levels, and this potential increase at future receptors would also be unnoticeable.

The closest noise-sensitive receptors to the Outer Harbor Turning Basin are residences approximately 5,000 feet (0.95-mile) to the east in West Oakland. Given this distance the presence of intervening structures, and the I-880 freeway, and because the expanded Outer Harbor Turning Basin would be shifted slightly to the northwest (away from these receptors), the change in noise from vessel turning activity would not be perceptible. Thus, noise effects from a vessel turning activity under any of the action alternatives would be negligible and are not discussed further in this section.

6.15.1 Noise and Vibration Effect Methodology

For this study, construction equipment noise levels were estimated following FTA's general assessment approach, which recommends assessing the two noisiest pieces of construction equipment operating concurrently at the center of the project site (U.S. DOT and FTA 2018). However, for the purpose of conducting a conservative analysis, and given the expansive work areas associated with the proposed alternatives, equipment noise was assumed to occur in areas closest to a sensitive receptor instead of at the center of the site. Increased noise levels due to construction were estimated for the nearest sensitive receptors to each of the proposed turning basin expansion areas.

As described in Section 6.10 construction activities associated with the action alternatives would also generate traffic from worker commutes, equipment delivery/removal, and material hauling. Traffic noise modeling was completed using the Federal Highway Administration (FHWA) Traffic Noise Model (FHWA 2006) algorithms to estimate the noise generated by haul trucks. The potential increases in roadside noise levels generated by these transport trips were analyzed for local roadways where noise-sensitive receptors exist.

Construction related noise levels were compared to existing noise levels and the above thresholds to assess their potential effect. Human responses to typical environmental noise exposure are generally subjective (e.g., dissatisfaction, annoyance) or involve interference with activities such as normal conversations, watching television, and sleep (awakening or arousal to a lesser state of sleep). Typical noise levels and potential public reactions are shown in Figure 48. It should be noted that the responses of individuals to similar noise events are diverse and are influenced by the type of noise, perceived importance of the noise, appropriateness of the noise to the setting, noise duration, time of day, and individual noise sensitivity. In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it.

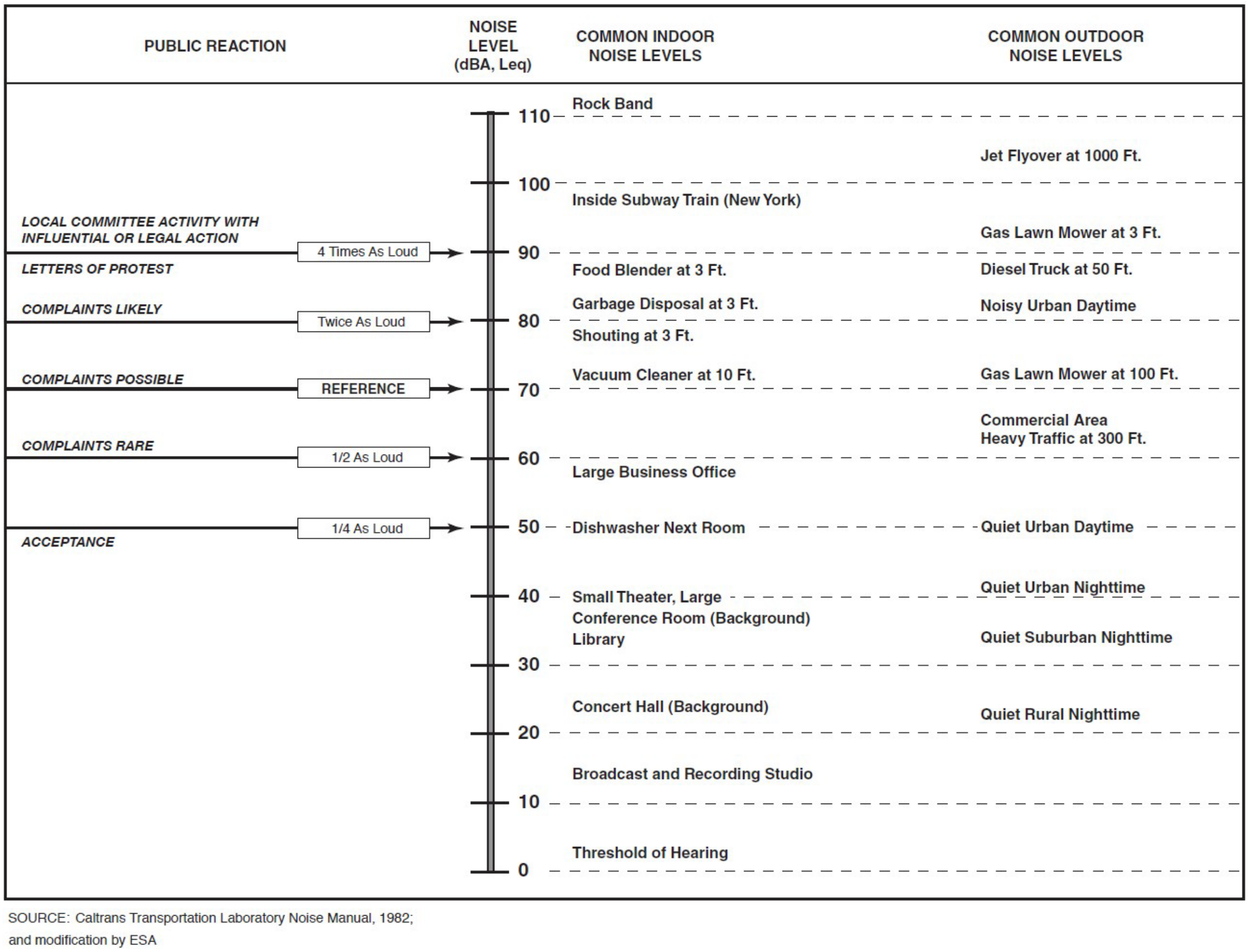

Figure 48: Effects of Noise on People

Some construction activities that would occur on the Inner Harbor Turning Basin action area would also have the potential to generate ground borne vibration. For example, landside pile driving, drilling, and compaction. In residential areas, the background vibration velocity level is usually around 50 VdB (approximately 0.0013 in/sec PPV). This level is well below the vibration velocity level threshold of perception for humans, which is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people (U.S. DOT and FTA 2018). Potential ground borne vibration levels associated with construction equipment use under the action alternatives were modeled and compared to the above thresholds for structural damage to analyze their effect.

6.15.2 Inner Harbor Turning Basin Expansion

As described in Section 3.15.4, beyond 2,000 feet, construction-related noise would generally be attenuated by distance and intervening structures to noise levels commensurate with existing ambient noise levels of the surrounding urbanized areas. Therefore, an area extending 2,000 feet from the perimeter of the proposed expanded Inner Harbor Turning Basin was used as the geographical study area for this analysis.

Construction Noise

Equipment Noise

Construction of the Inner Harbor Turning Basin expansion (Alternative B) would require the use of heavy equipment during demolition, pile removal and installation, and dredging activities. Construction activities would also involve the use of smaller power tools, generators, and other sources of noise. Throughout all stages of construction, there would be a changing mix of equipment. As a result, construction activity noise levels at and near the Inner Harbor Turning Basin project sites would fluctuate depending on the type, number, and duration of use of the various pieces of construction equipment.

Table 71 shows the hourly maximum instantaneous noise levels (L_{max}) produced by the various types of the noisiest equipment measured at 50 feet. It should be noted that L_{max} noise levels associated with the construction equipment would only be generated when equipment is operated at full power. Typically, the operating cycle for a piece of construction equipment would involve 1 or 2 minutes of full power operation, followed by operation at lower power settings. The L_{max} noise levels shown in Table 71 would, therefore, be expected to only occur briefly throughout the construction day.

Table 71. Maximum Noise Levels from Construction Equipment

Construction Equipment	Noise Level at 50 Feet (dBA, L_{max})
Air Compressor	77
Backhoe	78
Compactor	83
Crane	81
Excavator	81
Haul Truck	77
Front-End Loader	80
Dozer	82
Concrete Saw	90
Tugboat	80
Dredge (Diesel-powered)	81
Dredge (Electrically powered)	72
Impact and Vibratory Pile Drivers	101

Notes:
dBA = A-weighted decibel
L_{max} = maximum instantaneous noise level
Sources: U.S. DOT and FHWA 2017; U.S. DOT and FTA 2018; Epsilon Associates 2006; USFWS and SDRPJPA 2000

Following the FTA methodology described above, the two noisiest pieces of equipment during both the daytime and nighttime were identified to calculate construction related noise effects at nearby sensitive receptors in Oakland and Alameda. For this alternative, the noisiest daytime activity would be land-based pile driving (for landside shoring) and the two noisiest pieces of equipment associated with such pile driving would be a pile driver and crane. The only construction activity planned to occur at night would be dredging which would occur 24 hours a day, seven days a week. The two noisiest pieces of equipment associated with dredging would be a diesel-powered dredge and a support tugboat. The input equipment noise values, nearest sensitive-receptor distances, adjusted noise levels at each sensitive receptor, and comparison to the FTA criteria for daytime or nighttime construction are presented in Table 72.

Table 72. Noise Levels from Construction

Receptor	Existing Daytime/ Nighttime Noise Level (dBA, L_{eq})	Loudest Two Noise Sources	Source Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	L_{eq} Noise Level at Receptor (dBA)[c]	Exceed FTA Standards – 90 dBA Daytime/ 80 dBA Nighttime?
Noise Levels at Receptors in Oakland							
Phoenix Lofts Residential (daytime)	68/65[d]	Pile driver/ crane	101/81	1,300	20/16 %	66	No
4th Avenue Residences (daytime)	69/64[d]	Pile driver/ crane	101/81	1,800	20/16 %	63	No
Future Howard Terminal Multi-family Residences (daytime)	59/58	Pile driver/ crane	101/81	200	20/16 %	82	No
Phoenix Lofts Residential (nighttime)	68/65[d]	Dredge/ tug	81/82	1,300	50/25 %	52	No
4th Avenue Residences (nighttime)	69/64[d]	Dredge/ tug	81/82	1,800	50/25 %	49	No
Future Howard Terminal Multi-family Residences (nighttime)	59/58	Dredge/ tug	81/82	200	50/25 %	68	No
Noise Levels at Receptors in Alameda							
Mitchell Avenue Residential (daytime)	58/52	Pile driver/ crane	101/81	1,000	20/16 %	68	No
Mosley Avenue Residential (daytime)	55/50	Pile driver/ crane	101/81	500	20/16 %	74	No

Receptor	Existing Daytime/ Nighttime Noise Level (dBA, L_{eq})	Loudest Two Noise Sources	Source Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	L_{eq} Noise Level at Receptor (dBA)[c]	Exceed FTA Standards – 90 dBA Daytime/ 80 dBA Nighttime?
Barbers Point Residential (daytime)	63/60	Pile driver/ crane	101/81	1,100	20/16 %	68	No
Future Landing at Bay 37 Multifamily Residential (daytime)	58/52	Pile driver/ crane	101/81	500	20/16 %	74	No
Mitchell Avenue Residential (nighttime)	58/52	Dredge/ tug	81/82	1,350	50/25 %	51	No
Mosley Avenue Residential (nighttime)	55/50	Dredge/ tug	81/82	600	50/25 %	59	No
Barbers Point Residential (nighttime)	63/60	Dredge/ tug	81/82	1,200	50/25 %	53	No
Future Landing at Bay 37 Multifamily Residential (nighttime)	58/52	Dredge/ tug	81/82	600	50/25 %	59	No

Notes:
a L_{max} at distance of 50 feet.
b Distance between approximate location of equipment and property line of sensitive receptor.
c The L_{eq} level is adjusted for distance and percentage of usage.
d Existing noise level as reported in the Draft Environmental Impact Report for the Waterfront Ballpark District at Howard Terminal.
dBA = A-weighted decibel
FTA = Federal Transit Administration
L_{eq} = equivalent-continuous sound level
L_{max} = maximum instantaneous noise level

As shown in Table 72, daytime noise from construction would be below the 90 dBA daytime criterion for the nearest residential sensitive receptors on both the Oakland and Alameda side of the Inner Harbor Turning Basin. Similarly, as shown in Table 72, nighttime construction noise levels from dredging operations would be below the 80 dBA nighttime criterion of the FTA for the nearest residential sensitive receptors in both Oakland and Alameda. Because noise generated by construction equipment associated with the Inner Harbor Turning Basin expansion (Alternative B) would not exceed the FTA significance thresholds for residential receptors, there would be a less than significant effect from construction equipment noise under this alternative.

While the FTA criteria are used as the significance threshold under NEPA, it is also worthwhile to note for decision makers when an action might exceed local thresholds. Thus, construction noise was also assessed relative to the standards of the local noise ordinances in Oakland and Alameda. For daytime noise Oakland's standard is 65 dBA for construction activity occurring over 10 days or more. To prevent exceeding this standard at the Phoenix Lofts and, potentially, future residential uses proposed for Howard Terminal when impact pile driving occurs, nylon or wood cushion blocks would be used during pile-driving activities and would be expected to reduce noise by 5 dBA and 11 dBA, respective to the material used. However, even with the use of cushion blocks, Oakland's 65 dBA standard for construction activity would be exceeded at the proposed future residential uses at Howard Terminal if they were built and occupied at the time of Inner Harbor Turning Basin expansion construction.

The City of Alameda exempts construction noise from noise standards if occurring between 7:00 a.m. and 7:00 p.m. on Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays. Since daytime construction activities would take place during these hours, daytime noise would be consistent with the Alameda noise ordinance.

Dredging would be the one construction activity that would occur at night (during the hours of 7:00 p.m. to 7:00 a.m. on weekdays and 8:00 p.m. to 9:00 a.m. on weekends and federal holidays) and on weekends. Oakland's ordinance limits nighttime construction noise levels at residential receptors to 45 dBA (L_{33}) or the ambient noise level if it is greater. Existing noise levels surrounding the Inner Harbor Turning Basin exceed the applicable 45 dBA so the existing nighttime noise level at each respective receptor (shown in Table 72) would be the applicable nighttime construction standard. Construction noise levels from dredging operations would be below existing ambient nighttime noise levels at all receptors in Oakland except the potential future Howard terminal residences. Alameda's ordinance limits nighttime noise at residential uses to 50 dBA (L_{50}) which could be exceeded by up to 9 dBA at the residential use on Mosley Avenue and future Landing at Bay 37 multi-family residences when dredging is at the closest distance of approximately 600 feet away.[1] A temporary noise barrier would be used as an additional minimization measure approximately 200 feet from the southern edge of the Oakland Harbor during dredging activities to lower the nighttime noise levels by 5 dBA and minimize exceedance of this local ordinance at the Mosley Avenue residences. Such barriers are generally constructed with two layers of ½-inch thick plywood and would be 10-12 feet high. For the future Landing at Bay 37 multi-family residences, the warehouses immediately to the west are over 20 feet in height and would serve as a noise barrier for dredging activity that is not within the direct line of sight of first and second floor residences, which would minimize exceedance of the Alameda local ordinance at these residences; however, an effective noise barrier would not be feasible for third floor residences. Additionally, because of aesthetic impacts, it would not be feasible to place a noise barrier to the north of the waterfront residences to reduce noise impacts to

[1] This should be considered a highly conservative estimate given that it is based on noise generating equipment being located closest to a noise-sensitive receptor, not in the center of the construction zone, as is the standard methodology for evaluating such noise.

first and second floor residences from dredging activities that would be within direct line of sight of these residences.

<u>Traffic Noise</u>

In addition to construction-related noise from equipment, traffic noise modeling using the FHWA Traffic Noise Model algorithms was conducted for baseline conditions and baseline plus the peak haul truck traffic amounts determined by the transportation analysis (see Section 6.10). Most of the routes used by haul trucks to access freeways pass through industrial areas where no noise-sensitive receptors are present. However, the truck route on Adeline Street would pass by existing 5th Street Lofts. Additionally, most of the truck routes in Alameda would use roadway segments with adjacent residential uses.

Traffic noise modeling results are summarized in Table 73. The NEPA significance threshold for traffic noise for this analysis is identified as readily perceivable increase in existing traffic noise levels of 5 dB or more. However, it should be noted that local jurisdictions have promulgated significance thresholds for their jurisdictions as well. Therefore, the following traffic noise analysis discusses compares the increase in noise levels (traffic contribution only) relative to both the NEPA significance threshold and local thresholds established by the cities of Oakland and Alameda.

The city of Oakland's significance criteria for traffic noise is an increase in noise levels of 5 dBA or more and is therefore equivalent to the NEPA threshold identified for this study. As shown in Table , the addition of peak haul truck volumes on Adeline Street would generate a roadside noise-level increase of less than 5 dBA and therefore would not exceed the NEPA or City of Oakland significance thresholds. Truck trips to and from Berth 10 for hauling dredged Inner Harbor sediments to a landfill would involve routes that do not pass noise-sensitive receptors and thus would not be perceivable by such receptors.

Traffic noise-level significance thresholds for roadways in Alameda are described in the City of Alameda General Plan Safety and Noise (SN) Element Policy HS-60. This policy considers noise impacts to be "significant" if the project causes an increase in the noise exposure of 4 dBA or more and the resulting noise level would exceed that described as normally acceptable for the affected land use; or otherwise result in any increase in Ldn of 6 dBA or more. The proposed truck routes through Alameda would use two roadway segments that have multi-family residential uses where the normally acceptable noise level associated with the City's policy is 65 dBA and eight roadway segments that have single-family residential uses where the normally acceptable noise level is 60 dBA. The assumed truck distribution on the Alameda routes for this alternative (Alternative B) reflect an estimated split route with 61 percent of trucks using the Webster Tube to landfills route and 39 percent of trucks using the Park Street bridge to a local recycler.

As shown in Table 73, there is one roadway in the City of Alameda where both the NEPA threshold and the City of Alameda threshold would be exceeded unless avoidance or minimization measures are implemented. The addition of unmitigated peak haul truck volumes on Main Street between Willie Stargell Avenue and Ralph Appazzato Memorial Parkway would generate a noise level increase of 5.1 dBA, which is slightly above the NEPA threshold of 5.0 dBA and greater than the City of Alameda's applicable threshold of 4 dBA where the resultant noise level would exceed 60 dBA in the presence of single family residential uses. To avoid this exceedance of the roadway noise level thresholds along Main

Street in Alameda, a limit of no more than 23 truck trips per hour (approximately one truck every 3 minutes) would be established for hauling operations entering or egressing the Alameda work site as part of the project Traffic Control Plan (see Appendix A7). With this minimization measure, the impact of traffic noise along this roadway would be less than significant. Noise increase along all other Alameda roadways from project peak truck traffic would be less than significant without any minimization measures.

Table 73. Traffic Noise Increases along Roads in the Project Vicinity

Roadway Segment	Existing[a]	Applicable Local Increase Threshold (dB) (The applicable NEPA threshold is 5dBA or greater increase for all roadways)	Existing plus Project	dBA Difference	Substantial Increase before / after minimization measures?
Oakland Roadways with Sensitive Receptors					
Adeline Street from 3rd Street to 5th Street	68.2	5 dBA or greater increase	70.4	2.2	No / No
Alameda Roadways with Sensitive Receptors					
Main Street from Southern Inner Turning Basin to Willie Stargell Avenue	59.2	6 dBA or greater increase (multi-family residential uses with resultant noise level < 65 dBA)	63.5	4.3	No / No
Main Street from Willie Stargell Avenue to Ralph Appazzato Memorial Parkway	57.9	4 dBA or greater increase (single-family residential uses with resultant noise level > 60 dBA)	63.0	5.1	Yes / No
Ralph Appazzato Memorial Parkway from Main Street to Webster Street	67.7	4 dBA or greater increase (single-family residential uses with resultant noise level > 60 dBA)	70.1	2.4	No / No
Webster Street from Ralph Appazzato Memorial Parkway to Willie Stargell Avenue	69.5	4 dBA or greater increase (multi-family residential uses with resultant noise level > 65 dBA)	70.6	1.1	No / No
Atlantic Avenue from Webster Street to Sherman Street	60.3	4 dBA or greater increase (single-family residential uses with resultant noise level > 60 dBA)	62.6	2.2	No / No
Sherman Street from Atlantic Avenue to Buena Vista Avenue	64.8	4 dBA or greater increase (single-family residential uses	66.3	1.5	No / No

Roadway Segment	Existing[a]	Applicable Local Increase Threshold (dB) (The applicable NEPA threshold is 5dBA or greater increase for all roadways)	Existing plus Project	dBA Differenc e	Substantial Increase before / after minimization measures?
		with resultant noise level > 60 dBA)			
Buena Vista Avenue from Sherman Street to Grand Street	64.5	4 dBA or greater increase (single-family residential uses with resultant noise level > 60 dBA)	66.0	1.6	No / No
Grand Street from Buena Vista Avenue to Clement Avenue	60.3	4 dBA or greater increase (single-family residential uses with resultant noise level > 60 dBA)	64.1	3.8	No / No
Clement Avenue from Grand Street to Park Street	60.8	4 dBA or greater increase (single-family residential uses with resultant noise level > 60 dBA)	63.8	3.1	No / No

Notes:
a. Existing noise levels are modeled on traffic contributions from the specific roadway only and do not reflect localized contributions of industrial uses or I-880.
dB = decibel
dBA = A-weighted decibel
I-880 = Interstate 880
Sources: Traffic data compiled by Fehr & Peers and AECOM in 2019 and 2021, respectively, and modeling performed by Environmental Science Associates in 2021.

Because noise generated by construction equipment associated with the Inner Harbor Turning Basin expansion (Alternative B) would not exceed the FTA significance thresholds for residential receptors, and construction traffic noise would not exceed the identified NEPA threshold of greater than 5dBA increase with the proposed traffic noise minimization measure, there would be a less than significant effect from construction noise under this alternative. With the proposed noise minimization measure for construction traffic noise, this alternative would also not exceed local City of Alameda traffic noise thresholds.

Construction Vibration

Construction activities associated with the Inner Harbor Turning Basin expansion (Alternative B) that have the potential to generate ground borne vibration would include impact pile driving and movement of loaded haul trucks. The estimated PPV levels for these types of construction equipment are identified in, as are the resultant vibration levels for the closest structures. As shown in Section 6.15, vibration from construction equipment would be below the applicable 0.5 PPV threshold for standard (nonhistorical) buildings, which the nearby buildings are considered. Thus, construction-related vibration associated with this alternative would be less than significant.

Table 74. Vibration Levels from Construction Equipment

Nearest Building/ Receptor	Vibration-Inducing Equipment	Reference Vibration Level (PPV)[a]	Distance to Nearest Receptor (feet)[b]	Adjusted Vibration at Building (PPV)[c]	Exceed 0.5 PPV Standard or 0.25 PPV for Historic Building?
2900 Main Street Building 140D, Alameda	Impact Pile Driver	0.65	100	0.08	No
	Loaded Trucks	0.076	100	0.01	No
Schnitzer Steel, Oakland	Impact Pile Driver	0.65	700	0.004	No
	Loaded Trucks	0.076	700	0.0005	No
Future Ballpark	Impact Pile Driver	0.65	100	0.08	No
	Loaded Trucks	0.076	100	0.01	No

Notes:
a PPV at 25 feet.
b Distance between approximate location of equipment and structure. Propagation estimates assume a site-specific vibration attenuation rate (“n”) of 1.5, based on FTA guidance.
c The PPV level is adjusted for distance.
FTA = Federal Transit Administration
PPV = peak particle velocity
Source: U.S. DOT and FTA 2018; Caltrans 2020b

6.15.3 Outer Harbor Turning Basin Expansion

The nearest noise-sensitive land use to the Outer Harbor Turning Basin would be single-family residences on Pine Street in West Oakland, approximately 5,000 feet (0.95-mile) to the east. The Middle Harbor Shoreline Park is approximately 2,000 feet (0.38-mile) from the Outer Harbor Turning Basin but recreational users at the park are not considered sensitive noise receptors.

Construction Noise

Equipment Noise

Construction activities for the Outer Harbor Turning Basin expansion (Alternative C) would only require dredging. No landside construction activities, other than staging, are proposed as part of this alternative. Noise from dredging activity would be attenuated to approximately 40 dBA at the nearest sensitive noise receptors and would be further attenuated by intervening structures and the I-880 freeway. Consequently, noise from dredging equipment would not be perceptible at these closest residences during daytime or nighttime hours. Noise from dredging activity at the Middle Harbor Shoreline Park would be approximately 49 dBA, which is less than existing monitored daytime noise levels at this park that were recorded to be 59 dBA. Thus, noise would not impact park users even if they were considered a noise-sensitive use for the purpose of this analysis. Noise generated by construction equipment associated with the Outer Harbor Turning Basin expansion (Alternative B) would not exceed the FTA significance thresholds and would have negligible impacts under this alternative.

Traffic Noise

Construction related traffic associated with the Outer Harbor Turning Basin expansion (Alternative C) would only be associated with worker commutes, not haul trucks. Routes under this alternative would also use roadways that do not pass noise-sensitive receptors. Therefore, traffic-related construction noise impacts of the Outer Harbor Turning Basin only alternative would be negligible.

Construction Vibration

The nearest structure to the Outer Harbor Turning Basin is the TraPac administration building, approximately 760 feet (0.14-mile) to the southeast of the basin. There are no landside activities proposed as a part of this alternative that have the potential to generate high vibration levels. No construction-related vibration effects would occur under the Outer Harbor Turning Basin expansion (Alternative C).

6.15.4 Inner Harbor and Outer Harbor Turning Basin Expansion

Sub-alternatives D-1 and D-2 (Proposed Action) involve expansion of both the Inner and Outer Harbor Turning Basins using dredge equipment powered by diesel fuel and electricity, respectively. All elements of these sub-alternatives would be the same, except for electrical infrastructure improvements near Berth 26 at the Outer Harbor under Sub-alternative D-2. The electrical infrastructure improvements under Sub-alternative D-2 would only involve a minor amount of ground disturbance that would not generate substantial amounts of noise or vibration and, as noted above in Section 6.15.3, there are no sensitive receptors or structures located near the Outer Harbor Turning Basin expansion area. As such, the noise and vibration impacts of these activities would be negligible. Therefore, the impacts associated with the expansion of the Inner Harbor Turning Basin and Outer Harbor Turning Basin under Sub-Alternatives D-1 and D-2 would be essentially the same as those identified in Section 6.15.2 for the expansion of Inner Harbor Turning Basin (Alternative B).

While both Sub-alternative D-1 and D-2 would have less than significant effects from noise and vibration based on the NEPA thresholds of significance established herein, electric dredges generate less noise than diesel powered dredges. For example, the electric dredge used to dredge the navigation channels in the Port of Los Angeles generates 72 dBA L_{eq} at 50 feet (USFWS and SDRPJPA 2000), which is approximately 9 dBA less than a diesel-powered dredge. Because dredging would occur 24 hours a day and, therefore, have the potential to impact receptors during the more sensitive nighttime hours, the reduced noise generated by an electric dredge would result in lower noise-effects from construction than the use of a diesel-powered dredge under the other alternatives. However, under Sub-alternative D-2, construction noise levels from electric dredging operations at the very edge of the Inner Harbor Expansion could still potentially exceed Alameda's nighttime noise ordinance by up to approximately 5 dBA at the residential receptors on Mosley Avenue and future multi-family residential uses at the Landing at Bay 37 currently under construction north of Mitchell Avenue when dredging is occurring at the closest distance of approximately 600 feet away.[1]

As described for the Inner Harbor Turning Basin expansion (Alternative B) above, a temporary noise barrier would be placed approximately 200 feet from the southern edge of the Oakland Harbor during dredging activities to lower the nighttime noise levels by 5 dBA. At the Mosley Avenue residences, this would reduce the noise level at these receptors to 50 dBA which would avoid conflicting with the local ordinance. For the future Landing at Bay 37 multi-family residences, the warehouses immediately to the west are over 20 feet in height and would serve as a noise barrier for dredging activity that is not within the direct line of sight of first and second floor residences; this in combination with electric dredging would similarly reduce the noise level at these receptors to 50 dBA and would avoid conflicting with the local ordinance for first and second floor residences for dredging activity that is not within their direct line of sight. However, a noise barrier would not be feasible for third floor residences or for dredging activities within the direct line of sight. Therefore, to further reduce the noise level at these receptors during nighttime dredging, the Port would require contractors to construct a temporary 12-foot noise barrier along the southern edge of the harbor on the Alameda side of the turning basin during nighttime dredging activities at the Alameda Site. The barrier would be installed approximately 220 feet from the noise source and 380 feet from the nearest receptors. This would reduce the noise level to 49.5 dBA at the Mosley Avenue Residences and would avoid conflicts with Alameda's noise ordinance. Construction noise levels from dredging operations would be below existing ambient nighttime noise levels at all receptors in Oakland except the potential future Howard terminal residences, should they be built and occupied at the time of project construction.

6.15.5 No Action Alternative

Under the No Action Alternative, there would be no construction activities or changes to existing vessel maneuvering requirements and restrictions in the Inner Harbor Turning Basin or the Outer Harbor Turning Basin. Therefore, there would be no noise or vibration impacts associated with the No Action Alternative.

6.16 Cumulative Impacts

6.16.1 Analysis of Cumulative Impacts

The CEQ implementing regulations for NEPA define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can

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[1] This should be considered a highly conservative estimate given that it is based on noise generating equipment being located closest to a noise-sensitive receptor, not in the center of the construction zone, as is the standard methodology for evaluating such noise.

result from individually minor but collectively significant actions taking place over a period of time" (40 C.F.R. 1508.1(g)(3)). The NEPA regulations themselves do not provide specific criteria for cumulative impact analyses, but the CEQ has produced a handbook of guidance for doing cumulative effects analysis (CEQ 1997). The handbook recommends temporally and spatially bounding the analysis by establishing a geographic scope and time frame that addresses past, present, and reasonably foreseeable projects that could combine with the proposed action to create cumulative impacts.

For this analysis, the criterion used for considering whether a project is reasonably foreseeable and probable is whether the project has been defined in adequate detail—either through the completion of publicly available preliminary evaluations, feasibility studies, or draft environmental and engineering documents—to inform understanding of potential project impacts. Projects that were only in the development phase without detailed descriptions, operations criteria, or general locations at the time that this cumulative impact assessment was written were not considered further.

Table 75 lists the past, present, and reasonably foreseeable projects considered in the cumulative analysis. The list of projects generally includes those close to the proposed turning basins expansion areas (i.e., those that could result in overlapping impacts, such as to air quality, transportation and circulation, or noise and vibration); or other projects along the Inner and Outer Harbor waterways that could result in overlapping impacts to resources, such as biological resources and water quality. The spatial extent for analysis of cumulative impacts varies by resource and is equivalent to the geographic extent of impacts that would result from the action alternatives as described in the preceding sections of this chapter. Future projects identified are those expected to be constructed or implemented prior to or potentially overlapping with construction of the action alternatives, which are estimated to be completed by 2029.

The cumulative impact evaluation assumes that the impacts of past and present projects are accounted for in the description of baseline conditions (as previously described in the regulatory and environmental setting section for each resource topic); these projects include the Oakland Harbor Navigation Improvement (-50-foot) Project and ongoing maintenance dredging at the Port, which in particular have contributed to baseline conditions at the project sites. Cumulative impacts are considered in the context of baseline conditions alongside reasonably foreseeable future projects.

Table 75. Plans and Projects Considered for Cumulative Impact Analysis

Plan or Project Name	Description	Status
Oakland Harbor Navigation Improvement (-50-foot) Project	Deepened the federal channels of Oakland Harbor and Port-maintained berths from a depth of -42 feet mean lower low water to -50 feet mean lower low water.	Waterway improvements were completed in 2009.
Maintenance dredging	Annual maintenance dredging of the federal navigation channels by the USACE. Annual maintenance dredging of Port-maintained berths outside of the federal navigation channels.	Ongoing
Port-wide cargo throughput per the 2002 Oakland Army Base Area Redevelopment Plan Port	Port's target cargo throughput is 4.05 million TEU.	Due to recession, cargo has not yet reached target throughput.
Replace Outer Harbor Berths per the 2002 Oakland Army Base Area Redevelopment Plan Port	This project involves replacement of Berths 21, 20, 10, 9, and 8 with a new Berth 21.	This project is part of the 2002 Oakland Army Base Area Redevelopment Plan; the BCDC Seaport Plan; and the Port's long-term development plan.
7th Street Grade Separation East Project per the 2002 Oakland Army Base Area Redevelopment Plan Port	This project involves realignment and reconstruction of the existing railroad underpass and multi-use path along 7th Street between west of I-880 and Maritime Street. This will increase vertical and horizontal clearances for trucks to current standards and provide a separate pedestrian/bicycle pathway.	Approved; construction anticipated to commence mid 2023; anticipated 30-month construction duration
ERA Terminal at Outer Harbor Port	ERA proposes to construct and operate the ERA Oakland Terminal Project, a marine terminal at the Port that would import, store, and distribute bulk construction aggregates (i.e., sand and gravel). This project will take place at the Port's Outer Harbor Terminal. It would use Berth 22 for vessel and barge operations; and approximately 18 acres of Berth 20, 21, and 22 backlands (land directly adjacent to a vessel berth) for stockpiling and distribution of construction aggregates.	This project has been approved; in pre-construction phase
California Waste Solutions Recycling Facility	California Waste Solutions proposes to build a new recycling facility at 2008 Wake Avenue in the Gateway Industrial District and relocate its existing recycling facilities in the West Oakland community to the new location. The proposal is comprised of a two-story, 170,765 square feet (ft^2) recycling facility including approximately 6,000 ft^2 of administrative office space and approximately 1,600 ft^2 of educational/observation areas. The new facility is intended to receive, process and transfer up to 850 tons per day of residential and commercial recycling material.	Construction anticipated to commence mid 2023.

Plan or Project Name	Description	Status
Custom Alloy Scrap Sales	Custom Alloy Scrap Sales proposes construction and operation of a state-of-the-art recycling center on 10-acre area of the Gateway Industrial District; it would relocate operations at existing West Oakland facilities to the new facility.	Construction anticipated to commence in 2027 and be completed by 2029. Relocation of existing operations to the new facility to occur from 2027 to 2029.
Downtown Oakland Specific Plan City of Oakland	This Plan encompasses approximately 930 acres in downtown Oakland, generally bound by 27th Street to the north; Brush and Market Streets to the west; and the Jack London estuary waterfront and Embarcadero West to the south. The Plan will provide a roadmap for the area's development over the next 20 years, through policy guidance on land use, transportation, housing, economic development, public spaces, cultural arts, and social equity.	The Draft Plan/EIR was circulated in 2019. The Final Plan/EIR is scheduled for completion in late 2022.
West Oakland Specific Plan City of Oakland	This is a mixed use plan to redevelop vacant and/or underutilized commercial and industrial properties in West Oakland. The planning area encompasses approximately 1,900 acres.	The Plan was approved in 2015 and assumes buildout by 2035.
Oakland Waterfront Ballpark District at Howard Terminal	This project encompasses 55 acres of Howard Terminal. Proposed development includes a 35,000-person capacity Major League Baseball park, up to 1.77 million ft2 of commercial development, up to 3,000 residential units, a 400-room hotel, and a performance venue with a capacity of approximately 35,000 individuals.	The Final EIR was certified in 2022. Development applications are under review and project approvals are pending.
Brooklyn Basin Marina Expansion Project	This project is a modification of the previously approved 64.2-acre project analyzed under the 2009 Brooklyn Basin EIR. The previously approved project includes 64.2 acres of land area and 7.95 acres of water surface for marina facilities and 167 boat slips. The approved project will redevelop the site to house up to 3,100 dwelling units, 200,000 ft2 of ground-floor retail/ commercial space, and 31 acres of parkland, trails, and open space. The project modifications would add 158 boat slips and approximately 10 acres of water surface to the project site.	The Draft Supplemental EIR for Marina Expansion was issued in 2021. The approved project consists of four phases and one sub-phase. The master developer and site developers are delivering Phases 1 and 2 of the approved project while the City of Oakland considers the request for project modifications. Certain portions of the project could be developed from 2025 to 2031, and other portions to 2038.
500 Kirkham Project	This project is a mixed-use development with 1,032 residential units, including 85 affordable units, and nearly 35,000 ft2 of ground-floor retail and commercial space.	A development agreement with the City of Oakland is pending.

Plan or Project Name	Description	Status
Jack London Square Redevelopment Sites D, F2, and F3 (Site D is at Broadway/Embarcadero West; Site F2 is at Harrison Street and Embarcadero West; and Site F3 is at Alice Street/ Embarcadero)	This project involves mixed-use retail/dining/hotel redevelopment.	This project has been approved.
Alameda Housing Authority North Housing	This project involves development of up to 586 units of permanent supportive housing, affordable senior housing, and affordable family housing along Bette Street between Mosley and Singleton Avenues.	Planning entitlements and environmental review have been approved.
Landing at Bay 37 Mixed Use Development Project	This project involves mixed-use development, with residences and shoreline development.	This project is under construction.
Alameda Point Project	This project involves mixed-use development, with commercial, residential, open space, recreational, retail uses and shoreline development.	The first phase of development (Site A) is under construction.
Encinal Terminals	This project involves residential mixed-use waterfront development, at 1521 Buena Vista Avenue along on Alameda's northern waterfront, of up to 589 new housing units, a marina with up to 160 boat slips and a harbormaster's office, between 30,000 and 50,000 sq. ft. of commercial/ office and restaurant uses, and more than 3 acres of waterfront-related public open space and parks.	Planning entitlements and environmental review have been approved.
San Francisco Bay Trail Projects Multi-agency	This project would create a trail and facilities that connect the San Francisco Bay Trail, including in downtown Oakland and around Alameda Point.	Previously planned segments that have been identified are being evaluated to confirm the build-out and for prioritization purposes prior to build-out.

Notes:
BCDC = Bay Conservation and Development Commission
EIR = Environmental Impact Report
ERA = Eagle Rock Aggregates
I-880 = Interstate 880
Port = Port of Oakland
TEU = twenty-foot equivalent units

Environmental Justice

The action alternatives would have short-term, less-than-significant effects related to air quality, noise, and transportation during construction. Minimization measures such as use of off-road equipment with engines meeting USEPA and CARB Tier 4 Final standards, dust control, noise reduction measures, and a traffic control plan would reduce the effects from construction of the action alternatives. Consequently, the action alternatives would not result in substantial adverse human health or environmental resource impacts that would disproportionately harm low-income communities and/or minority communities.

In terms of operations, the Port's future forecasted cargo volumes as determined by external economic factors, including but not limited to global trade, are consistent under all alternatives. Implementation of the action alternatives would increase the efficiency of vessel operations at the Port and reduce vessel delays. (See for example, Sections 5.4 and 6.13). As a result of reducing vessel delays and associated idling, the action alternatives are expected to reasonably reduce Port vessel operational emissions over the long-term. This would represent a beneficial effect under any of the action alternatives.

There are no available analyses of environmental justice impacts for most of the cumulative projects in . Some of the cumulative projects could result in air quality, noise and transportation impacts that could overlap with those that would occur during construction of the action alternatives; however, as described in the corresponding sections below, the cumulative impacts associated with these resources would be less than significant. In addition, projects would be required to implement mitigation measures to reduce potentially significant effects, which lessen effects to surrounding communities. Further, the California Waste Solutions Recycling Facility and Custom Alloy Scrap Sales are assumed to have a beneficial effect on environmental justice communities by moving industrial operations to a designated industrial district and away from residences in West Oakland.

Therefore, the project alternatives would not be expected to result in significant cumulative effects on neighboring environmental justice communities.

Socioeconomics

As stated in Section 6.2.1, adverse impacts related to the construction of the action alternatives would be limited to relatively minor reductions of adjoining land uses; such impacts would be mitigated by financial consideration for project-related loss, relocation, or impairment to the affected property. The action alternatives would be associated with short-term job creation during construction which would be a minor, short-term beneficial effect. Temporary jobs in the region would be created during construction of many of the cumulative projects in and, if the construction projects overlap in time, would combine to produce a larger beneficial temporary job creation effect. Other projects that involve relocation would be relocating within the region and therefore would not be expected to cause regional job loss. The action alternatives would not affect housing stock in the region, but many of the cumulative projects are efforts to build more housing and therefore would result in a beneficial cumulative effect on regional housing availability. There would be no adverse cumulative impacts related to socioeconomics from the project alternatives.

Geology, Soils, and Seismicity

As stated in Section 6.3, the action alternatives would not introduce elements that would increase potential risks related to rupture of a known earthquake fault; seismic shaking; or seismic-related ground failure, including liquefaction; or landsides. Any new bulkhead or sheet pile shoreline structures that would be installed as part of the action alternatives would comply with applicable seismic standards. Similarly, the action alternatives would not involve activities that would cause geologic units or soils to become unstable, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, or collapse; this excludes minor erosion of the turning basins' side slopes from sloughing that may occur after the areas are dredged. Because the action alternatives would have no effect on seismicity or geologic resources, they would not contribute to cumulative impacts to these resources.

Water Quality

The action alternatives would result in temporary water quality impacts related to construction activities in, over, and adjacent to waterbodies. Other projects listed in Table 75 that are located along the waterfront, such as the Oakland Waterfront Ballpark District at Howard Terminal, Brooklyn Basin Marina Expansion Project, and Encinal Terminals, could also involve similar activities that could result in similar short-term impacts to water quality. Cumulative water quality impacts could include increases in turbidity; disturbance and release of contaminated sediments; or accidental release of hazardous materials such as diesel fuel from construction equipment. The construction activities associated with the action alternatives and cumulative projects could result in cumulative water impacts if construction activities for these projects were to occur concurrently. However, as described in Section 6.4, the water quality impacts from the action alternatives would be localized so concurrent projects that overlap with the proposed action alternatives geographically would create more substantial cumulative effects. Of the waterfront cumulative projects, only the Oakland Waterfront Ballpark District at Howard Terminal is in the immediate area of the project sites and could result in overlapping water quality impacts if in-water construction activities were to occur concurrently with those for expansion of the Inner Harbor Turning Basin. As discussed in Section 6.4, various measures would be implemented during construction of the action alternatives to minimize potential water quality impacts, including adherence to the NPDES Construction General Permit through preparation and implementation of a stormwater pollution prevention plan and use of silt curtains where specific site conditions demonstrate that they would be practicable and effective to minimize adverse water quality impacts. Similarly, the Oakland Waterfront Ballpark District at Howard Terminal EIR identified measures that would be implemented to minimize that project's potential impacts on water quality during construction (City of Oakland 2021). The action alternatives and cumulative projects involving dredging and construction in the marine environment would also be subject to permitting/regulatory approval processes (e.g., Water Quality Certification from the SFRWQCB, CZMA approval from BCDC, DMMO review/approval for dredged material placement/disposal, etc.) and would be required to implement measures to minimize water quality impacts as conditions of those permits/approvals.

Both expansion of the Inner Harbor Turning Basin and the Oakland Waterfront Ballpark District would involve construction at Howard Terminal within an active DTSC regulated site. All ground-disturbing activities at Howard Terminal for both projects would occur in coordination with DTSC to ensure that construction activities are properly managed such that adverse impacts associated with existing contamination would be avoided to protect human health and the environment, including surface waters and groundwater.

Based on the above considerations, cumulative impacts on water quality from the project alternatives would be less than significant.

Wildlife, Special Status Species and Protected Habitat

Because the action alternatives' impacts on wildlife (Section 6.5) and special status species and protected habitat (Section 6.6) would be similar, potential cumulative impacts on these resources would also be similar and therefore are discussed collectively.

Terrestrial wildlife in the landside portions of the project area is limited to common species that are adapted to inhabiting developed areas. All terrestrial areas that would be impacted by the action alternatives are heavily developed, and any wildlife present would be able to relocate to other nearby areas of similar habitat in the vicinity. Therefore, the project's impacts to terrestrial wildlife would be negligible and would not contribute to cumulative impacts.

Construction of the action alternatives would result in temporary effects on aquatic wildlife and special status species (fish, marine mammals, and birds) including temporary impacts to foraging and species health due to temporary increases in turbidity; temporary disturbance and loss of benthic and aquatic habitat; alteration of behavior due to underwater noise from pile removal and installation; and potential exposure to contaminants in resuspended sediments. Although unlikely, mechanical dredging could also entrain fish and potentially result in mortality. Other projects listed in Table 75that are located along the waterfront, such as the Oakland Waterfront Ballpark District at Howard Terminal, Brooklyn Basin Marina Expansion Project, and Encinal Terminals, could also involve similar activities that could result in similar short-term impacts. The in- and over-water construction activities associated with these projects could result in adverse cumulative impacts related to underwater noise (e.g., alteration of behavior of fish and marine mammals) and dredging (e.g., increases in turbidity, disturbance or loss of benthic habitat) if construction activities for these projects were to occur concurrently with those for expanding the turning basins. As discussed in Sections 6.5 and 6.6, various measures would be implemented during construction of the action alternatives to minimize potential impacts to wildlife and aquatic habitats, including confining in-water work to the June 1 through November 30 salmonid environmental work window; conducting pile installation with a vibratory driver to the extent feasible; use of "soft-start" techniques and a bubble curtain or similar attenuation device if impact pile driving is necessary; monitoring for marine mammals during pile removal and installation; and use of silt curtains 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. The beneficial reuse of suitable sediments at a wetland restoration site as part of the action alternatives would benefit both aquatic and terrestrial species. In addition, the expansion of the Inner

Harbor Turning Basin would create more open water habitat for fish to move through in the long term.

The action alternatives would comply with existing regulations, requirements, and conditions in permits and approvals from NMFS, USFWS, the SFRWQCB, and BCDC, which would minimize and/or avoid adverse impacts to wildlife and listed species associated with project construction. Additionally, other projects involving dredging and construction in the marine environment would be subject to permitting/regulatory approval processes like those for the turning basins expansion and would be required to implement similar measures to minimize water quality and biological resource impacts. Due to the regulatory environment that would require similar protective measures for these biological resources for cumulative projects, the incremental contribution of the project alternatives in combination with other cumulative projects would not result in significant cumulative impacts to wildlife, special status species and protected habitats.

Cultural Resources

Under all alternatives, project activities would not result in impacts to known historic architectural or archaeological resources because no historic properties eligible for listing were found to exist in the study APE, and therefore the alternatives would not contribute to any cumulative impact to these resources. Excavation, dredging, and pile installation activities could result in the inadvertent discovery of a previously unrecorded archaeological resource or buried human remains. As stated in Section 6.7, should such an unanticipated discovery occur, all activities that may result in disturbance to the discovery would be required to cease until an archaeologist has recorded and determined the NRHP eligibility of the finds. Most of the projects shown in Table 75 involve ground-disturbing construction activities that would also have the potential to inadvertently uncover previously unidentified buried archaeological resources, including human remains. If previously undiscovered archaeological resources are inadvertently exposed during construction activities, an incremental effect to archaeological resources may occur. However, the reasonably foreseeable future projects would be subject to compliance with NEPA and/or CEQA, and would be required to implement similar measures for inadvertently-discovered historical or archaeological resources. As these resources would be properly evaluated and managed according to such measures, no adverse cumulative impacts would occur.

Aesthetics

As discussed in Section 6.8, impacts on aesthetics from the action alternatives would be limited to temporary views of construction activities, materials, and equipment by recreational and commercial boaters and San Francisco Bay Ferry boats in the vicinity of the turning basins as well as recreationists along shoreline areas that have a view of either turning basin (e.g., Alameda's Estuary Park, Judge John Sutter Regional Shoreline Park) or Berth 10. Although construction equipment would be visible throughout the duration of construction, the Port and other maritime facilities already sustain considerable industrial/maritime activity, and the dredging and construction equipment associated with the action alternatives would therefore appear as an extension of existing surrounding industrial/maritime activities and would be considered visually compatible with existing uses. Of the projects listed in Table 75, the only project in close proximity where construction activity may occur concurrently and would be visible at a similar scale from the same public vantage points as one or more of the action alternatives is the Oakland Waterfront Ballpark District at Howard Terminal. Like the views of the action alternatives construction activities, these effects would be temporary in nature and would appear as an extension of the surrounding industrial/maritime activities at the Port. In addition, temporary views of various construction activities are common in an urban setting. Therefore, cumulative impacts on aesthetics from the project alternatives would be less than significant.

Recreation

The presence of water-based construction equipment in the turning basins may necessitate localized areas of the channels be temporarily closed off from public waterway access. The only project in the study area that could involve concurrent in-water construction in close proximity to the proposed turning basin expansion areas requiring similar temporary closure of a portion of the waterway is the Oakland Waterfront Ballpark District at Howard Terminal. However, the Inner Harbor Channel and turning basin are wide enough that recreational boaters and San Francisco Bay Ferry boats would have ample room to traverse through the waterway around the construction activities. Recreational boaters in the Inner Harbor could also experience concurrent construction noise from both projects; however, these effects would be temporary as vessels transit through the area and would be like noise generated by existing industrial activities at the Port and nearby.

Cumulative impacts on recreationists from visual setting degradation would be as described above under Aesthetics. In addition, for action alternatives involving expansion of the Inner Harbor Turning Basin, recreationists at the City of Alameda's Estuary Park could experience temporary increases in noise and dust during construction activities. As noted above, construction for the Inner Harbor Turning Basin expansion could occur concurrently with construction of the Oakland Waterfront Ballpark District at Howard Terminal. Given that Estuary Park is surrounded by existing heavy industrial/maritime uses on the northwestern, northern, and northeastern sides, and by traffic on Mosley Avenue to the south, the construction sounds and level of noise in the vicinity of the park would be like these ambient sources. Standard best management practices to reduce dust during construction would be implemented for both projects so impacts related to dust would not be substantial. In addition, several other nearby parks are available for landside recreation use by recreationists should they be deterred from use of Estuary Park by these construction activities.

Based on the above considerations, cumulative impacts on recreation from the project alternatives would be less than significant.

Navigation and Transportation

Cumulative land use development plans and projects identified in the table above (e.g., 500 Kirkham Project, Alameda Point Project, etc.) would generally increase traffic, transit, bicycle, and pedestrian activity in the vicinity of the proposed turning basin expansion areas in Oakland and Alameda and may result in minor changes to circulation patterns (e.g., new or modified street alignments). Other cumulative projects would involve improvements to the transportation network (e.g., 7th Street East Grade Separation Project or the San Francisco Bay Trail Projects), may impact container operations and associated landside activities at the Seaport, or may affect vessel activity in the Inner and Outer Harbor waterways (e.g., Brooklyn Basin Marina Expansion Project, Encinal Terminals, etc.).

While the cumulative projects would generally effect permanent changes to navigation and transportation, the Oakland Harbor Turning Basins Widening project is intended to allow the Port to accommodate turning of larger container ships, with no change in overall projected freight volumes. As such, the effects of the project are primarily related to construction activities, with no landside operational effects and beneficial reductions in vessel operation inefficiencies. As discussed in more detail in Section 6.10, the effects of the action alternatives on land-based transportation would be less than significant and on waterway navigation would be less than significant (during construction) and beneficial (in the long-term). The cumulative projects, together with the project, would result in some changes to the overall transportation context, but would not result in substantial enough changes that would be likely to cause significant cumulative effects.

As discussed in Section 6.10, ADT levels on local roadways are below (and, in many cases, well below) capacity, and are expected to remain below capacity even with the cumulative projects. In addition, many of the larger cumulative projects with greater potential for transformative changes, such as the Oakland Waterfront Ballpark District at Howard Terminal, would include targeted transportation improvements and other project components specifically designed to offset potential impacts to transportation.

As shown in Table 52 in Section 6.10, the peak construction ADT for the Oakland Harbor Turning Basins Widening project would only represent an increase of approximately 1 to 18 percent over the existing ADT on local roadways and would represent even smaller contributions in a cumulative context when considering the effects of the other cumulative projects. Further, USACE would require the project construction contractor to develop a comprehensive construction traffic control plan that includes measures to minimize the effects of project-related construction traffic on overall circulation, including traffic, transit, bicycle, and pedestrian routes, safety, and emergency access. Similar measures would be undertaken by other construction projects (e.g., Oakland Waterfront Ballpark District at Howard Terminal) to lessen impacts of construction-related traffic as required by project environmental review and approvals.

The project's added traffic would also be reduced to zero upon completion of construction activities, which would take anywhere from approximately 8 months (for the Outer Harbor Turning Basin expansion, Alternative C) to approximately 2.5 years (for the Inner Harbor Turning Basin [Alternative B] and expansion of both the Inner and Outer Harbor Turning Basins [Sub-alternatives D-1 and D-2]).

Given these considerations, cumulative effects on navigation and transportation from the project alternatives would be less than significant.

Hazardous, Toxic and Radioactive Wastes

Construction activities for the action alternatives have the potential to expose the public, construction workers, and/or the environment to hazardous materials. Project construction activities would require the use, transport, and disposal of a hazardous materials (such as diesel fuel and lubricants for construction equipment) and wastes (such as demolition waste). As discussed in Section 6.11, the construction contractor would be required to develop an environmental protection plan including spill pollution control and countermeasure procedures, and appropriate HTRW storage, handling, and disposal processes. The contractor would also be required to keep onsite appropriate spill control equipment commensurate with the quantity and type of materials being generated by construction in case an accidental spill occurs.

Additionally, terrestrial soils on land adjacent to the Inner Harbor Turning Basin, as well as associated groundwater, have previously been found to contain HTRW. As discussed in Section 6.11, all ground-disturbing activities at Howard Terminal would occur in coordination with DTSC, as applicable, to ensure that adverse impacts associated with existing contamination would be avoided, and upland excavation throughout the proposed Inner Harbor Turning Basin expansion area would have a long-term benefit by removing contaminated soils at Howard Terminal and the Alameda site. Excavated material would be tested to identify an appropriate disposal site (e.g., Class I or II landfill) and all federal, state, and local regulations regarding the storage, handling, transport, and disposal of any excavated HTRW materials would be adhered to during construction.

The reasonably foreseeable projects listed in Table 75 may also result in similar releases or risks. However, these projects are required to follow federal, state, and local regulations governing the use of hazardous materials and would implement similar best management practices as the action alternatives. Cumulative projects involving releases of or encountering hazardous materials also would be required to remediate their respective sites to the established or site-specific regulatory standards which would ensure that the issue would be addressed at a project level and would not combine to create a cumulative construction impact. Therefore, there would be no cumulative adverse HTRW impacts from the project alternatives.

Contaminants in Dredge or Fill Material

As discussed in Section 6.12, sediments that would be dredged as part of implementation of any action alternative would be sampled and tested in the pre-construction engineering and design phase that follows completion of the USACE's study phase, but occurs prior to any construction activities, including dredging. The results would be reviewed by the DMMO to identify appropriate placement site options based on the characteristics of the sediment and criteria for each placement location. All handling and disposal of dredged sediments would occur in accordance with applicable permit conditions. If dredged sediments do not meet the criteria for placement as permitted beneficial reuse site, they would be hauled to a facility permitted for the receipt of such material (e.g., a landfill). Other projects in Table 75(e.g., Encinal Terminals, Brooklyn Basin Marina Expansion Project) that may involve dredging and disposal (placement) of dredged materials would be subject to the same DMMO review and approval process and would be required to handle and dispose of dredged sediments in accordance with applicable permit conditions. Therefore, considering the DMMO and other regulatory oversight applicable to dredged material management, there would be no cumulative adverse impacts related to contaminants in dredged material from the project alternatives.

Air Quality

The cumulative analysis for air quality considers cumulative regional air quality impacts associated with criteria air pollutants and is evaluated in context of the potential of the project to lead to regional violations of the ambient air quality standards.

The project, combined with cumulative development in Table 75 and citywide, would contribute to cumulative regional air quality impacts associated with criteria air pollutants. The cumulative geographic context for cumulative air quality impacts related to criteria air pollutants is the regional SFBAAB, which is considered a nonattainment area for federal ambient air quality standards for ozone and $PM_{2.5}$.[31]

Regional air pollution is largely a cumulative impact. Emissions from past, present, and reasonably foreseeable future projects in the region have or will contribute to adverse regional air quality impacts on a cumulative basis. A cumulative adverse impact exists as the SFBAAB is currently designated as nonattainment for federal ozone and $PM_{2.5}$ standards. No single project by itself would be sufficient in size to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative air quality conditions.

Established under Section 176(c) of the Clean Air Act, the General Conformity Rule, as codified in 40 C.F.R. Part 51 Subpart W and 40 C.F.R. Part 93 Subpart B, ensures that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state's plans to meet NAAQS. 40 C.F.R. 93 § 153 defines *de minimis* levels as the minimum threshold at or above which a conformity determination must be performed, for various criteria air pollutants in various areas. The *de minimis* levels vary based on the level of nonattainment for the respective pollutant. The USEPA considers project emissions below these *de minimis* levels to not interfere with a state's plans to meet the NAAQS through its State Implementation Plan. Therefore, if a project's criteria air pollutant emissions are below the project-level thresholds, the project would not result in a considerable contribution to cumulative regional air quality impacts.

As shown in Tables 7 and 8 of the General Conformity memo (included in Appendix A4), all project alternatives would generate criteria air pollutants, particularly VOC, NO_x and $PM_{2.5}$ below the applicable *de minimis* thresholds for the SFBAAB, and therefore would not be considered substantial enough to impede attainment of the NAAQS. Therefore, the contribution of all project alternatives to the cumulative regional air quality impact would also be considered less than significant.

As stated in Section 6.1, an HRA was conducted for the potential air concentrations stemming from the proposed alternatives and is included in Appendix A04b for informational purposes. The analysis presented in Section 6.1 notes, for informational purposes, that alternatives involving expansion of the Inner Harbor Turning Basin (i.e.,

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[31] On January 9, 2013, USEPA issued a final rule, determining that SFBAAB has attained the 24-hour $PM_{2.5}$ national standard. This rule suspends key State Implementation Plan requirements if monitoring data continue to show that SFBAAB attains the standard. Despite this USEPA action, SFBAAB will continue to be designated as "nonattainment" for the national 24-hour $PM_{2.5}$ standard until BAAQMD submits a "redesignation request" and a "maintenance plan" to USEPA, and USEPA approves the proposed redesignation.

alternatives B, D-1, and D-2) may result in localized areas immediately at and adjacent to the construction areas where excess liftime cancer risk and $PM_{2.5}$t concentrations that exceed local thresholds. As discussed in Sections 3.13 and 5.4, West Oakland has a high cumulative air pollution exposure burden, particularly to DPM, and background cancer risk values range from 55 to 2,492 in one million within 2,000 feet of the Inner Harbor Turning Basin (BAAQMD and WOEIP 2019c). Cancer risk and health impacts associated with TAC emissions from construction of the action alternatives would add to this cumulative exposure and related cancer risk and health impacts. Since there is no USEPA threshold for cumulative cancer risk and health impacts, this is noted for informational purposes.

Noise and Vibration

The geographic scope of analysis for cumulative noise and vibration construction impacts encompasses sensitive receptors within approximately 2,000 feet of the project sites.[32] Beyond 2,000 feet, the contributions of noise from other projects would be greatly attenuated through both distance and intervening structures and their contribution would be expected to be minimal. As noted in Section 3.15, the closest sensitive receptors to the Outer Harbor Turning Basin expansion area are approximately 5,000 feet away; therefore, the analysis of cumulative effects is focused on the Inner Harbor Turning Basin expansion area. Based on a list of reasonably foreseeable future projects in the vicinity of the Inner Harbor Turning Basin expansion area that could contribute to cumulative construction noise, one of these projects (Landing at Bay [37]) is currently under construction and anticipated to have completed the noisiest phases of construction33 before construction of any alternative authorized as a result of this study, and thus, would not cumulatively combine with project construction, which would begin in 2027. Of the remaining cumulative projects, six of them would be within the 1,000-foot geographic scope of analysis:

- Downtown Oakland Specific Plan
- West Oakland Specific Plan
- Oakland Waterfront Ballpark District at Howard Terminal
- Jack London Square Redevelopment Sites D, F2, and F3
- Alameda Housing Authority North Housing
- San Francisco Bay Trails Project

Individual projects developed under the Downtown Oakland Specific Plan, the West Oakland Specific Plan, or the Jack London Square Redevelopment are subject to the city of Oakland's Standard Conditions of Approval 61 through 65 and 69 addressing construction noise and vibration. The environmental documents for these plans found that subsequent development would not result in a significant cumulative noise and vibration impact during

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[32] This screening threshold distance was developed based on stationary source noise attenuation equations (Caltrans, 2013) and the combined noise level generated by pile driving for a given project (assuming impact pile driver and a crane) at 50 feet. Using the attenuation equations, the maximum noise level of 101 A-weighted decibels (dBA) would diminish to below 65 dBA, Leq at 2,000 feet which, hence, is used as the geographic scope.

[33] The earliest phases of a construction project, which may involve demolition, excavation, pile driving, and foundation work are generally associated with the highest noise levels. Later phases occurring once the building skin is in place are generally not a source of noise complaints.

construction with implementation of City’s Standard Conditions of Approval for construction noise and vibration.

Construction of the Alameda Housing Authority North Housing Project would comply with the City of Alameda’s limitations on construction hours and would, therefore, be consistent with the City’s noise ordinance which exempts construction noise during daytime hours.

The Oakland Waterfront Ballpark District at Howard Terminal would construct a mixed-use development and Ballpark immediately adjacent to the portion of Howard Terminal that would be demolished for the Inner Harbor Turning Basin expansion. The environmental documents for the Ballpark District project estimated a maximum noise level during pile driving activities of 86 dBA at the Phoenix Lofts, which is below the FTA’s daytime noise criteria for residential uses of 90 dBA. The project level-analysis for the Inner Harbor Turning Basin expansion estimates a noise level of 66 dBA. In the unlikely event that pile driving activities for both projects were to occur simultaneously, the cumulative noise level at the Phoenix Lofts would be 86.1 dBA which would still be below the FTA’s daytime noise criteria for residential uses of 90 dBA.

The San Francisco Bay Trails projects would result in minor construction activity to accommodate relatively short segments of trail extensions which would not be expected to contribute substantially to local noise levels in those areas.

With respect to construction-related vibration, vibration impact analysis is based on instantaneous PPV levels and worst-case ground borne vibration levels from construction are generally determined by whichever individual piece of equipment generates the highest vibration levels. Unlike the analysis for average noise levels, in which noise levels of multiple pieces of equipment can be combined to generate a maximum combined noise level, instantaneous PPV levels do not combine in this way. The vibration levels from construction of the proposed turning basins expansion would be well below the applicable 0.5 PPV thresholds. Vibration from construction of other cumulative projects, even if those projects are in close proximity and another structure would not combine to raise the maximum PPV because there would be sufficient distance as well a substantial unlikelihood of simultaneous vibration peaks from separate construction sites. For these reasons, the impact of construction vibration from construction of cumulative projects located near the proposed action would be highly localized and would not be anticipated to combine to further increase vibration levels.

The project level-analysis for the Oakland Harbor Turning Basins Widening found that there would not be a perceptible change in noise levels during vessel turning activities with wider turning basins. Therefore, once constructed, the Oakland Harbor Turning Basins Widening would not contribute meaningfully to any noise impacts of other cumulative development projects.

Based on the above considerations, cumulative impacts related to noise and vibration from the project alternatives would be less than significant.

Chapter 7: Coordination and Compliance with Environmental Requirements*

Applicability of and compliance with relevant environmental laws and EOs is described for the Proposed Action (Alternative D-2) in Table 76. Note that this does not encompass every law or regulation potentially applicable to the Proposed Action.

7.1 Environmental Compliance, EOs, and Permitting Requirements

Table 76. Environmental Compliance, EOs, and Permitting Requirements

STATUTE	STATUS OF COMPLIANCE
National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321 *et seq.*) Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 C.F.R. §§ 1500-1508) dated July 1986	This EA has been prepared in compliance with NEPA and CEQ regulations. An initial draft EA was released for public comment in December 2021. Subsequently the Recommended Plan was optimized based, in part, on public comments received, which resulted in features and effects that were not previously analyzed in the initial draft. A second re-released Draft EA that incorporated these additional components and their potential effects, as well as responded to comments received on the initial draft EA, was released in April 2023. All agency and public comments on the re-release draft EA have been considered and evaluated in this Final EA. If appropriate, a Finding of No Significant Impact (FONSI) will be signed with a conclusion of no significant impacts from this proposed action. An unsigned FONSI is provided in Appendix A11.
Clean Air Act, as amended (42 U.S.C. § 7401 *et seq.*)	An applicability analysis has been completed and the emissions were found to be below the applicable *de minimis* thresholds. Thus, a general conformity analysis and determination is not necessary. Therefore, this project is in compliance with the Clean Air Act.
Clean Water Act, as amended (33 U.S.C. § 1251 *et seq.*)	All dredged material will be placed at a permitted upland beneficial reuse site or landfill; no aquatic placement of dredged material is expected. The proposed plan would place rock fill and bulkhead support structures in waters of the United States. Alternatives involving the Inner Harbor Turning Basin expansion would remove existing fill and result in net expansion of open waters of the U.S. A 404(b)(1) analysis was prepared for this study and can be found in Appendix A3a. Coordination with the Regional Water Quality Control Board occurred as a part of this study. As allowed under USACE policy, a water quality certification for the project will be obtained after the

STATUTE	STATUS OF COMPLIANCE
	feasibility phase, in the pre-construction engineering and design phase (PED). However, the RWQCB has reviewed the IFR/EA and provided a response stating they have reviewed and concur to defer the 401 certification process to PED and can be found in Appendix A3b.
Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403)	Original construction of the federal navigation channels was authorized under the Rivers and Harbors Act and these proposed modifications remain consistent with the act. Therefore, this project is appropriately exempt from Section 10. See 33 C.F.R. § 322.3
EO 11990, Protection of Wetlands, (42 Fed. Reg. 26961, May 24 1977)	While the project occurs entirely within the waters of the United States, no impacts to wetland habitats or submerged aquatic vegetation (SAV) would occur as there are none present in the project area. The 404(b)(1) analysis can be found in Appendix A3a.
National Oceanic and Atmospheric Administration Federal Consistency Regulation (15 C.F.R. Part 930)	See CZMA
Coastal Zone Management Act of 1972 (16 U.S.C. § 1451 *et seq.*)	A Consistency Determination (CD) was prepared for the proposed action and concurrence was requested from BCDC. The CD is included in Appendix A5a. BCDC provided a Letter of Agreement (LOA) for the Phase I CD on December 27, 2023. This LOA is included in Appendix A5b. A Final Phase CD will be prepared and a final LOA requested during PED.
The McAteer-Petris Act (Cal Gov’t. Code § 66600 *et seq*.)	See CZMA
Endangered Species Act as amended (16 U.S.C. § 1531 *et seq*)	A Biological Assessment (BA) was prepared and was submitted to both NMFS and USFWS.USFWS issued a Letter of Concurrence (LOC) concurring with USACE’s determination the the proposed project may affect but is not likely to adversely affect the endangered California least tern and the longfin smelt, which is proposed for listing as endangered. NMFS similarly issued a LOC concurring with USACE’s determination that the proposed project is not likely to adversely affect salmonids, steelhead, green sturgeon or any critical habitat. The BA and resulting Letters of Concurrence are located in Appendix A1a.

STATUTE	STATUS OF COMPLIANCE
Fish and Wildlife Coordination Act (16 U.S.C. §§ 661-666c)	USACE has completed coordination with the USFWS per the FWCA. A Final CAR was released on Nov 3, 2023 is included in Appendix A2.
Magnuson-Stevens Fishery Conservation and Management Act - Fishery Conservation Amendments of 1996, (16 U.S.C. § 1801 *et seq.*) – Essential Fish Habitat (EFH)	An EFH assessment was prepared and can be found in Appendix A1b. NMFS completed an EFH consultationdated August 24, 2023 and concurred with the USACE determination that the proposed project may adversely affect EFH for various life stages of fish species managed under the Pacific Groundfish, Coastal Pelagic Species, and Pacific Coast Salmon EFH. No additional conservation measures beyond those proposed by USACE in the EFH Assessment were recommended by NMFS.
Migratory Bird Treaty Act (16 U.S.C. §§ 703-711)	The project area is highly industrialized and has very little habitat value for terrestrial birds. Negligable and localized impacts to aquatic bird feeding could occur from the turbidity resulting from dredging operations. No significant impacts to migratory birds are expected from the action alternatives.
Marine Mammal Protection Act (16 U.S.C. § 1361 *et seq.)*	The proposed plan includes measures to avoid noise impacts to marine mammals from aquatic pile driving and removal. An Incidental Harassment Authorization (IHA) permit is expected to be necessary. A project risk analysis has been prepared and coordinated with USACEHQ to defer obtaining the IHA to the PED phase due to the need for a higher-level of design detail to consult on the action under MMPA and the associated time restrictions associated with permit coverage. The project MMPA concurrence package will be included in the final Chief's report submittal. NMFS coordination is ongoing and would continue during PED.
National Marine Sanctuaries Act (16 U.S.C. § 1431 *et seq.*)	The proposed action would not take place in or near a national marine sanctuary.
Marine Protection Research and Sanctuaries Act of 1972 (33 U.S.C. § 1401 *et seq*)	The proposed plan will not involve aquatic or ocean disposal. If aquatic or ocean placement were to become necesscary, additional NEPA and environmental compliance would be undertaken, as applicable. All dredged material transport would be compliant with this act with respect to spillage, leakage and BMPs employed.
National Historic Preservation Act (16 U.S.C. § 470 and 36	Consultation with the SHPO under Section 106 was initiated in April 2022. USACE has determined that the

STATUTE	STATUS OF COMPLIANCE
C.F.R. Part 800): Protection of Historic Properties EO 11593: Protection and Enhancement of the Cultural Environment (36 Fed. Reg. 8921, May 13, 1971) Archaeological and Historic Preservation Act of 1974, (16 U.S.C. § 469 *et seq.*)	Proposed Action would not adversely affect any historical and cultural resources as none occur within the proposed action area. The SHPO requested additional information regarding identification of historic properties prior to responding regarding USACE's determination. That information was provided and the SHPO's response concurring with USACE's assessment is in Appendix A9. See Above See Above
Abandoned Shipwreck Act of 1987 (43 U.S.C. § 2101 *et seq.*)	None occur in the proposed action areas.
Submerged Lands Act (Pub. L. 82-3167; 43 U.S.C. § 1301 *et seq.*)	Because the proposed action would expand the turning basins which are part of the federal navigation project, the proposed action is being exercised in accordance with federal navigational servitude and a lease from the State Lands Commission is not required.
EO 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629; February 16, 1994)	The proposed plan identified environmental justice communities and addressed the health and environmental impacts on low-income and minority populations, including tribal populations, within the project area. USACE has determined that no significant impacts would disproportionately impact low income or minority populations as result of the proposed action. A Health Risk Assessment is included in Appendix A04b.
EO 14008: Executive Order on Tackling the Climate Crisis at Home and Abroad	The proposed action utilizes electric dredges to minimize the potential health and environmental impacts to communities near the project area. The use of an electric dredge in lieu of a diesel dredge also reduces noise impacts and impacts to air quality and greenhouse gas emissions. See sections 6.14 and 6.15 of the report. The Health Risk Assessment is included in Appendix A04b.

7.2 Public Involvement

The study team has endeavored to meaningfully engage with the public and stakeholders, as well as resource agencies and tribes at key points in the study to solicit input on the IFR/EA. The team ensured an open pathway for communication with the public and stakeholders through the USACE project website, which includes relevant information for the study, public participation meeting schedules and recordings, and other resources such as a "Frequently Asked Questions" document and a narrated Powerpoint Presentation[34].

The study team held interagency coordination team meetings (January 2021, May 2021, August 2021, June 2022) and resource agency and tribal working group meetings (October 2020, May 2021, August 2021, September 2022) throughout the study phase as new relevant information became available to gain valuable input and feedback on the study process, especially for environmental justice coordination Table 80 lists agencies and entities that were contacted for input on the study through the working group meetings. Additionally, USACE and the Port held community stakeholder engagement meetings in August 2021, January 2022, February 2023, May 2023, June 2023, October 2023, and November 2023

7.2.1 Agency Coordination

Pursuant to 40 C.F.R. § 1501.6, USACE requested the involvement of the following federal agencies as cooperating agencies in the NEPA process for the Oakland Harbor Study: Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), and United States Fish and Wildlife Service (USFWS). The USACE also requested the involvement of the following non-federal agencies as participating agencies: California Department of Fish and Wildlife, California State Historic Preservation Office (SHPO), California State Lands Commission, City of Oakland, San Francisco Bay Conservation and Development Commission (BCDC), and the San Francisco Bay Regional Water Quality Control Board (SFRWQCB). The USACE additionally requested the involvement of the following tribes as participating tribal entities: Indian Canyon Mutsun Band of Costanoan, Amah Mutsun Tribal Band, Esselen Tribe of Monterey County, and Ohlone Indian Tribe. A tribal consultation log is included in Appendix A06d.

The EPA, NMFS, and USFWS provided responses accepting the USACE's request to serve as cooperating agencies. The SHPO provided a response stating they would engage in the study through the Section 106 process but could not serve as a participating agency under NEPA and BCDC provided a response stating they would engage in the NEPA process, but their review of the project would be governed by the Coastal Zone Management Act and its implementing regulations. No other responses were received.

The USACE and Port of Oakland held resource agency working group meetings throughout the course of the study process to date to engage and obtain input from those invited as cooperating or participating entities, as well as additional agency stakeholders such as the Bay Area Air Quality Management District, Department of Toxic Substances Control

[34] https://www.spn.usace.army.mil/Missions/Projects-and-Programs/Current-Projects/Oakland-Harbor-Turning-Basins-Widening/

(DTSC), California Department of Fish and Wildlife, and the United States Coast Guard. These meetings were held October 2020, May 2021, August 2021, and September 2022.

7.2.2 Tribal Consultation

The USACE and the Port consulted with the following eleven tribes to identify the cultural values, religious beliefs, traditional practices, and the concerns or interests of Bay Area Tribes, which could be affected by the project:

- Amah Mutsun Tribal Band of Mission San Juan Bautista
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- Costanoan Rumsen Carmel Tribe
- Ohlone/ Costanoan Indian Tribe
- The Confederated Villages of Lisjan
- North Valley Yokuts Tribe
- Indian Canyon Mutsun Band of Costanoan
- Amah Mutsun Tribal Band of Costanoan
- Esselen Tribe of Monterey County
- Ohlone Indian Tribe
- Wuksache Indian Tribe/Eshom Valley Band

USACE and the Port initiated consultation efforts with the Indian Canyon Mutsun Band of Costoan Native American community on September 16, 2020 requesting participation in public agency meetings to discuss the project (Appendix A6). These meetings, conducted virtually due to the COVID-19 pandemic, were held in October 2020, May 2021, August 2021, and September 2022, all being attended by Cultural Representatives of Indian Canyon Mutsun Band of Costanoan Ohlone People.

In July 2021, a list of Native American contacts as well as results of a Sacred Lands File (SLF) review for the study area were obtained from the Native American Heritage Commission (NAHC). 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. In September 2021, a second letter was sent out by USACE and the Port to all of the groups identified in the July 2021 response from the NAHC, and requested 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 A6). One response was received from cultural representatives of the Indian Canyon Band of Costanoan Ohlone People expressing interest in consulting regarding the study area. The USACE has continued to consult on the study area and proposed action with the Indian Canyon Band of Costanoan Ohlone People during the preparation of this Integrated Report.

7.2.3 List of Statement Recipients

The IFR/EA will be posted to the USACE project website and will be provided to the Port of Oakland. The IFR/EA will also be sent directly to the agencies and tribes, listed in Sections 7.2.1 and 7.2.2.

7.2.4 Public Comments Received and Responses

The study team held community stakeholder engagement meetings on August 23, 2021, and January 12, 2022. The primary concerns expressed were regarding traffic and air quality impacts. Additionally, two neighborhood councils, the Prescott Neighborhood Council and the Lowell-Acorn Neighborhood Council invited the USACE and the Port to provide a briefing of the Oakland Harbor Turning Basins Study on March 10, 2022, and April 7, 2022, respectively. Both virtual meetings were facilitated by their neighborhood council presidents, and the USACE was allotted sufficient time to answer residents' questions.

An in-person meeting, with an option for virtual attendance, was held at the West Oakland Senior Center on the evening of February 15, 2023. Community Stakeholders were invited via email and were provided with a short video highlighting the status of the study, announcing the upcoming rerelease of the Draft IFR/EA. The USACE and the Port received input and answered questions from community members and stakeholders. A post re-release public meeting was held in May 2023. The Port held additional meetings with the community as part of the CEQA process. In-person meetings were held October 25, 2023 and November 14, 2023. Virtual meetings were held November 06, 2023 and November 07, 2023.

Public comments ranged in inquiries related to future growth of the Port, CEQA/NEPA synchronization, environmental justice and air quality concerns, and the potential project effects to water quality and marine mammals. The responses to the public comments can be found in Appendix A10.

Chapter 8: Plan Implementation

8.1 Institutional Requirements

The implementation of the Recommended Plan is subject to cost sharing and other applicable requirements of federal laws, regulations, and policies. Federal implementation of the project for commercial navigation includes, but is not limited to, the following items of local cooperation to be undertaken by the non-Federal sponsor in accordance with applicable federal laws, regulations, and policies:

a. Provide the non-Federal share of construction costs, as further specified below:
    1) Provide, during design, 25% of the costs of design for the general navigation features of the project in accordance with the terms of the design agreement for the project;
    2) Provide, during construction, 25% of the costs of the general navigation facilities allocated to that portion of the project with an authorized channel depth in excess of 25 feet;
    3) Provide during construction, 35% of the incremental cost of the beneficial use placement above the least cost method of placement.

b. Provide all real property interests, including those required for relocations and dredged material placement facilities, acquire or compel the removal of obstructions, and perform or ensure the performance of all relocations, including utility relocations, as determined by the Federal government to be necessary for the construction, operation, and maintenance of the general navigation features;

c. For each relocation of a utility, or portion thereof, located in or under navigable waters of the United States that is required to accommodate a channel depth over 45 feet, pay to the owner of the utility at least one half of the owner's relocation costs, unless the owner voluntarily agrees to waive all or a portion of the non-Federal sponsor's contribution;

d. Pay, with interest over a period not to exceed 30 years following completion of construction of the general navigation features, an additional amount equal to 10 percent of the construction costs of the general navigation features less the amount of credit afforded by the Federal government for the value of the real property interests and relocations, including utility relocations, provided by the non-Federal sponsor for the general navigation features, except for the value of the real property interests and relocations provided for mitigation, which is included in the construction costs of the general navigation features;

e. For general navigation features in excess of 50 feet (MLLW), pay 50 percent of the excess cost of operation and maintenance of the project, which includes operation and maintenance of dredged material placement facilities, over that cost which the Federal government would have incurred for operation and maintenance of the project if the channel had a depth of 50 feet;

f. Ensure that the local service facilities are constructed, operated, and maintained at no cost to the Federal government, and that all applicable licenses and permits necessary for construction, operation, and maintenance of such work are obtained;

g. Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon the real property interests that the non-Federal sponsor owns or controls for the purpose of operating and maintaining the project;

h. Hold and save the Federal government free from all damages arising from design, construction, operation and maintenance of the project, except for damages due to the fault or negligence of the Federal government or its contractors;

i. Perform, or ensure performance of, any investigations for hazardous, toxic, and radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601-9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal government determines to be necessary for construction, operation and maintenance of the general navigation features;

j. Agree, as between the Federal government and the non-Federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal government;

k. Perform the non-Federal sponsor's responsibilities in a manner that will not cause HTRW liability to arise under applicable law to the maximum extent practicable; and

l. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. §§ 4630 and 4655) and the Uniform Regulations contained in 49 C.F.R Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

8.2 Real Estate Requirements

U.S. Army Corps of Engineers projects require that the non-federal sponsor provide the lands, easements, rights-of-way and relocations necessary for a project[35]. The Recommended Plan has lands, easements, rights-of-way cost of $61,980,000 and facility/utility relocation costs of $1,705,600, for a total of $63,685,600. These costs will be

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[35] Any conclusion or categorization that an item is a utility or facility relocation to be performed by the non-federal sponsor as part of its lands, easements, rights-of-way, and relocations responsibilities is preliminary only. USACE will make a final determination of the relocations necessary for the construction, operation or maintenance of the project after further analysis and completion and approval of a Final Attorney's Opinion of Compensability for each of the impacted utilities and facilities.

borne by the Port of Oakland who will serve as the non-federal sponsor for construction of this project.

There may be modifications to the plan that occur during Pre-construction, Engineering and Design (PED) phase, thus changing the final acquisition area(s), administrative, and land costs.

The project is located at the Port of Oakland, on the eastern side of the San Francisco Bay in the counties of Alameda and San Francisco, California. It includes the Entrance Channel – Oakland Bar, the Outer Harbor Channel and its Outer Harbor Turning Basin, the Inner Harbor Channel, and its Inner Harbor Turning Basin.

A Feasibility Cost Sharing Agreement was executed on July 1, 2020, with the Port of Oakland as the non-federal sponsor. The Oakland Harbor Study is cost shared 50% federal and 50% non-federal. The non-Federal sponsors will acquire the minimum interests in real estate to support the construction and subsequent operation and maintenance of the future USACE project.

Navigation Servitude per Article I, Section 8 (Commerce Clause) will be applied in this project for the dredging of the Federal channel in the Inner and Outer Harbors where the City of Alameda owns submerged lands. It will further apply in the turning basin where private parties own a portion of the submerged lands.

The non-Federal sponsors must comply with the Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970, as amended, 42 U.S.C. § 4601 *et seq.* (Pub. L. 91-646, "the Uniform Act") and provide relocation assistance to qualifying residences and businesses within the project area that are displaced, as defined in the Uniform Act, because of USACE project implementation. Possible displacements will be required for the Recommended Plan.

8.3 Implementation Schedule

For Preconstruction Engineering and Design and construction to be initiated, the USACE must sign a Design Agreement with a non-federal sponsor. After Preconstruction Engineering and Design is complete, the USACE must sign a Project Partnership Agreement with a non-federal sponsor for construction to begin.

This project would require congressional authorization for Preconstruction Engineering and Design and construction. The Preconstruction Engineering and Design and construction phases are cost shared 75% federal and 25% non-federal[36]. Implementation would then occur, provided that sufficient funds are appropriated to design and construct the project.

The schedule in Table 77 was estimated for study analysis purposes and is dependent on congressional authorization, federal and non-federal budgeted funding, and agreement executions.

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[36] Memorandum, Modification of non-federal contribution in Design Agreement (2013) https://planning.erdc.dren.mil/toolbox/library/MemosandLetters/2013May-DA.pdf

Table 77. Recommended Plan Implementation Schedule

TASK	DATE
Chief of Engineers Report Signed	May 2024
Design Agreement	April 2025
Pre-Construction Engineering & Design	January 2025 – January 2027
Project Partnership Agreement Execution	March 2027
Real Estate Acquisition	April 2025 – March 2027
Construction	June 2027 – November 2029

8.4 Cost Sharing and Non-Federal Partner Responsibilities

Cost sharing for the Recommended Plan will be done in accordance with Section 1111 of the Water Resources Development Act of 2016, as amended, and cost shared as a general navigation feature. The cost share is based on the recommended improvements being at 50 feet MLLW. Projects with authorized channel depths exceeding 25 feet are cost shared 25% non-federal and 75% federal. The Port of Oakland will provide all lands, easements, rights-of-way, and relocations. Disposal necessary for the project is cost-shared as a general navigation feature. Local service facilities and aids to navigation are not anticipated.

An additional 10% of the total costs of general navigation features would typically be repaid by the non-federal sponsor over a period not to exceed 30-years. The sponsor's costs for lands, easements, rights-of-way, and relocations [37], are credited against the additional cash contribution. The current estimates LERRD costs exceed 10% of the cost of the general navigation features, therefore it is not anticipated, based on current cost estimates, that the non-federal sponsor will be required to pay the additional 10%. The cost share for the incremental cost of the Beneficial Use Plan above the Base Plan (least cost disposal option) is shared 65% federal and 35% non-federal (WRDA 1986, as amended, Section 103). The cost to place the 454,000 cubic yards of material at a beneficial use site, above the cost of the least cost placement option of SFDODS, would be cost shared in compliance with Section 204(d) of WRDA 1992 at 35% non-federal and 65% federal.

Consistent with current Port of Oakland practice, the turning basins are anticipated to be maintained by dredging every year. It is estimated that implementation of the Recommended Plan would require an additional 93,000 cy of material to be removed every year as regular operation and maintenance of the turning basins.

Since the cost share for electric dredges was not approved, but the team identified Alternative D-2 (rather than Alternative D-1) as the Recommended Plan, the cost for electric dredges will be at 100% non-federal cost.

[37] Any conclusion or categorization that an item is a utility or facility relocation to be performed by the non-federal sponsor as part of its lands, easements, rights-of-way, and relocations responsibilities is preliminary only. USACE will make a final determination of the relocations necessary for the construction, operation or maintenance of the project after further analysis and completion and approval of a Final Attorney's Opinion of Compensability for each of the impacted utilities and facilities.

Table 78. Approximate Cost Sharing – Recommended Plan

DESCRIPTION	TOTAL	FEDERAL	NON-FEDERAL
General Navigation Features (-50FT MLLW)			
0 – 50 feet MLLW (25% non-federal)	$475,335,000	$356,501,250	$118,833,750
Subtotal GNF	$475,335,000	$356,501,250	$118,833,750
Beneficial Use Increment (35% non-federal)	$2,980,000	$1,937,000	$1,043,000
Lands, Easements, Rights of Ways, Relocations (LERRD) (100% non-federal)	$63,496,000	$0	$63,496,000
Project Cost Apportionment	$541,811,000	$358,438,250	$183,372,750
Aids to Navigation	$0	$0	$0
Local Service Facilities	$0	$0	$0
Final Apportionment of Costs	**$541,811,000**	**$358,438,250**	**$183,372,750**
Electric Dredging (100% non-federal)	$16,616,040		$16,616,040
Final Apportionment of Costs with Electric Dredging Betterment	**$558,427,040**	**$358,438,250**	**$199,988,790**
Costs associated with disposal of HTRW material are at 100% non-federal expense. Non-Federal Sponsor shall pay an additional 10 percent of construction costs, less any credit afforded by the Government for the real property interests and relocations, over a period not to exceed 30 years.			

8.5 Views of the Non-Federal Sponsor and Other Agencies*

As summarized in section 7.2, the study team engaged with the public, agencies, and stakeholders throughout the study process and will continue coordination through the design process. During the planning process we received feedback from various agencies regarding the proposed alternatives and Recommended Plan. Stakeholders with business operations within the study area expressed strong support for the Recommended Plan. Neighboring community stakeholders and Non-government organizations provided comments during our public meetings and comment periods expressing concern primarily over impacts to resources such as air quality, environmental justice, water quality, wildlife, and HTRW, as well as perceptions that the action alternatives would induce commodity throughput growth or changes and increased truck traffic. Input received on the initially released draft report allowed for refinement and improved alignment of the turning basins and refinement of effect analyses and avoidance and minimization measures. Comments received on the first released IFR/EA were responded to in the re-released draft IFR/EA. Comments received on the re-released draft IFR/EA have been addressed in this Final IFR/EA (Appendix A10)

Table 79 lists agencies and entities that were contacted for input on the study through the working group meetings. The non-federal sponsor is supportive of the Recommended Plan.

Table 79. Agencies and Entities Contacted During the Study Phase

AB Trucking	Oakland Athletics
Alameda Chamber of Commerce	Oakland Black Cowboy Association
Alameda County	Oakland Latino Chamber of Commerce
Alba Wheels Up	OCA Easy Bay – Asian Pacific American Advocates
Amah Mutsun Tribal Band	Ohlone Indian Tribe
Associated Right of Way Services, Inc.	ONE
Bay Area Air Quality Management District	Pacific Merchant Shipping Association
Bay Planning Coalition	Pacific Trailer Repair Services
Bay Ship & Yacht Co.	Port Transfer Inc.
BergDavis Public Affairs	Prescott Neighborhood Council
Berkeley Architectural Heritage Association	Quick Pick Express, Inc.
Board of Port Commissioners	Ramboll
California Department of Fish and Wildlife	San Francisco Bay Conservation and Development Commission
California Department of Toxic Substance Control	San Francisco Bay Regional Water Quality Control Board
California Engineering Contractors	Schnitzer Steel
CalTrans Bay Area	Sierra Club
Central Valley Agricultural Grinding	SSA Terminals
City of Oakland	State Historic and Preservation Office
Envirocom	State Lands Commission
Esselen Tribe of Monterey County	Swire Property Group
FlexiVan Leasing, LLC	Tower Lofts Homeowners Association
Harbor Trucking Association	Trina Marie Ruano Family
Holy Names University	U.S. Coast Guard
Indian Canyon Mutsun Band of Costanoan	U.S. Environmental Protection Agency
International Longshore and Warehouse Union	U.S. Fish and Wildlife Service
International Maritime Center	Upline Solutions LLC
Kealy Connections	Wan Hai Lines Ltd.
Marine Exchange of San Francisco Bay Region	West Oakland Commerce Association
Mott MacDonald Engineers	West Oakland Environmental Indicators Project
Muwekma Ohlone Indian Tribe of San Francisco Bay Area	Wyse Logistics
National Marine Fisheries Service	

Chapter 9: Recommendation

In making the following recommendations, I have given consideration to all significant aspects in the overall public interest, including environmental, social and economic effects, engineering feasibility and compatibility of the project with the policies, desires and capabilities of the Port of Oakland, the State of California, and other non-federal interests.

I recommend that the Recommended Plan for navigation improvements in the Oakland Harbor be authorized for construction as a federal project, subject to such modifications as may be prescribed by the Chief of Engineers. The Recommended Plan is fully detailed in this Integrated Feasibility Report and Environmental Assessment. The Recommended Plan consists of widening the Outer Harbor and Inner Harbor turning basins to be able to accommodate the larger containership vessels and the beneficial use of eligible dredged material. Additionally, the Port of Oakland has indicated their desire to have electric dredges used for construction of the project, which will decrease air-pollutant emissions released into communities already disproportionately affected by air pollutant emissions. The Port is willing to pay for, as a betterment, 100% of the additional costs associated with using electric dredges. It is estimated the Recommended Plan would cost $541,811,000 and provide $28,003,000 in annual net benefits. The cost of beneficial use would be $2,980,000 and the benefits of beneficial use would be reasonable, based on current USACE guidance. The non-federal sponsor would be responsible for $199,988,790 including $63,496,000 in lands, easements, rights-of-way, and relocation.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of highest review levels within the Executive Branch. Consequently, the recommendations may be modified (by the Chief of Engineers) before they are transmitted to Congress as proposals for authorization and implementing funding. However, prior to transmittal to Congress, the partner, the State, interested federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

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SHANTEL K. GLASS
MAJ, EN
Acting Commander

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