Initial Study/Mitigated Negative Declaration Alameda Main Street Ferry Terminal Refurbishment Project

NOVEMBER 2022

Prepared for:

SAN FRANCISCO BAY AREA WATER EMERGENCY TRANSPORTATION AUTHORITY

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ACC	Advance Clean Cars Standards
AFV	alternative fuel vehicles
AMP	Alameda Municipal Power
AMS	Alameda Main Street
ATCM	Airborne toxic control measure
BAAQMD	Bay Area Air Quality Management District
BACT	Best Achievable Control Technology requirements
Basin Plan	San Francisco Bay Basin Plan
BCDC	San Francisco Bay Conservation and Development Commission
BMP	best management practice(s)
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy standards
CalGreen	Section 5.106 of the California Building Code
Cal/OSHA	California Occupational Safety and Health Administration
CARB	California Air Resources Board
CalEEMod	California Emissions Estimator Model
CBC	California Building Code
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CDC	California Department of Conservation
CEC	California Energy Commission
CGS	California Geological Survey
City	City of Alameda
CNEL	Community noise equivalent level
CNRA	California Natural Resources Agency
COx	Oxides of carbon
CPT	Cone penetration test
CWA	Clean Water Act
DMG	Division of Mines and Geology
DPS	Distinct Population Segment
DTSC	Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
EISA	Energy Independence and Security Action of 2017
EOP	Emergency operations plan
EPA	U.S. Environmental Protection Agency
ESU	Evolutionarily Significant Unit
FHSZ	Fire Hazard Severity Zone
FR	Federal Register

Acronym/Abbreviation	Definition
HR	Hydrologic Region
I-(580, 880, etc.)	Interstate
IS/MND	Initial Study/Mitigated Negative Declaration
LCFS	Low Carbon Fuel Standards
LEV	Low emission vehicles
LRA	Local Responsibility Area
MFR	Materials Recovery Facility
MT	Metric ton
MWWTP	EBMUD Main Wastewater Treatment Plant
NAAQS	National Ambient Air quality Standards
NHTSA	National Highway Traffic Safety Administration
NMFS	National Marine Fisheries Service
NO _x	Oxides of Nitrogen
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
03	Ozone
PM _x	Particulate matter (2.5 [fine] to 10 [coarse] microns)
PRC	Public Resource Code
project	Alameda Main Street Ferry Terminal Refurbishment Project
RFS	Renewable fuels
ROG	Reactive organic gases
RWQCB	regional water quality control board
SB X	State Bill
SFFBAAB	San Francisco Bay Area Air Basin
SO ₂	Sulfur dioxide
SWRCB	State Water Resources Control Board
TAC	Toxic air contaminants
USFWS	United States Fish and Wildlife Service
VHFHSZ	Very high hazard severity zone
WETA	San Francisco Bay Area Water Emergency Transportation Authority
ZEV	Zero emission vehicles

1 Introduction

This Initial Study/Proposed Mitigated Negative Declaration (IS/MND) evaluates potential environmental effects resulting from the Alameda Main Street (AMS) Ferry Terminal Refurbishment Project (project). Chapter 2, "Project Description" presents the detailed project information.

1.2 California Environmental Quality Act Compliance

This document has been prepared in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) and the State CEQA Guidelines (California Code of Regulations Section 15000 et seq.). An initial study is prepared by a lead agency to determine if a project may have a significant effect on the environment (State CEQA Guidelines Section 15063[a]), and thus to determine the appropriate environmental document. In accordance with State CEQA Guidelines Section 15070, a "public agency shall prepare...a proposed negative declaration or mitigated negative declaration...when: (a) The Initial Study shows that there is no substantial evidence...that the project may have a significant impact on the environment, or (b) The Initial Study identifies potentially significant effects but revisions to the project plans or proposal are agreed to by the applicant and such revisions would reduce potentially significant effects to a less-than-significant level." In this circumstance, the lead agency prepares a written statement describing its reasons for concluding that the project would not have a significant effect on the environment and, therefore, does not require the preparation of an Environmental Impact Report (EIR). By contrast, an EIR is required when the project may have a significant environmental impact that cannot clearly be reduced to a less-than-significant effect by adoption of mitigation or by revisions in the project design.

As described in the environmental checklist (Chapter 3), the project would not result in any unmitigated significant environmental impacts. Therefore, an IS/MND is the appropriate document for compliance with the requirements of CEQA. This IS/MND conforms to these requirements and to the content requirements of State CEQA Guidelines Section 15071.

1.3 Lead Agency

Under CEQA, the lead agency is the public agency with primary responsibility over approval of the project. The Water Emergency Transportation Authority (WETA) is the CEQA lead agency because it is responsible for discretionary approval of the project.

1.4 Public Review Process

The purpose of this document is to present to decision-makers and the public information about the environmental consequences of implementing the project. This disclosure document is being made available to the public for review and comment. This IS/MND will be available for a 30-day public review period from November 30th, 2022 to December 30th, 2022.

The IS/MND is available for download and review at:

https://weta.sanfranciscobayferry.com/current-projects

Supporting documentation referenced in this document is available upon request from WETA.

Comments on the IS/MND should be addressed to:

San Francisco Bay Area Water Emergency Transportation Authority Pier 9, Suite III, The Embarcadero San Francisco, California 94111 Contact: Chad Mason Email: <u>mason@watertransit.org</u>

If you have questions regarding the IS/MND, please call Chad Mason at: (415) 364-1745. If you wish to send written comments (including via e-mail), they must be postmarked by December 30th, 2022 at 5:00 PM. After comments are received from the public and reviewing agencies, WETA may (1) adopt the MND and approve the project; (2) undertake additional environmental studies; or (3) abandon the project. If the project is approved and funded, the project proponent may proceed with the project.

1.5 Summary of Potential Impacts

Chapter 3 of this document contains the analysis and discussion of potential environmental impacts of the project. Based on the issues evaluated in that chapter, it was determined that the project would have either no impact or a less-than-significant impact related to most of the issue areas identified in the Environmental Checklist, included as Appendix G of the State CEQA Guidelines.

These include the following issue areas:

- Aesthetics
- Agriculture and Forest Resources
- Energy
- Geology/Soils
- Greenhouse Gas Emissions and Climate Change
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use/Planning
- Mineral Resources
- Noise
- Population/Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities/Service Systems; and,
- Wildfire Hazard.

Potentially significant impacts were identified for air quality, biological resources, cultural resources, and tribal cultural resources; however, mitigation measures included in this IS/MND would reduce all impacts to a less-than-significant level.

1.6 Environmental Permits

As CEQA lead agency for the project, WETA will be responsible for adopting the MND and approving the project. Additionally, the following responsible agencies may have jurisdiction over elements of the project.

- California Department of Fish and Wildlife (CDFW)
- U.S. Army Corps of Engineers (USACE)
- National Marine Fisheries Service (NMFS)
- San Francisco Bay Regional Water Quality Control Board (RWQCB)
- San Francisco Bay Conservation and Development Commission (BCDC)

1.7 Document Organization

This IS/MND is organized as follows:

Chapter 1: Introduction. This chapter provides an introduction to the environmental review process. It describes the purpose and organization of this document and presents a summary of findings.

Chapter 2: Project Description. This chapter describes the purpose of and need for the proposed project, identifies project objectives, and provides a detailed description of the project.

Chapter 3: Initial Study Checklist. This chapter presents an analysis of a range of environmental issues identified in the CEQA Environmental Checklist and determines if project actions would result in no impact, a less-thansignificant impact, a less-than-significant impact with mitigation incorporated, or a potentially significant impact. If any impacts were determined to be potentially significant, an EIR would be required. For this project, however, none of the impacts were determined to be significant after implementation of mitigation measures.

Chapter 4: References. This chapter lists the references used in preparation of this IS/MND.

Chapter 5: List of Preparers. This chapter identifies report preparers.

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2 Project Description

2.1 Project Location

The project is in the City of Alameda (City) in Alameda County, California. The City occupies approximately 10.6 square miles of land area immediately south of the City of Oakland and the Oakland-Alameda Estuary, east of the City of San Francisco, and north and east of the San Francisco Bay. Alameda Island makes up approximately 80 percent of the City's land area, with the remainder on Bay Farm Island across the San Leandro Channel (See Figure 1). Regional access to the City is provided by a variety of transportation modes. Interstate 880 (I-880) through Oakland—the nearest freeway to the project site—provides regional access for automobiles and transit. Regional traffic accesses the project site via State Route 61 (SR 61) through the Webster-Posey Tubes, the Park Street Bridge, the Miller Sweeney Bridge, and the High Street Bridge connecting the island of Alameda and the City of Oakland.

The project site is located at 2990 Main Street (Assessor Parcel Numbers 74-890-1-17, 74-1368-13-1, 74-1368-1, and 999-9999-999) and includes the existing AMS Ferry Terminal, which consists of a trestle, steel float structure, aluminum gangway, and bridge structure (See Figure 2). The site is designated under the General and Maritime Industry land use and zoned as General Industrial (M-2). Much of the project site is within the Oakland Inner Harbor, with a portion of the bridge structure extending onto the landside of the City. The project site is accessible by vehicle via Main Street and by ferry within the harbor. The project is within a developed area of the City and is bounded by the Oakland Inner Harbor to the north, industrial uses to the east, the San Francisco Bay Trail, AMS Ferry Terminal parking lot, and residential uses to the south, as well as the Main Street Dog Park and undeveloped uses to the east.

2.2 Project Purpose

To address structure aging, deterioration, and stabilization issues (i.e., compliance with current seismic safety requirements) associated with existing AMS Ferry Terminal components, WETA has identified the need to refurbish several portions of the terminal.

2.3 Project Elements

Project elements would include replacement of the existing bridge walkway and foundation, and replacement of the gangway, float, guide piles, and upgrades to utilities at the project site. All project features would be compliant with Americans with Disabilities Act (ADA) standards. These details rely on project plans (included as Appendix A) and are further described, below.

Terminal Bridge and Foundation Replacement. Project activities would involve demolishment of existing bridge/walkway and bridge foundation and replacement with a new aluminum truss bridge. Onshore and landside support would be installed and would consist of a 48-inch (in) monopile and two 24-in pipe piles with cap beams, respectively.

Gangway Replacement. The project would include removal of the existing 60-foot gangway and replacement with an 80-foot covered aluminum gangway.

Float Demolition/Replacement. The existing terminal float would be removed and replaced-in-kind with a new steel float. Ramps that had been previously installed on the float would be removed, protected in place, and reused once

the new float is installed. Float ramps would be shifted to the west to provide additional room for a longer gangway. The four (4) existing 30-foot guide piles would be removed and replaced with four (4) new 36-in guide piles. To achieve a more safe, efficient berthing capacity and enable ingress and egress in a timely manner, float demolition/replacement activities would also involve installation of two (2) new 36-in steel pipe piles and two (2) 72-in donut fender piles.

Utility Upgrades. Utility upgrades associated with the project would involve replacement of existing razor equipment, installation of electrical service for replacement lighting, ramp controls, and outlets and a new potable water line. The new potable water line will connect to an existing line at the Ferry Terminal restroom facility. The new line will be used for intermittent terminal cleaning activities as needed. No other utility improvements are planned. The bridge, gangway, and float structures are designed to accommodate additional conduit related to an electric shorepower system that is to be constructed in the future as part of a separate project. The shorepower system will allow for charging of electric ferry vessels that will berth at AMS Ferry Terminal.

Overall, the footprint of the project site is expected to increase the AMS Ferry Terminal shade area by approximately 830 square feet. No changes in operational demand (i.e., an increase in ferry users) are anticipated, and no physical impacts beyond the project boundaries (see Figure 2) are anticipated as part of the project. Vehicular and pedestrian access to the AMS Ferry Terminal is not anticipated to change.

The water depth at the project site varies between 14-in to 28-in mean lower low water (MLLW). Most construction activities will occur above or at the waterline. The only elements that will extend below the mudline are the new piles that will have a maximum tip elevation of approximately 110-in MLLW.

2.4 Construction

Construction of the project is expected to occur over a period of approximately 4-6 weeks, beginning in Summer 2023 with an anticipated completion date of late Summer/Fall 2023. It is estimated that project construction would require 4-8 daily construction crew members, with the possibility for up to 15 onsite construction workers during major operations (e.g., concrete pours).

The following construction equipment is anticipated to be used during construction of the project:

- One (1) Derrick crane barge,
- One (1) skiff,
- One (1) support tug,
- One (1) support barge,
- One (1) vibratory hammer,
- One (1) impact hammer,
- One (1) delivery truck,
- One (1) concrete truck,
- One (1) pump truck
- Construction personnel trucks (approximately 3-6); and,
- One generator (1)/one (1) compressor.

Where feasible and available, diesel construction equipment would be powered by Tier 3 or Tier 4 engines as designated by the California Air Resources Board (CARB) and U.S. Environmental Protection Agency. In addition, if available for on-site delivery, diesel construction equipment would be powered with renewable diesel fuel that is compliant with California's Low Carbon Fuel Standards and certified as renewable by the CARB executive officer.

The project would require Bay fill removal (existing piles) and placement for installation of steel pipe piles for the new float and donut fenders, and bridge support. It is estimated that approximately 162 square feet (sf) of existing piles would be removed, and approximately 240 sf of steel pipe piles, fender piles, and bridge support piles would be installed. A total of 78 sf net fill of pilings (total piling installed minus pilings removed) would be installed. Once the new AMS Ferry Terminal is operational, no dredging would be required to accommodate vessels associated with the project.

Most project components would be fabricated off-site and transferred to the project site via barge. Debris generated during construction and site clearing activities would consist of the existing steel float, steel guide piles, gangway, bridge structure, bridge structure steel support system (H-Pile and steel beams), concrete approach slab, and miscellaneous electrical/mechanical conduit attached to the existing elements to be removed. In accordance with Section 5.408 of the CALGreen Code, the project would implement a Construction Waste Management Plan (CWMP) for recycling and/or salvaging for reuse of a minimum of 65 percent of nonhazardous construction/demolition debris. Solid waste collected throughout the City is hauled to the Davis Street Transfer Station in the City of San Leandro, where it is loaded into higher-capacity trailer trucks and hauled to Altamont Landfill in eastern Alameda County. Recyclable materials, which are collected from residential and commercial customers in separate bins, are hauled to ACI's Aladdin Materials Recovery Facility (MRF) and Transfer Facility in the City of San Leandro, which sorts, separates, and bundles the recyclables for sale to secondary markets (City of Alameda 2021a). Materials removed from the project site would be removed via a support barge in the Oakland Inner Harbor.

Consistent with Section 4-10.7 of the Alameda Municipal Code, noise-generating construction activities would be limited to occur between 7:00 a.m. and 7:00 p.m. Monday through Friday and 8:00 a.m. and 5:00 p.m. on Saturdays. It is anticipated that project construction would occur Monday through Friday, 7:00 a.m. to 3:30 p.m., with the potential for Saturday and Sunday work. In the event that weekend construction activities would be required, WETA would coordinate with the City of Alameda to obtain necessary permits/approvals.

Project construction staging would occur within the AMS Ferry Terminal parking lot. Before construction activities begin on any project component, signage would be posted surrounding the project site notifying the public of temporary parking lot closure. No street closures are anticipated. Because the project would be limited to the project site and construction/staging activities would not impede into the local roadways, a traffic control plan would not be implemented. The San Francisco Bay Trail, which traverses east-west through the AMS Ferry Terminal and project site, would remain open for pedestrian access with the potential for brief interruptions during certain construction activities, such as concrete installation for the new bridge structure landside cap beam. Access and use of the San Francisco Bay Trail would return to its original condition upon project completion.

2.5 Anticipated Permits and Approvals

WETA is the CEQA lead agency for this project and has sole authority to consider and approve the project and adopt the IS/MND. Table 2-1 lists agencies that may be required to issue permits or approve certain aspects of the project. This IS/MND is expected to be used to satisfy CEQA requirements of the listed responsible and/or trustee agencies.

Table 2-1. Responsible Agencies and Anticipated Permits and Approvals

Agency	Permit Approval
Water Emergency Transportation Agency (WETA)	CEQA Lead Agency and responsible for project approval/environmental document certification
City of Alameda	Encroachment Permit Structural Permit Building Permit Potential City approval for weekend construction activities
San Francisco Bay Conservation and Development Commission (BCDC)	Permit application/approval
California Department of Fish and Wildlife (CDFW)	Incidental Take Permit
U.S. Army Corps of Engineers (USACE)	Consultation/concurrence with Biological Assessment Permit and Authorization under the Clean Water Act Section 404 and Section 10 of the 1899 Rivers and Harbors Act
National Marine Fisheries Service (NMFS)	Incidental Harassment Authorization (IHA)
San Francisco Bay Regional Water Quality Control Board (RWQCB)	Section 401 Water Quality Certification through a Notice of Applicability under Order No. R2 2018, 0009 Waste Discharge Requirements for Maintenance of Overwater Structures

Data compiled by Dudek in 2022.

3 Initial Study Checklist

1. Project title: Alameda Main Street Ferry Terminal Refurbishment Project

2. Lead agency name and address:

San Francisco Bay Area Water Emergency Transportation Authority Pier 9, Suite III, The Embarcadero San Francisco, California 94111

3. Contact person and phone number:

Chad Mason, Project Manager/Senior Planner 415.364.1745

4. Project location:

2990 Main Street Alameda, California 94501

5. Project sponsor's name and address:

(See #2, Lead agency name and address, above)

6. General plan designation:

The project site's land use designation is General and Maritime Industry in the Alameda 2040 General Plan.

7. Zoning:

The project site is zoned as General Industrial (M-2).

8. Description of project:

Project elements include replacement of the existing bridge walkway and foundation; replacement of the gangway, float, guide piles, and upgrades to utilities at the project site. Additional details are provided in Chapter 2, "Project Description."

9. Surrounding land uses and setting:

The project site is located within an urban area of the City of Alameda. Surrounding uses include the Oakland Inner Harbor to the north; industrial uses to the east (including a full-service ship repair company immediately adjacent to the site); the San Francisco Bay Trail and Main Street Dog Park to the west; and the AMS Ferry Terminal parking lot, and residential uses to the south.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement): California Department of Fish and Wildlife, U.S. Army Corps of Engineers, National Marine Fisheries Service, San Francisco Regional Water Quality Control Board, San Francisco Bay Conservation and Development Commission (BCDC), and City of Alameda.

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

The Confederated Villages of Lisjan Nation responded on August 18, 2022, requesting a copy of the Native American Heritage Commission (NAHC) response. WETA provided the Confederated Villages of Lisjan Nation with the NAHC response letter on August 25, 2022. Since August 25th, no further coordination has occurred.

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages.

	Aesthetics		Agriculture and Forestry Resources	\boxtimes	Air Quality
\boxtimes	Biological Resources	\bowtie	Cultural Resources		Energy
	Geology and Soils		Greenhouse Gas Emissions		Hazards and Hazardous Materials
	Hydrology and Water Quality		Land Use and Planning		Mineral Resources
	Noise		Population and Housing		Public Services
	Recreation		Transportation	\boxtimes	Tribal Cultural Resources
	Utilities and Service Systems		Wildfire	\boxtimes	Mandatory Findings of Significance

Determination (To be completed by the Lead Agency)

On the basis of this initial evaluation:

- I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Min

Signature

<u>11/30/22</u> Date

Evaluation of Environmental Impacts

- 1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
- 2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
- 3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an Environmental Impact Report (EIR) is required.
- 4. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).
- 5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:
 - a. Earlier Analysis Used. Identify and state where they are available for review.
 - b. Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
 - c. Mitigation Measures. For effects that are "Less Than Significant With Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
- 6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
- 7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
- 8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.
- 9. The explanation of each issue should identify:
 - a. The significance criteria or threshold, if any, used to evaluate each question; and
 - b. The mitigation measure identified, if any, to reduce the impact to less than significance

3.1 Aesthetics

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
١.	AESTHETICS – Except as provided in Public Re	esources Code S	Section 21099, wo	ould the project	
a)	Have a substantial adverse effect on a scenic vista?			\boxtimes	
b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				
C)	In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?				
d)	Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				

Regulatory Framework

Shoreline Space Public Access Design Guidelines

The San Francisco Bay Conservation and Development Commission (BCDC) is charged with maintaining public access, including visual public access (views to the San Francisco Bay [Bay] from other public spaces) within its jurisdiction. The BCDC developed public access objectives in the Shoreline Space Public Access Design Guidelines to provide, maintain and enhance visual access and visual quality to the Bay and shoreline by locating buildings, structures, parking lots and landscaping of new shoreline projects such that they enhance and dramatize views of the Bay and the shoreline from public thoroughfares and other public spaces, organizing shoreline development to allow Bay views and access between buildings (SFBCDC 2005).

Per these guidelines, the design character of public access areas should relate to the scale and intensity of the proposed development. Objectives related to visual access and visual quality may be accomplished by providing visual interest and architectural variety in massing and height in new buildings along the shoreline and/or using forms, materials, colors and textures that are compatible with the Bay and adjacent development.

Environmental Setting

The project site is developed with the existing Alameda Main Street (AMS) Ferry Terminal, which consists of a trestle, steel float structure, aluminum gangway, and bridge structure. As described in section 2.1, "Project Location and Setting", the project site is located on the northern portion of Alameda island, along the Oakland Inner Harbor shoreline, and extends within the harbor. The landside of the project site consists of various rocks, rip-rap, and dirt/sand.

The visual character of the project area includes undeveloped/open space, industrial uses, urban development, as well as residential uses. Structures surrounding the project site are one to two stories in height. Other built features include fencing, power lines, roads, designated parking lots, and pedestrian sidewalks. Though the site and its surroundings are developed, due to its location along the Oakland Inner Harbor, the project site offers unique vantage points of the Bay, including short- and long-distance scenic views towards the City of Oakland to the north, and towards the City of San Francisco to the west.

There are no designated or eligible scenic highways in the City of Alameda (City of Alameda 2021a). The nearest designated state scenic highway is Interstate 580 (I-580), located approximately 2.75 miles northeast of the project site (Caltrans 2018). Existing lighting within the project site includes terminal structure and security lighting. Overhead streetlights are also located within the AMS Ferry Terminal parking lot, directly south of the project site.

a) Would the project have a substantial adverse effect on a scenic vista?

Less-than-Significant Impact. A scenic vista is generally defined as a distant public view along or through an opening or corridor that is recognized and valued for its scenic quality, or a natural or cultural resource that is indigenous to the area. The project site is located in within the City of Alameda, along the shoreline of the Oakland Inner Harbor and extending into the harbor. As previously described, due to the site's location, unique vantage points of the Bay are available. Project construction activities would occur over a period of 4-6 weeks and would involve removal and replacement of existing terminal structures, as well as upgrades to terminal utilities. Once operational, the project site would be visually similar to existing AMS Ferry Terminal operations. The installation of replacement and new terminal features (i.e., donut fenders) would not impede or block short- or long- distance views available to or from the project site. Therefore, construction and operation of the project would not impede or adversely affect a scenic vista. Impacts would be less than significant, and no mitigation would be required.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. There are no scenic highways within the City of Alameda. The nearest designated scenic highway, I-580, is located approximately 2.75 miles northeast of the project site (Caltrans 2018). Furthermore, intervening development including the Oakland Inner Harbor, I-880, I-980, and a portion of the City of Oakland are located between the I-580 and the project site, obscuring long-range views. As such, project construction and operation would not be readily visible from I-580 and therefore would not degrade or damage existing scenic resources along the interstate. There would be no impact, and no mitigation would be required.

c) In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less-than-Significant Impact. The project is located in an urban area of the City of Alameda and is surrounded by both developed and open space uses. Project construction activities would involve ground disturbance associated with new and replacement terminal structures, including the terminal bridge, bridge foundation, gangway, and terminal float. Once operational, the project site would be visually similar to existing conditions. The project site is surrounded by developed uses and project construction activities would not substantially degrade the existing visual character of the project area. Impacts would be less than significant and no mitigation is required.

d) Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less-than-Significant Impact. Lighting is already present within the project site and surrounding area and consists of terminal and overhead parking lot light sources. Project implementation would include upgrades to the existing terminal and replacement of several terminal structures. Construction activities would be limited to daytime hours, between 7:00 a.m. and 7:00 p.m., Monday through Friday, and between 8:00 a.m. and 5:00 p.m. on Saturdays. Lighting for construction activities is not anticipated. No new lighting is proposed as part of the project, and once operational, lighting at the project site would be restored or replaced to pre-project conditions. Impacts would be less than significant, and no mitigation is required.

3.2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
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II. AGRICULTURE AND FORESTRY RESOURCES – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

((N	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?		
,	Conflict with existing zoning for agricultural use, or a Williamson Act contract?		\boxtimes

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
C)	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				
d)	Result in the loss of forest land or conversion of forest land to non-forest use?				
e)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				

Regulatory Framework

No plans, policies, regulations, or laws related to agricultural and forestry resources are applicable to the project.

Environmental Setting

The project site is zoned as General Industrial (M-2). No surrounding sites or properties are zoned or used for agricultural uses (City of Alameda 2019).

The project site and surrounding area is identified as Urban and Built-Up Land by the California Department of Conservation's (CDC's) Farmland Mapping and Monitoring Program. Urban and Built-Up Land includes residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatments, and water control structures (CDC 2018). The City of Alameda was not identified as a reporting jurisdiction for Williamson Act contracts in 2021 (CDC 2022). There is no forest land or land zoned as forest land within the City of Alameda (Alameda 2021a).

a-e) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use; conflict with existing zoning for agricultural use, or a Williamson Act contract; conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)); result in the loss of forest land or conversion of forest land to non-forest use; or involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. The project site does not contain any lands designated as Important Farmland (i.e., Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) or zoned as forest land or a timberland area. There are no active agricultural operations within or near the project site, and there is no Williamson Act contract associated with the project site. No existing agricultural or timber-harvest uses are located on or near the project site. There would be no impact, and no mitigation is required.

3.3 Air Quality

Potentially Impact With Less Than Significant Mitigation Significant Impact Incorporated Impact No
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III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:

a)	Conflict with or obstruct implementation of the applicable air quality plan?		\boxtimes	
b)	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?			
c)	Expose sensitive receptors to substantial pollutant concentrations?		\boxtimes	
d)	Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?		\boxtimes	

Regulatory Framework

Criteria air pollutants are defined as pollutants for which the federal and state governments have established ambient air quality standards, or criteria, for outdoor concentrations to protect public health. The federal and state standards have been set, with an adequate margin of safety, at levels above which concentrations could be harmful to human health and welfare. These standards are designed to protect the most sensitive persons from illness or discomfort. Pollutants of concern include ozone (O_3) , nitrogen dioxide (NO_2) , carbon monoxide (CO), sulfur dioxide (SO_2) ,

particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), and lead. In California, sulfates, vinyl chloride, hydrogen sulfide, and visibility-reducing particles are also regulated as criteria air pollutants.

A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure, or acute and/or chronic noncancer health effects. A toxic substance released into the air is considered a toxic air contaminant (TAC). TACs are identified by federal and state agencies based on a review of available scientific evidence. Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources, such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources, such as automobiles; and area sources, such as landfills. Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and noncarcinogenic effects. Noncarcinogenic effects typically affect one or more target organ systems and may be experienced on either short-term (acute) or long-term (chronic) exposure to a given TAC.

Federal

The federal Clean Air Act, passed in 1970 and last amended in 1990, forms the basis for the national air pollution control effort. The U.S. Environmental Protection Agency (EPA) is responsible for implementing most aspects of the Clean Air Act, including setting National Ambient Air Quality Standards (NAAQS) for major air pollutants; setting hazardous air pollutant (HAP) standards; approving state attainment plans; setting motor vehicle emission standards; issuing stationary source emission standards and permits; and establishing acid rain control measures, stratospheric O₃ protection measures, and enforcement provisions. Under the Clean Air Act, NAAQS are established for the following criteria pollutants: O₃, CO, NO₂, SO₂, PM₁₀, PM_{2.5}, and lead.

State

The federal Clean Air Act delegates the regulation of air pollution control and the enforcement of the NAAQS to the states. In California, the task of air quality management and regulation has been legislatively granted to the California Air Resources Board (CARB), with subsidiary responsibilities assigned to air quality management districts and air pollution control districts at the regional and county levels. CARB, which became part of the California Environmental Protection Agency in 1991, is responsible for ensuring implementation of the California Clean Air Act of 1988, responding to the federal Clean Air Act, and regulating emissions from motor vehicles and consumer products.

CARB has established California Ambient Air Quality Standards (CAAQS), which are generally more restrictive than the NAAQS. The CAAQS describe adverse conditions; that is, pollution levels must be below these standards before a basin can attain the standard. Air quality is considered "in attainment" if pollutant levels are continuously below the CAAQS and violate the standards no more than once each year. The CAAQS for O₃, CO, SO₂ (1-hour and 24 hour), NO₂, PM₁₀, and PM_{2.5} and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded.

Local

While the Bay Area Air Quality Management District (BAAQMD) has initiated an update to their CEQA Air Quality Guidelines, the timeline for their release is unknown. Therefore, the BAAQMD CEQA Air Quality Guidelines (BAAQMD 2017a) remain as the applicable guidelines for the project and include significance thresholds for use in CEQA analyses. These BAAQMD significance thresholds are summarized in Table 3.3-1. The BAAQMD notes that these

thresholds are intended to maintain ambient air quality concentrations of these criteria air pollutants below state and federal standards and to prevent a cumulatively considerable contribution to regional nonattainment with ambient air quality standards. The TAC thresholds (cancer and noncancer risks) and local CO thresholds address localized impacts. These criteria air pollutant and TAC thresholds are supported by substantial evidence presented in the BAAQMD's Revised Draft Options and Justification Report (BAAQMD 2009).

	Construction Thresholds	Operational Thresholds			
Pollutant	Average Daily Emissions (Ibs/day)	Average Daily Emissions (lbs/day)	Maximum Annual Emissions (tons/year)		
ROG	54	54	10		
NO _x	54	54	10		
PM10	82 (exhaust)	82	15		
PM _{2.5}	54 (exhaust)	54	10		
$PM_{10}/PM_{2.5}$ (fugitive dust)	Best Management Practices	None			
Local CO	None	9.0 ppm (8-hour average, 20.0 ppm (1-hour average)			
Risks and Hazards (Individual Project)	Compliance with Qualified Community Risk Reduction Plan or Increased cancer risk of >10.0 in a million Increased noncancer risk of >1.0 Hazard Index (Chronic or Acute) Ambient PM _{2.5} increase >0.3 μg/m ³ annual average Zone of Influence: 1,000-foot radius from property line of source or receptor				
Risks and Hazards (Cumulative)	or Cancer risk of >100 in a mi Noncancer risk of >10.0 Ha Ambient PM _{2.5} >0.8 µg/m ³	e with Qualified Community Risk Reduction Plan <pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre>			
Accidental Release of Acutely Hazardous Air Pollutants	None	Storage or use of acutely hazardous material located near receptors or new receptors located near stored or used acutely hazardous materials considered significant			
Odors	None	Five confirmed complaints to BAAQMD per year averaged over 3 years			

Table 3.3-1. Air Quality - Thresholds of Significance

Source: BAAQMD 2017a

Notes: lbs/day = pounds per day; tons/year = tons per year; ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter; ROG = reactive organic gases; NO_x = oxides of nitrogen; PM₁₀ = particulate matter with an aerodynamic resistance diameter of 10 micrometers or less; PM_{2.5} = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less; CO = carbon monoxide

Environmental Setting

The project site is located within the boundaries of the San Francisco Bay Area Air Basin (SFBAAB) and is under the jurisdiction of the BAAQMD. The SFBAAB encompasses all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, and the southern portions of Solano and Sonoma Counties. Air pollutants are emitted by a variety of sources, including mobile sources (vehicles), off-road equipment, marine sources, area sources (hearths, consumer product use, architectural coatings, and landscape maintenance equipment), energy sources (natural gas), and stationary sources (generator or other stationary equipment).

Air quality is a function of the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features that influence pollutant movement and dispersal. Atmospheric conditions such as wind speed, wind direction, atmospheric stability, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants, and consequently affect air quality. The climate of the SFBAAB is determined largely by a high-pressure system that is usually present over the eastern Pacific Ocean off the west coast of North America. During winter, the Pacific high-pressure system shifts southward, allowing more storms to pass through the region. During summer and early fall, when few storms pass through the region, emissions generated within the Bay Area can combine with abundant sunshine under the restraining influences of topography and subsidence inversions to create conditions that are conducive to the formation of photochemical pollutants, such as O₃, and secondary particulates, such as nitrates and sulfates. In the SFBAAB, temperature inversions can often occur during the summer and winter months. An inversion is a layer of warmer air over a layer of cooler air that traps and concentrates pollutants near the ground. As such, the highest air pollutant concentrations in the SFBAAB generally occur during inversions (BAAQMD 2017a).

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?

Less-than-Significant Impact. An area is designated as "in attainment" when it is in compliance with the federal and/or state standards. These standards are set by the EPA or CARB for the maximum level of a given air pollutant that can exist in the outdoor air without unacceptable effects on human health or public welfare with a margin of safety. The SFBAAB is designated non-attainment for the federal 8-hour O₃ and 24-hour PM_{2.5} standards. The area is in attainment or unclassified for all other federal standards. The area is designated non-attainment for state standards for 1-hour and 8-hour O₃, 24-hour PM₁₀, annual PM₁₀, and annual PM_{2.5}.

On April 19, 2017, the BAAQMD adopted the Spare the Air: Cool the Climate Final 2017 Clean Air Plan (BAAQMD 2017b). The 2017 Clean Air Plan provides a regional strategy to protect public health and protect the climate. To protect public health, the 2017 Clean Air Plan includes all feasible measures to reduce emissions of O₃ precursors (ROG and NO_x) and reduce O₃ transport to neighboring air basins. In addition, the 2017 Clean Air Plan builds upon the BAAQMD efforts to reduce fine particulate matter (PM) and TACs. To protect the climate, the plan defines a vision for transitioning the region to a post-carbon economy needed to achieve ambitious greenhouse gas (GHG) reduction targets for 2030 and 2050, and provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG reduction targets.

The BAAQMD Guidelines identify a three-step methodology for determining a project's consistency with the current Clean Air Plan. If the responses to these three questions can be concluded in the affirmative and those conclusions are supported by substantial evidence, then the BAAQMD considers the project to be consistent with air quality plans prepared for the Bay Area.

The first question to be assessed in this methodology is "does the project support the goals of the Air Quality Plan"? The BAAQMD-recommended measure for determining project support for these goals is consistency with BAAQMD thresholds of significance. If a project would not result in significant and unavoidable air quality impacts, after the application of all feasible mitigation measures, the project would be consistent with the goals of the 2017 Clean Air Plan. As indicated in the following discussion with regard to air quality impact questions b) and c), the project would result in less-than-significant construction and operational emissions and would not result in long-term adverse air quality impacts. Therefore, the project would be considered to support the primary goals of the 2017 Clean Air Plan and is consistent with the current Clean Air Plan.

The second question to be assessed in this consistency methodology is "does the project include applicable control measures from the Clean Air Plan?" The 2017 Clean Air Plan contains 85 control measures aimed at reducing air pollution in the Bay Area. Projects that incorporate all feasible air quality plan control measures are considered consistent with the Clean Air Plan. The project includes the refurbishment of the AMS Ferry Terminal, including replacement of the terminal bridge and foundation, gangway replacement, float demolition and replacement, and utility upgrades. No operational changes would occur with the project. The control strategies of the 2017 Clean Air Plan include measures in the categories of stationary sources, the transportation sector, the buildings sector, the energy sector, the agriculture sector, natural and working lands, the waste sector, the water sector, and super-GHG pollutant measures. Depending on the control measure, the tools for implementation include leveraging the BAAQMD rules and permitting authority, regional coordination and funding, working with local governments to facilitate best policies in building codes, outreach and education, and advocacy strategies. The project would comply with all applicable BAAOMD rules and would incorporate any applicable energy efficiency and green building measures as required by the City of Alameda and in compliance with state standards and/or local building codes in effect at the time of development. Therefore, the project would include applicable control measures from the 2017 Clean Air Plan.

The third question to be assessed in this consistency methodology is "does the project disrupt or hinder implementation of any control measures from the Clean Air Plan?" Examples of how a project may cause the disruption or delay of control measures include a project that precludes an extension of a transit line or bike path or proposes excessive parking beyond parking requirements. The project would not create any barriers or impediments to planned or future improvements to transit or bicycle facilities in the area, nor would it include excessive parking. Therefore, the project would not hinder implementation of 2017 Clean Air Plan control measures.

In summary, the responses to all three of the questions with regard to Clean Air Plan consistency are affirmative and the project would not conflict with or obstruct implementation of the 2017 Clean Air Plan. Impacts would be less than significant, and no mitigation is required.

b) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Less-than-Significant Impact with Mitigation Incorporated. The California Emissions Estimator Model (CalEEMod) Version 2020.4.0 was used to estimate emissions from construction of the project. CalEEMod is a statewide computer model developed in cooperation with air districts throughout the state to quantify criteria air pollutant and GHG emissions associated with the construction and operational activities from a

variety of land use projects, such as residential, recreational, commercial, and industrial facilities. CalEEMod input parameters, including the proposed construction schedule and equipment were based on information provided by the applicant, or default model assumptions if project specifics were unavailable. In addition, the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Harborcraft, Dredge, and Barge Emission Factor Calculator (2017) was used to estimate emissions associated with the support tugboat and small skiff usage during construction.¹

Construction

Demolition and subsequent construction would likely begin in Summer 2023 and take a total of 30 days to complete. Sources of emissions would include: off-road construction equipment exhaust (i.e., pile driver, a crane on the derrick barge, and small compressors and generators for handheld tools), on-road vehicles exhaust and entrained road dust (i.e., concrete/ material delivery trucks and worker vehicles), and marine vessels. Detailed assumptions associated with project construction are included in Appendix B.

Average daily emissions were computed by dividing the total construction emissions by the number of active construction days, which were then compared to the BAAQMD construction thresholds of significance. Table 3.3-2 shows average daily construction emissions of O_3 precursors (ROG and NO_x), PM_{10} exhaust, and $PM_{2.5}$ exhaust during project construction.²

	ROG	NOx	PM ₁₀ Exhaust	PM _{2.5} Exhaust	
Source	Pounds per Day ^a				
Unmitigated					
Off-road Equipment and On-road Vehicles	1.84	15.97	0.75	0.73	
Marine Vessels	3.16	39.41	1.78	1.58	
Total Daily Average	5.00	55.38	2.52	2.31	
BAAQMD Construction Thresholds	54	54	82	54	
Exceed Threshold?	No	Yes	No	No	
Mitigated ^b					
Off-road Equipment and On-road Vehicles	1.46	11.30	0.54	0.54	
Marine Vessels	3.16	39.41	1.78	1.58	
Total Daily Average	4.62	50.71	2.32	2.13	
BAAQMD Construction Thresholds	54	54	82	54	
Exceed Threshold?	No	No	No	No	

Table 3.3-2. Average Daily Construction Emissions

Source: Appendix B

Note: ROG = reactive organic gases; Nox = oxides of nitrogen; PM_{10} = coarse particulate matter; $PM_{2.5}$ = fine particulate matter

^a The values shown are average daily emissions based on total overall tons of construction emissions, converted to pounds, and divided by 30 active work days.

^b The mitigated scenario accounts for implementation of Mitigation Measure 3.3-1.

¹ The BAAQMD does not have a harbor craft emissions calculator; therefore, the SMAQMD calculator was used.

² Fuel combustion during construction and operations would also result in the generation of sulfur dioxide (SO₂) and CO. These values are included in Appendix B. However, since the SFBAAB is in attainment of these pollutants, the BAAQMD has not established a quantitative mass-significance threshold for comparison and are not included in the project-generated emissions tables in this document. Notably, the BAAQMD does have screening criteria for operational localized CO, which are discussed in more detail below.

As shown in Table 3.3-2, unmitigated construction of the project would potentially exceed the average daily BAAQMD significance threshold for NO_x. However, implementation of Mitigation Measure 3.3-1, which requires Tier 4 Final engines for equipment greater than 200 horsepower, would reduce average daily NO_x emissions to below the BAAQMD threshold. Further, although the BAAQMD does not have a quantitative significance threshold for fugitive dust, the BAAQMD's CEQA Guidelines recommend that projects determine the significance for fugitive dust through application of best management practices (BMPs). However, no grading for the project is anticipated. Based on the preceding considerations, criteria air pollutant emissions during construction would be less than significant after mitigation.

Operations

The project would not result in a change in operations, and operations are anticipated to resume upon completion of project construction. Therefore, there would be no net increase in emissions.

Health Effects of Criteria Air Pollutants

ROG and NO_x are precursors to O_3 , for which the SFBAAB is designated as nonattainment with respect to the NAAQS and CAAQS. The health effects associated with O₃ are generally associated with reduced lung function. The contribution of ROG and NO_x to regional ambient O_3 concentrations is the result of complex photochemistry. The increases in O₃ concentrations in the SFBAAB due to O₃ precursor emissions tend to be found downwind from the source location to allow time for the photochemical reactions to occur. However, the potential for exacerbating excessive O_3 concentrations would also depend on the time of year that the ROG emissions would occur because exceedances of the O₃ CAAQS/NAAQS tend to occur between April and October when solar radiation is highest. The holistic effect of a single project's emissions of O₃ precursors is speculative due to the lack of quantitative methods to assess this impact. Thus, a project's ROG and NO_x emissions are evaluated in the context of the BAAQMD significance thresholds, which define the levels of emissions that can occur without causing or contributing to violations of the NAAQS or CAAQS. In turn, the NAAQS and CAAQS define the pollutant concentrations above which adverse health effects are expected to occur. Nonetheless, because ROG and NO_x emissions associated with Project construction would be potentially significant before mitigation, the project could minimally contribute to regional O₃ concentrations and the associated health effects. However, this impact would be reduced to a less than significant level after implementation of 3.3-1. Regarding operations, the project would not result in a change to existing conditions or increased emissions.

Health effects that result from NO₂ include respiratory irritation, which could be experienced by nearby receptors during the periods of heaviest use of off-road construction equipment. However, construction of the project is not anticipated to contribute to exceedances of the NAAQS or CAAQS for NO₂ because the SFBAAB is designated as in attainment of the NAAQS and CAAQS for NO₂, and the existing NO₂ concentrations in the area are well below the NAAQS and CAAQS standards.

CO tends to be a localized impact associated with congested intersections. In terms of adverse health effects, CO competes with oxygen, often replacing it in the blood, thereby reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can include dizziness, fatigue, and impairment of

central nervous system functions. Regarding localized CO concentrations, according to the BAAQMD thresholds, a project would result in a less-than-significant impact if the following screening criteria are met:

- 1. The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.
- 2. The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- 3. The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

The project would generate minimal traffic during short-term construction and would comply with the BAAQMD screening criteria. Accordingly, project-related traffic would not exceed CO standards and therefore, no further analysis was conducted for CO impacts. This CO emissions impact would be considered less than significant on a project-level and cumulative basis. Thus, the project's CO emissions would not contribute to the health effects associated with this pollutant.

As depicted in Table 3.3-2, construction of the project would not exceed thresholds for PM_{10} or $PM_{2.5}$, and thus, would not contribute to exceedances of the NAAQS and CAAQS for particulate matter or obstruct the SFBAAB from coming into attainment for these pollutants. Additionally, grading is not anticipated to be required for the project. Due to the minimal contribution of particulate matter during construction, the project is not anticipated to result in health effects associated with PM_{10} or $PM_{2.5}$.

Mitigation Measure 3.3-1: Construction Equipment Emission Reductions

Prior to the commencement of construction activities for the project, the applicant shall require its construction contractor to demonstrate that all 200-horsepower or greater diesel-powered equipment is powered with CARB-certified Tier 4 Final engines.

An exemption from this requirement may be granted if (1) the applicant documents equipment with Tier 4 Final engines greater than 200-horsepower are not reasonably available, and (2) the required corresponding reductions in criteria air pollutant emissions can be achieved for the project from other combinations of construction equipment. Before an exemption may be granted, the Applicant's construction contractor shall: (1) demonstrate that at least two construction fleet owners/operators in Alameda County were contacted and that those owners/operators confirmed Tier 4 Final equipment could not be located within Alameda County during the desired construction schedule; and (2) the proposed replacement equipment has been evaluated using the California Emissions Estimator Model (CalEEMod) or other industry standard emission estimation method and documentation provided to the Lead Agency to confirm that necessary project-generated emissions reductions are achieved.

c) Would the project expose sensitive receptors to substantial pollutant concentrations?

Less-than-Significant Impact. Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Children, pregnant women, older adults, and people with existing health problems are especially vulnerable to the effects of air pollution. Accordingly,

land uses where sensitive-receptor population groups are likely to be located at hospitals, medical clinics, schools, playgrounds, childcare centers, residences, and retirement homes (BAAQMD 2017a). The nearest sensitive receptors to the project are the single-family residences across Main Street (approximately 500 feet to the south).

TACs are defined as substances that may cause or contribute to an increase in deaths or in serious illness, or that may pose a present or potential hazard to human health. Health effects from carcinogenic air toxics are usually described in terms of cancer risk. BAAQMD recommends an incremental cancer risk threshold of 10 in 1 million. "Incremental cancer risk" is the net increased likelihood that a person continuously exposed to concentrations of TACs resulting from a project over a 9-, 30-, and 70-year exposure period will contract cancer based on the use of standard California Office of Environmental Health Hazard Assessment risk-assessment methodology (OEHHA 2015). In addition, some TACs have non-carcinogenic effects. BAAQMD recommends a Hazard Index of 1 or more for acute (short-term) and chronic (long-term) non-carcinogenic effects.³ The TAC that would potentially be emitted during construction activities associated with the project would be diesel particulate matter.

Diesel particulate matter emissions would be emitted from heavy equipment operations, marine vessels, and heavy-duty trucks. Heavy-duty construction equipment is subject to a CARB Airborne Toxic Control Measure (ATCM) for diesel construction equipment to reduce diesel particulate emissions. CARB has also established an ATCM for auxiliary diesel engines and diesel-electric engines operated on ocean-going vessels within California waters. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 30-year exposure period for the maximally exposed individual resident; however, such assessments should be limited to the period and duration of activities associated with the project. The duration of the proposed construction period for the project would be up to 30 days, after which construction-related TAC emissions would cease. In addition, implementation of Mitigation Measure- 3.3-1 would reduce diesel exhaust. Due to the short period of exposure and minimal particulate emissions generated, TACs emitted during construction would not be expected to result in concentrations causing significant health risks. Impacts would be less than significant, and no mitigation is required.

d) Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less-than-Significant Impact. The occurrence and severity of potential odor impacts depends on numerous factors. The nature, frequency, and intensity of the source; the wind speeds and direction; and the sensitivity of receiving location each contribute to the intensity of the impact. Although offensive odors seldom cause physical harm, they can be annoying and cause distress among the public and generate citizen complaints. BAAQMD has identified typical sources of odor in the CEQA Air Quality Guidelines, a few examples of which include manufacturing plants, rendering plants, coffee roasters, wastewater treatment plants, sanitary landfills, and solid waste transfer stations. The project would not include uses that have

³ Non-cancer adverse health risks are measured against a hazard index, which is defined as the ratio of the predicted incremental exposure concentrations of the various non-carcinogens from the proposed project to published reference exposure levels that can cause adverse health effects.

been identified by BAAQMD as potential sources of objectionable odors. Impacts would be less than significant, and no mitigation is required.

3.4 Biological Resources

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV.	BIOLOGICAL RESOURCES - Would the project			Γ	
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				
C)	Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?				
e)	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			\boxtimes	
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				\boxtimes

Environmental Setting

A Biological Technical Report (BTR) (Appendix C) was prepared by Dudek in November 2022. The BTR describes the existing conditions related to biological resources within the project area, provides regulatory and environmental

setting for the project, and includes discussions of potential biological resource impacts that could result under project implementation. Mitigation measures are also provided where potentially significant impacts were identified. For a discussion of the applicable regulatory setting for the project, refer to Section 2, Regulatory Setting.

The data regarding biological resources present within the biological survey area (BSA) of the BTR was obtained through a review of pertinent literature, field reconnaissance, and habitat assessment. On July 8, 2022, a reconnaissance-level field survey of the BSA was conducted to document biological resources and vegetation communities (Dudek 2022).

Vegetation

Landside vegetation within the project area includes ruderal and non-native grassland and urban/developed land. Marine resources include open water, aquatic, and subtidal habitat in the vicinity of the terminal dock and in the Oakland Inner Harbor, which is part of the Central Bay, and Oakland-Alameda Estuary. Aquatic vegetation in the project area could include algae species or common subtidal plants including pondweed (*Potamogeton* spp.) and widgeon grass (*Ruppia maritima*). The greater San Francisco Bay and the Oakland-Alameda Estuary supports a large variety of invertebrates, crustaceans, mollusks, pelagic species, and a wide variety of fishes.

Plants and Wildlife

A total of 7 native or naturalized plants species and 8 wildlife species were recorded within the project area and vicinity during the biological survey. Ruderal and nonnative grassland habitat species included fennel, foxtail brome, rat-tail six-weeks grass, wild oat, and black mustard (*Brass egraegra*). Wildlife species detected on or in the immediate vicinity of the project included California ground squirrel (*Otospermophilus beecheyi*), Canada goose (*Branta canadensis*), common raven (*Corvus corax*), European starling (*Sturnus vulgaris*), California gull (*Larus californicus*), rock pigeon (*Columba livia*), common tern (*Sterna hirundo*), and black oystercatcher (*Haematopus bachmani*). Appendix A and Appendix B of the BTR (Appendix C) provide tables of all special-status species whose geographic ranges fall within the general project vicinity.

Special Status Plants Species

Based on the results of the literature review and database searches, 105 special-status plant species were identified as potentially occurring within the region of the BSA. None of these species were determined to have the potential to occur within the BSA based on the soils, vegetation communities (habitat) present, elevation range, and previous known locations based on the CNDDB, IpaC, and CNPS Inventory.

Special Status Wildlife Species

Based on the results of the literature review and database searches, 86 special-status wildlife species were reported in the CNDDB and USFWS databases as occurring in the vicinity of the BSA. Of these, the following were determined to have a moderate or high potential to occur within the BSA based on habitat present and previous known locations in the CNDDB and IpaC records: California Central Valley steelhead DPS, Central Coast Steelhead DPS, southern DPS of North American green sturgeon, Sacramento River winter-run ESU (endangered), Central Valley spring-run ESU (threatened), Central Valley spring-run ESU (San Joaquin River experimental population, non-essential), Central Valley fall-run/late fall-run (species of concern), longfin smelt (*Spirinchus thaleichthys*), and marine mammals.

Critical Habitat and Essential Fish Habitat

"Critical habitat" is defined in Section 3(5)(A) of the federal Endangered Species Act, and designated by USFWS and NMFS, as habitat (lands or waters) that contain physical or biological features considered essential to the species' conservation within the species' range, as well as habitat determined to be essential to the species conservation outside of the current range of that species. The open water habitat in the BSA includes areas designated as critical habitat for green sturgeon and is adjacent to portions of the San Francisco Bay estuary designated as critical habitat for Sacramento River winter-run Chinook Salmon ESU.

Essential Fish Habitat (EFH) includes "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" as defined by congress in the Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297). The open water habitat within the BSA is designated EFH for fish managed in the following federal fisheries management plans (FMPs):

- The Pacific Groundfish FMP
- The Coastal Pelagic FMP
- The Pacific Coast Salmon FMP

Potential Jurisdictional Waters

The project area includes portions of the San Francisco Bay estuary and Oakland Inner Harbor, which are considered navigable waters of the United States. The open water portion of the project area is therefore a "jurisdictional" water regulated by the Army Corps of Engineers (Corps) under Section 10 of the Rivers and Harbors Act up to mean high water and Section 404 of the Clean Water Act (CWA) up to the high tide line. These waters are also regulated by the San Francisco Bay Regional Water Quality Control Board (RWQCB) as Waters of the State and by the San Francisco Bay Conservation and Development Commission (BCDC), which has jurisdiction over all areas of San Francisco Bay that are subject to tidal action, as well as a shoreline band that extends inland 100 feet from the high tide line (see Figure 2). No wetlands are present within the project area.

Wildlife Corridors and Habitat Linkages

The San Francisco Bay estuary and the Oakland Inner Harbor serves as a local movement corridor that connects habitat for certain birds, marine mammals, and fish species. Since the proposed project would not significantly alter habitat conditions in the Oakland Inner Harbor, it is not expected to contribute to the impediment of local or seasonal movement of wildlife through the surrounding habitat.

a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less-than-Significant Impact with Mitigation Incorporated. The following special status fish and wildlife species could occur within the project site during construction: California Central Valley steelhead Distinct Population Segment (DPS), Central Coast Steelhead DPS, southern DPS of North American green sturgeon, Sacramento River winter-run chinook salmon Evolutionarily Significant Unit (ESU), Central Valley spring-run chinook salmon ESU, Central Valley fall-run chinook salmon (species of concern), longfin smelt, and marine mammals.

The demolition of the existing bridge/walkway and bridge foundation, and replacement of the existing terminal float will require in-water work to remove existing piles and install new steel pipe piles. The special-status fish and marine mammals that could occur in the BSA could be adversely impacted by these project activities through impacts to water quality and release of sediments into the water and underwater noise impacts. Because species regulated by the NMFS, USFWS, and CDFW could occur and be potentially impacted by project construction, it is anticipated that the appropriate project permits will be obtained prior to project implementation and may include a Biological Opinion from NMFS and USFWS, an Incidental Take permit (ITP) from CDFW, and an Incidental Harassment Authorization (IHA) from NMFS.

Impacts to Water Quality

The demolition of the existing bridge/walkway and bridge foundation, and replacement of the existing terminal float will require in-water work to remove existing piles and install new steel pipe piles which has the potential to result in short-term, temporary disturbance of benthic sediments. Existing piles planned for removal will be pulled, or if removal is not feasible, piles will be cut two (2) feet below the mudline. Suspended sediments could result in decreased water quality due to increased turbidity, the release of harmful chemicals into the water column, and may result in harmful effects to fish and wildlife in the vicinity. While removal of piles could result in the release of sediments, it is expected that the sediment release and increased turbidity would be of relatively short duration and generally confined within a few hundred feet of the activity, and that background levels would be restored within hours.

Underwater Noise Impacts

No protected biological resources are located landside, and in light of existing industrial uses in the vicinity and distance of sensitive receptors to the project site, impacts related to excessive groundborne vibration or groundborne noise levels landside are considered less than significant

Installation of steel pipe piles can produce intense underwater noise that may lead to physical damage to swim bladders or other soft tissues, or cause alterations to swimming, sleeping, or foraging behaviors in fish and marine mammals. The installation of the new pipe piles for the float and bridge support are expected to use a vibratory hammer, with an impact hammer used only if needed. The NMFS has developed injury criteria for fish and for marine mammals; these injury criteria are typically reported as peak levels (peak), root-mean-square pressure (RMS), and sound exposure levels (SEL). While injury criteria have been established, lower sound levels that result in altered behavior would also be considered harassment to any ESA listed fish species.

To evaluate the potential project noise impacts related to pile installation, an acoustic assessment was conducted by Illingworth and Rodkin in 2022 (Appendix E). The analysis indicated that impact pile driving of the largest piles (48") could result in maximum underwater noise impacts exceeding the marine mammal thresholds extending out to about 997 meters for the Level A Injury zone for Pinnipeds while extending out to about 4,200 meters for the Level B Harassment Zones. Impact pile driving of the largest (48") piles could cause acoustic impacts at distances extending out to 4,200 m and 1,010 m for the root-mean-square (RMS) (150 decibel [dB] re 1 micropascal [μ Pa]) and Cumulative sound exposure level (SEL) (187 dB re 1 μ Pa2-sec) respectively for the adopted fish thresholds. While all impact hammer use would be conducted between June 1 and November 30, when the likelihood of sensitive fish species being present in the work area is minimal, sensitive fish species could be present in the vicinity of the project area and could be

impacted by noise from pile driving. Therefore, project construction activities would result in a potentially significant impact to special-status fish and marine wildlife.

Mitigation Measure 3.4-1: Minimize and Avoid Underwater Noise Impacts

WETA and their construction contractor shall implement the following noise minimization and avoidance measures during project construction activities.

- All piling installation shall be conducted between June 1 and November 30, when the likelihood of sensitive fish species being present in the work area is minimal.
- Vibratory pile driving shall be conducted following the United States. Army Corps of Engineers. 2018. "U.S. Army Corps of Engineers Proposed Additional Procedures and Criteria for Permitting Projects under a Programmatic Determination of Not Likely to Adversely Affect Select Listed Species in California (the 2018 NLAA Program)". p 1-37. San Francisco, CA.
- To the extent feasible, all pilings shall be installed and removed with vibratory pile driver hammer only.
- An impact pile driver may only be used where necessary to complete installation of larger steel pilings in accordance with seismic safety or other engineering criteria.
 - If an impact pile driver is used it will be cushioned using a 12-inch-thick wood cushion block.
 - A Hydro Acoustic Monitoring Plan shall be prepared to be implemented in the event that an impact hammer is used. The sound monitoring results will be made available to CDFW and NMFS.
 - This Plan will provide detail on the sound attenuation system, the methods used to monitor and verify sound levels during impact pile driving activities,
 - The Plan shall include the use of a bubble curtain during any impact pile driving of piles in the water. The bubble curtain will be operated in a manner consistent with the following performance standards:
 - The bubble curtain will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.
 - The lowest bubble ring will be in contact with the mudline for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100% mudline contact. No parts of the ring or other objects shall prevent full mudline contact.
 - Air flow to the bubblers must be balanced around the circumference of the pile.
- A "soft start" technique shall be employed in all pile driving to give marine mammals an opportunity to vacate the area.
- Soft Start: When initiating pile driving, or when there has been downtime of 30 minutes or more without pile driving, the contractor will initiate the driving with ramp-up procedures described below.
- For vibratory hammers, the contractor will initiate the driving for 15 seconds at reduced energy, followed by a 30-second waiting period. This procedure will be repeated two additional times before continuous driving is started.
- For impact driving, an initial set of three strikes would be made by the hammer at 40% energy, followed by a 30-second waiting period, then two subsequent three-strike sets at 40% energy, with 30-second waiting periods, before initiating continuous driving.
- A biological monitor will be present during all pile driving to observe the work area before, during, and after pile driving. The monitor will be present as specified by NMFS during the impact piledriving phases of construction.
- A safety zone, based on the results of the noise analysis (Appendix C) will be established based on the type of pile driving required for the protection of marine mammals. Pile driving will be halted if a marine mammal is observed within the safety zone and will not re-start until 15 minutes after the animal has left the safety zone.
- All necessary permits including a BO from USFWS and NMFS, an IHA from NMFS, and an ITP will be
 obtained and adhered to during construction for in-water work that requires impact pile driving and
 is not covered under one of the existing programmatic consultations for federally listed species.

Mitigation Measure 3.4-2: Compensatory Mitigation for Longfin Smelt

Prior to construction, WETA shall obtain an ITP from the CDFW in accordance with California Fish & Game Code § 2081 (b), which states that, "the impacts of the authorized take shall be minimized and fully mitigated". In addition to the noise impact minimization measures described above, WETA shall provide compensatory mitigation for potential noise impacts to the longfin smelt by purchasing mitigation credits at a CDFW-approved conservation bank or contribute funds to a CDFW-approved mitigation project. Specific details for the compensatory mitigation including the number of credits, schedule and payment terms shall be outlined in the conditions of the ITP.

With implementation of Mitigation Measures 3.4-1 and 3.4-2 which outline methods for reducing potentially harmful noise impacts during installation of piles and provision of compensatory mitigation, potentially significant impacts to special status fish and marine wildlife would be less than significant. No further mitigation would be necessary. Water quality impacts including turbidity and sedimentation from pile removal and demolition of existing structures are addressed under criterion (c), below.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less-than-Significant Impact with Mitigation Incorporated. No riparian habitat, or eelgrass and native oyster beds occur within the BSA. The BSA does include Critical Habitat for green sturgeon, and essential fish habitat (EFH) as defined under the Pacific Groundfish, Coastal pelagics, and Pacific Coast Salmon Fisheries Management Plans. Pile removal and replacement activities during project construction could result in water quality and noise impacts, as described under Impact BIO-1, and would temporarily limit the suitability of the open water habitat present in the BSA. No long-term impacts to this habitat (including habitat created by the presents of pilings- submerged vegetation or aquatic organisms can attach to pilings) is expected as a result of the project.

Another potential concern resulting from in-water work is the spread of invasive marine species. Project activities, including disturbance and temperature changes as a result of construction activities, could result in the spread of invasive marine species which could limit the future suitability of both EFH and green sturgeon critical habitat. Any adverse effect to critical habitat or other sensitive natural communities, including EFH and green sturgeon, would result in a potentially significant impact. Potentially significant impacts to special-status fish and marine wildlife habitat from the spread of invasive species would be

mitigated to less than significant through implementation of Mitigation Measure 3.4-2 which outlines methods for reducing the potential introduction and spread of invasive marine species.

Mitigation Measure 3.4-3: Avoid Any Spread or Introduction of Invasive Marine Species

WETA and their construction contractor will ensure that standard Best Management Practices (BMPs) to avoid introduction or spread of marine invasive species are followed during construction and in-water work. Specific BMPs will be provided on the contractor's design drawings and will include but not be limited to the following:

- Environmental training of construction personnel involved in in-water work.
- Cleaning and sanitizing procedures for equipment and machinery used for in-water work.
- Procedures for the safe removal and disposal of any invasive taxa observed.

c) Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less-than-Significant Impact with Mitigation Incorporated. No federally or state-defined wetlands occur within the BSA and thus no impacts to wetlands would occur. However, implementation of the proposed project would have minor temporary impacts to non-wetland waters under the jurisdiction of the USACE, RWQCB, and BCDC. The San Francisco Bay and Oakland Inner Harbor is a navigable water of the United States and is regulated by the Corps under Section 10 of the Rivers and Harbors Act up to mean high water and Section 404 of the CWA up to the high tide line. These waters are also regulated by the San Francisco Bay RWQCB as Waters of the State and by the BCDC. As described in Section 2, Project Description, a net total of 78 sf of additional pilings (total piling installed minus pilings removed) would be installed as part of the terminal rehabilitation. The 78 sf of pilings to be introduced would consist of piling and fender components and fill material. As discussed in criterion (a), above, temporary project impacts associated with installation of new pilings could decrease water quality and increase turbidity within the immediate project area. Any adverse effect on jurisdictional wetlands and/or water would result in a potentially significant impact.

Mitigation Measure 3.4-4: Implement BMPs and Follow Approved Agency Requirements for In-Water Construction

Best management practices (BMPs) will be employed during project construction activities to protect special status species and their aquatic habitats. The contractor undertaking construction work will exercise every reasonable precaution to protect listed species and ESA-protected species and their habitat(s) from construction by-products and pollutants such as construction chemicals, fresh cement or other deleterious materials. Construction may be conducted from both land and water. Care will be used by equipment operators to control debris so that it does not enter the Bay. WETA's contractors shall prepare the plans covering the BMPs as follows: Stormwater Pollution Prevention Plan, Erosion and Sediment Control Plan, Oil Spill Prevention and Control Plan to specify restrictions and procedures for fuel storage

location, fueling activities, and equipment maintenance locating fueling stations away from potentially jurisdictional features, and Construction Debris Management Plan.

The measures identified in these four plans listed above will be based on Best Available Technology and will include but not be limited to the following:

- All debris will be off hauled, processed, and properly disposed of. The piles will be cut at the mudline
 and pulled out of the water. Timber piles that have been treated with creosote, or that contain other
 potentially hazardous materials, will be handled properly and disposed of at a facility permitted to
 handle hazardous waste. Any debris found on the seafloor in the ferry terminal's vicinity will be
 removed and disposed of on land.
 - Measures to ensure that fresh cement or concrete will not be allowed to enter the Bay. Construction waste will be collected and transported to an authorized upland disposal area, as appropriate, and per federal, state and local laws and regulations.
 - All hazardous material will be stored upland in storage trailers and/or shipping containers designed to provide adequate containment. Short-term laydown of hazardous materials for immediate use will be permitted with the same anti-spill precautions:
 - All construction material, wastes, debris, sediment, rubbish, trash, fencing, etc., will be removed from the site once the proposed project is completed and transported to an authorized disposal area, as appropriate, in compliance with applicable federal, state and local laws and regulations;
 - Construction material will need to be covered every night and during any rainfall event (if there is one);
 - Construction crews will reduce the amount of disturbance within the Project site to the minimum necessary to accomplish the project;
 - Measures to prevent debris from entering the Bay;
 - Vessels and equipment that rely on internal combustion engines for power and/or propulsion will be kept in good working condition and compliant with California emission regulations;
 - No in-water fueling at the Project site will be permitted. Vehicles and equipment that are used during the course of construction will be fueled and serviced offsite. Fueling locations will be inspected after fueling to document that no spills have occurred. Any spills will be cleaned up immediately.

With implementation of Mitigation Measure 3.4-4, which would ensure compliance with agency requirements and application of BMPs during construction activities to prevent adverse impacts to receiving waters, the project's potential to significantly impact non-wetland waters would be less than significant. No further mitigation would be required.

d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less-than-Significant Impact. During construction activities, temporary disturbance to local species may occur, but would not substantially degrade the quality or use of the marine communities in the vicinity. The Oakland Inner Harbor does not provide a migratory corridor for sensitive fish species; as

described in Section 5.6 of Appendix C (Biological Technical Report), fish migrating into and out of spawning habitat either in the Sacramento or San Joaquin River systems, or suitable perennial streams located in other parts of the Bay, are not likely to be found moving through the Oakland Inner Harbor. Following temporary construction disturbances, the function and values of the Oakland Inner Harbor are expected to remain the same. Thus, no significant direct permanent impacts would occur on wildlife movement or use of native wildlife nursery sites associated with project activities. Construction activities would not likely result in permanent impacts to wildlife movement because no new structures that would impede wildlife movement are proposed.

Furthermore, indirect impacts to localized wildlife movement could occur during construction activities due to construction-related noise, including during pile driving. However, construction-generated noise would be temporary and would not be expected to significantly, nor permanently, disrupt wildlife movement during and following construction activities. Impacts would be less than significant, and no mitigation is required.

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less-than-Significant Impact. Potentially significant impacts resulting from implementation of the proposed project were analyzed for compliance with the County's General Plan Open Space and Conservation Element. General Plan Policy CC-28 involves maintenance and improvement measures for the Alameda Nature Reserve, which is located approximately one mile west of the project site and does not apply to the proposed project. General Plan Policy CC-34 involves preservation of existing natural areas/elements and protection of native plant and wildlife species through actions such as implementing BMPs during construction, conducting biological surveys, consultation with applicable agencies, and implementing mitigation measures, The project would involve refurbishment of the existing AMS Ferry terminal which would include temporary construction activities within the Oakland Inner Harbor. During construction, the project would comply with applicable General Plan policies, including Policy CC-34, and would also implement mitigation measures, described above, to reduce any potential biological resource impacts to a less-than-significant level. Further, the project does not propose any changes nor modifications to existing policies or ordinances that would conflict with measures intended to protect biological resources. Because the project would comply with existing General Plan 2040 policies and would not conflict with any policies or ordinances protecting biological resources. Impacts would be less than significant and no mitigation is required.

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact. There are no habitat conservation plans (HCPs) or natural community conservation plans (NCCPs) covering the project site. As described in criterion (e), above, the project would not conflict with any local policies or ordinances. No HCPs or NCCPs cover the project site. There would be no impacts, and no mitigation is required.

3.5 Cultural Resources

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
۷.	CULTURAL RESOURCES – Would the project:				
a)	Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?			\boxtimes	
b)	Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?		\boxtimes		
C)	Disturb any human remains, including those interred outside of formal cemeteries?			\boxtimes	

Regulatory Framework

National Register of Historic Places

The National Register of Historic Places (NRHP) is the nation's master inventory of known historic properties. It is administered by the National Park Service and includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level.

Listing in the NRHP does not entail specific protection or assistance for a property but it does guarantee consideration in planning for federal or federally-assisted projects, eligibility for federal tax benefits, and qualification for federal historic preservation assistance. Additionally, project effects on properties listed in the NRHP must be evaluated under CEQA.

California Environmental Quality Act

The CEQA Guidelines define a historical resource as: (1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

CEQA requires lead agencies to determine if a proposed project would have a significant effect on important archeological resources, either historical resources or unique archeological resources. If a lead agency determines that an archeological site is a historical resource, the provisions of Public Resources Code Section 21084.1 would apply and CEQA Guidelines Sections 15064.5(c) and 15126.4 and the limits in Public Resources Code Section 21083.2 would not apply. If an archaeological site does not meet the CEQA Guidelines criteria for a

historical resource, then the site may meet the threshold of PRC Section 21083.2 regarding unique archaeological resources. A unique archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria.

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person" (PRC Section 21083.2 [g]).

The CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064[c][4]).

California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility are based on National Register criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for or listed in the National Register.

To be eligible for the California Register, an historical resource must be significant at the local, state, and/or federal level under one or more of the following criteria.

- 1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- 2. Is associated with the lives of persons important in our past.
- 3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
- 4. Has yielded, or may be likely to yield, information important in prehistory or history (PRC Section 5024.1[c]).

For a resource to be eligible for the California Register, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the National Register criteria may still be eligible for listing in the California Register.

Environmental Setting

Prehistoric Setting

Prior to the arrival of Europeans in the late 18th Century, much of the San Francisco Bay area was occupied for thousands of years by a collection of Native American tribal groups referred to as Costanoans. Subsequently, Costanoans were referred to by ethnographers as Ohlone, which is the term preferred by some of the affiliated tribal

groups. Also referred to as Bay Miwok, the Ohlone occupied an area stretching from below Monterey, northward through the Coast Ranges to the Sacramento River Delta, and eastward to the San Joaquin River.

The languages spoken in the Ohlone territories included Chochenyo, Matsun, Rumsen, and Tamyen, among others. The present-day City of Alameda lies within the prehistoric territory of the Chochenyo. The Chochenyo occupied a large area extending from present day Richmond to Mission San Jose, including the entire Alameda Creek watershed, and inland to the Livermore and Pleasanton Valleys.

Archaeologists have divided human history of the San Francisco Bay region into four broad periods: the Paleoindian Period (11,500 to 8000 before current era [B.C.E]), the Early Period (8000 to 500 B.C.E), the Middle Period (500 B.C.E to anno domini [A.D.] 1050), and the Late Period (A.D. 1050 to 1550).

Evidence of human habitation during Paleoindian Period, which was characterized by big-game hunters occupying broad geographic areas, has not yet been discovered in the San Francisco Bay Area. During the Early Period (Lower Archaic; 8000 to 3500 B.C.E), geographic mobility continued but the period is also marked by the introduction of milling slabs and hand stones for processing acorns and large wide-stemmed and leaf-shaped projectile points for use in hunting weapons. The first cut shell beads and the mortar and pestle are documented in burials during the Early Period (3500 to 500 B.C.E), indicating the beginning of a shift to sedentism.

During the Middle Period, which includes the Lower Middle Period (500 B.C.E to A.D. 430), and Upper Middle Period (A.D. 430 to 1050), geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The first rich midden sites are recorded from this period. The addition of milling tools, obsidian and chert concave-base projectile points, and the occurrence of sites in a wider range of environments suggest that the economic base was increasingly diverse.

By the Upper Middle Period, highly mobile hunter-gatherers were increasingly settling down into numerous small villages. Around A.D. 430, a dramatic cultural disruption occurred evidenced by the sudden collapse of the Olivella saucer bead trade network. During the Initial Late Period (A.D. 1050 to 1550), social complexity developed toward lifeways of large, central villages with resident political leaders and specialized activity sites. Artifacts associated with the period include the bow and arrow, small corner-notched projectile points, and a diversity of beads and ornaments (City of Alameda 2021a).

Historic Setting

Ferry service was established early in Alameda. By 1864 ferry service to San Francisco and Oakland was operating from the west end of the City. The service was operated by the San Francisco and Alameda Railroad, and was used for a brief time by the Central Pacific Railroad as the terminus of the Transcontinental Railroad. As a result of these proximate rail and water connections, an industrial center grew in western Alameda.

In 1978 the City of Alameda conducted a survey of Alameda's architectural and historical heritage, compiling the results into an Historical Building Study List of historic resources. The Historical Building Study List is maintained by the Historical Advisory Board and includes approximately 4,000 properties in Alameda. The List serves as preliminary evaluation and constitutes a tool in the ongoing process of identification, evaluation, and preservation of Alameda's architectural and historical resources. There are 29 designated Historical Monuments in Alameda as well as two historic districts (City of Alameda 2021a).

Known Resources

A cultural resources literature search was conducted in August 2022 by the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS) at California State University, Sonoma. The records search was conducted to determine if prehistoric or historic cultural resources had been previously recorded within the project site, the extent to which the project site had been previously surveyed, and the number and type of cultural resources within a 0.5-mile radius of the project area.

The NWIC records search indicated that two prior cultural resource studies have been completed within the project area, and an additional six have been completed outside the project area but within the 0.5-mile record search radius. The records search revealed that one cultural resource has been previously recorded within the project area, and 51 additional resources have been previously identified within the 0.5-mile record search radius.

The previously recorded cultural resource located in the project area is the Todd Shipyard historic district, also known as the United Engineering Company Shipyard (P-01-003218). The shipyard was evaluated as a district containing 27 buildings and structures in May 1988 and assigned an Office of Historic Preservation (OHP) California Historical Resource (CHR) status code of 4D: *May become eligible for NR* [National Register of Historic Places] *as a contributing property*. Following the conversion of new CHR status codes in 2003, the resource as a whole is presently listed in the Built Environment Resources Directory (BERD) with a CHR status code of 7N: Needs to be reevaluated - *formerly coded as may become NR eligible with specific conditions*. There is one building within the district, the Shop Building (61T), located approximately 500 feet southeast of the project site, that was individually evaluated and is listed as individually eligible for *NR as a contributor to a NR eligible multi-component resource through survey evaluation*. The Bay Ship & Yacht Company building located adjacent to the proposed project site, is within the delineated boundary of the Todd Shipyard historic district, however, it is modern construction, estimated to be built in 2005.

Because P-01-003218 was previously evaluated as an eligible district and requires further evaluation for current listing, the analysis below considers the Todd Shipyard a resource under CEQA Guidelines Section 15064.5.

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Less-than-Significant Impact. As described above, P-01-003218 was previously evaluated as an eligible district and requires further evaluation for NRHP and CRHR listing. Implementation of the project would include refurbishment of the existing AMS Ferry Terminal and would be limited to the project site, as indicated in Figure 2-2. Construction and operation activities would not extend beyond the identified project boundaries and would not result in any changes and/or alterations to any of the individual buildings within the Todd Shipyard historic district site. As such, project implementation would not result in any changes in the significance of a historical resource. Impacts would be less than significant and no mitigation is required.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Less-than-Significant Impact with Mitigation Incorporated. The results of the NWIC records search, conducted in August 2022, did not yield any information regarding known archaeological sites within the

project site or within 0.5 miles of the project site. Project construction activities would involve ground disturbance associated with new and replacement terminal structures, including the terminal bridge, bridge foundation, gangway, and terminal float. Though no known resources have been identified within the project site and surrounding area, the possibility remains that archaeological materials could be encountered during construction-related ground disturbing activities. This impact would be potentially significant.

Mitigation Measure 3.5-1: Protection of Known and Unknown Archaeological Resources

The following shall be implemented by WETA and the construction contractor during any ground-disturbing activities associated with project construction:

- In the event that unknown cultural deposits (e.g., prehistoric stone tools, milling stones, historic glass bottles, foundations) are encountered during project construction, all ground-disturbing activity within 30 feet of the resources shall be halted and a qualified professional archaeologist (36 Code of Federal Regulations [CFR] 61) and appropriate Native American tribal representative shall be notified immediately and retained to assess the significance of the find. Construction activities could continue in other areas of the project site.
- If the find is determined to be significant by the qualified archaeologist or Native American tribe (i.e., because it is determined to constitute either a historical resource or a unique archaeological resource), the archaeologist shall develop appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Procedures could include but would not necessarily be limited to preservation in place, archival research, subsurface testing, or contiguous block unit excavation and data recovery.
- If the qualified archaeologist determines the archaeological material to be Native American in nature, WETA shall contact the culturally affiliated Native American tribe for their input on the preferred treatment of the find.

Therefore, with implementation of Mitigation Measure 3.5-1, the project's potential to impact archaeological resources would be addressed by cessation of work, implementation of proper data recovery, and/or preservation procedures upon discovery of previously unknown resources, would be less than significant. No further mitigation would be required.

c) Would the project disturb any human remains, including those interred outside of formal cemeteries?

Less-than-Significant Impact. Based on documentary research, no evidence suggests that any prehistoric or historic-era marked or un-marked human interments are present within or in the immediate vicinity of the project site. However, the location of grave sites and Native American remains can occur outside of identified cemeteries or burial sites. Therefore, there is a possibility that unmarked, previously unknown Native American or other graves could be present within the project site and could be uncovered by project-related construction activities.

California law recognizes the need to protect Native American human burials, skeletal remains, and items associated with Native American burials from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in California Health and Safety Code Sections 7050.5 and PRC Section 5097.

These statutes require that, if human remains are discovered during any construction activities, potentially damaging ground-disturbing activities in the area of the remains shall be halted immediately, and the Alameda County coroner and Native American Heritage Commission (NAHC) shall be notified immediately, in accordance with to PRC Section 5097.98 and Section 7050.5 of California's Health and Safety Code. If the remains are determined by NAHC to be Native American, the guidelines of the NAHC shall be adhered to in the treatment and disposition of the remains.

Following the coroner's findings, the archaeologist, the NAHC-designated Most Likely Descendant, and the landowner shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in PRC Section 5097.94.

Compliance with California Health and Safety Code Sections 7050.5 and PRC Section 5097 would provide an opportunity to avoid or minimize the disturbance of human remains, and to appropriately treat any remains that are discovered. Impacts would be less than significant and no mitigation is required.

3.6 Energy

M	Enormy Would the project:	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VI.	Energy – Would the project:				[
a)	Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?				
b)	Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?				

Regulatory Framework

Federal

Federal Energy Policy and Conservation Act and CAFE Standards

In 1975, Congress enacted the Federal Energy Policy and Conservation Act, which established the first fuel economy standards, known as the Corporate Average Fuel Economy (CAFE) standards, for on-road motor vehicles in the United States. Pursuant to the act, the National Highway Traffic Safety Administration (NHTSA) is responsible for establishing additional vehicle standards. In 2012, new Corporate Average Fuel Economy standards for passenger cars and light trucks were approved for model years 2017 through 2021 (77 FR 62624–63200). Fuel economy is determined based on each manufacturer's average fuel economy for the fleet of vehicles available for sale in the United States.

Energy Policy Act of 1992 and 2005

The Energy Policy Act of 1992 was passed to reduce the country's dependence on foreign petroleum and improve air quality. The act includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. The act requires certain federal, state, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in the Act. Federal tax deductions are allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the Act to consider a variety of incentive programs to help promote AFVs. The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Federal Energy Policy and Conservation Act

In 1975, Congress enacted the Federal Energy Policy and Conservation Act, which established the first fuel economy standards for on-road motor vehicles in the United States. Pursuant to the act, the NHTSA is responsible for establishing additional vehicle standards. In 2012, new fuel economy standards for passenger cars and light trucks were approved for model years 2017 through 2021 (77 FR 62624–63200). Fuel economy is determined based on each manufacturer's average fuel economy for the fleet of vehicles available for sale in the United States.

Energy Independence and Security Act of 2007

On December 19, 2007, the Energy Independence and Security Act of 2007 (EISA) was signed into law. In addition to setting increased Corporate Average Fuel Economy standards for motor vehicles, the EISA includes the following other provisions related to energy efficiency:

- Renewable Fuel Standard (RFS) (Section 202)
- Appliance and Lighting Efficiency Standards (Sections 301–325)
- Building Energy Efficiency (Sections 411–441)

This federal legislation requires ever-increasing levels of renewable fuels (RFS) to replace petroleum. The U.S. Environmental Protection Agency (EPA) is responsible for developing and implementing regulations to ensure that transportation fuel sold in the United States contains a minimum volume of renewable fuel. The RFS program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders.

The RFS program was created under the Energy Policy Act of 2005 and established the first renewable fuel volume mandate in the United States. As required under the act, the original RFS program (RFS1) required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012. Under the EISA, the RFS program was expanded in several key ways that lay the foundation for achieving significant reductions in GHG emissions from the use of renewable fuels, reducing imported petroleum, and encouraging the development and expansion of the renewable fuels sector in the United States. The updated program is referred to as RFS2 and includes the following:

- EISA expanded the RFS program to include diesel, in addition to gasoline.
- EISA increased the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022.

- EISA established new categories of renewable fuel and set separate volume requirements for each one.
- EISA required the U.S. Environmental Protection Agency to apply lifecycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

Additional provisions of the EISA address energy savings in government and public institutions, research for alternative energy, additional research in carbon capture, international energy programs, and the creation of "green" jobs.

State

Warren-Alquist Act

The California legislature passed the Warren-Alquist Act in 1974. The Warren-Alquist Act created the California Energy Commission (CEC). The legislation also incorporated the following three key provisions designed to address the demand side of the energy equation:

- It directed the CEC to formulate and adopt the nation's first energy conservation standards for buildings constructed and appliances sold in California.
- The act removed the responsibility of electricity demand forecasting from the utilities, which had a financial interest in high-demand projections, and transferred it to a more impartial CEC.
- The CEC was directed to embark on an ambitious research and development program, with a particular focus on fostering what were characterized as non-conventional energy sources.

Senate Bills 1078 (2002), 107 (2006), X1-2 (2011), 350 (2015) and 100 (2018)

Senate Bill (SB) 1078 established the California Renewables Portfolio Standard (RPS) Program and required that a retail seller of electricity purchase a specified minimum percentage of electricity generated by eligible renewable energy resources as defined in any given year, culminating in a 20% standard by December 31, 2017. These retail sellers include electrical corporations, community choice aggregators, and electric service providers. The bill relatedly required the CEC to certify eligible renewable energy resources, design and implement an accounting system to verify compliance with the RPS by retail sellers, and allocate and award supplemental energy payments to cover above-market costs of renewable energy.

SB 107 (2006) accelerated the RPS established by SB 1078 by requiring that 20% of electricity retail sales be served by renewable energy resources by 2010 (not 2017). Additionally, SB X1-2 (2011) requires all California utilities to generate 33% of their electricity from eligible renewable energy resources by 2020. Specifically, SB X1-2 sets a three-stage compliance period: by December 31, 2013, 20% had to come from renewables; by December 31, 2016, 25% had to come from renewables; and by December 31, 2020, 33% will come from renewables.

SB 350 (2015) expanded the RPS because it requires retail seller and publicly owned utilities to procure 50% of their electricity from eligible renewable energy resources by 2030, with interim goals of 40% by 2024 and 45% by 2027.

SB 100 (2018) accelerated and expanded the standards set forth in SB 350 by establishing that 44% of the total electricity sold to retail customers in California per year by December 31, 2024, 52% by December 31, 2027, and 60% by December 31, 2030 be secured from qualifying renewable energy sources. SB 100 also states that it is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100 percent of the

retail sales of electricity to California. This bill requires that the achievement of 100 percent zero-carbon electricity resources does not increase the carbon emissions elsewhere in the western grid and that the achievement not be achieved through resource shuffling.

Consequently, utility energy generation from non-renewable resources is expected to be reduced based on implementation of the RPS requirements. Therefore, any project's reliance on non-renewable energy sources would also be reduced.

Assembly Bill 1007

AB 1007 (2005) required the CEC to prepare a statewide plan to increase the use of alternative fuels in California (State Alternative Fuels Plan). The CEC prepared the plan in partnership with the California Air Resources Board (CARB) and in consultation with other state agencies, plus federal and local agencies. The State Alternative Fuels Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

California Building Standards

The California Building Standards Code was established in 1978 and serves to enhance and regulate California's building standards (California Code of Regulations, Title 24). Part 6 establishes energy efficiency standards for residential and non-residential buildings constructed in California to reduce energy demand and consumption. Part 6 is updated periodically (every 3 years) to incorporate and consider new energy efficiency technologies and methodologies. The 2022 standards will improve upon the 2019 standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The CEC adopted the 2022 Title 24 Energy Code in August 2021 and the California Building Standards Commission approved incorporating the updated code into the California Building Standards Code (CALGreen) in December 2021. The 2022 Energy Code will go into effect on January 1, 2023.

State Vehicle Standards

In response to the transportation sector accounting for more than half of California's carbon dioxide (CO₂) emissions, AB 1493 was enacted in 2002. AB 1493 required CARB to set GHG emissions standards for passenger vehicles, light-duty trucks, and other vehicles determined by the state board to be vehicles whose primary use is noncommercial personal transportation in the state. The bill required that CARB set GHG emissions standards for motor vehicles manufactured in 2009 and all subsequent model years. The 2009–2012 standards resulted in a reduction in approximately 22% of GHG emissions compared to emissions from the 2002 fleet, and the 2013–2016 standards resulted in a reduction of approximately 30% compared to the 2002 fleet.

In 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global-warming gases with requirements for greater numbers of zeroemissions vehicles into a single package of standards called Advanced Clean Cars (ACC). By 2025, when the rules would be fully implemented, new automobiles would emit 34% fewer global-warming gases and 75% fewer smogforming emissions (CARB 2020). In 2019, the EPA and NHTSA published the Safer Affordable Fuel-Efficient Vehicles Rule Part One: One National Program (SAFE-1)(84 Fed. Reg. 51310), which revoked California's authority to set its own GHG emissions standards and set zero-emission vehicle (ZEV) mandates in California. In March 2020, Part Two was issued which set CO₂ emissions standards and corporate average fuel economy standards for passenger vehicles and light-duty trucks for model years 2021 through 2026. In March 2022, EPA reinstated California's authority under the Clean Air Act to implement its own GHG emission standards and ZEV sales mandate. EPA's action concludes its reconsideration of the 2019 SAFE-1 rule by finding that the actions taken under the previous administration as a part of SAFE-1 were decided in error and are now entirely rescinded.

Advanced Clean Cars Program

The ACC I program (January 2012) is an emissions-control program for model years 2015 through 2025. The program combines the control of smog- and soot-causing pollutants and GHG emissions into a single coordinated package of regulations: the Low-Emission Vehicle (LEV) regulation for criteria air pollutant and GHG emissions and a technology forcing regulation for zero-emission vehicles (ZEV) that contributes to both types of emission reductions (CARB 2021a). The package includes elements to reduce smog-forming pollution, reduce GHG emissions, promote clean cars, and provide the fuels for clean cars. To improve air quality, CARB has implemented new emission standards to reduce smog-forming emissions beginning with 2015 model year vehicles. It is estimated that in 2025 cars will emit 75% less smog-forming pollution than the average new car sold in 2015. The ZEV program will act as the focused technology of the ACC I program by requiring manufacturers to produce increasing numbers of ZEVs and plug-in hybrid EVs in the 2018 to 2025 model years.

The ACC II program is currently in development to establish the next set of LEV and ZEV requirements for model years after 2025 to contribute to meeting federal ambient air quality ozone standards and California's carbon neutrality standards (CARB 2021a). The main objectives of ACC II are:

- 1. Maximize criteria and GHG emission reductions through increased stringency and real-world reductions.
- 2. Accelerate the transition to ZEVs through both increased stringency of requirements and associated actions to support wide-scale adoption and use.

The ACC II rulemaking package was adopted by CARB on August 25, 2022.

Advanced Clean Trucks Program

The purpose of the ACT Regulation (June 2020) is to accelerate the market for zero-emission vehicles in the mediumand heavy-duty truck sector and to reduce emissions NO_x, fine particulate matter, TACs, GHGs, and other criteria pollutants generated from on-road mobile sources (CARB 2021b). Requiring medium- and heavy-duty vehicles to transition to zero-emissions technology will reduce health risks to people living in and visiting California and is needed to help California meet established near- and long-term air quality and climate mitigation targets. The regulation has two components including (1) a manufacturer sales requirement and (2) a reporting requirement:

 Zero-emission truck sales: Manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines will be required to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck/chassis sales would need to be 55% of Class 2b – 3 truck sales, 75% of Class 4 – 8 straight truck sales, and 40% of truck tractor sales. 2. Company and fleet reporting: Large employers including retailers, manufacturers, brokers and others will be required to report information about shipments and shuttle services. Fleet owners, with 50 or more trucks, will be required to report about their existing fleet operations. This information will help identify future strategies to ensure that fleets purchase available zero-emission trucks and place them in service where suitable to meet their needs.

Environmental Setting

The primary energy source required for the project would be petroleum during short-term construction. According to the U.S. Energy Information Administration, California used approximately 683 million barrels of petroleum in 2017 (EIA 2019). This equates to a daily use of approximately 1.9 million barrels of petroleum. There are 42 U.S. gallons in a barrel, so California consumes approximately 78.6 million gallons of petroleum per day, adding up to an annual consumption of 29 billion gallons of petroleum. However, technological advances, market trends, consumer behavior, and government policies could result in significant changes in fuel consumption by type and in total. At the federal and state levels, various policies, rules, and regulations have been enacted to improve vehicle fuel efficiency, promote the development and use of alternative fuels, reduce transportation-source air pollutants and GHG emissions, and reduce vehicle miles traveled.

a) Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Construction

Electricity. Electric power for as-necessary electronic equipment would be provided by Alameda Municipal Power (AMP). The amount of electricity used during construction would be minimal because typical demand would be generated by electrically-powered hand tools. Lighting for construction activities is not anticipated. Furthermore, electric demand would be intermittent (as-needed) and limited to the duration of construction (4-6 weeks). Therefore, project construction would not result in wasteful, inefficient, or unnecessary consumption of electricity.

Natural Gas. Natural gas is not anticipated to be required during construction of the project. Fuels used for construction would primarily consist of diesel and gasoline, which are discussed below. Therefore, project construction would not result in wasteful, inefficient, or unnecessary consumption of natural gas.

Petroleum. The primary energy consumed during construction would be associated with petroleum usage. Potential impacts were assessed for off-road equipment, marine vessels, and on-road vehicle trips during construction, as provided by the CalEEMod and the Harborcraft, Dredge, and Barge Emission Factor Calculator outputs (see Appendix B). Heavy-duty equipment associated with construction would rely on diesel fuel, as would vendor trucks involved in delivery of materials to the project site and a tugboat. Notably, no haul trucks are anticipated since there would not be grading and all debris from demolition would be transported via tugboat/barge. Construction workers would travel to and from the project site throughout the duration of construction. It is assumed in this analysis that construction workers would travel in gasoline-powered light-duty vehicles. The small skiff was also assumed to use gasoline. Fuel consumption from construction equipment and vehicle trips was estimated by converting the total carbon dioxide (CO₂) emissions anticipated to be generated by the construction of the project to gallons using conversion factors for CO₂ to gallons of gasoline or diesel. The conversion factor for gasoline is 8.78 kilograms per metric ton (MT) CO₂ per gallon, and the conversion factor for diesel is 10.21 kilograms per MT CO₂ per gallon (The Climate Registry 2021). Appendix B lists the assumed equipment usage, vehicle trips for construction, and marine vessel assumptions for the project.

The estimated diesel fuel usage from construction equipment, vendor trucks, and tugboat, as well as estimated gasoline fuel usage from worker vehicles and the small skiff are shown in Table 3.6-1.

	Off-Road Equipment (diesel)	Vendor Trucks (diesel)	Tugboat (diesel)	Worker Vehicles (gasoline)	Small Skiff (gasoline)
Phase	Gallons				
Demolition/Construction	4,207.68	94.73	1,081.24	154.26	2,355.57
Total Petroleum Consumed	7,893.48				

	Table 3.6-1. Pro	ject Construction Petroleum Demand
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Notes: See Appendix B for details.

As shown in Table 3.6-1, the project is estimated to consume approximately 7,893 gallons of petroleum during the total demolition and construction activity. Notably, the project will be subject to CARB's In-Use Off-Road Diesel Vehicle Regulation that applies to certain off-road diesel engines, vehicles, or equipment greater than 25 horsepower. The regulation: (1) imposes limits on idling, requires a written idling policy, and requires a disclosure when selling vehicles, (2) requires all vehicles to be reported to CARB (using the Diesel Off-Road Online Reporting System) and labeled, (3) restricts the adding of older vehicles into fleets starting on January 1, 2014, and (4) requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing Verified Diesel Emission Control Strategies (i.e., exhaust retrofits). The fleet must either show that its fleet average index was less than or equal to the calculated fleet average target rate, or that the fleet has met the Best Achievable Control Technology (BACT) requirements. Overall, because the project would not be unusual as compared to overall local and regional demand for energy resources and would not involve characteristics that require equipment that would be less energy-efficient than at comparable construction sites in the region or state, the petroleum consumption associated with the project would not be considered inefficient or wasteful.

Operations

The project would not result in a change in a substantive change in operations. Therefore, the potential increase in energy consumption during operations would be negligible.

Summary

Less-than-Significant Impact. As provided in the discussion above, implementation of the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation. Impacts would be less than significant and no mitigation is required.

b) Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less-than-Significant Impact. As discussed in Section 3.6(a), the project would not result in wasteful, inefficient, and unnecessary consumption of energy during construction and no increase in energy demand

from operations. During construction, the project would comply with CARB's ATCMs, one of which restricts heavy-duty diesel vehicle idling time to 5 minutes. Additionally, energy use during construction would be minimal and temporary. During operations, the project would not result in an increase in energy consumption as compared to the existing terminal; however, the project would continue to support the reduction of single-occupant vehicle use and associated petroleum consumption by providing ferry service in the Bay Area. Impact would be less than significant, and no mitigation is required.

3.7 Geology and Soils

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII.	GEOLOGY AND SOILS - Would the project:				
a)	Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
	 Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. 				
	ii) Strong seismic ground shaking?			\square	
	iii)Seismic-related ground failure, including liquefaction?				
	iv)Landslides?				\square
b)	Result in substantial soil erosion or the loss of topsoil?			\square	
C)	Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?				
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
f)	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			\boxtimes	

Regulatory Framework

The California Building Code (CBC) contains the minimum standards for design and construction in California. The CBC addresses, among other topics, design criteria for seismic hazards. Prior to issuance of a building permit for the project, the project sponsor would be required to complete a site-specific design-level geotechnical investigation to identify the specific geologic hazards that could affect the project, evaluate soil conditions, and provide design recommendations to achieve applicable CBC seismic safety design requirements.

Title 24, Part 11, Section 5.106 of the CBC (or CALGreen Code), outlines BMPs to prevent the pollution of stormwater runoff from construction activities for projects that would disturb less than one acre. BMPs include erosion control, sediment control, construction scheduling practices, dewatering activities, material handling, vehicle/equipment management, spill prevention and control, among others.

Environmental Setting

A Preliminary Geotechnical Report was prepared by ENGEO in January 2022 (Appendix D). The report includes an assessment of geotechnical conditions associated with the proposed project, subsurface data, and preliminary recommendations. Pertinent information from the report is included herein.

The project site is located in Alameda County and within the California Coast Ranges, a series of northwesterly trending uplifted ranges and intervening valleys. A limited subsurface exploration, involving two cone penetration tests (CPTs), was performed at the project site on October 28, 2021. In general, deposits encountered at the project site include, from youngest to oldest, (1) artificial deposits (sand, gravel, and clay), (2) Young Bay Mud (YBM) deposits (silty clay), (3) San Antonio Formation (silty sand), and Old Bay Clay (silt or clay with interbedded sand deposits). The project site can be divided into two generalized subsurface profiles – shoreside and offshore. The shore-side subsurface profile consists of loose to medium dense sandy artificial fill, soft YBM, and dense sandy or stiff clayey San Antonio Formation. The offshore subsurface profile consists of softer (relative to shore-side) YBM overlying San Antonio Formation.

Numerous small earthquakes occur every year in the San Francisco Bay Region, and larger earthquakes have been recorded and can be expected to occur in the future. The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site. The nearest active fault, the Hayward Fault, is located approximately 5.4 miles from the site.

According to the California Geological Survey (CGS), the site is mapped within an area susceptible to earthquakeinduced liquefaction. A liquefaction analysis was performed for the project site and indicated that potential liquefaction-induced ground settlement up to approximately 1 in may occur. The potential for lateral spreading was determined to be low.

The project site is mapped within a tsunami hazard zone on the CGS tsunami hazard map for the County of Alameda, indicating that it is within inundation limits corresponding to a 975-year average return period tsunami event (ENGEO 2022).

a) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

 Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

No Impact. As described above, the project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site. Because of this, ground rupture associated with a known earthquake fault is unlikely at the subject property (ENGEO 2022). The project would not expose people or structures to adverse effects caused by the rupture of a known fault. There would be no impact and no mitigation is required.

ii) Strong seismic ground shaking?

Less-than-Significant Impact. As previously discussed, they San Francisco Bay Region, which includes the project site, is subject to numerous earthquakes every year. As described in criterion (a-i), above, no known active faults exist within the site. The project would be constructed consistent with the CBC Title 24, which includes standards intended to protect structures from earthquake-related seismic activity. The construction and operation of the project would not exacerbate existing seismic conditions. Impacts would be less than significant and no mitigation is required.

iii) Seismic-related ground failure, including liquefaction?

Less-than-Significant Impact. As discussed above, the project site is mapped within an area susceptible to earthquake-induced liquefaction. A liquefaction analysis performed by ENGEO indicated that potential liquefaction-induced ground settlement up to approximately 1-in may occur within the site (ENGEO 2022). As described in Chapter 2, "Project Description," most of the project components would be positioned within the shoreside of the project site, within the Oakland Inner Harbor. Liquefaction or other ground failure would not be a hazard for features within the Oakland Inner Harbor. Further, the project would comply with CBC Title 24, which includes specific design requirements to reduce damage from ground failure. Compliance with current building codes, would address project-related risks from seismic-related ground failure. Impacts would be less than significant, and no mitigation is required.

iv) Landslides?

No Impact. The project site is located in a developed area of the Oakland Inner Harbor on flat terrain; there is no risk of landslides in such terrain. There would be no impact, and no mitigation would be required.

b) Would the project result in substantial soil erosion or the loss of topsoil?

Less-than-Significant Impact. Ground disturbance associated with project implementation would consist of installation of the monopile, pipe piles, guide piles, and donut fender piles, as further described in Chapter 2, "Project Description." The project would be required to comply with the current CBC, which provides specifications related to soil compaction and stability. Further, the project would be required to adhere to various federal, State, and regional water quality standards, including BMPs (i.e., erosion control, site stabilization, etc.) as outlined in Title 24 of the CALGreen Code. Compliance with applicable regulations, including BMPs, would address project-related soil erosion/loss of topsoil. Impacts would be less than significant, and no mitigation is required.

c, d) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse? Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less-than-Significant Impact. As described above, the project site consists of a variety of soil types that range in density. Additionally, potential liquefaction-induced ground settlement up to approximately 1-in may occur at the project site, however, the potential for lateral spreading at the site was determined to be low (ENGEO 2022). Piles installed to support terminal components would not be affected by expansive soil properties because they would be continually saturated (i.e., they would not experience drying and wetting conditions that cause soil to shrink and swell). Further, project compliance with the CBC, which provides specifications related to soil compaction and stability, would ensure that project implementation would not result in on- or off-site adverse geologic conditions such as landslide, lateral spreading, subsidence, liquefaction, shrink-swell potential, or collapse such that risks to life or property would occur. Impacts would be less than significant and no mitigation is required

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The project would not involve the use of septic tanks or alternative wastewater disposal systems. There would be no impact, and no mitigation is required.

f) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less-than-Significant Impact. The project site and the immediate surrounding area are composed of Bay fill and other fill materials that typically do not preserve or contain unique paleontological resources. Project construction would involve earthmoving activities associated with installation of new piles that would disturb Bay Mud and other geologically young deposits that are submerged. These activities would be limited to individual, discrete, borings beneath the water and would not involve excavation. Although the sediment disturbed by pile removal and installation could contain invertebrate remains of shelled animals, the resources are ubiquitous throughout the Bay Area and are not considered unique or significant paleontological resources. In addition, past dredging and filling activities within the surrounding area of the Oakland Inner Harbor would likely have destroyed or compromised the integrity of fossils if they were present. Impacts would be less than significant, and no mitigation is required.

3.8 Greenhouse Gas Emissions

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact	
VIII. GREENH	VIII. GREENHOUSE GAS EMISSIONS – Would the project:					
directly o	greenhouse gas emissions, either r indirectly, that may have a nt impact on the environment?			\boxtimes		
regulatio	vith an applicable plan, policy or n adopted for the purpose of the emissions of greenhouse					

Regulatory Framework

Also refer to Section 3.6 for relevant regulations that are also applicable to Energy.

Federal

Massachusetts v. EPA

In *Massachusetts v. EPA* (April 2007), the U.S. Supreme Court directed the EPA administrator to determine whether GHG emissions from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In December 2009, the administrator signed a final rule with the following two distinct findings regarding GHGs under Section 202(a) of the federal Clean Air Act:

- The Administrator found that elevated concentrations of GHGs— carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride —in the atmosphere threaten the public health and welfare of current and future generations. This is the "endangerment finding."
- The Administrator further found the combined emissions of GHGs—CO2, CH4, N2O, and HFCs—from new motor vehicles and new motor vehicle engines contribute to the GHG air pollution that endangers public health and welfare. This is the "cause or contribute finding."

These two findings were necessary to establish the foundation for regulation of GHGs from new motor vehicles as air pollutants under the Clean Air Act.

State

The state has taken a number of actions to address climate change. These include executive orders (EOs), legislation, and CARB plans and requirements. A few key regulations are summarized below.

E0 S-3-05

EO S-3-05 (June 2005) established California's GHG emissions reduction targets and laid out responsibilities among the state agencies for implementing the EO and for reporting on progress toward the targets. This EO established the following targets:

- By 2010, reduce GHG emissions to 2000 levels
- By 2020, reduce GHG emissions to 1990 levels
- By 2050, reduce GHG emissions to 80 percent below 1990 levels

EO S-3-05 also directed the California Environmental Protection Agency to report biannually on progress made toward meeting the GHG targets and the impacts to California due to global warming, including impacts to water supply, public health, agriculture, the coastline, and forestry. The Climate Action Team was formed, which subsequently issued reports from 2006 to 2010.

AB 32

In furtherance of the goals established in EO S-3-05, the Legislature enacted AB 32 (Núñez and Pavley). The bill is referred to as the California Global Warming Solutions Act of 2006 (September 27, 2006). AB 32 provided initial direction on creating a comprehensive multiyear program to limit California's GHG emissions at 1990 levels by 2020 and initiate the transformations required to achieve the state's long-range climate objectives.

SB 32 and AB 197

SB 32 and AB 197 (enacted in 2016) are companion bills. SB 32 codified the 2030 emissions reduction goal of EO B-30-15 by requiring CARB to ensure that statewide GHG emissions are reduced to 40% below 1990 levels by 2030. AB 197 established the Joint Legislative Committee on Climate Change Policies, consisting of at least three members of the Senate and three members of the Assembly, in order to provide ongoing oversight over implementation of the state's climate policies. AB 197 also added two members of the Legislature to the Board as nonvoting members; requires CARB to make available and update (at least annually via its website) emissions data for GHGs, criteria air pollutants, and TACs from reporting facilities; and, requires CARB to identify specific information for GHG emissions reduction measures when updating the Scoping Plan.

CARB's Climate Change Scoping Plan

One specific requirement of AB 32 is for CARB to prepare a "scoping plan" for achieving the maximum technologically feasible and cost-effective GHG emission reductions by 2020 (Health and Safety Code, Section 38561(a)), and to update the plan at least once every 5 years. In 2008, CARB approved the first scoping plan. The *Climate Change Scoping Plan: A Framework for Change* (Scoping Plan) included a mix of recommended strategies that combined direct regulations, market-based approaches, voluntary measures, policies, and other emission reduction programs calculated to meet the 2020 statewide GHG emission limit and initiate the

transformations needed to achieve the state's long-range climate objectives. The key elements of the Scoping Plan include the following (CARB 2008):

- 1. Expanding and strengthening existing energy efficiency programs as well as building and appliance standards
- 2. Achieving a statewide renewable energy mix of 33%
- 3. Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system and caps sources contributing 85% of California's GHG emissions
- 4. Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets
- Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard (LCFS; 17 Cal. Code Regs., Section 95480 et seq.)
- 6. Creating targeted fees, including a public goods charge on water use, fees on high GWP gases, and a fee to fund the administrative costs of the State of California's long-term commitment to AB 32 implementation

The Scoping Plan also identified local governments as essential partners in achieving California's goals to reduce GHG emissions because they have broad influence and, in some cases, exclusive authority over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Specifically, the Scoping Plan encouraged local governments to adopt a reduction goal for municipal operations and for community emissions to reduce GHGs by approximately 15 percent from then levels (2008) by 2020. Many local governments developed community-scale local GHG reduction plans based on this Scoping Plan recommendation.

In 2014, CARB approved the first update to the Scoping Plan. The *First Update to the Climate Change Scoping Plan: Building on the Framework* (First Update) defined the state's GHG emission reduction priorities for the next 5 years and laid the groundwork to start the transition to the post-2020 goals set forth in EO S-3-05 and EO B-16-2012 (CARB 2014). The First Update concluded that California is on track to meet the 2020 target but recommended a 2030 mid-term GHG reduction target be established to ensure a continuum of action to reduce emissions. The First Update recommended a mix of technologies in key economic sectors to reduce emissions through 2050 including: energy demand reduction through efficiency and activity changes; large-scale electrification of on-road vehicles, buildings and industrial machinery; decarbonizing electricity and fuel supplies; and, the rapid market penetration of efficient and clean energy technologies. As part of the First Update, CARB recalculated the state's 1990 emissions level, using more recent global warming potentials identified by the Intergovernmental Panel on Climate Change, from 427 MMT CO₂e to 431 MMT CO₂e.

In 2015, as directed by EO B-30-15, CARB began working on an update to the Scoping Plan to incorporate the 2030 target of 40% below 1990 levels by 2030 to keep California on its trajectory toward meeting or exceeding the long-term goal of reducing GHG emissions to 80 percent below 1990 levels by 2050 as set forth in S-3-05. The Governor called on California to pursue a new and ambitious set of strategies, in line with the five climate change pillars from his inaugural address, to reduce GHG emissions and prepare for the unavoidable impacts of climate change. In the summer of 2016, the Legislature affirmed the importance of addressing climate change through passage of Senate Bill 32 (SB 32) (Pavley, Chapter 249, Statutes of 2016).

In December 2017, CARB adopted *California's 2017 Climate Change Scoping Plan (2017 Scoping Plan)* for public review and comment (CARB 2017). The 2017 Scoping Plan builds on the successful framework established in the

initial Scoping Plan and First Update, while identifying new, technologically feasible and cost-effective strategies that will serve as the framework to achieve the 2030 GHG target as established by SB 32 and define the state's climate change priorities to 2030 and beyond. The strategies' known commitments include implementing renewable energy and energy efficiency (including the mandates of SB 350), increased stringency of the LCFS, measures identified in the Mobile Source and Freight Strategies, measures identified in the proposed Short-Lived Climate Pollutant (SLCP) Plan, and increased stringency of SB 375 targets. To fill the gap in additional reductions needed to achieve the 2030 target, it recommends continuing the Cap-and-Trade Program and a measure to reduce GHGs from refineries by 20%.

For local governments, the 2017 Scoping Plan replaced the initial Scoping Plan's 15 percent reduction goal with a recommendation to aim for a community-wide goal of no more than 6 MT CO₂e per capita by 2030 and no more than 2 MT CO₂e per capita by 2050, which are consistent with the state's long-term goals. The 2017 Scoping Plan recognized the benefits of local government GHG planning (e.g., through CAPs) and provide more information regarding tools CARB is working on to support those efforts. It also recognizes the CEQA streamlining provisions for project level review where there is a legally adequate CAP.⁴

When discussing project-level GHG emissions reduction actions and thresholds in the context of CEQA, the 2017 Scoping Plan states that "achieving no net additional increase in GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development" for project-level CEQA analysis, but also recognizes that such a standard may not be appropriate or feasible for every development project. The 2017 Scoping Plan further provides that "the inability of a project to mitigate its GHG emissions to net zero does not imply the project results in a substantial contribution to the cumulatively significant environmental impact of climate change under CEQA."

CARB released the *Draft 2022 Scoping Plan Update* in May 2022, which outlines the state's plan to reach carbon neutrality by 2045 or earlier, while also assessing the progress the state is making toward reducing GHG emissions by at least 40 percent below 1990 levels by 2030, as is required by SB 32 and laid out in the 2017 Scoping Plan. The carbon neutrality goal requires CARB to expand proposed actions from only the reduction of anthropogenic sources of GHG emissions to also include those that capture and store carbon (e.g., through natural and working lands, or mechanical technologies). The carbon reduction programs build on and accelerate those currently in place, including moving to zero-emission transportation; phasing out use of fossil gas use for heating homes and buildings; reducing chemical and refrigerants with high global warming potential (GWP); providing communities with sustainable options for walking, biking, and public transit; displacement of fossil-fuel fired electrical generation through use of renewable energy alternatives (e.g., solar arrays and wind turbines); and scaling up new options such as green hydrogen⁵ (CARB 2022).

The *Draft 2022 Scoping Plan Update* also emphasizes that there is no realistic path to carbon neutrality without carbon removal and sequestration, and to achieve the state's carbon neutrality goal, carbon reduction programs must be supplemented by strategies to remove and sequester carbon. Strategies for carbon removal and sequestration include carbon capture and storage (CCS) from anthropogenic point sources, where CO₂ is captured

⁴ Sierra Club v. County of Napa (2004) 121 Cal.App.4th 1490; San Francisco Tomorrow et al. v. City and County of San Francisco (2015) 229 Cal.App.4th 498; San Franciscans Upholding the Downtown Specific Plan v. City & County of San Francisco (2002) 102 Cal.App.4th 656; Seguovah Hills Homeowners Assn. V. City of Oakland (1993) 23 Cal.App.4th 704, 719.

⁵ Green hydrogen refers to hydrogen that is generated by renewable energy or from low-carbon power, and has significantly lower associated carbon emissions than grey hydrogen, which is produced using natural gas and makes up the majority of hydrogen production. For the purposes of the *Draft 2022 Scoping Plan*, the term "green hydrogen" is not limited to only electrolytic hydrogen produced from renewables.

as it leaves a facility's smokestack and is injected into geologic formations or used in industrial materials (e.g., concrete); and carbon dioxide removal (CDR) from ambient air, through mechanical (e.g., direct air capture with sequestration [DACS]) or nature-based (e.g., management of natural and working lands) applications.

The Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32, SB 32, and the EOs; it also establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions. A project is considered consistent with the statutes and EOs if it would meet the general policies in reducing GHG emissions in order to facilitate the achievement of the state's goals and would not impede attainment of those goals. While the 2022 Scoping Plan Update is still in draft form, the guidance and policies contained in the update are anticipated to largely remain unchanged. The public meeting to consider the *Draft 2022 Scoping Plan Update* was held in June 2022, and it is anticipated that adoption of the Plan will occur in the fall of 2022.

Local

Bay Area Air Quality Management District

On April 20, 2022, the BAAQMD Board of Directors held a public meeting and adopted the proposed CEQA Thresholds for Evaluating the Significance of Climate Impacts From Land Use Projects and Plans. The BAAQMD "Thresholds for Land Use Projects (Must Include A or B)" are as follows (BAAQMD 2022):

- A. Projects must include, at a minimum, the following project design elements:
 - 1. Buildings
 - a. The project will not include natural gas appliances or natural gas plumbing (in both residential and nonresidential development).
 - b. The project will not result in any wasteful, inefficient, or unnecessary electrical usage as determined by the analysis required under CEQA Section 21100(b)(3) and Section 15126.2(b) of the State CEQA Guidelines.
 - 2. Transportation
 - a. Achieve compliance with electric vehicle requirements in the most recently adopted version of CALGreen Tier 2.
 - b. Achieve a reduction in project-generated vehicle miles traveled (VMT) below the regional average consistent with the current version of the California Climate Change Scoping Plan (currently 15 percent) or meet a locally adopted Senate Bill 743 VMT target, reflecting the recommendations provided in the Governor's Office of Planning and Research's Technical Advisory on Evaluating Transportation Impacts in CEQA:
 - i. Residential projects: 15 percent below the existing VMT per capita
 - ii. Office projects: 15 percent below the existing VMT per employee
 - iii. Retail projects: no net increase in existing VMT.
- B. Projects must be consistent with a local GHG reduction strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b).

Alameda Climate Action and Resiliency Plan

In September 2019, the City of Alameda adopted the Alameda Climate Action and Resiliency Plan (CARP), which set a goal to reduce emissions by 50 percent below 2005 levels by 2030. Achieving this goal means the City must carry out already committed to actions (i.e., Transportation Choices Plan and the Zero Waste Implementation Plan) and new actions proposed in the CARP in the sectors of transportation, buildings, sequestration, and waste (City of Alameda 2019).

Environmental Setting

Climate change refers to any significant change in measures of climate (e.g., temperature, precipitation, or wind patterns) lasting for an extended period of time (i.e., decades or longer). Earth's temperature depends on the balance between energy entering and leaving the planet's system, and many factors (natural and human) can cause changes in Earth's energy balance. The greenhouse effect is the trapping and buildup of heat in the atmosphere near Earth's surface (the troposphere). The greenhouse effect is a natural process that contributes to regulating Earth's temperature, and it creates a livable environment on Earth. Human activities that emit additional GHGs to the atmosphere increase the amount if infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and causing Earth's surface temperature to rise. Global climate change is a cumulative impact; a project contributes to this impact through its incremental contribution combined with the cumulative increase of all other sources of GHGs. Thus, GHG impacts are recognized exclusively as cumulative impacts (CAPCOA 2008).

A GHG is any gas that absorbs infrared radiation in the atmosphere; in other words, GHGs trap heat in the atmosphere. As defined in California Health and Safety Code Section 38505(g) for purposes of administering many of the state's primary GHG emissions reduction programs, GHGs include CO₂, CH₄, N₂O, HFCs, PFCs, sulfur hexafluoride, and nitrogen trifluoride (see also CEQA Guidelines Section 15364.5). The three GHGs evaluated herein are CO₂, CH₄, and N₂O because these gases would be emitted during the project's construction.

The Intergovernmental Panel on Climate Change developed the GWP concept to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The reference gas used is CO_2 ; therefore, GWP-weighted emissions are measured in metric tons (MT) of CO_2 equivalent (CO_2e). Consistent with CalEEMod version 2020.4.0, this GHG emissions analysis assumed the GWP for CH₄ is 25 (i.e., emissions of 1 MT of CH₄ are equivalent to emissions of 25 MT of CO_2), and the GWP for N₂O is 298, based on the Intergovernmental Panel on Climate Change's Fourth Assessment Report (IPCC 2007).

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less-than-Significant Impact. Construction of the project would result in GHG emissions, which are primarily associated with use of off-road construction equipment, on-road vendor (material delivery) trucks, worker vehicles, and marine vessels. A detailed depiction of the construction assumptions is included in Appendix B. The estimated project-generated GHG emissions from demolition and construction activities are shown in Table 3.8-1.

	CO2	CH₄	N2O	CO ₂ e
Construction	Metric Tons pe	r Year		
Off-road Equipment and On-road Vehicles	45.28	<0.01	<0.01	45.46
Marine Vessels	31.72	<0.01	<0.01	31.83
Total Project GHGs	HGs 77.29			

Table 3.8-1. Estimated Annual Construction Greenhouse Gas Emissions

Source: Appendix B.

Notes: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent.

As shown in Table 3.8-1, the estimated total GHG emissions during construction would be approximately 77 MT CO₂e over the construction period. As with project-generated construction criteria air pollutant emissions, GHG emissions generated during construction of the project would be short term in nature, lasting only for the duration of the construction period (30 working days), and would not represent a long-term source of GHG emissions. Notably, the BAAQMD has stated that there is no proposed construction-related climate impact threshold at this time, since GHG emissions from construction represent a very small portion of a project's lifetime GHG emissions (BAAQMD 2022). The BAAQMD thresholds for land use projects are designed to address operational GHG emissions which represent the vast majority of project GHG emissions. Additionally, the project would result in refurbishment of the AMS Ferry Terminal, which helps reduce single-occupant vehicle use and associated GHG emissions in the Bay Area. Based on the negligible GHG emissions generated by construction, and since the project would not result in an increase in long-term operational GHG emissions, and it would support alternative transportation in the Bay Area, potential emissions contributions are not cumulatively considerable. Impacts would be less than significant and no mitigation is required.

b) Would the project generate conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less-than-Significant Impact. As mentioned previously, the City developed the CARP to identify strategies by which the City would reduce GHG emissions to 50 percent below 2005 levels by 2030, which exceeds the statewide goal (City of Alameda 2019). Overall, as discussed in GHG impact a), the project would result in minimal GHG emissions from construction and would not result in increased GHG emissions during operations. In addition, the project would support the reduction of single-occupant vehicle use and associated GHGs by continuing to provide ferry service in the Bay Area. Based on these considerations, the project would not conflict with the City's CARP or impede the statewide trajectory towards the SB 32 GHG reduction goals.

The Scoping Plan (approved by CARB in 2008 and updated in 2014 and 2017), provides a framework for actions to reduce California's GHG emissions and requires CARB and other state agencies to adopt regulations and other initiatives to reduce GHGs. As such, the Scoping Plan is not directly applicable to specific projects. Relatedly, in the Final Statement of Reasons for the Amendments to the CEQA Guidelines, the California Natural Resources Agency (CNRA) observed that "[t]he [Scoping Plan] may not be appropriate for use in determining the significance of individual projects because it is conceptual at this stage and relies on the future development of regulations to implement the strategies identified in the Scoping Plan" (CNRA 2009). Under the Scoping Plan, however, there are several state regulatory measures aimed at the

identification and reduction of GHG emissions. CARB and other state agencies have adopted many of the measures identified in the Scoping Plan. Most of these measures focus on area source emissions (e.g., energy usage, high-GWP GHGs in consumer products) and changes to the vehicle fleet (i.e., hybrid, electric, and more fuel-efficient vehicles) and associated fuels (e.g., LCFS), among others. To the extent that these regulations are applicable to the project, the project would comply will all regulations adopted in furtherance of the Scoping Plan to the extent required by law.

In summary, the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Impacts would be less than significant and no mitigation is required.

3.9 Hazards and Hazardous Materials

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX.	HAZARDS AND HAZARDOUS MATERIALS - Wo	ould the project:			
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				
C)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				
d)	Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?				
f)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				\boxtimes

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
g)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?				

Regulatory Framework

California Occupational Safety and Health Administration

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations within the state. Cal/OSHA standards are typically more stringent than federal OSHA regulations and are presented in Title 8 of the CCR. Cal/OSHA conducts onsite evaluations and issues notices of violation to enforce necessary improvements to health and safety practices.

Title 8 of the CCR also includes regulations that provide for worker safety when blasting and explosives are utilized during construction activities. These regulations identify licensing, safety, storage, and transportation requirements related to the use of explosives in construction.

Environmental Setting

The State Water Resources Control Board's (SWRCB) GeoTracker website along with the California Department of Toxic Substances Control's (DTSC) Envirostor website provide a comprehensive list of the facilities and sites identified as meeting the "Cortese List" requirements pursuant to Government Code Section 65962.5. The SWRCB Geotracker website provides data relating to leaking underground storage tanks and other types of soil and groundwater contamination, along with associated cleanup activities. Three hazardous materials sites were identified within 0.5 miles of the project site, all of which have previously undergone site investigation, remediation, and closure (SWRCB 2022). As such, no active hazardous materials sites were identified within the project vicinity. The DTSC Envirostor website provides data related to hazardous materials spills and clean ups. No active hazardous waste facilities are located within 0.5 miles of the project site. One site, Miller Elementary School, which is no longer operational, is considered open for investigation, however no action from DTSC is required. (DTSC 2022).

The nearest school is Ruby Bridges Elementary School, which is approximately 0.75 mile southeast of the project site.

The nearest airport, Oakland International Airport, is located approximately 5.5 miles southeast of the project site. The project site is outside of the airport influence area (Alameda County 2010).

The Alameda County Emergency Operations Plan (EOP) establishes the foundational policies and procedures that define how Alameda County will effectively prepare for, respond to, recover from, and mitigate against natural or human-caused disasters. It provides a description of the emergency management organization and how it is activated. (Alameda County 2012).

The City of Alameda, which includes the project site, is within a Local Responsibility Area (LRA) and is designated as a non-very high fire hazard severity zone (VHFHSZ). The entire City of Alameda is an urbanized area and there are no wildlands in proximity to the site.

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less-than-Significant Impact. Equipment used during construction of the project would require the use of oil, diesel fuel, gasoline, hydraulic fluid, and other liquid materials that would be considered hazardous if improperly stored or handled. Operation of the project is not anticipated to involve the use of hazardous materials. WETA would be required to comply with existing laws and regulations regarding the transportation, use, and disposal of hazardous materials during construction and operation. Specifically, the project would be required to comply with the California Environmental Protection Agency's Unified Program, which protects Californians from hazardous waste and hazardous materials by ensuring consistency throughout the state regarding the implementation of administrative requirements, permits, inspections, and enforcement at the local regulatory level. Regulated activities would be managed by the Alameda County Department of Environmental Health, which is the designated Certified Unified Program Agency, and in accordance with the regulations included in the Unified Program (e.g., hazardous materials release response plans and inventories, California Uniform Fire Code hazardous material management plans and inventories). Furthermore, the Department of Transportation Hazardous Materials Regulations cover all aspects of hazardous materials handling and transportation. Parts 130 (Oil Spill Prevention and Response) and 172 (Emergency Response) would apply to project construction activities. Compliance with applicable regulations would reduce the potential for accidental release of hazardous materials during project construction.

The project would be required to comply with existing laws and regulations regarding hazardous materials. These regulations are specifically designed to protect the public health and the environment and must be adhered to during project construction and operation. Compliance with applicable regulations would address risks related to the transportation, use, and disposal of hazardous materials. Impacts would be less than significant, and no mitigation is required.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less-than-Significant Impact. As discussed above, there are no existing active hazardous materials sites at the project site or within 0.5 miles. However, project construction could involve the transport, storage, use, and disposal of hazardous materials. Implementation of the project would comply with existing laws and regulations regarding the transportation, use, and disposal of hazardous materials in relation to construction and operation of the refurbished terminal. These regulations are specifically designed to protect the public health and the environment and must be adhered to during project construction and operation. Impacts would be less than significant and no mitigation is required.

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact. Ruby Bridges Elementary School is located 0.75 miles to the southwest of the project. No schools are proposed in the project area. Therefore, the project would not result in the release of hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. There would be no impact, and no mitigation is required.

d) Would the project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. As discussed above, review of the GeoTracker and Envirostor databases determined that no designated hazardous materials sites are located on the project site. Three former hazardous waste facilities were located within 0.5 miles of the site, however they are not active and are considered closed. Thus, no active designated hazardous materials sites are on or near the project site. There would be no impacts, and no mitigation is required.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact. The project area is not located within an airport land use plan, within 2 miles of a public airport, or in the vicinity of a known private airstrip. The project site is located approximately 5.5 miles northwest of the Oakland International Airport and is outside of the airport influence area as well as the 60-community noise equivalent level (CNEL) airport noise contour (Alameda County 2010). Project construction and operation would not result in any safety hazards or excessive noise within the vicinity of the airport. There would be no impact, and no mitigation is required.

f) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact. The project would include refurbishment and upgrades to the existing AMS Ferry Terminal in Alameda County. Construction and operation would not impede vehicular travel on local roadways. During the construction period, equipment/personnel staging would occur within the terminal parking lot and emergency access and circulation would be maintained at all times. The project does not propose any modifications or revisions to existing emergency response or evacuation plans within the City or Alameda County. There would be no impacts, and no mitigation is required.

g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

No impact. The project site is within a developed area in the City of Alameda. Based on the California Department of Forestry Resources Very High Fire Hazard Severity Zone Map, the project site is within the Local Responsibility Area and is not located within an area identified as a high Fire Hazard Severity Zones (FHSZ) (CAL FIRE 2022). Construction and operation of the project would not expose people or structures

to a significant risk of loss, injury, or death involving wildland fires. There would be no impacts and no mitigation is required.

3.10 Hydrology and Water Quality

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
Χ.	HYDROLOGY AND WATER QUALITY - Would the	project:		T	
a)	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?				
b)	Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?				
C)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
	result in substantial erosion or siltation on- or off-site;			\boxtimes	
	substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;				\boxtimes
	 iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or 				
	iv) impede or redirect flood flows?				\boxtimes
d)	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			\square	
e)	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?			\boxtimes	

Regulatory Framework

Clean Water Act

The objective of the federal Clean Water Act (CWA) (33 USC 1251 et seq.) is to restore and maintain the chemical,

physical, and biological integrity of the nation's waters. Specific sections of the CWA control the discharge of pollutants and wastes into the marine and aquatic environments. The major section of the CWA that would apply to the proposed project is the National Pollutant Discharge Elimination System (NPDES) (Section 402). In the event maintenance dredging is needed, those activities would be regulated under Sections 401 and 404.

Water Quality Control Act

The Water Quality Control Act (Porter-Cologne Act) (California Water Code Sections 13000 et seq.; CCR Title 23, Chapter 3, Subchapter 15) is the primary state regulation that addresses water quality. The requirements of the Act are implemented by the State Water Resources Control Board (SWRCB) at the state level, and RWQCB at the regional level. Under Subchapter 15, wastes that cannot be discharged directly or indirectly to waters of the state (and therefore must be discharged to land for treatment, storage, or disposal) are classified to determine specifically where such wastes may be discharged. This classification requirement would apply to dredged material or fill, if any, that would be disposed of in an upland environment.

California Green Building Code

Title 24, Part 11, Section 5.106 of the California Building Code (or CALGreen Code), outlines BMPs to prevent the pollution of stormwater runoff from construction activities for projects that would disturb less than one acre. BMPs include erosion control, sediment control, construction scheduling practices, dewatering activities, material handling, vehicle/equipment management, spill prevention and control, and others.

San Francisco Bay Basin Plan

The Water Quality Control Plan for San Francisco Bay Basin Plan (Basin Plan) identifies surface waters in the region as consisting of inland surface water (freshwater lakes, rivers, and streams), estuaries, enclosed bays, and ocean waters. The Basin Plan describes the water quality control measures that contribute to the protection of the beneficial uses of the Bay watershed. The Basin Plan identifies beneficial uses for each segment of the Bay and its tributaries, water quality objectives for the reasonable protection of the uses, and an implementation plan for achieving these objectives. Beneficial uses of the Bay include commercial and sport fishing, estuarine habitat, industrial water supply, fish migration, navigation, industrial process water supply, preservation of rare and endangered species, contact and noncontact water recreation, shellfish harvesting, fish spawning, and wildlife habitat.

BCDC is responsible for implementing the McAteer-Petris Act (PRC Sections 66600 et seq.). The Act directs BCDC to exercise its authority to issue or deny permit applications for placing fill, extracting minerals, or changing the use of any land, water, or structure within the area of its jurisdiction (San Francisco Bay waters and a 100-foot-wide shoreline band inland from the high tide line). BCDC also carries out determinations of consistency with the Federal Coastal Zone Protection Act for federally sponsored projects. It also specifies no creosote-treated wood pilings or other structures may be placed in any area subject to tidal action.

Environmental Setting

The project site lies within the San Francisco Bay Hydrologic Region (HR) surface watershed, which covers 4,603 square miles, and includes all of San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda counties. The project site is located on the northern shoreline of the City of Alameda, which lies in between Oakland-Alameda Estuary ("Estuary"), and San Francisco Bay.

Oakland Inner Harbor and San Francisco Bay

The project site is located in the central portion of the City of Alameda between Oakland Inner Harbor and San Francisco Bay, Central Basin. The project site lies adjacent to the Oakland Inner Harbor – a tidal canal, part of the Oakland Estuary – originally a tidal slough that originated in a vast marsh stretching from Lake Merritt to Brooklyn Basin. The Oakland Estuary is influenced by both freshwater and marine water. The Estuary receives freshwater inflow from a combination of natural creeks, human-made stormwater drainage facilities, and direct surface runoff. The Estuary is also influenced by the marine waters of San Francisco Bay and is subject to tidal currents. Sediment from the City of Oakland's shoreline and creeks is carried by the tidal current to shoals and sandbars, causing siltation of the shipping channels that periodically require dredging.

Groundwater

The project site lies in the East Bay Plain of the San Francisco Bay HR. Subsurface groundwater at the project site occurs at shallower depths consistent with the low existing ground elevations. During the most recent geotechnical investigation near the site, groundwater was observed at approximately 6.5 below ground surface (ENGEO 2022).

Flood/Tsunami Hazards

The landside of the project site is located in a special flood hazard area (Zone AE), or areas with a 1 percent annual chance of flooding (FEMA 2022). The shoreside of the project site is located entirely within the Oakland Inner Harbor.

The project site is mapped within a tsunami hazard zone on the CGS tsunami hazard map for the County of Alameda, indicating that it is within inundation limits corresponding to a 975-year average return period tsunami event (ENGEO 2022).

a) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Less-than-Significant Impact. The applicable water quality standards for the portion of the Bay where the proposed project is situated are set forth in the Basin Plan, which is administered by the San Francisco RWQCB. The major waterside construction activities would include replacement of existing terminal structures and installation of pipe piles, guide piles, donut fender piles, and a monopile. During construction activities, installation of piles could mobilize underwater sediments into the water column. Any activity involving the use of construction products and heavy equipment could also result in the incidental release of construction materials (e.g., sawdust, metal fragments, concrete), or the accidental spill of construction materials (e.g., paints and solvents) or substances commonly used in construction equipment (e.g., fuels, oil, grease). Compliance with applicable water quality regulations would reduce the potential for waterside activities, including utility connections and removal/replacement of the bridge structure, spills from construction products and leaks from the equipment have the potential to enter stormwater that flows across the site toward the Bay. Stormwater runoff would be controlled through best management practices outlined in Title 24, Part 11, of the CALGreen Code, which would be required through project implementation. Impacts would be less than significant and no mitigation is required.

b) Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less-than-Significant Impact. The project involves replacement and upgrades to the existing AMS Ferry Terminal within the Oakland Inner Harbor and along the City of Alameda shoreline. No groundwater is expected to be encountered during construction activities because construction activities would largely take place along the shoreline, rather than landside. The project site is currently developed with both pervious and impervious surfaces. Refurbishment of the existing AMS Ferry Terminal would not substantially alter impervious surfaces because most of the project structures would be located within the water. Therefore, the project would not interfere with nor adversely affect groundwater supplies or recharge. Impacts would be less than significant and no mitigation is required.

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) Result in substantial erosion or siltation on- or off-site?

Less-than-Significant Impact. As previously discussed, project construction activities involving replacement of structures and installation of piles would primarily occur within the shoreline (waterside) portion of the project. Landside components include minor utility upgrades, the bridge structure, and construction of new piles to support it. Installation of landside components and construction are not anticipated to result in a significant temporary or permanent modification the shoreline such that it could be susceptible to erosion or cause siltation. Further, the project would comply with BMPs set forth in Title 24 of the CALGreen code intended to reduce or eliminate the potential for project-related impacts such as erosion or siltation that would otherwise degrade local water quality. As such, the project would not substantively alter the existing drainage pattern on land. Impacts would be less than significant, and no mitigation is required.

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

No Impact. Project implementation would include replacement and upgrades to structures at the existing AMS Ferry Terminal in addition to minor utility upgrades. Structures to be replaced are located primarily onsite waterside, within the Oakland Inner Harbor. No new permanent impermeable surfaces would be introduced within the project site such that increased surface water/runoff would result during a rain or storm event. No increase in- on or off-site flooding is anticipated. There would be no impact and no mitigation is required.

iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

No Impact. As described above, project implementation would not result in new, permanent impermeable surfaces that would change stormwater peak flows, volumes, or result in changes in stormwater quality compared to existing conditions. Replacement of terminal structures and installation of piles would occur

within the Oakland Inner Harbor and would not contribute flows to a stormwater drainage system. There would be no impact and no mitigation would be required.

iv) Impede or redirect flood flows?

No Impact. As described above, the landside of the project site is located in a special flood hazard area (Zone AE), or areas with a 1 percent annual chance of flooding. The shoreside is located within the Oakland Inner Harbor. Upgrades and replacement of existing terminal structures would have no effect on tidal flooding that could redirect or impede flood flows landside of the terminal because the project would not involve placement of fill or create barriers to flow. There would be no impact and no mitigation is required.

d) In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Less-than-Significant Impact. See criterion (c-iv) for discussion regarding floor hazards. Portions of San Francisco Bay are susceptible to tsunami hazard. However, the proposed project would not involve any occupancy of permanent structures that could be damaged by tsunami. The terminal structure, although modified as part of the project, could be subject to flooding by tsunami. Tsunami-induced flooding at the site could damage the terminal features or a vessel moored there, but people would not be exposed to any risk because evacuation procedures implemented by WETA and the City of Alameda would ensure populations at risk would not be present. Seiche historically has not resulted in substantial flooding or damage in the San Francisco Bay Area. Given that marine facilities can be readily replaced (although costly) and that landside facilities are above the predicted inundation level, potential risks related to release of pollutants is low. Impacts would be less than significant, and no mitigation is required.

e) Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less-than-Significant Impact. Implementation of the project would not involve the use of groundwater. Earthmoving activities associated with project construction would consist of installation of new piles to support replacement of terminal structures and would occur within the Oakland Inner Harbor. Project construction activities would comply with the CBC, including BMP requirements intended to reduce water quality impacts (e.g., erosion and siltation control). Therefore, the project would not conflict with or obstruct a water quality control plan or groundwater management plan. Impacts would be less than significant and no mitigation is required.
3.11 Land Use and Planning

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XI.	LAND USE AND PLANNING - Would the project	ct:	-		
a)	Physically divide an established community?				
b)	Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?				

Regulatory Framework/Environmental Setting

The project site is located in the City of Alameda and is designated as General and Maritime Industry on the Alameda General Plan land use map. Surrounding uses include public parks and open space, medium-density residential, low-density residential, and mixed-use (City of Alameda 2021b). The project site is zoned as General Industrial (M- 2) (City of Alameda 2019).

a) Would the project physically divide an established community?

No Impact. The construction and operation of the project would occur on a site that is surrounded by development and the Oakland Inner Harbor and would not physically divide an established community. Rather, the project would support continued and improved operation of the AMS Ferry Terminal to provide transportation options to the public. There would be no impact and no mitigation is required.

b) Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

No Impact. The project would not result in any land use changes, and would not conflict with any adopted plans, policies, or regulations adopted for avoiding or mitigating an environmental effect. There would be no impact and no mitigation would be required.

3.12 Mineral Resources

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. M	IINERAL RESOURCES – Would the project:				
mi	esult in the loss of availability of a known ineral resource that would be of value to ne region and the residents of the state?				\boxtimes
, de	esult in the loss of availability of a locally- nportant mineral resource recovery site elineated on a local general plan, specific lan or other land use plan?				

Regulatory Framework

No plans, policies, regulations, or laws related to mineral resources are applicable to the project.

Environmental Setting

Regionally significant mineral deposits are located in the range of coastal mountains that extends along the coast of California, however, such deposits have not been identified anywhere in the City of Alameda. The entire city, as well as neighboring areas in Oakland, San Leandro, and Emeryville, are classified Mineral Resource Zone (MRZ) category MRZ-1 by the California Department of Conservation's Division of Mines and Geology (DMG). The MRZ-1 designation is assigned to areas where available information is adequate to determine that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

a,b) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. The City of Alameda, including the project site, is classified as MRZ-1. No known mineral deposits are present within the project site or immediate project area. Project implementation would include upgrades to the existing AMS Ferry Terminal and would not result in a loss of availability of known or locally important mineral resources. There would be no impact and no mitigation would be required.

3.13 Noise

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII	I. NOISE – Would the project result in:			1	
a)	Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				
b)	Generation of excessive groundborne vibration or groundborne noise levels?			\boxtimes	
C)	For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				

Environmental Setting

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. Sound is the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a human ear. Noise is defined as loud, unexpected, annoying, or unwanted sound. As sound travels through the atmosphere from the source to the receiver, noise levels attenuate (i.e., decrease) depending on a variety of factors, including geometric spreading (i.e., spherical or cylindrical spreading), ground absorption (i.e., hard versus soft sites), atmospheric conditions (e.g., wind direction and speed, air temperature, humidity, turbulence), and shielding by natural or human-made features.

The amplitude of pressure waves generated by a sound source determines the loudness of that source, also called the sound pressure level (SPL). SPL is most commonly described by using decibels (dB) because this logarithmic unit best corresponds to the way the human ear interprets sound pressures and allows for a more usable scaled numbering system. However, the decibel scale does not adequately characterize how humans perceive noise because the human ear is not equally sensitive to loudness at all frequencies (i.e., pitch) in the audible spectrum. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of decibels A-weighted or dBA) can be computed based on this information. All sound levels discussed in this section are expressed in A-weighted decibels.

Because decibels are logarithmic units, SPLs expressed in dB cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In typical noisy

environments, changes in noise of 1-2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness (Caltrans 2013a:2-10).

Various noise descriptors have been developed to describe time-varying noise levels and their perception. The noise descriptors used in this chapter include:

- Equivalent Continuous Sound Level (Leq): Leq represents an average of the sound energy occurring over a specified period. In effect, Leq is the steady-state sound level containing the same acoustical energy as the time varying sound level that occurs during the same period (Caltrans 2013a:2-48). For instance, the 1-hour equivalent sound level, also referred to as the hourly Leq, is the energy average of sound levels occurring during a 1-hour period; and
- Maximum Sound Level (Lmax): Lmax is the highest instantaneous sound level measured during a specified period (Caltrans 2013a:2-48; FTA 2018:207–208).

Ground Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Groundborne vibration is vibration of and through the ground. Sources of groundborne vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery) or transient in nature (e.g., explosions).

Groundborne vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV and RMS vibration velocity are normally described in inches per second (in/sec) but can also be expressed in decibel notation (VdB), which is used mainly in evaluating human response to vibration.

Existing Sources of Noise and Sensitive Receptors

The predominant noise sources in the project area include vehicle traffic and industrial noises from adjacent shipyard and general Oakland Inner Harbor operations. This includes the Bay Ship & Yacht Company (a full-service ship repair company), which is located immediately to the east of the project site. Their property includes two floating drydocks, a Synchrolift, rails to dry-berth, and a propeller shop. Recreational uses to the south and west (the Main Street Dog Park and San Francisco Bay Trail), and residential uses further to the south of the project site generally do not generate much noise. The project site is located approximately 5.5 miles northwest of the Oakland International Airport, and approximately 2 miles outside of the 60 dBA CNEL noise level contour, and thus, does not substantially influence the noise environment at the project site.

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in healthrelated risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Vibration-sensitive land uses are generally considered to be buildings or structures that could be damaged due to vibration or land uses where vibration levels could interfere with operations or cause human annoyance. As shown in Figure 2-2 in Section 2, Project Description, the project boundaries are limited to the existing AMS Ferry Terminal and parking lot. As described, sensitive receptors located close to various components of the project site include recreational facilities. The San Francisco Bay Trail runs immediately behind the terminal structure (approximately 60 feet from the gangway) and the Main Street Dog Park is approximately 260 feet from the float and 350 feet from the gangway. Further south and across the terminal parking lot and separated from the project site by Main Street (a two-way arterial street) are residential land uses. The edge of the nearest residence is located approximately 500 feet south of the project site. No residences are located immediately to the north, east, or west of the project site.

a) Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction Noise

The project would involve refurbishment and upgrade of the existing terminal structures on the northernmost portion of the site, with the majority of work occurring in and immediately adjacent to the water. Installation of steel pipe piles for the new float, donut fenders, and bridge support are expected to use a vibratory hammer, with an impact hammer used only if needed. Installation of steel pipe piles can produce intense underwater noise that may lead to physical damage to swim bladders and/or other soft tissues, or cause alterations to swimming, sleeping, or foraging behaviors in fish and marine mammals.

To evaluate the potential project noise impacts related to pile installation in the water, a hydroacoustic assessment was conducted by Illingworth and Rodkin in 2022 (Appendix E). The analysis indicated that impact pile driving of the largest piles (48 in) could result in maximum underwater noise impacts exceeding the marine mammal thresholds extending out to about 997 meters for the Level A Injury zone for Pinnipeds while extending out to about 4,200 meters for the Level B Harassment zone. Impact pile driving of the largest (48 in) piles could result in acoustic impacts at distances extending out to 4,200 m and 1,010 m for the root-mean-square (RMS) (150 decibel [dB] re 1 micropascal [μ Pa]) and Cumulative sound exposure level (SEL) (187 dB re 1 μ Pa²-sec) respectively. Impacts to biological resources in the water during project construction activities are further discussed in Section 3.4, Biological Resources.

Landside and above-water noise generated construction would be limited to the operation of construction equipment and removal and replacement of the terminal bride/foundation, gangway, and float, as well as installation of a new potable water line at the terminal. Landside and above-water construction activities would be temporary in nature (intermittently over a 4-6 week period), and would involve vibration pile driving (unless impact pile driving is required). The majority of noise generated by construction activities would be similar in nature to other commercial/industrial activities that occur in the immediate vicinity. The most substantial noise sources would be caused by vibratory or impact pile driving (inclusive of noise from a crane, generator, or compressor), which would result in a noise level of approximately 68 dB at the nearest resident to the south based on Federal Highway Administration (FHWA) reference noise level data (FHWA 2006, FTA 2018).

As described in Section 2, Project Description, it is anticipated that project construction would occur Monday through Friday, 7:00 a.m. to 3:30 p.m., with the potential for Saturday work, which would be consistent with Section 4-10.7 of the Alameda Municipal Code. Section 4.10.5 restricts construction

activities between 7:00 a.m.-7:00 p.m. and Section 4.10-7 provides an exemption from the Alameda Municipal Code for construction if activities stay within this timeframe.

Equipment/personnel staging would occur within the terminal parking lot and emergency access and circulation (including bicycle/vehicular access) would be maintained at all times. No customer access to the terminal would be provided and ferry users would be routed to nearby terminals.

Operational Noise

After construction is completed, the project would not appreciably increase the number of employees or visitors at the project site to operate the terminal. Operations at the project site would be similar to existing conditions, would not result in any new vehicle trips to and from the site, and thus there would be no measurable change in traffic noise levels. The types of operational, noise-generating equipment used at the project site would be similar to the types of equipment currently used. As such, no new stationary noise would be generated compared to existing conditions. Construction noise impacts would be less than significant.

Summary

Less-than-Significant Impact. As described above, the project would not substantial temporary or permanent increase in ambient noise levels during construction or operation. Impacts would be less than significant and no mitigation is required.

b) Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Less-than-Significant Impact. As described in section a, installation of steel pipe piles for the new float and donut fenders, and bridge support, are expected to use a vibratory hammer, with an impact hammer used only if needed.

Potential impacts associated with use of the vibratory hammer could have an adverse impact on protected biological species in the project area that occur in the water. Potential noise impacts to biological resources resulting from use of the vibratory or impact hammer are discussed in Section 3.4, Biological Resources.

Groundborne vibration from various construction equipment have been documented and are presented in the Federal Transit Authority's Transit Noise and Vibration Impact Assessment Manual. The level of groundborne vibration generated by an impact pile driver have been shown to reach 1.518 in./sec. PPV, with typical vibration levels of 0.644 in./sec. PPV. Vibratory pile drivers have been shown to reach 0.734 in./sec. PPV with typical levels of 0.17 in./sec. PPV. The nearest sensitive residential structure are the houses south-southwest of the project 2860 Barbers Point Road), at an approximate distance of 545 feet from the nearest piles (24-in steel pipe piles to secure the landside of the terminal bridge). Propagating the upper level for impact pile driving to the residential structure, the level generated by the impact pile driving would be reduced to approximately 0.015 in./sec. PPV. Vibratory pile driving activities and the use of other construction equipment anticipated for use on the project would produce vibration levels far below that of the impact pile driver. Groundborne vibration associated with construction of the proposed project would be well below Caltrans' Guideline Vibration Damage Potential Threshold Criteria of

0.5 in./sec. PPV for older residential structures. Impacts would be less than significant, and no mitigation is required.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The project is not located within an airport land use plan or within two (2) miles of a public airport or public use airport. Additionally, the project is not located within two (2) miles of a private airstrip. As described above, the Oakland International Airport is located approximately 5.5 miles southeast of the project site. Further, the project would not include any new land uses where people would live or work. There would be no impact, and no mitigation is required.

3.14 Population and Housing

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV	POPULATION AND HOUSING – Would the projection	ect:			
a)	Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				
b)	Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				

Regulatory Framework

No plans, policies, regulations, or laws related to mineral resources are applicable to the project.

Environmental Setting

The City of Alameda's population was estimated to be 77,784 in 2022. Total housing for 2022 included an estimated 75,677 units within the City with an average of 2.4 persons per household (DOF 2022). The project does not include or remove a residential development and would not provide any new permanent jobs.

a) Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The project does not include new homes or businesses that would induce or generate unplanned population growth. The construction and operation of the project would not remove an obstacle to growth through extension of roads and/or other infrastructure, indirectly inducing population growth. There would be no impacts and no mitigation is required.

b) Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. The project site is developed with the existing AMS Ferry Terminal. The project would not displace existing homes or businesses and would not require the construction of replacement housing. There would be no impacts and no mitigation is required.

3.15 Public Services

	Potentially Significant Impact	Mitigation	Less Than Significant Impact	No Impact
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XV. PUBLIC SERVICES

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

Fire protection?		\square
Police protection?		\square
Schools?		\square
Parks?		\square
Other public facilities?		\square

Regulatory Framework

No plans, policies, regulations, or laws related to public services are applicable to the project.

Environmental Setting

Fire protection within the project area is provided by the City of Alameda Fire Department. Alameda Fire Station 2 is located approximately 1.3 miles south of the project site. City of Oakland Fire Station 2 is located approximately 0.9-mile northeast of the project site, across the Inner Harbor.

Police services within the project area are provided by the Alameda Police Department. The police department is located approximately 3.25 miles southeast of the project site. The Oakland Police Department is located approximately 1.2 miles northeast of the project site, across the Inner Harbor.

The project site is within the area of the Alameda Unified School District. The nearest school is Ruby Bridges Elementary School, which is approximately 0.75 mile southeast of the project site.

The nearest parks and/or other public facilities include the San Francisco Bay Trail, which runs along the Bay shoreline and between the terminal and the terminal parking lot, Main Street Dog Park, which is located directly adjacent to the project site to the west, as well as the Alameda Estuary Park, approximately 0.3 miles east of the project site. Other parks/public facilities within 0.75 mile of the project site include Bayport Park, Alameda Point Soccer Field, and Alameda Point Multipurpose Field.

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

Fire protection?

No Impact. Implementation of the project would not increase demand for fire protection services because the project would not generate new residents or businesses, which is generally the driving factor for increased or expanded fire protection services. During construction, emergency access would be maintained along roadways for emergency vehicles and services. Because the project would not increase demand for fire protection services, the construction of new or expansion of existing fire service facilities would not be required. There would be no impacts and no mitigation is required.

Police protection?

No Impact. Implementation of the project would not increase demand for police protection services because the project would not generate new residents or businesses. During construction, emergency access would be maintained along roadways for emergency vehicles and services. Because the project would not increase demand for police protection services, the construction of new or expansion of existing police service facilities would not be required. There would be no impacts and no mitigation is required.

Schools?

No Impact. The project would not provide any new housing that would generate new students in the community nor result in an increase in employment opportunities that could indirectly contribute new students to the Alameda Unified School District. There would be no impacts and no mitigation is required.

Parks?

No Impact. Impacts to parks are typically associated with population growth and/or alteration or removal of existing park spaces. The project would not alter or remove any parks or recreational facilities, would not result in additional housing, and would not generate new residents. There would be no impacts and no mitigation is required.

Other public facilities?

No Impact. As previously described, the project would involve upgrades and modifications to the AMS Ferry Terminal. No residences or businesses would be removed or added to the local population, and operation of the upgraded terminal would not impact demand for public facilities in Alameda. There would be no impacts and no mitigation is required.

3.16 Recreation

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact			
XV	XVI. RECREATION							
a)	Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?							
b)	Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?							

Regulatory Framework

No plans, policies, regulations, or laws related to recreation are applicable to the project.

Environmental Setting

As described in Section 3.15, "Public Services," the nearest parks and other public facilities to the project site include the San Francisco Bay Trail and Main Street Dog Park, which are located directly adjacent to the project site, as well as the Alameda Estuary Park, approximately 0.3 miles east of the site. Other parks/public facilities within 0.75 mile of the project site include Bayport Park, Alameda Point Soccer Field, and Alameda Point Multipurpose Field.

a,b) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

No Impact. Implementation of the project includes upgrades to the existing AMS Ferry Terminal. The project would not alter or remove any parks or other recreational facilities, nor would it alter the short- or long-term use of parks or recreation facilities. Additionally, the project would not generate increased

population or additional housing such that increased use of parks and recreational facilities necessitate new or expanded parks or recreation facilities. There would be no impacts and no mitigation is required.

3.17 Transportation

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI	II. TRANSPORTATION – Would the project:				
a)	Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?			\boxtimes	
b)	Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?			\boxtimes	
C)	Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				
d)	Result in inadequate emergency access?			\boxtimes	

Environmental Setting

As described in Section 2, Project Description, regional access to the City of Alameda is provided by a variety of transportation modes. Interstate 880 (I-880) through Oakland—the nearest freeway to the project site—provides regional access for automobiles and transit. Regional traffic accesses the project site via State Route 61 (SR 61) through the Webster-Posey Tubes, the Park Street Bridge, the Miller Sweeney Bridge, and the High Street Bridge connecting the island of Alameda and the City of Oakland. The project site is accessed by Main Street, a two (2)-lane arterial road that includes intermittent bike lanes.

The San Francisco Bay Trail, which traverses the project site through the terminal facility provides 350 miles of trails that surround the Bay and welcomes hikers, joggers, bicyclists, skaters and wheelchair users. No sidewalks or other pedestrian facilities are located at the project site.

Public transit in the project area includes the Alameda-Contra Costa Transit District (AC Transit), which is the primary bus service provider in Alameda. The nearest AC Transit bus stop from the project site is approximately 0.3 miles south, on West Midway Avenue. The Alameda Main Street Ferry also serves the project area for public transportation via ferry to Downtown San Francisco.

a) Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Less-than-Significant Impact. The project would not conflict with the Mobility Element of the City of Alameda General Plan 2040 (Goals 1-5). The project area is predominantly automobile-oriented and the

project would not impact other modes of transportation. Temporary construction activities would result in a temporary albeit negligible increase in vehicle trips to the project site during construction by workers and equipment. Roadways leading to and from the project site would remain open during construction, however, the parking lot would remain temporarily closed during the 1-month duration of construction activities. Users of the San Francisco Bay Trail could be temporarily rerouted around the active construction site, however, access to the trail would remain open at all times. Once project construction is complete, the AMS Ferry Terminal parking lot would be restored to their pre-project conditions. Impacts would be less than significant, and no mitigation is required.

b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Less-than-Significant Impact. Temporary construction activities would result in a temporary increase in vehicle trips to the project site during construction by workers and equipment. However, the project would not alter existing land uses, would not generate new residents or businesses, and once operational, would not appreciably alter the vehicle miles traveled. Impacts would be less than significant, and no mitigation would be required.

c) Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less-than-Significant Impact. Temporary construction activities could result in temporary detours in the project area. However, this condition would be temporary in nature and traffic in the area is not anticipated as ferry users would be routed to nearby terminals. Hazards due to a geometric design feature or incompatible use are not anticipated. Traffic/circulation at the AMS Ferry Terminal is planned to be restored to the pre-project condition upon completion of construction. Impacts would be less than significant, and no mitigation is required.

d) Would the project result in inadequate emergency access?

Less-than-Significant Impact. Similar to item c, temporary construction activities could result in temporary detours in the project area. However, this condition would be temporary in nature and traffic in the area is not anticipated as ferry users would be routed to nearby terminals. Emergency access would still be provided. Traffic/circulation at the AMS Ferry Terminal is planned to be restored to the pre-project condition upon completion of construction. Impacts would be less than significant, and no mitigation would be required.

3.18 Tribal Cultural Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact	
XVIII. TRIBAL CULTURAL RESOURCES					
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:					
 a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or 					
 b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe. 					

Environmental Setting

Assembly Bill (AB) 52, signed by Governor Edmund G. Brown, Jr., in September 2014, established a new class of resources under CEQA: "tribal cultural resources." AB 52, as provided in Public Resource Code Sections 21080.3.1, 21080.3.2, and 21082.3, requires that lead agencies undertaking CEQA review must, upon written request of a California Native American Tribe, begin consultation once the lead agency determines that the application for the project is complete, prior to the issuance of a Notice of Preparation of an EIR or notice of intent to adopt a negative declaration or mitigated negative declaration.

The Native American Heritage Commission (NAHC) was contacted to request a Sacred Lands File search for known cultural resources within or near the project site. The results of the search returned by the NAHC on July 29, 2022 were positive for Native American cultural resources in the project vicinity. The NAHC provided contact information for tribal members and organizations affiliated with the region and recommended that they be contacted for more information on the potential for Native American cultural resources within or near the project area. The following tribes were contacted for consultation under AB 52:

- The Ohlone Indian Tribe
- Indian Canyon Mutsun Band of Costanoan
- Amah Mutsun Tribal Band of Mission San Juan Bautista

- Trina Marine Ruano Family
- Amah/Mutsun Tribal Band
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- North Valley Yokuts Tribe
- Costanoan Rumsen Carmel Tribe
- Wuksache Indian Tribe/Eshom Valley Band
- The Confederated Villages of Lisjan Nation

The Confederated Villages of Lisjan Nation responded on August 18, 2022, requesting a copy of the NAHC response. WETA provided the Confederated Villages of Lisjan Nation with the NAHC response letter on August 25, 2022. Since August 25th, no further coordination has occurred.

a, b) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)? Or a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Less-than-Significant Impact with Mitigation Incorporated. Project construction activities would involve ground disturbance associated with new and replacement terminal structures, including the terminal bridge, bridge foundation, gangway, and terminal float. As described above, though no formal AB52 consultation was initiated with any of the tribes contacted on August 4, 2022, the NAHC response received on July 29, 2022, was positive for Native American cultural resources in the project vicinity. Therefore, the potential to encounter tribal cultural resources within the project area exists. Any adverse change to a tribal cultural resource resulting from project construction activities would be potentially significant.

Mitigation Measure 3.18-1: Tribal Cultural Resources Unanticipated Discovery

If any suspected tribal cultural resources are discovered during ground disturbing construction activities, including midden soil, stone tools, chipped stone, or unusual amounts of baked clay, shell, or bone, all grading and excavation work shall cease within 100 feet of the find and the following procedures shall take place:

- WETA shall retain a qualified archaeologist and immediately notify and retain a tribal representative from a California Native American tribe that is traditionally and culturally affiliated with the geographic area. Together, the archaeologist and tribal representative shall determine if the find is a tribal cultural resource (pursuant to PRC Section 21074). If the find does not qualify as a tribal cultural resource, work may resume.
- If the find is determined to be a tribal cultural resource, the tribal representative shall make recommendations for the appropriate treatment, as necessary. Preservation in place is the

preferred alternative under CEQA and tribal protocols, and every effort must be made to preserve the resources in place, including through project redesign.

- Culturally appropriate treatment may include, but is not limited to, processing materials for reburial, minimizing handling of cultural objects, leaving objects in place within the landscape, or returning objects to a location within the project vicinity where they will not be subject to future impacts. Materials shall not be permanently curated unless approved by the tribe. Treatment that preserves or restores the cultural character and integrity of a tribal cultural resource may include culturally appropriate recovery of cultural objects and reburial of cultural objects or cultural soil. WETA shall work with the contractor and tribal representative to facilitate the appropriate tribal treatment of any finds, as necessary.
- Work at the discovery location cannot resume until all necessary investigation and evaluation of the discovery, has been completed.

Therefore, with implementation of Mitigation Measure 3.18-1, potential project impacts related to tribal cultural resources would be addressed by implementation of a cultural resources respect training program and, in the case of a discovery, preservation in place and/or culturally appropriate treatment as directed by a tribal representative if significant artifacts are recovered. No further mitigation would be required.

3.19 Utilities and Service Systems

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
	K. UTILITIES AND SERVICE SYSTEMS - Would th	e project:			
a)	Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?				
b)	Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?				
C)	Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
d)	Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?				
e)	Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?			\boxtimes	

Regulatory Framework

No plans, policies, regulations, or laws related to utilities and service systems are applicable to the project.

Environmental Setting

East Bay Municipal Utility District (EBMUD) supplies water and provides wastewater treatment for a large part of Alameda and Contra Costa counties. Approximately 1.4 million people are currently served by EBMUD's water system in a 332-square-mile area. The wastewater system serves approximately 740,000 people in an 88-square-mile area of Alameda and Contra Costa counties along the Bay's east shore, extending from the City of Richmond in the north, southward to the City of San Leandro. EBMUD water customers include residential, industrial, commercial, institutional, and irrigation water users.

The EBMUD water supply system collects, transmits, treats, and distributes high-quality water from its primary water source, the Mokelumne River, to its customers in the San Francisco East Bay Area. EBMUD has six water treatment plants (WTPs) located in the EBMUD service area. The average annual water demand for 2020 was 238 million gallons per day (mgd). EBMUD forecasts a future demand of 297 mgd by 2050.

EBMUD's wastewater service district provides wastewater treatment for approximately half of the population within the EBMUD water service area. The remainder of EBMUD's water service area receives wastewater treatment from various other agencies and municipalities. EBMUD's wastewater service district serves approximately 740,0001people in an 88 square-mile area of Alameda and Contra Costa counties along the east shore of the San Francisco Bay. The project site is located within EBMUD Special District No.1 (SD-1). Wastewater collected in SD-1 is treated at EBMUD's Main Wastewater Treatment Plant (MWWTP), which is located in Oakland near the foot of the Bay Bridge. The MWWTP provides secondary treatment for a maximum flow of 168 mgd. Primary treatment can be provided for up to 320 mgd. The average dry weather flow from 2010 to 2019 was approximately 54 mgd (EBMUD 2021).

Commercial and residential solid waste generated in the City of Alameda is collected by Alameda County Industries (ACI). Garbage collected throughout Alameda is hauled to the Davis Street Transfer Station in San Leandro, where it is loaded into higher-capacity trailer trucks and hauled to Altamont Landfill in eastern Alameda County. Recyclable materials, which are collected from residential and commercial customers in separate bins, are hauled to ACI's

Aladdin Materials Recovery Facility (MRF) and Transfer Facility in the City of San Leandro, which sorts, separates, and bundles the recyclables for sale to secondary markets (Alameda 2021a). The Altamont Landfill has permitted maximum daily throughput of 11,150 tons and a maximum remaining capacity of 65,400,000 cubic yards through 2070 (CalRecycle 2022).

Electric service in the City of Alameda is provided by AMP, which was founded in 1887 and is the oldest municipal electric utility in California. AMP owns local distribution lines and has joint ownership of generation and transmission resources with other municipally-owned utility members of the Northern California Power Agency (NCPA), a joint powers agency (Alameda 2021a).

Natural gas service is provided in Alameda by Pacific Gas & Electric Company (PG&E) (Alameda 2021a).

a) Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Less-than-Significant Impact. As described in Chapter 2, "Project Description," the project would include utility upgrades involving replacement of existing razor equipment, installation of electrical service for new ramp controls, and outlets, provision of conduit for future upgrades, as well as potable water infrastructure. Potable water infrastructure would involve connections to existing water supply lines to be used for periodic cleaning of the terminal. Utility connections for potable water and electricity would occur within existing infrastructure within the project site. No additional new or expanded infrastructure would be required such that significant environmental effects would occur. Impacts would be less than significant and no mitigation is required.

b) Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Less-than-Significant Impact. The project consists of upgrades and replacements to the existing AMS Ferry Terminal structure and would involve potable water connections at the site. Potable water at the site would be used for periodic cleaning of the terminal. The projects demand for potable water would be negligible and EBMUD would have available water supply to serve project implementation. Impacts would be less than significant and no mitigation is required.

c) Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Less-than-Significant impact. The project does not currently generate substantial wastewater. Project activities would involve refurbishment and upgrades to the existing AMF Ferry Terminal structures. As described above, the project would include potable water connections for periodic cleaning of the terminal. Water demand generated at the site would be negligible and therefore, wastewater resulting from water consumption would also be negligible. Impacts would be less than significant and no mitigation is required.

d, e) Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Less-than-Significant Impact. Debris generated during construction and site clearing activities would consist of the existing steel float, steel guide piles, gangway, bridge structure, bridge structure steel support system (H-Pile and steel beams), concrete approach slab, and miscellaneous electrical/ mechanical conduit attached to the existing elements to be removed. The project is estimated to generate a total of 164.3 cubic yards of debris during construction (refer to Appendix E). In accordance with Section 5.408 of the CALGreen Code, the project would implement a Construction Waste Management Plan for recycling and/or salvaging for reuse of a minimum of 65 percent of nonhazardous construction and demolition debris generated during project construction. As described above, solid waste would be disposed of at the Altamont Landfill, which has a remaining capacity of 65,400,000 cubic yards through 2070. Waste generated during construction would represent less than 0.00002 percent of the landfill's remaining capacity. Once operational, the project would not directly or substantially generate any new waste (incidental waste from ferry patrons is currently collected and would continue when operations resume). As such, there is adequate capacity at existing landfills for disposal of solid waste generated by project construction. Additionally, the project would comply with applicable State and local requirements including those pertaining to solid waste, construction waste diversion, and recycling. Impacts would be less than significant, and no mitigation is required.

3.20 Wildfire

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
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XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

	Sevency zones, would the project.		
a)	Substantially impair an adopted emergency response plan or emergency evacuation plan?		
b)	Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?		
c)	Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?		

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
 d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes? 				

Regulatory Framework

No plans, policies, regulations, or laws related to wildfire are applicable to the project.

Environmental Setting

The City of Alameda, which includes the project site, is within a Local Responsibility Area (LRA) and is designated as a non-very high fire hazard severity zone (VHFHSZ). The entire City is an urbanized area and there are no wildlands in close proximity to the site (CALFIRE 2022; City of Alameda 2021a).

As described in Section 3.9, "Hazardous Materials," The Alameda County EOP establishes the foundational policies and procedures that define how Alameda County will effectively prepare for, respond to, recover from, and mitigate against natural or human-caused disasters. As discussed in Section 3.15, "Public Services," fire protection within the project area is provided by the City of Alameda Fire Department.

a) Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact. Construction and operation of the project would not impede vehicular travel along local roadways, such that emergency response or evacuation would be impaired within the project area. During construction, the terminal would be closed and no access to the site would be provided, however, emergency access would be maintained at all times. There would be no impacts and no mitigation would be required.

b) Due to slope, prevailing winds, and other factors, would the project exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact. The project would not exacerbate wildfire risks as the project site is not located within a veryhigh fire hazard severity area within a State Responsibility Area. The project site is substantially surrounded by developed land and the Oakland Inner Harbor and is not located near wildland areas that would be susceptible to wildfire. There would be no impact and no mitigation would be required.

c) Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact. As described in Section 3.9, "Hazards and Hazardous Materials," the project is located in an urbanized area of the City of Alameda that is not adjacent to any sensitive fire hazard severity zones. Project

activities would involve replacement and upgrades of existing structures in an area that is surrounded by development and the Oakland Inner Harbor. Thus, project activities would not exacerbate fire risks within the project area. There would be no impact and no mitigation would be required.

d) Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact. The project is in an area of flat terrain on landside and the Oakland Inner Harbor. Project activities would not involve changes to landside slopes that could expose people to risks of flooding from post-fire slope instability. Further, the project site and surrounding areas have not been subject to recent wildfire burns such that downslope areas would be affected by project implementation. As described in Section 3.10, "Hydrology and Water Quality," the project would include implementation of CALGreen BMPs related siltation and erosion. Further, the project would not result in any increase in runoff such that flooding would occur. There would be no impact and no mitigation would be required.

3.21 Mandatory Findings of Significance

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XX	I. MANDATORY FINDINGS OF SIGNIFICANCE				
a)	Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self- sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?				
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)				
C)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below selfsustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less-than-Significant Impact with Mitigation Incorporated. Implementation of Mitigation Measure 3.4-1, 3.4-2, and 3.4-3, identified in Section 3.4, "Biological Resources," of this Initial Study would ensure that the project would not substantially affect fish or wildlife species during construction with regard to underwater noise, would not result in the spread of invasive marine species, and would not result in adverse effects on jurisdictional wetlands and/or water. Implementation of Mitigation Measure 3.5-1 and 3.18-1, identified in Sections 3.5, "Cultural Resources," and 3.18, "Tribal Cultural Resources," respectively, would prevent the project from significantly affecting previously undiscovered archaeological and/or tribal cultural resources.

Therefore, with implementation of Mitigation Measures 3.4-1 through 3.4-4, 3.5-1, and 3.18-1, the project's potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory, would be less than significant.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Less-than-Significant Impact with Mitigation Incorporated. As presented throughout this environmental checklist, the project would result in less-than-significant impacts or impacts that are mitigated to less-than-significant levels. Potential impacts related to construction air quality emissions would be avoided through implantation of Mitigation Measure 3.3-1. The potential affect fish and wildlife species, sensitive communities, and jurisdictional wetlands shall be avoided through Mitigation Measures 3.4-1, 3.4-2, and 3.4-3. The potential for unknown archaeological materials or tribal cultural resources to be disturbed is addressed through implementation of Mitigation Measures 3.5-1 and 3.18-1. Finally, underwater noise impacts, would be appropriately addressed through implementation of Mitigation to result in significant construction or operational environmental impacts, and the project would not contribute to significant cumulative impacts. Impacts would be less than significant.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less-than-Significant Impact with Mitigation Incorporated. Potential adverse effects to human beings would occur due to project-related construction impacts related to criteria air pollutant emissions and underwater noise. However, through implementation of Mitigation Measure 3.3-1, project-related air emissions would not be in excess of the BAAQMD thresholds for, NO_X, which are tied to achieving or maintaining attainment designations with the NAAQS and CAAQS, which are scientifically substantiated,

numerical concentrations of criteria air pollutants considered to be protective of human health. Potential underwater noise generated during project construction would be reduced to less-than-significant levels by implementation of Mitigation Measure 3.4-1, as previously discussed. Therefore, with implementation of Mitigation Measures 3.3-1 and 3.4-1, the project's potential adverse effect on human beings, either directly or indirectly, would be less than significant.

4 References and Preparers

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4.2 List of Preparers

San Francisco Water Emergency Transportation Authority

Chad Mason, Senior Planner/Project Manager Gabriel Chan, Planner

Dudek (CEQA Compliance)

Christine Fukasawa, CEQA Project Manager Kirsten Burrowes, CEQA Deputy Project Manager David Wickens, Permitting Specialist Matthew Morales, Air Quality Specialist Adam Poll, Air Quality Specialist Andrew Hatch, Biologist Michael Carr, Acoustician

Illingworth and Rodkin (Hydroacoustic Assessment)

James Reyff, Project Scientist Adwait Ambaskar, Project Consultant



SOURCE: USGS 7.5-minute Series Oakland West Quadrangle

1,000

2,000 Feet



FIGURE 1 Project Location Alameda Main Street Terminal Refurbishment Project

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SOURCE: Bing Maps 2021

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Appendix A

Alameda Main Street Ferry Terminal Refurbishment Project Plans

WATER EMERGENCY TRANSPORTATION **AUTHORITY**

2990 MAIN STREET ALAMEDA, CA 94501

ALAMEDA MAIN STREET FERRY TERMINAL REFURBISHMENT PROJECT

DRAWING LIST

DRAWING NUMBER	DATE	DESCRIPTION
S-00	12-20-21	TITLE SHEET AND DRAWING LIST
S-01	12-20-21	PROJECT DESCRIPTION, EXISTING AND PROPOSED SHADE
S-02	12-20-21	VICINITY MAP
S-03	12-20-21	PROJECT SITE LOCATION
S-04	12-20-21	EXISTING SITE PLAN WITH MAJOR FEATURES
S-05	12-20-21	EXISTING BRIDGE PLAN AND SECTION ELEVATION SHEET 1 OF 2
S-06	12-20-21	EXISTING BRIDGE PLAN AND SECTION ELEVATION SHEET 2 OF 2
S-07	12-20-21	EXISTING 60' GANGWAY PLAN AND SECTION ELEVATIONS
S-08	12-20-21	EXISTING FLOAT PLAN AND SECTION ELEVATION
S-09	12-20-21	PROPOSED SITE PLAN WITH MAJOR FEATURES
S-10	12-20-21	PROPOSED BRIDGE PLAN AND SECTION ELEVATION SHEET 1 OF 2
S-11	12-20-21	PROPOSED BRIDGE PLAN AND SECTION ELEVATION SHEET 2 OF 2
S-12	12-20-21	PROPOSED 80- GANGWAY SECTION ELEVATION AT MHHW AND MLLW
S-13	12-20-21	PROPOSED 80' GANGWAY PLAN AND SECTION ELEVATION
S-14	12-20-21	PROPOSED FLOAT PLAN AND SECTION ELEVATION

R					
WIA231857 - WETA A	APPLICANT : SAN FRANCISCO BAY AREA WATER EMERGENCY TRANSPORTATION AUTHORITY PIER 9, SUIT 111, THE EMBARCADERO	DRAWING BY	: COWI N.A 555 12TH STREET, SUITE 1700 OAKLAND CA 94607	TITLE SHEET AND DRAWING LIST	FER
SUILIBAYOC	SAN FRANCISCO, CA	CONTACT:	JESSICA RIVAS	SCALE: NTS	
ON: CHISER	CONTACT: CHAD MASON SENIOR PLANNER/PROJECT MANAGER MASON@WATERTRANSIT.ORG	DATUM:	(510) 839-8972 MLLW	WATER EMERGENCY TRANSPORTATION AUTHORITY	
I FLOCATI	(415) 291–3377 EXT. 745	DATUM:		2990 MAIN STREET ALAMEDA, CA 94501	

ALAMEDA MAIN STREET RRY TERMINAL REFURBISHMENT PROJECT

APPLICATION BY WETA

SHEET S-00

PROJECT DESCRIPTION:

THE PROJECT INCLUDES:

- REPLACEMENT OF APPROACH SLAB LEADING TO ALUMINUM BRIDGE
- REPLACEMENT OF EXISTING ALUMINUM BRIDGE
- REPLACEMENT OF EXISTING ALUMINUM GANGWAY
- REPLACEMENT OF EXISTING FLOAT
- REMOVAL OF FOUR EXISTING STEEL FLOAT 30-INCH DIAMETER STEEL PIPE PILES
- INSTALL FOUR NEW 36-INCH DIAMETER STEEL PIPE PILES
- INSTALL TWO NEW 36-INCH DIAMETER DONUT FENDER PILES
- INSTALL TWO NEW 72-INCH DIAMETER DONUT FENDER
- INSTALL ELECTRICAL CONDUIT RACK ALONG PERIMETER OF BRIDGE, GANGWAY AND FLOAT FOR FUTURE UPGRADES.

GENERAL NOTES:

- 1. APPROACH SLAB, ALUMINUM BRIDGE, ALUMINUM GANGWAY, FLOAT, FLOAT PILES, AND DONUT FENDER/FENDER PILES DESIGN SHOWN IS CONCEPTUAL. DETAILED DESIGN TO BE PROVIDED IN SUBSEQUENT SUBMITTALS.
- 2.ALL WORK SHALL CONFORM WITH THE CITY OF ALAMEDA PUBLIC WORKS STANDARD.
- 3.REFERENCES CIVIL AND ELECTRICAL SHEETS FOR FERRY TERMINAL MECHANICAL AND ELECTRICAL EQUIPMENT DETAILS NOT SHOWN HERE.
- 4. ALUMINUM STRUCTURES AND PILE INFORMATION PROVIDED FOR PERMITTING ONLY. DRAWING NOT TO BE USED TO LOCATE OR INSTALL PILES OR ALUMINUM STRUCTURES. LOCATIONS TO BE PROVIDED IN CONTRACTOR'S SEAL DESIGN SUBMITTALS.

EXISTING AND PROPOSED SHADE

EXISTING SHADE AREA OF STRUCTURES TO BE REMOVED					
ITEM	QTY.	DIMEN	DIMENSIONS		
	EA	FT	FT	(FT2)	
APPROACH SHELTER	-1	24.5	8.25	-202	
CONCRETE ABUTMENT	-1	12	2.5	-30	
BRIDGE	-1	106	8	-849	
GANGWAY	-1	60	8.25	-495	
STEEL FLOAT	-1	112	33	-3696	
GUIDE PILES	-4	30" OD; 28" ID		-3	CROSS
GUIDE PILE COLLARS	-4	1	12	-48	
	-5323				

NEW SHADE AREA OF STRUTURE TO BE INSTALLED					
ITEM	QTY.	QTY. DIMENSIONS		SHADE AREA	
	EA	FT	FT	(FT2)	
APPROACH SHELTER	1	24.5	9	220.5	
CONCRETE CAP AND 2-24" PIPE PILES	1	4	7	28	CAP E UNDE BRIDO
BRIDGE	1	107.5	9	968	
ELECTRICAL CONDUIT RACK	1	3.5	167.5	586	
CONCRETE CAP AND MONOPILE	1	1	3.3	3	CAP SHAD
GANGWAY	1	60	9	540	GANG FILL (
STEEL FLOAT	1	112	33	3696	
GUIDE PILES	4	36" OD;	33.5" ID	4	CROS
GUIDE PILE COLLARS	4	1	16	64	
DONUT PILES	2	36" OD	; 34" ID	2	CROS
DONUT PILE FENDER	2	72" OD	; 36" ID	42	CROS AREA
	NEW SHADE	AREA		6153	

PROJECT NET SHADE AREA	FILL AREA (FT2)
EXISTING SHADE AREA	-5323
NEW SHADE AREA	6153
NEW SHADE	830

APPLICANT : SAN FRANCISCO BAY AREA WATER EMERGENCY TRANSPORTATION AUTHORITY PIER 9, SUIT 111, THE EMBARCADERO	DRAWING BY: COWI N.A 555 12TH STREET, SUITE 1700 OAKLAND CA 94607	PROJECT DESCRIPTION, EXISTING AND PROPOSED SHADE	– FER
SAN FRANCISCO, CA	CONTACT: JESSICA RIVAS	SCALE: NTS	
CONTACT: CHAD MASON SENIOR PLANNER/PROJECT MANAGER MASON@WATERTRANSIT.ORG	(510) 839-8972 DATUM: MLLW	WATER EMERGENCY TRANSPORTATION AUTHORITY	
(415) 291–3377 EXT. 745	DATUM: MLLW	2990 MAIN STREET ALAMEDA, CA 94501	

NOTES
S SECTIONAL STEEL AREA

NOTES

P BEAM IS 16' LONG X 4' WIDE AND LOCATED PARTLY DERNEARTH BRIDGE. CAP BEAM SHADOW AREA OUTSIDE DGE AREA IS ACCOUNTED FOR HERE

IS 10'X12'-4" WIDE UNDERNEARTH BRIDGE. CAP BEAM DOW AREA OUTSIDE BRIDGE AREA IS ACCOUNTED FOR HERE

IGWAY IS 80'-0" LONG BUT ONLY 60 IS OVER WATER. NEW . OVER WATER IS 60'-0"

SS SECTIONAL STEEL AREA

SS SECTIONAL STEEL AREA

SS SECTIONAL AREA OF DONUT FENDER ONLY. PIPE PILE A PREVIOUSLY ACCOUNTED FOR.

ALAMEDA MAIN STREET RRY TERMINAL REFURBISHMENT PROJECT

APPLICATION BY WETA

SHEET S-01





ALAMEDA MAIN STREET FERRY TERMINAL REFURBISHMENT PROJECT

APPLICATION BY WETA

SHEET S-02



Ň				
MIA 23 1857 - WETA 4	APPLICANT : SAN FRANCISCO BAY AREA WATER EMERGENCY TRANSPORTATION AUTHORITY PIER 9, SUIT 111, THE EMBARCADERO	DRAWING BY: COWI N.A 555 12TH STREET, SUITE 1700 OAKLAND CA 94607	PROJECT SITE LOCATION	- FERF
	SAN FRANCISCO, CA	CONTACT: JESSICA RIVAS	SCALE: 1" = 40'	
ON- CUISER	CONTACT: CHAD MASON SENIOR PLANNER/PROJECT MANAGER MASON@WATERTRANSIT.ORG	(510) 839-8972 DATUM: MLLW	WATER EMERGENCY TRANSPORTATION AUTHORITY	
	(415) 291–3377 EXT. 745	DATOM. MLLW	2990 MAIN STREET ALAMEDA, CA 94501	

ALAMEDA MAIN STREET RY TERMINAL REFURBISHMENT PROJECT

APPLICATION BY WETA

SHEET S-03



T MANAGER	
RG	DATUM:
45	

MLLW

WATER EMERGENCY TRANSPORTATION AUTHORITY 2990 MAIN STREET ALAMEDA, CA 94501

ALAMEDA MAIN STREET FERRY TERMINAL REFURBISHMENT PROJECT

APPLICATION BY WETA

SHEET S-04




















Appendix B Air Quality CalEEMod and Harborcraft Data

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Alameda Main Street Terminal Rehabilitation Project

Alameda County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	10.00	1000sqft	0.23	10,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	63
Climate Zone	5			Operational Year	2024
Utility Company	Statewide Average				
CO2 Intensity (Ib/MWhr)	453.21	CH4 Intensity (lb/MWhr)	0.033	N2O Intensity (Ib/MWhr)	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Alameda Terminal Rehabilitation Project Land Use - Replacement of existing float, gangway, and bridge

Construction Phase - Duration based on applicant input

Off-road Equipment - Equipment based on applicant input. Bore/Drill rig representative of pile driver

Off-road Equipment - Equipment based on applicant input

Trips and VMT - Adjusted based on applicant input. Hauling will be done via barge

On-road Fugitive Dust - Default

Vehicle Trips - No operational changes. Modeling construction only.

Consumer Products - No operational changes. Modeling construction only.

Area Coating - No operational changes. Modeling construction only.

Landscape Equipment - No operational changes. Modeling construction only.

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Energy Use - No operational changes. Modeling construction only.

Water And Wastewater - No operational changes. Modeling construction only.

Solid Waste - No operational changes. Modeling construction only.

Construction Off-road Equipment Mitigation - Mitigation: Equipment above 200 HP shall have Tier 4 Final engines

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	600	0
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	100.00	20.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblConstructionPhase	NumDaysWeek	5.00	7.00
tblOffRoadEquipment	HorsePower	221.00	1,200.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	4.00	12.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	2.00	4.00
tblTripsAndVMT	WorkerTripNumber	13.00	12.00
tblTripsAndVMT	WorkerTripNumber	4.00	16.00

2.0 Emissions Summary

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year					ton	s/yr							МТ	/yr		
2023	0.0276	0.2396	0.2615	5.2000e- 004	2.0700e- 003	0.0112	0.0132	5.6000e- 004	0.0109	0.0115	0.0000	45.2820	45.2820	4.9400e- 003	1.8000e- 004	45.4600
Maximum	0.0276	0.2396	0.2615	5.2000e- 004	2.0700e- 003	0.0112	0.0132	5.6000e- 004	0.0109	0.0115	0.0000	45.2820	45.2820	4.9400e- 003	1.8000e- 004	45.4600

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year					ton	s/yr							МТ	/yr		
2023	0.0219	0.1695	0.2768	5.2000e- 004	2.0700e- 003	8.1700e- 003	0.0102	5.6000e- 004	8.1700e- 003	8.7300e- 003	0.0000	45.2820	45.2820	4.9400e- 003	1.8000e- 004	45.4599
Maximum	0.0219	0.1695	0.2768	5.2000e- 004	2.0700e- 003	8.1700e- 003	0.0102	5.6000e- 004	8.1700e- 003	8.7300e- 003	0.0000	45.2820	45.2820	4.9400e- 003	1.8000e- 004	45.4599

	ROG	NOx	СО	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	20.39	29.28	-5.85	0.00	0.00	26.86	22.66	0.00	25.18	23.89	0.00	0.00	0.00	0.00	0.00	0.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2023	8-31-2023	0.2671	0.1913
		Highest	0.2671	0.1913

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	/yr		
Area	6.5000e- 004	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000	 	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	6.5000e- 004	0.0000	9.0000e- 005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	'/yr		
Area	6.5000e- 004	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	6.5000e- 004	0.0000	9.0000e- 005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004

	ROG	NOx	СО	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

	Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1		Demolition	Demolition	6/1/2023	6/10/2023	7	10	
2	2	Building Construction	Building Construction	6/11/2023	6/30/2023	7	20	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.23

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Air Compressors	2	8.00	78	0.48
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Cranes	1	8.00	231	0.29
Demolition	Generator Sets	2	8.00	84	0.74
Demolition	Rubber Tired Dozers	0	1.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Building Construction	Air Compressors	2	8.00	78	0.48
Building Construction	Bore/Drill Rigs	1	0.50	1200	0.50
Building Construction	Cranes	1	12.00	231	0.29
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Generator Sets	2	12.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	12.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	6	16.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Use Cleaner Engines for Construction Equipment

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							MT	/yr		
Off-Road	7.3700e- 003	0.0636	0.0700	1.3000e- 004		3.0200e- 003	3.0200e- 003		2.9600e- 003	2.9600e- 003	0.0000	11.5912	11.5912	1.2700e- 003	0.0000	11.6230
Total	7.3700e- 003	0.0636	0.0700	1.3000e- 004		3.0200e- 003	3.0200e- 003		2.9600e- 003	2.9600e- 003	0.0000	11.5912	11.5912	1.2700e- 003	0.0000	11.6230

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	/yr		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.0000e- 005	4.4000e- 004	1.3000e- 004	0.0000	7.0000e- 005	0.0000	7.0000e- 005	2.0000e- 005	0.0000	2.0000e- 005	0.0000	0.1934	0.1934	0.0000	3.0000e- 005	0.2021
Worker	1.6000e- 004	1.1000e- 004	1.3300e- 003	0.0000	4.7000e- 004	0.0000	4.8000e- 004	1.3000e- 004	0.0000	1.3000e- 004	0.0000	0.3694	0.3694	1.0000e- 005	1.0000e- 005	0.3728
Total	1.7000e- 004	5.5000e- 004	1.4600e- 003	0.0000	5.4000e- 004	0.0000	5.5000e- 004	1.5000e- 004	0.0000	1.5000e- 004	0.0000	0.5628	0.5628	1.0000e- 005	4.0000e- 005	0.5749

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Demolition - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	/yr		
Off-Road	5.9700e- 003	0.0461	0.0738	1.3000e- 004		2.2700e- 003	2.2700e- 003		2.2700e- 003	2.2700e- 003	0.0000	11.5912	11.5912	1.2700e- 003	0.0000	11.6230
Total	5.9700e- 003	0.0461	0.0738	1.3000e- 004		2.2700e- 003	2.2700e- 003		2.2700e- 003	2.2700e- 003	0.0000	11.5912	11.5912	1.2700e- 003	0.0000	11.6230

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	/yr		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.0000e- 005	4.4000e- 004	1.3000e- 004	0.0000	7.0000e- 005	0.0000	7.0000e- 005	2.0000e- 005	0.0000	2.0000e- 005	0.0000	0.1934	0.1934	0.0000	3.0000e- 005	0.2021
Worker	1.6000e- 004	1.1000e- 004	1.3300e- 003	0.0000	4.7000e- 004	0.0000	4.8000e- 004	1.3000e- 004	0.0000	1.3000e- 004	0.0000	0.3694	0.3694	1.0000e- 005	1.0000e- 005	0.3728
Total	1.7000e- 004	5.5000e- 004	1.4600e- 003	0.0000	5.4000e- 004	0.0000	5.5000e- 004	1.5000e- 004	0.0000	1.5000e- 004	0.0000	0.5628	0.5628	1.0000e- 005	4.0000e- 005	0.5749

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							MT	/yr		
Off-Road	0.0196	0.1735	0.1859	3.6000e- 004		8.1300e- 003	8.1300e- 003		7.9400e- 003	7.9400e- 003	0.0000	31.3692	31.3692	3.6100e- 003	0.0000	31.4595
Total	0.0196	0.1735	0.1859	3.6000e- 004		8.1300e- 003	8.1300e- 003		7.9400e- 003	7.9400e- 003	0.0000	31.3692	31.3692	3.6100e- 003	0.0000	31.4595

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	/yr		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.0000e- 005	1.7500e- 003	5.3000e- 004	1.0000e- 005	2.6000e- 004	1.0000e- 005	2.7000e- 004	8.0000e- 005	1.0000e- 005	9.0000e- 005	0.0000	0.7738	0.7738	1.0000e- 005	1.2000e- 004	0.8086
Worker	4.2000e- 004	2.9000e- 004	3.5600e- 003	1.0000e- 005	1.2700e- 003	1.0000e- 005	1.2700e- 003	3.4000e- 004	1.0000e- 005	3.4000e- 004	0.0000	0.9850	0.9850	3.0000e- 005	3.0000e- 005	0.9940
Total	4.6000e- 004	2.0400e- 003	4.0900e- 003	2.0000e- 005	1.5300e- 003	2.0000e- 005	1.5400e- 003	4.2000e- 004	2.0000e- 005	4.3000e- 004	0.0000	1.7588	1.7588	4.0000e- 005	1.5000e- 004	1.8026

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	/yr		
Off-Road	0.0154	0.1208	0.1974	3.6000e- 004		5.8800e- 003	5.8800e- 003	 	5.8800e- 003	5.8800e- 003	0.0000	31.3692	31.3692	3.6100e- 003	0.0000	31.4595
Total	0.0154	0.1208	0.1974	3.6000e- 004		5.8800e- 003	5.8800e- 003		5.8800e- 003	5.8800e- 003	0.0000	31.3692	31.3692	3.6100e- 003	0.0000	31.4595

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							MT	'/yr		
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.0000e- 005	1.7500e- 003	5.3000e- 004	1.0000e- 005	2.6000e- 004	1.0000e- 005	2.7000e- 004	8.0000e- 005	1.0000e- 005	9.0000e- 005	0.0000	0.7738	0.7738	1.0000e- 005	1.2000e- 004	0.8086
Worker	4.2000e- 004	2.9000e- 004	3.5600e- 003	1.0000e- 005	1.2700e- 003	1.0000e- 005	1.2700e- 003	3.4000e- 004	1.0000e- 005	3.4000e- 004	0.0000	0.9850	0.9850	3.0000e- 005	3.0000e- 005	0.9940
Total	4.6000e- 004	2.0400e- 003	4.0900e- 003	2.0000e- 005	1.5300e- 003	2.0000e- 005	1.5400e- 003	4.2000e- 004	2.0000e- 005	4.3000e- 004	0.0000	1.7588	1.7588	4.0000e- 005	1.5000e- 004	1.8026

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	СО	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					ton	s/yr							МТ	'/yr		
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Avei	age Daily Trip Ra	ite	Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

		Miles			Trip %			Trip Purpos	e %
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.569946	0.056495	0.180011	0.112201	0.020944	0.005169	0.013608	0.012941	0.000792	0.000570	0.024535	0.000337	0.002451

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	Category tons/yr											MT	/yr			
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000	 	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	 	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	+ , , ,	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGa s Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use kBTU/yr tons/yr													МТ	/yr			
Other Non- Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Mitigated

	NaturalGa s Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr		tons/yr											MT	/yr		
Other Non- Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.3 Energy by Land Use - Electricity

<u>Unmitigated</u>

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr		MT	/yr	
Other Non- Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr		МТ	/yr	
Other Non- Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	egory tons/yr												MT	/yr		
Mitigated	6.5000e- 004	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004
Unmitigated	6.5000e- 004	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	Category tons/yr											МТ	'/yr			
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	6.5000e- 004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e- 005	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004
Total	6.6000e- 004	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	ubCategory tons/yr										MT	/yr				
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	6.5000e- 004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e- 005	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004
Total	6.6000e- 004	0.0000	9.0000e- 005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8000e- 004	1.8000e- 004	0.0000	0.0000	1.9000e- 004

7.0 Water Detail

7.1 Mitigation Measures Water

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Total CO2	CH4	N2O	CO2e
Category		МТ	/yr	
Mitigated		0.0000	0.0000	0.0000
·		0.0000	0.0000	0.0000

7.2 Water by Land Use <u>Unmitigated</u>

	Indoor/Out door Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal		МТ	/yr	
Other Non- Asphalt Surfaces	0/0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

7.2 Water by Land Use

Mitigated

	Indoor/Out door Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal		МТ	/yr	
Other Non- Asphalt Surfaces	0/0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
		МТ	/yr	
Mitigated	0.0000	0.0000	0.0000	0.0000
Chiningutou	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e					
Land Use	tons		MT/yr							
Other Non- Asphalt Surfaces		0.0000	0.0000	0.0000	0.0000					
Total		0.0000	0.0000	0.0000	0.0000					

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e						
Land Use	tons		MT/yr								
Other Non- Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000						
Total		0.0000	0.0000	0.0000	0.0000						

9.0 Operational Offroad

	-					
Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
Boilers						
Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type	
User Defined Equipment						
Equipment Type	Number					
11.0 Vegetation						

SMAQMD Harborcraft, Dredge and Barge Emission Factor Calculator - Main Engine Emission Rates

alendar Year:	2023		Number of Entries:	2																							
alendar rear.	2025		Vessel/Engin	e Information				Emis	sion Rates (It	/hr; estimat	es for each ro	w are totals o	ver the numb	er of engines	listed in colu	imn J for that	row)	Emission Rates for a Single Engine (g/b			(g/bhp-hr)	g/bhp-hr)					
essel Name	Vessel Number	Home Port		Engine Model	Engine Rated Power (hp)			PM10	PM _{2.5}	NOx	ROG	со	SO ₂	CO2	CH4	N ₂ O	CO ₂ e	PM10	PM2.5	NOx	ROG	со	SO ₂	CO2	CH₄	N ₂ O	CO2e
upport Tug	Number		Tug Boats	2002	Power (np) 1167	Factor engin 0.50	2	1.241	1.105	21.580	1.814	6.341	0.014	1521.118	0.062		1526.338	0.482	0.429	8.385	0.705	2.464	0.006	591.045	0.024	0.005	
mall Skiff			Crew and Supply	1995	384	0.38	1	0.140	0.124				0.002	189.982	0.008			0.434	0.387				0.006		0.024	0.005	593.
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SMAQMD Harborcraft, Dredge and Barge Emission Factor Calculator - Auxiliary Engine Emission Rates

Calendar Year:	2023		Number of Entries:	1	1																								
calendar rear.	1015		Number of Entries.	essel/Engine Information					Emis	sion Rates (Ib	/hr; estimate	s for each row	are totals ov	ver the numbe	r of engines I	listed in colum	in K for that	row)				Emission Ra	tes for a Sir	Single Engine (g/bhp-hr)					
Vessel Name	Vessel Number	Home Port	Vessel Type	Auxiliary Engine Type	Engine Model Year	Engine Rated Power (hp)	Engine Load Factor	Number of Engines	PM10	PM _{2.5}	NOx	ROG	со	SO ₂	CO2	CH4	N ₂ O	CO2e	PM10	PM _{2.5}	NOx	ROG	со	SO ₂	CO2	CH4	N ₂ O	CO ₂ e	
Support Tug			Tug Boats	Tug Boats Generator	2000	Power (hp) 86	0.31	1	0.039	0.035	0.465	0.064	0.245	0.000	34.782	0.001	0.000	34.901	0.67	0.60	7.90	1.09	4.17	0.006	591.04	0.02	0.00	593.1	
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Appendix C

Alameda Main Street Ferry Terminal Refurbishment Project Biological Technical Report

Biological Technical Report Alameda Main Street Ferry Terminal Refurbishment Project

NOVEMBER 2022

Prepared for:

WETA SAN FRANCISCO BAY AREA WATER EMERGENCY TRANSPORTATION AUTHORITY

Pier 9, Suite 111 The Embarcadero San Francisco, California 94111

Prepared by:



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Printed on 30% post-consumer recycled material.

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Acronyms and Abbreviations

Acronym	Definition
ADA	Americans with Disabilities Act
AMS	Alameda Main Street
Вау	San Francisco Bay
BMP	best management practice
BCDC	Bay Conservation and Development Commission
BO	Biological Opinion
BSA	biological survey area
CARB	California Air Resources Board
CCC	Central California Coast
CEQA	California Environmental Quality Act
CEQA Guidelines	State of California CEQA Guidelines
CESA	California Endangered Species Act
CDFA	California Department of Fish and Wildlife
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
County	Alameda County
CRPR	California Rare Plant Rank
CZMA	Coastal Zone Management Act
CWA	Clean Water Act
CWMP	Construction Waste Management Plan
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EFH	Essential Fish Habitat
EPA	U. S. Environmental Protection Agency
ESU	Evolutionarily Significant Unit
FESA	federal Endangered Species Act
FMPs	Fisheries Management Plans
General Plan	Alameda County General Plan 2040
GIS	geographic information system
HCP	Habitat Conservation Plan
IHA	Incidental Harassment Authorization
IPaC	Information for Planning and Consultation
ITP	Incidental Take Permit
I-880	Interstate Highway 880
MBTA	Migratory Bird Treaty Act
MLLW	Mean lower low water
MMPA	Marine Mammal Protection Act
MRF	Materials Recovery Facility
NCCP	Natural Community Conservation Plans



v

Acronym	Definition
NMFS	National Marine Fisheries Service
NPSC	Non-Point Source Control Program
OHWM	ordinary high-water mark
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
project	Alameda Main Street Ferry Terminal Refurbishment Project
RMS	root-mean-square pressure
RWQCB	regional water quality control board (SFRWQCB is San Francisco)
SB	State Bill
SEL	sound exposure level
SR 61	State Route 61
SWP	California State Water Project
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WETA	San Francisco Bay Area Water Emergency Transportation Authority

1 Introduction

1.1 Project Summary and Background

This report describes the results of a comprehensive biological resources assessment conducted for San Francisco Bay Area Water Emergency Transportation Authority's (WETA) proposed Alameda Main Street (AMS) Ferry Terminal Refurbishment Project (project). WETA was established in 2007 under Senate Bill (SB) 976 to replace the Water Transit Authority and serve as a regional ferry system that responds to natural or manmade disasters, such as earthquakes, that would affect access in and out of San Francisco. In 2009, WETA issued a Transition Plan, which outlined WETA's plans for operating, financing, and transferring city-run ferry services in the cities of Vallejo and Alameda to WETA. Operation of the City of Alameda ferry services transitioned to WETA in 2011.

The AMS Ferry offers five routes including daily service to and from downtown San Francisco, weekday service to and from South San Francisco's Oyster Point, weekday service to and from Main Street Alameda, event/gameday service to and from the Chase Center in San Francisco, and event/gameday service from Oracle Park in San Francisco. The AMS Ferry Terminal was constructed in 1991 has been operational since. In 1997, timber piles supporting the bridge structure failed. Repairs were made to the terminal and steel piles/beams were installed to attach the bridge structure to the concrete trestle. In 2014, the terminal was relocated approximately 100 feet to the west. No further upgrades or repairs have been made to the Ferry Terminal since 2014.

1.1.1 Report Format and Approach

The purpose of this report is to (1) describe the conditions of biological resources within the project site in terms of vegetation communities, plants, wildlife, wildlife habitats, and wetlands; (2) quantify potential direct and indirect impacts to biological resources that would result from the proposed project; (3) discuss those impacts in terms of biological significance in view of federal, state, and local laws and Alameda County (County) policies; and (4) specify measures to avoid, minimize, and/or mitigate any adverse impacts that would occur to biological resources as a result of project implementation. This assessment is intended to support the project's Initial Study/Mitigated Negative Declaration, which is currently being prepared as part of the environmental review pursuant to the California Environmental Quality Act (CEQA).

1.2 Project Description

1.2.1 Project Location

The project is in the City of Alameda in Alameda County, California. The City of Alameda occupies approximately 10.6 square miles of land area immediately south of the City of Oakland and the Oakland-Alameda Estuary, east of San Francisco, and north and east of the San Francisco Bay. Alameda Island makes up approximately 80 percent of the City's land area, with the remainder on Bay Farm Island across the San Leandro Channel (See Figure 1). Regional access to the City of Alameda is provided by a variety of transportation modes. Interstate 880 (I-880) through Oakland—the nearest freeway to the project site—provides regional access for automobiles and transit. Regional traffic accesses the project site via State Route 61 (SR 61) through the Webster-Posey Tubes, the Park Street Bridge, the Miller Sweeney Bridge, and the High Street Bridge connecting the island of Alameda and the City of Oakland.



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The project site is located at 2990 Main Street (Assessor Parcel Numbers 74-890-1-17, 74-1368-13-1, 74-1368-1, and 999-9999-999) and includes the existing AMS Ferry Terminal, which consists of a trestle, steel float structure, aluminum gangway, and bridge structure (See Figure 2). The site is designated under the General and Maritime Industry land use and zoned as General Industrial (M-2). Much of the project site is within the Oakland Inner Harbor, with a portion of the bridge structure extending onto the landside of Alameda. The project site is accessible by vehicle via Main Street and by ferry within the harbor. The project is within a developed area of Alameda and is bounded by the Oakland Inner Harbor to the north, industrial uses to the east, the San Francisco Bay Trail, Ferry parking lot, and residential uses to the south, as well as the Main Street Dog Park and undeveloped uses to the east.

1.2.2 Project Purpose

To address structure aging, deterioration, and stabilization issues (i.e., compliance with current seismic safety requirements) associated with existing AMS Ferry terminal components, WETA has identified the need to refurbish several portions of the terminal.

1.2.3 Project Elements

Project elements would include replacement of the existing bridge walkway and foundation, replacement of the gangway, float, guide piles, and upgrades to utilities at the project site. All project features would be compliant with Americans with Disabilities Act (ADA) standards. These details are further described, below.

- Terminal Bridge and Foundation Replacement. Project activities would involve demolishment of existing bridge/walkway and bridge foundation and replacement with a new aluminum truss bridge. Onshore and landside support would be installed and would consist of a 48-inch monopile and two 24-inch pipe piles with cap beams, respectively.
- **Gangway Replacement.** The project would include removal of the existing 60-foot gangway and replacement with an 80-foot covered aluminum gangway.
- Float Demolition/Replacement. The existing terminal float would be removed and replaced-in-kind with a new steel float. Ramps that had been previously installed on the float would be removed, protected in place, and reused once the new float is installed. Float ramps would be shifted to the west to provide additional room for a longer gangway. The four existing 30-foot guide piles would be removed and replaced with four (4) new 36-inch guide piles. To achieve a more safe, efficient berthing capacity and enable ingress and egress in a timely manner, float demolition/replacement activities would also involve installation of two (2) new 36-inch donut fender piles and two (2) 72-inch donut fender piles.
- Utility Upgrades. Utility upgrades associated with the project would involve replacement of existing razor equipment, installation of electrical service for new lighting, ramp controls, outlets, a new potable water line, as well as conduit for future upgrades on bridge, gangway, and float structures. The new potable water line will connect to an existing line at the Ferry Terminal restroom facility. The new line will be used for intermittent terminal cleaning activities, as needed. No other utility improvements are planned.

Overall, the footprint of the project site is expected to increase the AMS Ferry Terminal shade area by approximately 830 square feet. No changes in operational demand (i.e., an increase in ferry users) are anticipated, and no physical impacts beyond the project boundaries (see Figure 2) are anticipated as part of the project. Vehicular and pedestrian access to the AMS Ferry Terminal is not anticipated to change.



The water depth at the project site varies between 14 inches to 28 inches mean lower low water (MLLW). Most construction activities will occur above or at the waterline. The only elements that will extend below the mudline are the new piles that will have a maximum tip elevation of approximately 110 inches MLLW.

1.2.4 Construction

Construction of the project is expected to occur over a period of approximately 4-6 weeks, beginning in Summer 2023 with an anticipated completion date of late Summer 2023. It is estimated that project construction would require 4-8 daily construction crew members, with the possibility for up to 15 onsite construction workers during major operations (e.g., concrete pours).

The following construction equipment is anticipated to be used during construction of the project:

- One (1) Derrick crane barge,
- One (1) Skiff,
- One (1) support tug,
- One (1) support barge,
- One (1) vibratory hammer,
- One (1) impact hammer,
- One (1) delivery truck,
- One (1) concrete truck,
- One (1) pump truck
- Construction personnel trucks (approximately 3-6)
- Generator/compressors (1 generator/1 compressor at any given time)Where feasible and available, diesel construction equipment would be powered by Tier 3 or Tier 4 engines as designated by the California Air Resources Board (CARB) and U.S. Environmental Protection Agency. In addition, if available for on-site delivery, diesel construction equipment would be powered with renewable diesel fuel that is compliant with California's Low Carbon Fuel Standards and certified as renewable by the CARB executive officer.

The project would require removal of existing piles and material placement for installation of steel pipe piles for the new float and donut fenders, and bridge support. It is estimated the approximate 162 square feet (sf) of existing piles would be removed, and approximately 240 sf of steel pipe piles, fender piles, and bridge support piles would be installed. A net total of 78 sf of pilings (total piling installed minus pilings removed) would be installed.

Most project components would be fabricated off-site and transferred to the project site via barge. Debris generated during construction and site clearing activities would consist of the existing steel float, steel guide piles, gangway, bridge structure, bridge structure steel support system (H-Pile and steel beams), concrete approach slab, and miscellaneous electrical/mechanical conduit attached to the existing elements to be removed. In accordance with Section 5.408 of the CALGreen Code, the project would implement a Construction Waste Management Plan (CWMP) for recycling and/or salvaging for reuse of a minimum of 65 percent of nonhazardous construction/demolition debris. Solid waste collected throughout the City is hauled to the Davis Street Transfer Station in the City of San Leandro, where it is loaded into higher-capacity trailer trucks and hauled to Altamont Landfill in eastern Alameda County. Recyclable materials, which are collected from residential and commercial customers in separate bins, are hauled to ACI's Aladdin Materials Recovery Facility (MRF) and Transfer Facility in the City of San Leandro,



which sorts, separates, and bundles the recyclables for sale to secondary markets (City of Alameda 2021a). Materials removed from the project site would be removed via a support barge in the Oakland Inner Harbor.

Consistent with Section 4-10.7 of the Alameda Municipal Code, noise-generating construction activities would be limited to occur between 7:00 a.m. and 7:00 p.m. Monday through Friday and 8:00 a.m. and 5:00 p.m. on Saturdays. It is anticipated that project construction would occur Monday through Friday, 7:00 a.m. to 3:30 p.m., with the potential for Saturday work.

Project construction staging would occur within the AMS Ferry Terminal parking lot. Before construction activities begin on any project component, signage would be posted surrounding the project site notifying the public of temporary parking lot closure. No street closures are anticipated. Because the project would be limited to the project site and construction/staging activities would not impede into the local roadways, a traffic control plan would not be implemented. The San Francisco Bay Trail, which traverses east-west through the AMS Ferry Terminal and project site, would remain open for pedestrian access with the potential for brief interruptions with minor rerouting during certain construction activities, such as concrete installation for the new bridge structure landside cap beam. Access and use of the San Francisco Bay Trail would return to its original condition upon project completion.

1.3 Previous Agency Consultation

U. S. Army Corps of Engineers (USACE)

- Application filed under the federal Clean Water Act (CWA) Section 404 and Rivers & Harbors Act (RHAA) 1899 Section 10 (File No. 2013-00401S) on 01/10/22
- Biological Assessment submitted 01/26/22; Revised 02/12/22
- USACE/National Marine Fisheries Service (NMFS) Invitation to Consultation, 02/02/22
- NMFS Letter of Nonconcurrence (LNC), Endangered Species Act, Section, 7 Main Street Ferry Terminal Refurbishment Project (Corps File No. 2013-00401S), filed 02/24/22.

S. F. Bay Regional Water Quality Control Board (RWQCB)

 Application for Notice of Applicability (NOA) under the General Waste Discharge Requirements for Projects under Construction and Maintenance of Overwater Structures in San Francisco Bay (Order Number R- 2- 2018-0009) filed 02/07/22.

San Francisco Bay Conservation and Development Commission (BCDC)

- Application for a Non-Material Amendment No. 8 to BCDC Permit No. 1991.001.00 (City of Alameda) for the WETA Alameda Main Street (AMS) Ferry Terminal Refurbishment Project (Project), filed 01/04/22.
- California Department of Fish and Wildlife (CDFW) consultation initiated 02/13/22. Continued discussion with CDFW (Arn Aarreberg) resulting in CDFW's recommendation that WETA file an Incidental Take Permit (ITP) based on potential noise impacts to longfin smelt.



2 Regulatory Setting

2.1 Federal

2.1.1 Federal Endangered Species Act

The federal Endangered Species Act (FESA) of 1973 (16 USC 1531 et seq.), as amended, is administered by the U.S. Fish and Wildlife Service (USFWS) for most plant and animal species, and by the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) for certain marine species. This legislation is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing the extinction of plants and wildlife. The FESA defines an endangered species as "any species that is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Under FESA, it is unlawful to "take" any listed species, and "take" is defined as, "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

FESA allows for the issuance of incidental take permits for listed species under Section 7, which is generally available for projects that also require other federal agency permits or other approvals, and under Section 10, which provides for the approval of habitat conservation plans on private property without any other federal agency involvement.

2.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703 et seq.), as amended, prohibits the intentional take of any migratory bird or any part, nest, or eggs of any such bird. Under the MBTA, "take" is defined as pursuing, hunting, shooting, capturing, collecting, or killing, or attempting to do so. In December 2017, Department of the Interior Principal Deputy Solicitor Jorjani issued a memorandum (M-37050) that interprets the Migratory Bird Treaty Act's "take" prohibition to apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs. Unintentional or accidental take is not prohibited. Additionally, Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, requires that any project with federal involvement address impacts of federal actions on migratory birds with the purpose of promoting conservation of migratory bird populations (66 FR 3853–3856). The Executive Order requires federal agencies to work with USFWS to develop a memorandum of understanding. USFWS reviews actions that might affect these species.

2.1.3 Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 (MMPA), as amended, establishes federal responsibility for protection and conservation of marine mammal species by prohibiting the act of hunting, killing, capture, and/or harassment of any marine mammal, defined as "take" by the MMPA. The MMPA also prohibits the import, export, or sale of any marine mammals, parts, or products within the United States. The NMFS and USFWS are responsible for the implementation of the MMPA; the USFWS ensures protection of sea otters, marine otters, walruses, polar bears, three species of manatees, and dugongs, the NMFS protects pinnipeds (seals and sea lions) and cetaceans (whales



and dolphins). The MMPA, as amended, also provides for "incidental take" of marine mammals if NMFS determines that the "take" would have a negligible impact on small numbers of non-listed marine mammal species.

2.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. Sections 1801–1884) as amended in with the Sustainable Fisheries Act of 1996 (Public Law 104-297), establishes Essential Fish Habitat (EFH) descriptions in federal Fisheries Management Plans (FMPs) and requires federal agencies to consult with NMFS on activities that may adversely affect EFH. More generally the Magnuson-Stevens Act provides conservation and management of U.S. fisheries, development of domestic fisheries, and phasing out of foreign fishing activities in federal waters that extend to 200 miles offshore.

The Central Bay region of the San Francisco Bay-Delta, including the waters encompassing the project site, is designated as EFH for fish managed under Fishery Management Plans and as a Habitat Area of Particular Concern under Fishery Management Plans.

2.1.5 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) was enacted by Congress in 1972 to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." The CZMA is administered by NOAA's Office of Ocean and Coastal Resource Management.

Under Section 307 of the CZMA (16 USC § 1456), activities that are undertaken by federal agencies or receive federal funding and may affect coastal uses or resources require a federal license or permit and must be consistent with a state's federally approved coastal management program. California's California Coastal Act, the McAteer-Petris Act, and the Suisun Marsh Protection Act are these federally approved coastal management programs and are implemented by the California Coastal Commission for activities affecting coastal resources outside of San Francisco Bay. The Bay Conservation and Development Commission (BCDC) implements the McAteer-Petris Act and the Suisun Marsh Preservation Act and performs federal consistency reviews for activities affecting the San Francisco Bay and Delta and the Bay shoreline.

2.1.6 Clean Water Act

The Clean Water Act (CWA) provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. Section 401 requires a project operator for a federal license or permit that allows activities resulting in a discharge to waters of the United States to obtain state certification, thereby ensuring that the discharge will comply with provisions of the CWA. The regional water quality control boards (RWQCBs) administer the certification program in California. Section 402 establishes a permitting system for the discharge of any pollutant (except dredged or fill material) into waters of the United States. Section 404 establishes a permit program administered by the U.S. Army Corps of Engineers (USACE) that regulates the discharge of dredged or fill material into waters of the United States. USACE implementing regulations are found at 33 CFR 320 and 330. Guidelines for implementation are referred to as the Section 404(b)(1) Guidelines, which were developed by the U.S. Environmental Protection Agency in conjunction with USACE (40 CFR 230). The



guidelines allow the discharge of dredged or fill material into the aquatic system only if there is no practicable alternative that would have less adverse impacts.

Wetlands and Other Waters of the United States

Under Section 404 of the CWA, USACE has the authority to regulate activities that could discharge fill or dredge material or otherwise adversely modify wetlands or other waters of the United States. USACE implements the federal policy embodied in Executive Order 11990, which, when implemented, is intended to result in no net loss of wetland values or function. On January 23, 2020, USACE and the U.S. Environmental Protection Agency finalized the "Navigable Waters Protection Rule," which establishes a new definition of Waters of the United States under the CWA. The new Navigable Waters Protection Rule (Rule) repeals the Obama Administration-era 2015 Clean Water Rule and replaces it with a definition that drastically limits the scope of federal regulation to a much narrower collection of aquatic resource features. Among the greatest changes, the Rule eliminates "significant nexus" determinations to determine if potential tributaries have a significant effect on the "chemical, physical, and biological integrity of downstream traditional navigable waters." The Rule also redefines the term "adjacent." In order for an adjacent wetland to be jurisdictional, it must touch "at least one point or side of a jurisdictional water" or have a direct hydrological surface connection to a traditional navigable waterway. Hydrological connections through groundwater, which have been suggested to maintain federal jurisdiction in the past, are now outside of the scope of federal purview. Most importantly, the Rule identifies four specific categories of aquatic resource features that will be regulated by the federal government under the CWA, leaving oversight for other "excluded" waterbodies to states and tribes. The following four specific categories of aquatic resources are regulated under the CWA:

- 1. Territorial seas and traditional navigable waters
- 2. Perennial and intermittent tributaries
- 3. Certain lakes, ponds, and impoundments
- 4. Wetlands that are adjacent to jurisdictional waters

The revised Rule does not expand federal regulation to include new categories of aquatic features; however, it does provide a list of excluded features that would no longer be considered waters of the United States under the final Rule. Most significantly, "ephemeral" streams and other features that only flow in direct response to precipitation, and are particularly prevalent in the western United States, would no longer be subject to CWA regulation.

The State Water Resources Control Board has authority over wetlands through Section 401 of the CWA, as well as the Porter–Cologne Water Quality Control Act (Porter–Cologne Act), California Code of Regulations Section 3831(k), and California Wetlands Conservation Policy. The CWA requires that an applicant for a Section 404 permit (to discharge dredge or fill material into waters of the United States) first obtain certification from the appropriate state agency stating that the fill is consistent with the state's water quality standards and criteria. In California, the authority to either grant certification or waive the requirement for permits is delegated by the State Water Resources Control Board to the nine regional boards. A request for certification is submitted to the regional board at the same time that an application is filed with USACE.

2.2 State

2.2.1 California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Game Code, Section 2050–2068) provides protection and prohibits the take of plant, fish, and wildlife species listed by the State of California. Unlike FESA, under CESA state-listed plants have the same degree of protection as wildlife, but insects and other invertebrates may not be listed. Take is defined similarly to FESA and is prohibited for both listed and candidate species. Take authorization may be obtained by the project applicant from CDFW under CESA Section 2081, which allows take of a listed species for educational, scientific, or management purposes. In this case, private developers consult with CDFW to develop a set of measures and standards for managing the listed species, including full mitigation for impacts, funding of implementation, and monitoring of mitigation measures.

2.2.2 California Fish and Game Code

Fully Protected Species

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code outline protection for fully protected species of mammals, birds, reptiles, amphibians, and fish. Species that are fully protected by these sections may not be taken or possessed at any time. CDFW cannot issue permits or licenses that authorize the "take" of any fully protected species, except under certain circumstances, such as scientific research and live capture and relocation of such species pursuant to a permit for the protection of livestock. Furthermore, it is the responsibility of the CDFW to maintain viable populations of all native species. Toward that end, the CDFW has designated certain vertebrate species as Species of Special Concern, because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.

Section 5901

Section 5901 makes it unlawful to construct or maintain any device or contrivance that prevents, impedes, or tends to prevent or impede, the passing of fish up and down stream. Fish are defined in Section 45 as a wild fish, mollusk, crustacean, invertebrate, amphibian, or part, spawn, or ovum of any of those animals.

Section 5937

Section 5937 requires that the owner of any dam shall allow sufficient water at all times to pass through a fishway, or in the absence of a fishway, allow sufficient water to pass over, around or through the dam, to keep in good condition any fish that may be planted or exist below the dam. During the minimum flow of water in any river or stream, permission may be granted by the department to the owner of any dam to allow sufficient water to pass through a culvert, waste gate, or over or around the dam, to keep in good condition any fish that may be planted or exist below the dam, to keep in good condition any fish that may be planted or exist below the dam, to keep in good condition any fish that may be planted or exist below the dam, when, in the judgment of the department, it is impracticable or detrimental to the owner to pass the water through the fishway.



Section 1600-1616

CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses (including dry washes) and lakes characterized by the presence of (1) definable bed and banks and (2) existing fish or wildlife resources. CDFW takes jurisdiction to the top of bank of the stream, or the limit of the adjacent riparian vegetation, which may include oak woodlands in canyon bottoms. Historical court cases have further extended CDFW jurisdiction to include watercourses that seemingly disappear but reemerge elsewhere. Under the CDFW definition, a watercourse need not exhibit evidence of an ordinary high-water mark (OHWM) to be claimed as jurisdictional. CDFW does not have jurisdiction over ocean or shoreline resources.

Under California Fish and Game Code, Sections 1600–1616, CDFW has the authority to regulate work that will substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake. CDFW also has the authority to regulate work that will deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. This regulation takes the form of a requirement for a Lake or Streambed Alteration Agreement and is applicable to all projects. Applications to CDFW must include a complete certified CEQA document.

California Native Plant Protection Act

The Native Plant Protection Act of 1977 (see Section 1900 et seq. of the California Fish and Game Code) directed CDFW to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this State." The Native Plant Protection Act gave the California Fish and Game Commission the power to designate native plants as "endangered" or "rare" and protect endangered and rare plants from take. CESA expanded on the original Native Plant Protection Act and enhanced legal protection for plants, but the Native Plant Protection Act remains part of the California Fish and Game Code. To align with federal regulations, CESA created the categories of "threatened" and "endangered" species. It converted all "rare" animals into the act as threatened species, but did not do so for rare plants. Thus, there are three listing categories for plants in California: rare, threatened, and endangered. Because rare plants are not included in CESA, mitigation measures for impacts to rare plants are specified in a formal agreement between CDFW and the project proponent.

Nesting Birds

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 protects all birds of prey (raptors) and their eggs and nests. Section 3511 states that fully protected birds or parts thereof may not be taken or possessed at any time. Section 3513 states that it is unlawful to take or possess any migratory non-game bird as designated in the MBTA.

2.2.3 California Environmental Quality Act

CEQA requires identification of a project's potentially significant impacts on biological resources and ways that such impacts can be avoided, minimized, or mitigated. The act also provides guidelines and thresholds for use by lead agencies for evaluating the significance of proposed impacts.

The State of California CEQA Guidelines (CEQA Guidelines) Section 15380(b)(1) defines endangered animals or plants as species or subspecies whose "survival and reproduction in the wild are in immediate jeopardy from one or more



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causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors." A rare animal or plant is defined in Section 15380(b)(2) as a species that, although not presently threatened with extinction, exists "in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or ... [t]he species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered 'threatened' as that term is used in the federal Endangered Species Act." Additionally, an animal or plant may be presumed to be endangered, rare, or threatened if it meets the criteria for listing, as defined further in CEQA Guidelines Section 15380(c).

CDFW has developed a list of "Special Species" as "a general term that refers to all of the taxa the California Natural Diversity Database (CNDDB) is interested in tracking, regardless of their legal or protection status." This is a broader list than those species that are protected under the FESA, CESA, and other California Fish and Game Code provisions, and includes lists developed by other organizations, including for example the Audubon Watch List Species. Guidance documents prepared by other agencies, including the Bureau of Land Management Sensitive Species and USFWS Birds of Special Concern, are also included on this CDFW Special Species list. Additionally, CDFW has concluded that plant species listed as California Rare Plant Rank (CRPR) 1 and 2 by the California Native Plant Society (CNPS), and potentially some CRPR 3 plants, are covered by CEQA Guidelines Section 15380.

Section IV, Appendix G (Environmental Checklist Form), of the CEQA Guidelines requires an evaluation of impacts to "any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or the U.S. Fish and Wildlife Service."

2.2.4 San Francisco Bay Plan

The San Francisco BCDC is responsible for analyzing, planning, and regulating San Francisco Bay and its shoreline under the McAteer-Petris Act. This jurisdiction includes the waters of the Bay as well as a shoreline band that extends inland 100 feet from the high tide line. Any fill, excavation of material, or substantial change in use within BCDC jurisdiction requires a permit from BCDC. The San Francisco Bay Plan (Bay Plan) specifies goals, objectives, and policies for existing and proposed waterfront land use and other areas and is also implemented by the BCDC. Specific Bay Plan policies that are relevant to the project are as follows:

Policy 4(a): The Commission should consult with the California Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, whenever a proposed project may adversely affect an endangered or threatened plant, fish, other aquatic organism or wildlife species.

Policy 4(b): The Commission should not authorize projects that would result in the "taking" of any plant, fish, other aquatic organism or wildlife species listed as endangered or threatened pursuant to the state or federal Endangered Species Acts, or the federal Marine Mammal Protection Act, or species that are candidates for listing under these acts, unless the project applicant has obtained the appropriate "take" authorization from the U.S. Fish and Wildlife Service, National Marine Fisheries Service or the California Department of Fish and Wildlife.

Policy 4(c): The Commission should give appropriate consideration to the recommendations of the California Department of Fish and Wildlife, the National Marine Fisheries Service or the U.S. Fish and Wildlife Service in order to avoid possible adverse effects of a proposed project on fish, other aquatic organisms and wildlife habitat.



2.2.5 Porter-Cologne Water Quality Control Act

Pursuant to provisions of the Porter–Cologne Act, the RWQCBs regulate discharging waste, or proposing to discharge waste, within any region that could affect a water of the state (California Water Code, Section 13260[a]). The State Water Resources Control Board defines waters of the state as "any surface water or groundwater, including saline waters, within the boundaries of the state" (California Water Code, Section 13050[e]). As of April 2019, the State Water Resources Control Board has narrowed their definition of a waters of the state to include the following:

- 1. Natural wetlands
- 2. Wetlands created by modification of a surface water of the state
- 3. Artificial wetlands that meet any of the following criteria:
 - a. Approved by an agency as compensatory mitigation for impacts to other waters of the state, except where the approving agency explicitly identifies the mitigation as being of limited duration
 - b. Specifically identified in a water quality control plan as a wetland or other water of the state
 - c. Resulted from historic human activity, is not subject to ongoing operation and maintenance, and has become a relatively permanent part of the natural landscape
 - d. Greater than or equal to 1 acre in size unless the artificial wetland was constructed and is currently used and maintained, primarily for one or more of the following purposes: industrial or municipal wastewater treatment or disposal; settling of sediment; detention, retention, infiltration, or treatment of stormwater runoff and other pollutants or runoff subject to regulation under a municipal, construction, or industrial permitting program; treatment of surface waters; agricultural crop irrigation or stock watering; fire suppression; industrial processing or cooling water; active surface mining even if the site is managed for interim wetlands functions and values; log storage; treatment, storage, or distribution of recycled water; maximizing groundwater recharge (this does not include wetlands that have incidental groundwater recharge benefits); or fields flooded for rice growing.

All waters of the United States are waters of the state. Wetlands, such as isolated seasonal wetlands, that are not generally considered waters of the United States are considered waters of the state if, "under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation." (SWRCB 2019). If a CWA Section 404 permit is not required for a project, the RWQCB may still require a permit (waste discharge requirements) for impacts to waters of the state under the Porter–Cologne Act.

2.3 Local

2.3.1 Alameda County General Plan

The Alameda County General Plan Open Space and Conservation Element contains the following objectives and policies for biological resources protection relevant to the proposed project:

5.1.a: Preserve and enhance all wetlands and water-related habitat. Water-related habitat includes open water, Bay bottom, mudflats, uplands, sandy areas, lagoons, and sloughs. Since the various Bay wetlands are linked ecologically, preservation of nearby Arrowhead, Fan, and Damon marshes



would aid in the preservation and enhancement of Alameda's wetlands, including those at the Elsie D. Roemer Bird Sanctuary and Bayview Shoreline Preserve.

5.1.b: Protect Open Space-Habitat areas, including sensitive submerged tidelands areas (mudflats) and eelgrass beds, from intrusions by motorized recreational craft, including jet skis and hovercraft.

5.1.c: Continue to prohibit filling of water-related habitat except in those limited cases in which a strong public need clearly outweighs the habitat preservation need, and where approval is granted by the appropriate agencies.

5.1.g: Conduct all dredging in compliance with the Long-Term Management Strategy, Management Plan, prepared by the USACE, USEPA, BCDC, and SFRWQCB.

5.1.j: Use the City of Alameda Street Tree Management Plan as the guiding reference when considering action which would affect the trees contained in the urban forest. After presenting a thorough inventory of the location, composition, condition, and maintenance needs of Citymaintained trees, the Street Tree Management Plan presents recommendations for planting and tree maintenance.

5.1.n: Inventory existing wetlands and water-related and other habitats to create a comprehensive map of sensitive biological and botanical resources, to better protect these resources.

5.1.o: Complete the Bayview Shoreline Preserve Improvement Plan.

5.1.r: Continue to participate in the Alameda County Non-Point Source Task Force. The Task Force is made up of public works directors or representatives from each city within Alameda County and is engaged in organizing the implementation of the Non-Point Source Control Program, to ensure continued improvement of Bay water quality. Non-point sources of pollution include polluted urban runoff, construction site erosion, pollutants in freshwater inflow, pollutants from toxic waste sites and dumps, direct spills of pollutants to the Bay, dredging, and vessel waste discharges.

5.1.s: Participate in the Non-Point Source Control Program (NPSC). Although not fully designed, the NPSC Program is anticipated to include measures for prevention of contamination and source control of pollutants. Treatment of urban runoff, while potentially effective, is costly, and prevention and source control are the preferred methods of abatement. The main objective of the NPSC Program is to ensure that only storm water enters the storm drains, which will involve eliminating illegal connections and strict surveillance and enforcement "of "no dumping" mandates. Educational as well as regulatory strategies are under consideration.

5.1.t: Consider adopting City standards in addition to those adopted by the County, to deal with non-point source water pollution problems such as sheet flow storm runoff and sedimentation affecting sensitive water habitats.

5.1.w: Require new marinas and encourage existing marinas to provide easily accessible waste disposal facilities for sewage and bilge and engine oil residues.



5.1.x: Prevent migration of runoff off-site or into wetlands areas and water related habitat by requiring that proposed projects include design features ensuring detention of sediment and contaminants.

5.1.bb: Require a biological assessment of any proposed project site where species or the habitat of species defined as sensitive or special status by the California Department of Fish and Game or the U.S. Fish and Wildlife Service might be present. Listings of sensitive and special status species change from year to year, but might include birds, animals, and plants such as the California Least Tern, California Clapper Rail, Burrowing Owl, Alameda Island Mole, Salt Marsh Wandering Shrew, Adobe Sanicle, Pt. Reyes Bird's Beak, and Monterey Spineflower.

5.2.a: Protect and preserve Bay waters and vegetation as nurseries and spawning grounds for fish and other aquatic species, both as a part of habitat preservation and to encourage continued use of the Bay for commercial fishing production.

2.3.2 City of Alameda General Plan 2040

The City of Alameda General Plan 2040 Conservation and Climate Action Element, as well as the Parks and Open Space Element include the following biological resource policies relevant to the project:

- **Policy CC-27:** Habitat and Biological Resource Protection and Restoration. Protect and restore natural habitat in support of biodiversity and protect sensitive biological resources to prepare for climate change.
- Policy CC-33: Green Infrastructure. Protect San Francisco Bay, San Leandro Bay, and the Alameda Oakland Estuary by promoting, requiring, and constructing green infrastructure that improves stormwater runoff quality, minimizes stormwater impacts on stormwater infrastructure, improves flood management, and increases groundwater recharge.
- **Policy CC-34:** New Development. Promote the preservation of on-site natural elements in new development, when feasible, that contribute to the community's native plant and wildlife species value and to aesthetic character.
- Policy OS-12: Wildlife Habitat. Promote the preservation, protection and expansion of wildlife habitat areas, open space corridors, and ecosystems as essential pieces of the overall network and important contributors to building citywide resilience.

2.3.3 City of Alameda Tree Preservation Policies

The City of Alameda protects trees according to species, size and location of tree as follows:

- All coast live oaks (Quercus agrifolia) in Alameda with a ten inch (10") or greater diameter measured four and a half feet (4.5') above ground.
- All Mexican fan palms (Washingtonia robusta) and California fan palms (Washingtonia filifera) in the public rights of way on both sides of Burbank Street, Portola Avenue, and Eighth Street between Central and Portola Avenues.
- All trees in the three median islands on Thompson Avenue between High Street and Fernside Boulevard, known as Christmas Tree Lane. First island: Atlas Cedar (*Cedrus atlantica*); Coast Redwood (*Sequoia sempervirens*). Second island: Atlas Cedar; Coast Redwood; Monterey Pine (*Pinus radiate*). Third island: Atlas Cedar; Coast Redwood; Jellicote Pine (*Pinus patula*); Bradford Pear (*Pyrus calleryana*).



 All sycamore (London plane trees) (*Platanus acerifolia*) in the public rights of way on both sides of Central Avenue between Fernside Boulevard and 5th Street.

The removal of Protected Trees requires a permit, referred to as a Certificate of Approval from the City, and the removal of trees that were planted as part of a City-approved landscape plan requires an approval called a Zoning Compliance Determination (City of Alameda, 2015). In addition, no building shall be moved within the City unless provision be made for the protection of and prevention of injury to any tree, shrub or plant located in any street, park or other public place in the City (Municipal Code 13-17.14; Ord. No. 865 N.S.)

3 Methods

Data regarding biological resources present within the biological survey area (BSA) was obtained through a review of pertinent literature, field reconnaissance, and habitat assessments, which are described in detail in this section. For purposes of this report, special-status resources are defined as follows:

- Special-status plant species include (1) species designated as either rare, threatened, or endangered by CDFW or USFWS and are protected under either the CESA (California Fish and Game Code Section 2050 et seq.) or the FESA (16 USC 1531 et seq.); (2) species that are candidate species being considered or proposed for listing under FESA or CESA; (3) species that are included on the CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2022a), or species with a CRPR of 1 or 2 in the CNPS Inventory of Rare and Endangered Plants of California (CNPS Inventory) (CNPS 2022).
- Special-status wildlife species include (1) species designated as either rare, threatened, or endangered by CDFW or USFWS/NMFS and are protected under either the CESA (California Fish and Game Code Section 2050 et seq.) or the FESA (16 USC 1531 et seq.); (2) species that are candidate species being considered or proposed for listing under FESA or CESA; (3) species that are included on the CDFW Special Animals List (CDFW 2022b).
- Special-status vegetation communities are those designated as sensitive by the CDFW or those that provide habitat for special-status species.

3.1 Literature Review

Prior to conducting a field assessment, a literature search and database review were conducted by Dudek biologists to evaluate the natural resources found or potentially occurring within the BSA. The database review included the most recent versions of the CNDDB and special-status species lists (CDFW 2022a, 2022b), and the CNPS Inventory (CNPS 2022). These databases were reviewed to identify sensitive biological resources present or potentially present for the U.S. Geological Survey 7.5-minute quadrangle on which the BSA is located (Oakland West) and the eight surrounding quadrangles (Oakland East, Richmond, Briones Valley, San Francisco North, San Francisco South, Hunters Point, San Leandro, San Quentin). The CDFW occurrence data and critical habitat databases were queried using geographic information system (GIS) software based on a 5-mile buffer around the project site. Potential and/or historic drainages and aquatic features were investigated based on a review of U.S. Geological Survey topographic maps (1:24,000-scale), aerial photographs, the USFWS National Wetland Inventory database (USFWS 2022), and the Natural Resource Conservation Service's Web Soil Survey (USDA 2022a).

3.2 Field Surveys

On July 8, 2022, Dudek fisheries and wildlife biologist, Andy Hatch, conducted a reconnaissance-level field survey of the BSA to document biological resources and vegetation communities.

3.2.1 Vegetation Community and Land Cover Mapping

Dudek used CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2018) and List of Vegetation Alliances and Associations (CDFW 2019b), also referred to as

the Natural Communities List, to map the entire BSA. Vegetation communities and land covers were delineated to the vegetation alliance level, and where appropriate the association level. Some modifications, such as the Preliminary Descriptions of the Terrestrial natural Communities of California (Holland 1986; Oberbauer et al. 2008), were incorporated to accommodate the lack of conformity of the observed communities to those included in these references.

3.2.2 Plants

Latin and common names for plant species with a CRPR follow the CNPS Inventory (CNPS 2022). For plant species without a CRPR, Latin names follow the Jepson Interchange List of Currently Accepted Names of Native and Naturalized Plants of California (Jepson Flora Project 2022) and common names follow the U.S. Department of Agriculture's Natural Resources Conservation Service Plants Database (USDA 2022b).

3.2.3 Wildlife

All wildlife species detected during the field surveys by sight, vocalizations, burrows, tracks, scat, and other signs were recorded. The site was visually scanned with and without binoculars to identify wildlife. Latin and common names of animals follow Crother (2012) for reptiles and amphibians, American Ornithologists' Union for birds (AOU 2016), Wilson and Reeder (2005) for mammals, and Moyle (2002) for fish.

3.2.4 Survey Limitations

Limitations of the survey include a diurnal bias and the absence of trapping for small mammals, reptiles, fish, and amphibians. The survey was conducted during the daytime to maximize the detection of most wildlife. Most birds are active in the daytime, so diurnal surveys maximize the number of bird observations. Conversely, diurnal surveys usually result in few observations of mammals, many of which may only be active at night. In addition, many species of reptiles and amphibians are secretive in their habits and are difficult to observe using standard meandering transects.

3.3 Special-Status Species Habitat Assessment

Appendix A, Special-Status Plants Potentially Occurring within the BSA, and Appendix B, Special-Status Wildlife (including fish and marine species) Potentially Occurring within the BSA, provide tables of all special-status species whose geographic ranges fall within the general BSA vicinity. Special-status species potential to occur within the BSA were evaluated based on known species distribution, species-specific habitat preferences, and Dudek biologists' knowledge of regional biological resources. Species potentially occurring within the BSA are identified as having moderate or high potential to occur based on habitat conditions on site, and species for which there is little or no suitable habitat are identified as not expected to occur or having low potential to occur.

4 Environmental Setting

The purpose of this section is to describe the general existing conditions within and adjacent to the BSA to document the baseline conditions for this report and subsequent analysis.

4.1 Climate

The BSA is located in Alameda County, which experiences seasons of dry and warm summers and cooler, wetter winter seasons with monthly average temperatures ranging from 48°F to 65°F. Annual precipitation averages approximately 19.5 inches per year, with most precipitation received between October and April.

4.2 Geology and Topography

The BSA is located within the San Francisco Bay, in the Central Bay, and more specifically the Oakland-Alameda Estuary. Originally a tidal slough, the Oakland-Alameda Estuary has been dredged since the 1800s to create a shipping channel and support the port of Oakland which loads and discharges almost all the containerized goods moving through Northern California. The Oakland-Alameda Estuary receives freshwater input from creeks, stormwater drainage, and direct surface runoff. Tides and marine currents also impact the movements of sediments within the shipping channel and marine waters of the San Francisco Bay.

4.3 Soils

According to the Natural Resource Conservation Service's Web Soil Survey (USDA 2022a), the BSA occurs within the Alameda County, Western Part. The BSA consists of two soil types, Urban Land and Xeropsamments, fill (along the shoreline).

4.4 Surrounding Land Uses

The BSA is in the Oakland Inner Harbor, in a developed portion of Alameda Island. Residential neighborhoods are to the south of the BSA, and developed industrial sites are situated to the east. The Oakland Inner Harbor shipping channel and terminal are located north of the BSA, and a dog park and some undeveloped (but highly disturbed) shoreline occur west of the BSA, running out to the former Alameda naval air station, now known as Alameda Point.

4.5 Watersheds and Hydrology

The BSA is located within the North Alameda watershed, which compromises the majority of Alameda Island. Because the topography of Alameda Island is flat and has a lot of filled baylands, no creeks or streams occur but surface water is transported to the San Francisco Bay through a series of storm drains.



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5 Results

This section describes the results of the literature review, field surveys, and habitat assessments within the BSA.

5.1 Vegetation Communities and Land Covers

The BSA supports the following vegetation communities and landcovers: Ruderal and Non-Native Grassland and Urban/Developed Land. Marine resources are discussed in more detail in Section 5.2.

5.1.1 Ruderal and Non-Native Grassland

Ruderal vegetation and non-native grassland occur along undeveloped portions of the Oakland Inner Harbor shoreline, adjacent to the bay fill and rip-rap that make up the shoreline proper. These areas are subject to human disturbance; opportunistic plant species that can handle high levels of disturbance dominate in these conditions. While some native species may occur, these areas are typically dominated by non-native and often highly invasive species. The BSA included very limited ruderal vegetation and non-native grassland, including fennel (*Foeniculum vulgare*), and non-native grasses that may include foxtail brome (*Bromus madritensis*), rattail sixweeks grass (*Festuca myuros*), or wild oat (*Avena* spp.), but were not identified due to recent vegetation management and human disturbance.

5.1.2 Urban and Developed Land

According to Oberbauer et al. (2008), urban/developed land represents areas that have been constructed upon or otherwise physically altered to an extent that native vegetation communities are not supported. This land cover type generally consists of semi-permanent structures, homes, parking lots, pavement or hardscape, and landscaped areas that require maintenance and irrigation (e.g., ornamental greenbelts). Typically, this land cover type is unvegetated or supports a variety of ornamental plants and landscaping.

The majority of the BSA Is urban/developed land and includes the parking area, ferry terminal building, and walkways.

5.2 Marine Resources

Open water, aquatic, and subtidal habitat occurs in the BSA in the vicinity of the terminal dock and in the Oakland Inner Harbor, which is part of the Central Bay, and Oakland-Alameda Estuary. The estuary has been dredged for years to create the port and shipping channel, altering the pre-developed tidal slough condition that would have occurred there. Inflows of fresh water are primarily through storm drain and urban run-off with some natural creeks. Open water habitat in the San Francisco Bay provides wintering and stop-over sites for avian species using the Pacific Flyway. While the BSA and surrounding Alameda Island is largely urbanized, open water surrounding the island could support a variety of marine waterfowl including black oystercatcher (*Haematopus bachmani*), Canada goose (*Branta canadensis*), California brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocoraxuratuss*), various gulls (*Larus* spp.), and others.



Aquatic vegetation in the BSA could include algae species or common subtidal plants including pondweed (*Potamogeton* spp.) and widgeon grass (*Ruppia maritima*). The greater San Francisco Bay and the Oakland-Alameda Estuary supports a large variety of invertebrates, crustaceans, mollusks, pelagic species, and a wide variety of fishes.

San Francisco Bay and the Oakland-Alameda Estuary, and the BSA, could also support the following special-status species: Central California Coast (CCC) steelhead Distinct Population Segment (DPS) (*Oncorhynchus mykiss*), Central Valley fall/late-fall run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), and the southern DPS of North American green sturgeon (*Acipenser medirostris*). Pacific herring (*Clupea pallasii*) is a common pelagic species within the San Francisco Bay and is regulated by the CDFW due to declines. Marine mammal species, including harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) also occur within the San Francisco Bay, and have been observed in the Oakland Inner Harbor. WETA ferry boat captains have reported frequently seeing both harbor seals and California sea lions in the estuary channel and near Bay Ship and Yacht within the inner harbor but did not report seeing either species or other marine mammals near the ferry dock/platform. Whales (no species reported but likely gray whales, *Eschrichtius robustus*) were reported to have been occasionally spotted in the Bay during winter and spring (WETA, pers. Comm. 2022).

5.3 Plants and Wildlife Observed

5.3.1 Plants

A total of 7 species of native or naturalized plants, were recorded in the BSA. The majority of the site is developed, with ornamental vegetation including ornamental rosemary (*Sal2Oegra2Oinusinus*) and ornamental pear (*Pyrus calleryana*). Ruderal and nonnative grassland habitat species included fennel, foxtail brome, rattail sixweeks grass, wild oat, and black mustard (*Brass egraegra*).

5.3.2 Wildlife

A total of 8 wildlife species were recorded within the BSA or vicinity during surveys. Wildlife species detected on or in the immediate vicinity of the BSA included California ground squirrel (*Otospermophilus beecheyi*), Canada goose (*Branta canadensis*), common raven (*Corvus corax*), European starling (*Sturnus vulgaris*), California gull (*Larus californicus*), rock pigeon (*Columba livia*), common tern (*Sterna hirundo*), and black oystercatcher (*Haematopus bachmani*).

5.4 Special-Status Biological Resources

Appendix A and Appendix B provide tables of all special-status species whose geographic ranges fall within the general BSA vicinity. Special-status species' potential to occur within the BSA were evaluated based on known species distribution, species-specific habitat preferences, and Dudek biologists' knowledge of regional biological resources. Species potentially occurring within the BSA are identified as having moderate or high potential to occur based on habitat conditions on site, and species for which there is little or no suitable habitat are identified as not expected to occur or having low potential to occur.



5.4.1 Special Status Plants

Special-status plants include those listed, or candidates for listing, as threatened or endangered by USFWS and CDFW, and species identified as rare by the CNPS (particularly CRPR 1A, presumed extinct in California; CRPR 1B, rare, threatened, or endangered throughout its range; and CRPR 2, rare or endangered in California, more common elsewhere).

Dudek biologists performed an extensive desktop review of literature, existing documentation, and GIS data to evaluate the potential for special-status plant species to occur within the BSA. Each special-status plant species was assigned a rating of "not expected," "low," "moderate," or "high" potential to occur based on relative location to known occurrences, vegetation community, soil, and elevation. Based on the results of the literature review and database searches, 105 special-status plant species were identified as potentially occurring within the region of the BSA. None of these species were determined to have the potential to occur within the BSA based on the soils, vegetation communities (habitat) present, elevation range, and previous known locations based on the CNDDb, IPaC, and CNPS Inventory.

5.4.2 Special Status Fish, Wildlife, and Marine Species

Special-status fish, wildlife, and marine species include those listed, or candidates for listing, as threatened or endangered by USFWS and CDFW, and those designated as species of special concern by CDFW and as sensitive by USFWS.

Similar to special-status plants, Dudek biologists performed an extensive desktop review of literature, existing documentation, and GIS data to evaluate the potential for special-status fish, wildlife, and marine species to occur within the BSA. Each special-status species was assigned a rating of "not expected," "low," "moderate," or "high" potential to occur based on relative location to known occurrences and vegetation community/habitat association. Based on the results of the literature review and database searches, 86 special-status fish, wildlife, and marine species were reported in the CNDDB, NMFS, and USFWS databases as occurring in the vicinity of the BSA. Of these, the following were determined to have a moderate or high potential to occur within the BSA based on habitat present and previous known locations in the CNDDB and Information for Planning and Consultation (IpaC) records: California Central Valley steelhead DPS, Central Coast Steelhead DPS, southern DPS of North American green sturgeon, Sacramento River winter-run ESU (endangered), Central Valley spring-run ESU (threatened), Central Valley spring-run ESU (San Joaquin River experimental population, non-essential), Central Valley fall-run/late fall-run (species of concern), longfin smelt (*Spirinchus thaleichthys*), and marine mammals. These species are discussed below.

5.4.2.1 Special Status Wildlife Species

No special status terrestrial wildlife species were determined to have a moderate or high potential to occur within the BSA.

5.4.2.2 Special Status Fish Species

5.4.2.2.1 California Central Valley/Central Coast Steelhead (DPS)

Two Distinct Population Segments (DPSs) of steelhead could occur within the BSA, the California Central Valley Steelhead DPS which includes populations in California's Sacramento and San Joaquin Rivers and their tributaries, and the Central



California Coast Steelhead DPS which range from the Russian River (Sonoma County) south to Aptos Creek (Santa Cruz County). Both the California Central Valley and Central California Coast DPS were listed as threatened under the ESA in 1998. Critical habitat was designated in 2005; the BSA is not within designated critical habitat.

Steelhead generally migrate farther into tributaries and headwater streams than salmon where cool, welloxygenated water is available year-round. Central California steelhead typically enter freshwater streams, estuaries, and rivers between December and February, with spawning peaking between February to April. Adults typically spend up to two years in freshwater locations, and one year in the ocean prior to returning to spawn. In some smaller coastal watersheds, steelhead may be able to spawn more than once due to the relatively short migration from the ocean to suitable spawning habitat. Newly emerged steelhead fry use shallow, protected areas along streambanks but move to faster, deeper areas of the river as they grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates. Juvenile steelhead rear throughout the year and may spend 1–3 years in freshwater before emigrating to the ocean. Smoltification, the physiological adaptation that juvenile salmonids undergo to tolerate saline waters, occurs in juveniles as they begin their downstream migration. Smolting steelhead generally emigrate from March to June.

Suitable habitat for steelhead occurs in perennial creeks, larger streams and rivers, and estuaries. Estuaries, including the San Francisco Bay provide a holding area for adults prior to the upstream migrations and juveniles use estuaries for rearing and smoltification. While the BSA could provide estuarine habitat for steelhead, any steelhead using habitat within the BSA are only likely to use that habitat temporarily during migrations and there is a low overall likelihood of steelhead occurring within the BSA due to the lack of suitable rearing and holding habitat present in the BSA and the lack of natal streams in the vicinity (Leidy *et al.* 2005).

5.4.2.2.2 North American Green Sturgeon (Southern DPS)

On April 7, 2006, NMFS listed the Southern DPS of the North American green sturgeon as threatened under the ESA. The Southern DPS includes individual reproductive populations south of the Eel River. The populations north of the Eel River, grouped as the northern DPS, currently do not warrant listing. Critical habitat was designated in 2009 and includes open water habitat within the BSA.

Green sturgeon are found in the lower reaches of large rivers, including the Sacramento–San Joaquin River basin, and in the Eel, Mad, Klamath, and Smith Rivers. The green sturgeon is a primitive, bottom-dwelling fish found from Ensenada, Mexico, to the Bering Sea and Japan (Moser *et al.* 2016). It is characterized by its large size (up to 7 feet long and 350 pounds), a long, round body, and "scutes," or plates along dorsal and lateral sides. It is known to migrate up to 600 miles between freshwater and saltwater environments and is commercially caught in the Columbia River and coastal Washington (Moser *et al.* 2016). Very little is known about the life history of the green sturgeon relative to other fish species. It is an anadromous fish that spends most of its life in salt water and returns to spawn in freshwater. It is slow growing and late maturing and may spawn as little as every 4 to 11 years. Individuals congregate in the bays of these systems in summer, while some may travel upstream to spawn in spring and summer.

Spawning occurs in the lower reaches of large rivers with swift currents and large cobble. Adults broadcast spawn in the water column and fertilized eggs sink and attach to bottom substrate until they hatch (PSMFC 1996). Flow has been identified as the key determinant to larval survival, therefore water diversions and low dam releases may negatively impact green sturgeon survival rates (PSMFC 1996). Juveniles feed on algae and small invertebrates



and migrate downstream before they enter their third year of life. They may remain in the estuary for a short time before entering the ocean to feed on benthic invertebrates and fish.

Green sturgeon typically enter the San Francisco Bay between February and May and migrate up the Sacramento River to spawning grounds; cool sections of the upper Sacramento where they find deep, turbulent flows and clean substrate. Juveniles migrate and rear in the Delta and San Francisco Bay estuary then migrate back out to the ocean. The BSA could provide rearing habitat for juvenile or sub-adult green sturgeon.

5.4.2.2.3 Chinook Salmon

Multiple Chinook Salmon runs occur within the San Francisco Bay including the Sacramento River winter-run ESU (endangered), Central Valley spring-run ESU (threatened), Central Valley spring-run ESU (San Joaquin River experimental population, non-essential), and Central Valley fall-run (species of concern). Critical habitat was designated for Sacramento River winter-run ESU on June 16, 1993, and Central Valley spring-run ESU on September 2, 2005; the BSA is not within designated critical habitat- portions of the San Francisco Bay estuary north of the BSA are designated critical habitat for Sacramento River winter-run ESU.

Chinook salmon moving from the ocean through the San Francisco Bay and into the Sacramento-San Joaquin River system are part of the distinct runs described above, each entering the estuary at different times of year. Migrations often follow storms, and many adults will hold in the estuary prior to migrating upstream. Fall-run Chinook Salmon migrate upstream from July through December and spawn from early October through late December. Spring-run enter the Sacramento River from late March through September. Sacramento River winter-run migrate from November through May and spawn in the upper mainstem Sacramento River from mid-April through August. After emerging from their redds, juveniles migrate downstream within a few months. Smolts use food-rich tidal or flooded habitats with overhanging cover or undercut banks to forage before migrating out to the ocean where they mature for two-three years before returning to spawn.

Like steelhead, suitable habitat occurs in perennial creeks, larger streams and rivers, and estuaries. Estuaries, including the San Francisco Bay, provide a holding area for adults prior to the upstream migrations and juveniles use estuaries for rearing and smoltification. While the BSA could provide estuarine habitat, any chinook using habitat within the BSA are only likely to use that habitat temporarily during migrations and there is a low overall likelihood of chinook occurring within the BSA due to the lack of suitable rearing and holding habitat present in the BSA and the lack of natal streams in the vicinity.

5.4.2.2.4 Longfin Smelt

CDFW has designated the longfin smelt as threatened under CESA. The Bay-Delta DPS is currently under review by the USFWS, and the San Francisco Bay-Delta population is currently a candidate species under FESA.

Historically, longfin smelt populations were found in the Klamath, Eel, and Bay-Delta estuaries and in Humboldt Bay. In the Central Valley, longfin smelt are rarely found upstream from Rio Vista or Medford Island (northwest of Stockton) in the Delta. Adults concentrate in Suisun, San Pablo, and north San Francisco Bays (Moyle 2002).

Longfin smelt are found in San Pablo Bay from April through June and disperse in late summer. In fall and winter, yearlings move upstream into fresh water to spawn. Longfin smelt spawn downstream from Medford Island in the San Joaquin River and downstream from Rio Vista on the Sacramento River. Spawning may occur as early as November, and larval surveys indicate that it may extend into June (Moyle 2002). Longfin smelt use estuarine

wetland and slough habitat as adults before spawning runs and as juveniles for rearing habitat, they also have a low tolerance for warm water.

Because longfin smelt are typically a pelagic species, the BSA does not provide wetland or slough habitat, and no spawning habitat is present in the vicinity of the BSA, presence of longfin smelt within the BSA is likely to be temporary.

5.4.2.3 Species Status Marine Species

5.4.2.3.1 Marine Mammals

Two species protected by the MMPA could occur within the BSA, harbor seal (*Phoca vitulina richardii*) and California sea lion (*Zalophus californianus*). Both species are residents of the San Francisco Bay estuary and are known to occur within the vicinity of the Oakland Inner Harbor and BSA. The closest known haul-out for either species is a harbor seal haul-out at the breakwater island at Alameda Point. Harbor seals feed on a variety of fish, such as perch, gobies, herring, and sculpin and tend to feed in the deepest waters of the bay. The California sea lion is a common and abundant marine mammal, found throughout the West Coast, generally within 10 miles of shore hauling out on offshore rocks, sandy beaches, and onto floating docks, wharfs, vessels, and other man-made structures in the bay and coastal waters of the state. California sea lions feed on a wide variety of seafood, mainly squid and fish and sometimes clams. Both harbor seals and California sea lions may occasionally forage in the waters of the BSA.

5.4.3 Critical Habitat and Essential Fish Habitat

"Critical habitat" is defined in Section 3(5)(A) of the federal Endangered Species Act, and designated by USFWS and NMFS, as habitat (lands or waters) that contain physical or biological features considered essential to the species' conservation within the species' range, as well as habitat determined to be essential to the species conservation outside of the current range of that species. The open water habitat in the BSA includes areas designated as critical habitat for green sturgeon and is adjacent to portions of the San Francisco Bay estuary designated as critical habitat for Sacramento River winter-run Chinook Salmon ESU.

Essential Fish Habitat (EFH) includes "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" as defined by congress in the Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297). The open water habitat within the BSA is designated EFH for fish managed in the following federal fisheries management plans (FMPs):

- The Pacific Groundfish FMP
- The Coastal Pelagic FMP
- The Pacific Coast Salmon FMP

5.5 Potential Jurisdictional Waters

The BSA includes portions of the San Francisco Bay estuary and Oakland Inner Harbor, which are considered navigable waters of the United States. The open water portion of the BSA is therefore a "jurisdictional" water regulated by the USACE under Section 10 of the Rivers and Harbors Act up to mean high water and Section 404 of the CWA up to the high tide line. These waters are also regulated by the San Francisco Bay RWQCB as Waters of

the State and by the San Francisco BCDC, which has jurisdiction over all areas of San Francisco Bay that are subject to tidal action, as well as a shoreline band that extends inland 100 feet from the high tide line (see Figure 2). No wetlands are present within the BSA.

5.6 Wildlife Corridors and Habitat Linkages

Wildlife corridors are linear features that connect large patches of natural open space and provide avenues for the migration of animals. Wildlife corridors contribute to population viability by ensuring continual exchange of genes between populations, providing access to adjacent habitat areas for foraging and mating, and providing routes for recolonization of habitat after local extirpation or ecological catastrophes (e.g., fires).

Habitat linkages are small patches that join larger blocks of habitat and help reduce the adverse effects of habitat fragmentation. Habitat linkages provide a potential route for gene flow and long-term dispersal of plants and animals and may also serve as primary habitat for smaller animals, such as reptiles and amphibians. Habitat linkages may be continuous habitat or discrete habitat islands that function as steppingstones for dispersal.

Terrestrial habitats within the BSA are developed, surrounded by development, and do not provide native species with migratory habitat or connectivity between suitable habitats.

5.7 Marine and Aquatic Corridors

The San Francisco Bay estuary and the Oakland Inner Harbor serves as a local movement corridor that connects habitat for certain birds (e.g., shorebirds, marine species), marine mammals, and fish species. Special status fish species described in Section 5.4.2 use the Bay during migrations from the ocean to and from breeding habitat either in the estuary or in freshwater habitat upstream of the Delta in the Sacramento River, San Joaquin River, or other suitable perennial stream habitat. The vast majority of these migrations occur in the northern portions of the Bay and these migrating species are not expected to occur frequently in the Oakland Inner Harbor. No suitable breeding habitat for anadromous fish species is accessed through the Oakland Inner Harbor.

Since the proposed project would not significantly alter habitat conditions in the Oakland Inner Harbor and would only temporarily make a small portion of the Oakland Inner Harbor unavailable to fish, wildlife or marine species, it is not expected to contribute to the impediment of local or seasonal movement of wildlife through the surrounding habitat.

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6 Impacts and Mitigation

6.1 Explanation of Findings of Significance

Impacts to special-status vegetation communities, plant and wildlife species, and jurisdictional waters, including wetlands, must be quantified and analyzed to determine whether such impacts are significant under CEQA. CEQA Guidelines Section 15064(b) states that an ironclad definition of "significant" effect is not possible, because the significance of an activity may vary with the setting. Appendix G of the CEQA Guidelines, however, does provide "examples of consequences which may be deemed to be a significant effect on the environment" (14 CCR 15064[e]). These effects include substantial effects on rare or endangered species of animal or plant or the habitat of the species. CEQA Guidelines Section 15065(a) is also helpful in defining whether a project may have a significant effect on the environment. Under that section, a proposed project may have a significant effect on the environment, (2) substantially reduce the habitat of a fish or wildlife species, (3) cause a fish or wildlife population to drop below self-sustaining levels, (4) threaten to eliminate a plant or animal community, (5) reduce the number or restrict the range of a rare or endangered plant or animal, or (6) eliminate important examples of a major period of California history or prehistory.

The following are the significance thresholds for biological resources provided in the CEQA Guidelines Appendix G Environmental Checklist, which states that a project would potentially have a significant effect if it does any of the following:

- Impact BIO-1. Has a substantial adverse effect, either directly or through habitat modifications, on any species identified as being a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.
- Impact BIO-2. Has a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS.
- Impact BIO-3. Has a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Impact BIO-4. Interferes substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impedes the use of native wildlife nursery sites.
- Impact BIO-5. Conflicts with any local policies or ordinances protecting biological resources, such as a tree
 preservation policy or ordinance.
- Impact BIO-6. Conflicts with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

The evaluation of whether an impact to a particular biological resource is significant must consider both the resource itself and the role of that resource in a regional context. Substantial impacts are those that contribute to, or result in, permanent loss of an important resource, such as a population of a rare plant or wildlife species. Impacts may be important locally, because they result in an adverse alteration of existing site conditions but considered not significant because they do not contribute substantially to the permanent loss of that resource regionally. The severity of an impact is the primary determinant of whether that impact can be mitigated to a level below significance.



The following significance determinations were made based on the impacts of the proposed project.

6.2 Impact BIO-1: Special Status Species

6.2.1 Special-Status Plants

No special-status plants are expected to occur within the project site or be impacted by project activities; therefore, impacts to special-status plants would be less than significant.

6.2.2 Special-Status Fish and Wildlife

The following special status fish and wildlife species could occur within the project site during construction: California Central Valley steelhead DPS, Central Coast Steelhead DPS, southern DPS of North American green sturgeon, Sacramento River winter-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU, Central Valley fall-run chinook salmon (species of concern), longfin smelt, and marine mammals.

The demolition of the existing bridge/walkway and bridge foundation, and replacement of the existing terminal float will require in-water work to remove existing piles and install new steel pipe piles. The special-status fish and marine mammals that could occur in the BSA could be adversely impacted by these project activities through impacts to water quality and release of sediments into the water and underwater noise impacts. Because species regulated by the NMFS, USFWS, and CDFW could occur and be potentially impacted by project construction, it is anticipated that the appropriate project permits will be obtained prior to project implementation and may include a Biological Opinion (BO) from NMFS and USFWS, an Incidental Take permit (ITP) from CDFW, and an Incidental Harassment Authorization (IHA) from NMFS.

6.2.2.1 Impacts to Water Quality

The demolition of the existing bridge/walkway and bridge foundation, and replacement of the existing terminal float will require in-water work to remove existing piles and install new steel pipe piles which has the potential to result in short-term, temporary disturbance of benthic sediments. Existing piles planned for removal will be pulled, or if removal is not feasible, piles will be cut two feet below the mudline. Suspended sediments could result in decreased water quality due to increased turbidity, the release of harmful chemicals into the water column, and may result in harmful effects to fish and wildlife in the vicinity. While removal of piles could result in the release of sediments, it is expected that the sediment release and increased turbidity would be of relatively short duration and generally confined within a few hundred feet of the activity, and that background levels would be restored within hours.

6.2.2.2 Underwater Noise Impacts

Installation of steel pipe piles can produce intense underwater noise that may lead to physical damage to swim bladders or other soft tissues, or cause alterations to swimming, sleeping, or foraging behaviors in fish and marine mammals. The installation of the new pipe piles for the float and bridge support are expected to use a vibratory hammer, with an impact hammer used only if needed. The NMFS has developed injury criteria for fish and for marine mammals; these injury criteria are typically reported as peak levels (peak), root-mean-square pressure (RMS), and sound exposure levels (SEL). While injury criteria have been established, lower sound levels that result in altered behavior would also be considered harassment to any ESA listed fish species.



To evaluate the potential project noise impacts related to pile installation, an acoustic assessment was conducted by Illingworth and Rodkin in 2022 (Appendix C). The analysis indicated that impact pile driving of the largest piles (48 inches) could result in maximum underwater noise impacts exceeding the marine mammal thresholds extending out to about 997 meters for the Level A Injury zone for Pinnipeds while extending out to about 4,200 meters for the Level B Harassment Zones (See Appendix C for a more in-depth discussion of the NMFS criteria and results of the noise analysis). Impact pile driving of the largest (48") piles could cause acoustic impacts at distances extending out to 4,200 m and 1,010 m for the root-mean-square (RMS) (150 decibel [dB] re 1 micropascal [μ Pa]) and Cumulative sound exposure level (SEL) (187 dB re 1 μ Pa2-sec) respectively for the adopted fish thresholds. While all impact hammer use would be conducted between June 1 and November 30, when the likelihood of sensitive fish species being present in the work area is minimal, sensitive fish species could be present in the vicinity of the project area and could be impacted by noise from pile driving. Therefore, project construction activities would result in a potentially significant impact to special-status fish and marine wildlife.

Potentially significant impacts to special-status fish and marine wildlife would be mitigated to a less-than-significant level through implementation of **MM-BIO-1** which outlines methods for reducing potentially harmful noise impacts during installation of piles. Water quality impacts including turbidity and sedimentation from pile removal and demolition of existing structures are addressed in Section 6.4, below.

MM-BIO-1a: Minimize and Avoid Underwater Noise Impacts. WETA and their construction contractor shall implement the following noise minimization and avoidance measures during project construction activities.

- All piling installation shall be conducted between June 1 and November 30, when the likelihood of sensitive fish species being present in the work area is minimal.
- Vibratory pile driving shall be conducted following the United States. Army Corps of Engineers. 2018. "U.S. Army Corps of Engineers Proposed Additional Procedures and Criteria for Permitting Projects under a Programmatic Determination of Not Likely to Adversely Affect Select Listed Species in California (the 2018 NLAA Program)". p 1-37. San Francisco, CA.
- To the extent feasible, all pilings shall be installed and removed with vibratory pile driver hammer only.
- An impact pile driver may only be used where necessary to complete installation of larger steel pilings in accordance with seismic safety or other engineering criteria.
 - If an impact pile driver is used it will be cushioned using a 12-inch-thick wood cushion block.
 - A Hydro Acoustic Monitoring Plan shall be prepared to be implemented in the event that an impact hammer is used. The sound monitoring results will be made available to CDFW and NMFS.
 - This Plan will provide detail on the sound attenuation system, the methods used to monitor and verify sound levels during impact pile driving activities,
 - The Plan shall include the use of a bubble curtain during any impact pile driving of piles in the water. The bubble curtain will be operated in a manner consistent with the following performance standards:
 - The bubble curtain will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.
 - The lowest bubble ring will be in contact with the mudline for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100% mudline contact. No parts of the ring or other objects shall prevent full mudline contact.



- Air flow to the bubblers must be balanced around the circumference of the pile.
- A "soft start" technique shall be employed in all pile driving to give marine mammals an opportunity to vacate the area.
- Soft Start: When initiating pile driving, or when there has been downtime of 30 minutes or more without pile driving, the contractor will initiate the driving with ramp-up procedures described below.
- For vibratory hammers, the contractor will initiate the driving for 15 seconds at reduced energy, followed by a 30-second waiting period. This procedure will be repeated two additional times before continuous driving is started.
- For impact driving, an initial set of three strikes would be made by the hammer at 40% energy, followed by a 30-second waiting period, then two subsequent three-strike sets at 40% energy, with 30-second waiting periods, before initiating continuous driving.
- A biological monitor will be present during all pile driving to observe the work area before, during, and after pile driving. The monitor will be present as specified by NMFS during the impact piledriving phases of construction.
- A safety zone, based on the results of the noise analysis (Appendix C) will be established based on the type of pile driving required for the protection of marine mammals. Pile driving will be halted if a marine mammal is observed within the safety zone and will not re-start until 15 minutes after the animal has left the safety zone.
- All necessary permits including a BO from USFWS and NMFS, an IHA from NMFS, and an ITP will be obtained and adhered to during construction for in-water work that requires impact pile driving and is not covered under one of the existing programmatic consultations for federally listed species.
- MM-BIO-1b: Compensatory Mitigation for Longfin Smelt. Prior to construction, WETA shall obtain an ITP from the CDFW in accordance with California Fish & Game Code § 2081 (b), which states that, "the impacts of the authorized take shall be minimized and fully mitigated". In addition to the noise impact minimization measures described above (Mitigation Measure MM-BIO-1a), WETA shall provide compensatory mitigation for potential noise impacts to the longfin smelt by purchasing mitigation credits at a CDFW-approved conservation bank or contribute funds to a CDFW-approved mitigation project. Specific details for the compensatory mitigation including the number of credits, schedule and payment terms shall be outlined in the conditions of the ITP.

6.3 Impact BIO-2: Sensitive Natural Communities

No riparian habitat, or eelgrass and native oyster beds occur within the BSA. The BSA does include Critical Habitat for green sturgeon, and essential fish habitat (EFH) as defined under the Pacific Groundfish, Coastal pelagics, and Pacific Coast Salmon Fisheries Management Plans. Pile removal and replacement activities during project construction could result in water quality and noise impacts, as described under Impact BIO-1, and would temporarily limit the suitability of the open water habitat present in the BSA. No long-term impacts to this habitat (including habitat created by the presents of pilings- submerged vegetation or aquatic organisms can attach to pilings) is expected as a result of the project.



Another potential concern resulting from in-water work is the spread of invasive marine species. Project activities, including disturbance and temperature changes as a result of construction activities, could result in the spread of invasive marine species which could limit the future suitability of both EFH and green sturgeon critical habitat. Any adverse effect to critical habitat or other sensitive natural communities, including EFH and green sturgeon, would result in a potentially significant impact. Potentially significant impacts to special-status fish and marine wildlife habitat from the spread of invasive species would be mitigated to less than significant through implementation of **MM-BIO-2** which outlines methods for reducing the potential introduction and spread of invasive marine species.

MM-BIO-2: Avoid any spread or introduction of Invasive Marine Species. WETA and their construction contractor will ensure that standard Best Management Practices (BPMs) to avoid introduction or spread of marine invasive species are followed during construction and in-water work. Specific BMPs will be provided on the contractor's design drawings and will include but not be limited to the following:

- Environmental training of construction personnel involved in in-water work.
- Cleaning and sanitizing procedures for equipment and machinery used for in-water work.
- Procedures for the safe removal and disposal of any invasive taxa observed.

6.4 Impact BIO-3: Jurisdictional Wetlands and Waters

No federally or state-defined wetlands occur within the BSA and thus no impacts to wetlands would occur. However, implementation of the proposed project would have minor temporary impacts to non-wetland waters under the jurisdiction of the USACE, RWQCB, and BCDC. The San Francisco Bay and Oakland Inner Harbor is a navigable water of the United States and is regulated by the Corps under Section 10 of the Rivers and Harbors Act up to mean high water and Section 404 of the CWA up to the high tide line. These waters are also regulated by the San Francisco Bay RWQCB as Waters of the State and by the BCDC. As described in Section 1.2, Project Description, a net total of 78 sf of additional pilings (total piling installed minus pilings removed) would be installed as part of the terminal rehabilitation. The 78 sf of material to be introduced would consist of piling and fender components and is not considered fill material. As discussed in Section 7.1 (Impact BIO-1), temporary project impacts associated with installation of new pilings could decrease water quality and increase turbidity within the immediate project area. Any adverse effect on jurisdictional wetlands and/or water would result in a potentially significant impact.

Potentially significant impacts to non-wetland waters would be mitigated to less than significant through implementation of **MM-BIO-3**.

MM-BIO-3: Implement BMPs and Follow Approved Agency Requirements for In-Water Construction. Best management practices (BMPs) will be employed during project construction activities to protect special status species and their aquatic habitats. The contractor undertaking construction work will exercise every reasonable precaution to protect listed species and ESA-protected species and their habitat(s) from construction by-products and pollutants such as construction chemicals, fresh cement or other deleterious materials. Construction may be conducted from both land and water. Care will be used by equipment operators to control debris so that it does not enter the Bay. WETA's contractors shall prepare the plans covering the BMPs as follows: Stormwater Pollution Prevention Plan, Erosion and Sediment Control Plan, Oil Spill Prevention and Control Plan to specify restrictions and procedures for fuel storage location, fueling activities, and equipment maintenance locating fueling stations away from potentially jurisdictional features, and Construction Debris Management Plan.



The measures identified in these four plans listed above will be based on Best Available Technology and will include but not be limited to the following:

- All debris will be off hauled, processed, and properly disposed of. The piles will be cut at the mudline and pulled out of the water. Timber piles that have been treated with creosote, or that contain other potentially hazardous materials, will be handled properly and disposed of at a facility permitted to handle hazardous waste. Any debris found on the seafloor in the ferry terminal's vicinity will be removed and disposed of on land.
 - Measures to ensure that fresh cement or concrete will not be allowed to enter the Bay.
 Construction waste will be collected and transported to an authorized upland disposal area, as appropriate, and per federal, state and local laws and regulations.
 - All hazardous material will be stored upland in storage trailers and/or shipping containers designed to provide adequate containment. Short-term laydown of hazardous materials for immediate use will be permitted with the same anti-spill precautions:
 - All construction material, wastes, debris, sediment, rubbish, trash, fencing, etc., will be removed from the site once the proposed project is completed and transported to an authorized disposal area, as appropriate, in compliance with applicable federal, state and local laws and regulations;
 - Construction material will need to be covered every night and during any rainfall event (if there is one);
 - Construction crews will reduce the amount of disturbance within the Project site to the minimum necessary to accomplish the project;
 - Measures to prevent debris from entering the Bay;
 - Vessels and equipment that rely on internal combustion engines for power and/or propulsion will be kept in good working condition and compliant with California emission regulations;
 - No in-water fueling at the Project site will be permitted. Vehicles and equipment that are used during the course of construction will be fueled and serviced offsite. Fueling locations will be inspected after fueling to document that no spills have occurred. Any spills will be cleaned up immediately.

6.5 Impact BIO-4: Wildlife Corridors and Migratory Routes

No significant direct permanent impacts would occur on wildlife movement or use of native wildlife nursery sites associated with project activities. Construction activities would not likely result in permanent impacts to wildlife movement because no new structures that would impede wildlife movement are proposed.

During construction activities, temporary disturbance to local species may occur, but would not substantially degrade the quality or use of the marine communities in the vicinity. The Oakland Inner Harbor does not provide a migratory corridor for sensitive fish species; as described in Section 5.6, fish migrating into and out of spawning habitat either in the Sacramento or San Joaquin River systems, or suitable perennial streams located in other parts of the Bay, are not likely to be found moving through the Oakland Inner Harbor. Following temporary construction disturbances, the function and values of the Oakland Inner Harbor are expected to remain the same.


Indirect impacts to localized wildlife movement could occur during construction activities due to construction-related noise, including during pile driving. However, construction-generated noise would be temporary and would not be expected to significantly, nor permanently, disrupt wildlife movement during and following construction activities.

Therefore, direct and indirect impacts on wildlife corridors and migratory routes resulting from the proposed project would be less than significant.

6.6 Impact BIO-5: Local Policies or Ordinances

Potentially significant impacts resulting from implementation of the proposed project were analyzed for compliance with the County's General Plan Open Space and Conservation Element. General Plan Policy CC-28 involves maintenance and improvement measures for the Alameda Nature Reserve, which is located approximately one mile west of the project site and does not apply to the proposed project. General Plan Policy CC-34 involves preservation of existing natural areas/elements and protection of native plant and wildlife species through actions such as implementing BMPs during construction, conducting biological surveys, consultation with applicable agencies, and implementing mitigation measures, The project would involve refurbishment of the existing AMS Ferry terminal which would include temporary construction activities within the Oakland Inner Harbor. During construction, the project would comply with applicable General Plan policies, including Policy CC-34, and would also implement mitigation measures, described in Sections 6.2, 6.3, and 6.4, to reduce any potential biological resource impacts to a less-than-significant level. Further, the project does not propose any changes nor modifications to existing policies or ordinances that would conflict with measures intended to protect biological resources. Because the project would comply with existing General Plan 2040 policies and would not conflict with any policies or ordinances protecting biological resources, impacts would be less than significant.

6.7 Impact BIO-6: Habitat Conservation Plans

There are no habitat conservation plans (HCPs) or natural community conservation plans (NCCPs) covering the project site. As described above, the project would not conflict with any local policies or ordinances. Because no HCPs or NCCPs cover the project site, no impacts would result.

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7.2 Personal Communications

WETA, 2022. Email from Aden Anderson, Operations Manager, Blue and Gold Fleet to Chad Mason, WETA, August 4, 2022.

7.3 Preparers

Report Preparation

Andy Hatch, Fish and Wildlife Biologist



SOURCE: USGS 7.5-minute Series Oakland West Quadrangle

1,000

2,000 Feet



FIGURE 1 Project Location Alameda Main Street Terminal Refurbishment Project



SOURCE: Bing Maps 2021

Appendix A

Special-Status Plants Potentially Occurring within the BSA

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
Allium peninsulare var. franciscanum	Franciscan onion	None/None/1B.2	Cismontane woodland, Valley and foothill grassland; Clay, Serpentinite (often), Volcanic/perennial bulbiferous herb/(Apr)May–June/170–1,000	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Amorpha californica var. napensis	Napa false indigo	None/None/1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland/perennial deciduous shrub/Apr–July/ 165–6,560	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Amsinckia lunaris	bent-flowered fiddleneck	None/None/1B.2	Cismontane woodland, Coastal bluff scrub, Valley and Y Y foothill grassland/annual herb/Mar–June/10–1,640		N	Not expected to occur. No suitable vegetation present.	
Androsace elongata ssp. acuta	California androsace	Ace None/None/4.2 Chaparral, Cismontane woodland, Coastal scrub, Y Y Meadows and seeps, Pinyon and juniper woodland, Valley and foothill grassland/annual herb/ Mar-June/490-4,280		N	Not expected to occur. No suitable vegetation present.		
Arabis blepharophylla	coast rockcress	None/None/4.3	Broadleafed upland forest, Coastal bluff scrub, Coastal prairie, Coastal scrub; Rocky/perennial herb/Feb-May/10-3,605	Y	Y	N	Not expected to occur. No suitable vegetation present.
Arctostaphylos franciscana	Franciscan manzanita	FE/None/1B.1	Coastal scrub/perennial evergreen shrub/ Feb-Apr/195-985	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Arctostaphylos imbricata	San Bruno Mountain manzanita	None/SE/1B.1	Chaparral, Coastal scrub; Rocky/perennial evergreen shrub/Feb-May/900-1,210	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Arctostaphylos montana ssp. ravenii	Presidio manzanita	FE/SE/1B.1	Chaparral, Coastal prairie, Coastal scrub/perennial evergreen shrub/Feb-Mar/150-705	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Arctostaphylos montaraensis	Montara manzanita	None/None/1B.2	Chaparral, Coastal scrub/perennial evergreen shrub/Jan-Mar/260-1,640	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Arctostaphylos pacifica	Pacific manzanita	None/SE/1B.1	Chaparral, Coastal scrub/evergreen shrub/ Feb-Apr/1,080-1,080	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Arctostaphylos pallida	pallid manzanita	FT/SE/1B.1	Broadleafed upland forest, Chaparral, Cismontane woodland, Closed-cone coniferous forest, Coastal scrub/perennial evergreen shrub/Dec-Mar/ 605-1,525	Y	Y	N	Not expected to occur. No suitable vegetation present.
Arenaria paludicola	marsh sandwort	FE/SE/1B.1	Marshes and swamps; Openings, Sandy/perennial stoloniferous herb/May-Aug/10-560	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
Aspidotis carlotta-halliae	Carlotta Hall's lace fern	None/None/4.2	Chaparral, Cismontane woodland; Serpentinite (usually)/perennial rhizomatous herb/Jan–Dec/ 330–4,590	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Astragalus nuttallii var. nuttallii	ocean bluff milk-vetch	None/None/4.2	Coastal bluff scrub, Coastal dunes/perennial herb/Jan-Nov/10-395	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Astragalus tener var. tener	alkali milk-vetch	None/None/1B.2	Playas, Valley and foothill grassland, Vernal pools; Alkaline/annual herb/Mar–June/5–195	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there are no suitable vegetation or vernal pools present.
Calamagrostis ophitidis	serpentine reed grass	None/None/4.3	Chaparral, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland; Rocky, Serpentinite/perennial herb/Apr–July/ 295–3,490	Y	Y	N	Not expected to occur. No suitable vegetation present.
Calochortus pulchellus	Mt. Diablo fairy-lantern	None/None/1B.2	Chaparral, Cismontane woodland, Riparian woodland, Valley and foothill grassland/perennial bulbiferous herb/Apr–June/100–2,755	Y	Y	N	Not expected to occur. No suitable vegetation or soils present.
Calochortus tiburonensis	Tiburon mariposa-lily	FT/ST/1B.1	Valley and foothill grassland/perennial bulbiferous herb/Mar-June/165-490	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Calochortus umbellatus	Oakland star-tulip	None/None/4.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland; Serpentinite (often)/perennial bulbiferous herb/Mar-May/330-2,295	Y	Y	Ν	Not expected to occur. No suitable vegetation present.
Calystegia purpurata ssp. saxicola	coastal bluff morning-glory	None/None/1B.2	Coastal bluff scrub, Coastal dunes, Coastal scrub, North Coast coniferous forest/perennial herb/(Mar)Apr-Sep/0-345	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Carex comosa	bristly sedge	None/None/2B.1	Coastal prairie, Marshes and swamps, Valley and foothill grassland/perennial rhizomatous herb/ May–Sep/0–2,050	Y	Y	N	Not expected to occur. No suitable vegetation present.
Carex praticola	northern meadow sedge	None/None/2B.2	Meadows and seeps/perennial herb/May-July/ 0-10,495	Y	Y	N	Not expected to occur. No suitable vegetation present.
Castilleja affinis var. neglecta	Tiburon paintbrush	FE/ST/1B.2	Valley and foothill grassland/perennial herb (hemiparasitic)/Apr-June/195-1,310	Y	Y	N	Not expected to occur. No suitable vegetation present.

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
Castilleja ambigua var. ambigua	johnny-nip	None/None/4.2	Coastal bluff scrub, Coastal prairie, Coastal scrub, Marshes and swamps, Valley and foothill grassland, Vernal pools/annual herb (hemiparasitic)/ Mar-Aug/0-1,425	Y	Y	N	Not expected to occur. No suitable vegetation or vernal pools present.
Centromadia parryi ssp. congdonii	Congdon's tarplant	None/None/1B.1	Valley and foothill grassland/annual herb/ May-Oct (Nov)/0-755	Y	Ν	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Centromadia parryi ssp. parryi	pappose tarplant	None/None/1B.2	Chaparral, Coastal prairie, Marshes and swamps, Meadows and seeps, Valley and foothill grassland; Alkaline (often)/annual herb/May–Nov/0–1,375	Y	Y	N	Not expected to occur. No suitable vegetation present.
Chloropyron maritimum ssp. palustre	Point Reyes salty bird's-beak	None/None/1B.2	Marshes and swamps/annual herb (hemiparasitic)/June-Oct/0-35	rshes and swamps/annual herb Y N		N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower	None/None/1B.2	Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub; Sandy/annual herb/ Apr–July(Aug)/10–705	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Chorizanthe robusta var. robusta	robust spineflower	FE/None/1B.1	Chaparral, Cismontane woodland, Coastal dunes, Coastal scrub; Gravelly (sometimes), Sandy (sometimes)/annual herb/Apr-Sep/10-985	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Cicuta maculata var. bolanderi	Bolander's water-hemlock	None/None/2B.1	Marshes and swamps/perennial herb/July-Sep/ 0-655	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Cirsium andrewsii	Franciscan thistle	None/None/1B.2	Broadleafed upland forest, Coastal bluff scrub, Coastal prairie, Coastal scrub; Mesic, Serpentinite (sometimes)/perennial herb/Mar–July/0–490	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Cirsium hydrophilum var. vaseyi	Mt. Tamalpais thistle	None/None/1B.2	Broadleafed upland forest, Chaparral, Meadows and seeps; Seeps, Serpentinite/perennial herb/May– Aug/785–2,030	Y	Y	N	Not expected to occur. No suitable vegetation present.
Cirsium occidentale var. compactum	compact cobwebby thistle	None/None/1B.2	Chaparral, Coastal dunes, Coastal prairie, Coastal scrub/perennial herb/Apr-June/15-490	Y	N	N	Not expected to occur. The site is outside of the species' known elevation

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
							range and there is no suitable vegetation present.
Clarkia concinna ssp. automixa	Santa Clara red ribbons	None/None/4.3	Chaparral, Cismontane woodland/annual herb/(Apr)May-June(July)/295-4,920	Y	Y	N	Not expected to occur. No suitable vegetation present.
Clarkia franciscana	Presidio clarkia	FE/SE/1B.1	Coastal scrub, Valley and foothill grassland/annual herb/May–July/80–1,095	Y	Y	N	Not expected to occur. No suitable vegetation present.
Collinsia corymbosa	round-headed Chinese- houses	None/None/1B.2	Coastal dunes/annual herb/Apr-June/0-65	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Collinsia multicolor	San Francisco collinsia	None/None/1B.2	Closed-cone coniferous forest, Coastal scrub; Serpentinite (sometimes)/annual herb/(Feb)Mar- May/100-900	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Collomia diversifolia	serpentine collomia	None/None/4.3	Chaparral, Cismontane woodland; Gravelly (sometimes), Rocky (sometimes), Serpentinite (sometimes)/annual herb/May-June/655-1,965	Y	Y	N	Not expected to occur. No suitable vegetation present.
Dirca occidentalis	western leatherwood	None/None/1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Closed-cone coniferous forest, North Coast coniferous forest, Riparian forest, Riparian woodland; Mesic/perennial deciduous shrub/Jan-Mar(Apr)/ 80-1,390		Y	N	Not expected to occur. No suitable vegetation present.
Equisetum palustre	marsh horsetail	None/None/3	Marshes and swamps/perennial rhizomatous herb/Unk/150-3,280	Y	Y	N	Not expected to occur. No suitable vegetation present.
Eriogonum luteolum var. caninum	Tiburon buckwheat	None/None/1B.2	Chaparral, Cismontane woodland, Coastal prairie, Valley and foothill grassland; Gravelly, Sandy, Serpentinite/annual herb/May–Sep/0–2,295	Y	Y	N	Not expected to occur. No suitable vegetation present.
Eryngium jepsonii	Jepson's coyote-thistle	None/None/1B.2	Valley and foothill grassland, Vernal pools; Clay/perennial herb/Apr-Aug/10-985	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Erysimum franciscanum	San Francisco wallflower	None/None/4.2	Chaparral, Coastal dunes, Coastal scrub, Valley and foothill grassland; Granitic (often), Roadsides (sometimes), Serpentinite (often)/perennial herb/Mar-June/0-1,800	Y	Y	N	Not expected to occur. No soils present.
Erythranthe laciniata	cut-leaved monkeyflower	None/None/4.3	Chaparral, Lower montane coniferous forest, Upper montane coniferous forest; Granitic, Mesic/annual herb/Apr–July/1,605–8,690	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
							suitable vegetation present.
Erythranthe nudata	bare monkeyflower	None/None/4.3	Chaparral, Cismontane woodland; Seeps, Serpentinite/annual herb/May-June/655-2,295	Y	Y	Ν	Not expected to occur. No suitable vegetation present.
Extriplex joaquinana	San Joaquin spearscale	None/None/1B.2	Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland; Alkaline/annual herb/ Apr-Oct/5-2,735	Y	Y	N	Not expected to occur. No suitable vegetation present.
Fissidens pauperculus	minute pocket moss	None/None/1B.2	North Coast coniferous forest/moss//35-3,355	Y	Y	N	Not expected to occur. No suitable vegetation present.
Fritillaria liliacea	fragrant fritillary	None/None/1B.2	Cismontane woodland, Coastal prairie, Coastal scrub, Valley and foothill grassland; Serpentinite (often)/perennial bulbiferous herb/Feb-Apr/10- 1,345	Y	Y	N	Not expected to occur. No suitable vegetation present.
Gilia capitata ssp. chamissonis	blue coast gilia	None/None/1B.1	Coastal dunes, Coastal scrub/annual herb/ Apr-July/5-655	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Gilia millefoliata	dark-eyed gilia	None/None/1B.2	Coastal dunes/annual herb/Apr-July/5-100	Y	N	Ν	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Grindelia hirsutula var. maritima	San Francisco gumplant	None/None/3.2	Coastal bluff scrub, Coastal scrub, Valley and foothill grassland; Sandy (sometimes), Serpentinite (sometimes)/perennial herb/June-Sep/50-1,310	Y	Y	N	Not expected to occur. No suitable vegetation present.
Helianthella castanea	Diablo helianthella	None/None/1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland, Valley and foothill grassland; Azonal soils, Partial Shade (often), Rocky (usually)/perennial herb/ Mar-June/195-4,265	Y	Y	N	Not expected to occur. No suitable vegetation present.
Hemizonia congesta ssp. congesta	congested-headed hayfield tarplant	None/None/1B.2	Valley and foothill grassland; Roadsides (sometimes)/annual herb/Apr-Nov/65-1,835	Y	Y	N	Not expected to occur. No suitable vegetation present.
Hesperevax caulescens	hogwallow starfish	None/None/4.2	Valley and foothill grassland, Vernal pools; Alkaline (sometimes)/annual herb/Mar-June/0-1,655	Y	Y	N	Not expected to occur. No suitable vegetation or alkali soils present.
Hesperevax sparsiflora var. brevifolia	short-leaved evax	None/None/1B.2	Coastal bluff scrub, Coastal dunes, Coastal prairie/annual herb/Mar-June/0-705	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.

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Hesperolinon congestum	Marin western flax	FT/ST/1B.1	Chaparral, Valley and foothill grassland; Serpentinite/annual herb/Apr-July/15-1,210	Y	Y	N	Not expected to occur. No suitable vegetation present.
Heteranthera dubia	water star-grass	None/None/2B.2	Marshes and swamps; Alkaline/perennial herb (aquatic)/July-Oct/100-4,900	Y	Y	N	Not expected to occur. No suitable vegetation present.
Hoita strobilina	Loma Prieta hoita	None/None/1B.1	Chaparral, Cismontane woodland, Riparian woodland; Mesic, Serpentinite (usually)/perennial herb/ May-July (Aug-Oct)/100-2,820	lesic, Serpentinite (usually)/perennial herb/ lay-July (Aug-Oct)/100-2,820		Ν	Not expected to occur. No suitable mesic vegetation present.
Holocarpha macradenia	Santa Cruz tarplant	FT/SE/1B.1	Coastal prairie, Coastal scrub, Valley and foothill Y grassland; Clay (often), Sandy/annual herb/ June-Oct/35-720		N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Horkelia cuneata var. sericea	Kellogg's horkelia	None/None/1B.1	Chaparral, Closed-cone coniferous forest, Coastal dunes, Coastal scrub; Gravelly (sometimes), Openings, Sandy (sometimes)/perennial herb/ Apr–Sep/35–655	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Horkelia marinensis	Point Reyes horkelia	None/None/1B.2	Coastal dunes, Coastal prairie, Coastal scrub; Sandy/perennial herb/May-Sep/15-2,475	Y	Y	N	Not expected to occur. No suitable vegetation present.
Hosackia gracilis	harlequin lotus	None/None/4.2	Broadleafed upland forest, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal prairie, Coastal scrub, Marshes and swamps, Meadows and seeps, North Coast coniferous forest, Valley and foothill grassland; Roadsides/perennial rhizomatous herb/Mar-July/0-2,295	Y	Y	N	Not expected to occur. No suitable vegetation present.
Hypogymnia schizidiata	island tube lichen	None/None/1B.3	Chaparral, Closed-cone coniferous forest/foliose lichen/1,180-1,325	Y	Y	N	Not expected to occur. No suitable vegetation present.
Iris longipetala	coast iris	None/None/4.2	Coastal prairie, Lower montane coniferous forest, Meadows and seeps; Mesic/perennial rhizomatous herb/Mar-May(June)/0-1,965	Y	Y	N	Not expected to occur. No suitable mesic vegetation present.
Isocoma arguta	Carquinez goldenbush	None/None/1B.1	Valley and foothill grassland/perennial shrub/ Aug-Dec/5-65	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Juglans californica	Southern California black walnut	None/None/4.2	Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland/perennial deciduous tree/ Mar-Aug/165-2,950	Y	Y	N	Not expected to occur. No suitable vegetation present.
Lasthenia conjugens	Contra Costa goldfields	FE/None/1B.1	Cismontane woodland, Playas, Valley and foothill grassland, Vernal pools; Mesic/annual herb/ Mar-June/0-1,540	Y	Y	N	Not expected to occur. No suitable vegetation or vernal pools present.

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
Layia carnosa	beach layia	FE/SE/1B.1	Coastal dunes, Coastal scrub/annual herb/ Mar-July/0-195	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Leptosiphon acicularis	bristly leptosiphon	None/None/4.2	Chaparral, Cismontane woodland, Coastal prairie, Valley and foothill grassland/annual herb/ Apr-July/180-4,920	Y Y		N	Not expected to occur. No suitable vegetation present.
Leptosiphon ambiguus	serpentine leptosiphon	None/None/4.2	Cismontane woodland, Coastal scrub, Valley and foothill grassland; Serpentinite (usually)/annual herb/Mar–June/395–3,705	Y Y		N	Not expected to occur. No suitable vegetation present.
Leptosiphon grandiflorus	large-flowered leptosiphon	None/None/4.2	Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub, Valley and foothill grassland; Sandy (usually)/annual herb/Apr-Aug/15-4,000	nd;		N	Not expected to occur. No suitable vegetation present.
Leptosiphon latisectus	broad-lobed leptosiphon	None/None/4.3	Broadleafed upland forest, Cismontane woodland/annual herb/Apr-June/560-4,920	Y	Y	N	Not expected to occur. No suitable vegetation present.
Leptosiphon rosaceus	rose leptosiphon	None/None/1B.1	Coastal bluff scrub/annual herb/Apr-July/0-330	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Lessingia germanorum	San Francisco lessingia	FE/SE/1B.1	Coastal scrub/annual herb/(June)July-Nov/80-360	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Lessingia hololeuca	woolly-headed lessingia	None/None/3	Broadleafed upland forest, Coastal scrub, Lower montane coniferous forest, Valley and foothill grassland; Clay, Serpentinite/annual herb/June- Oct/50-1,000	Y	Y	N	Not expected to occur. No suitable vegetation present.
Malacothamnus arcuatus	arcuate bush-mallow	None/None/1B.2	Chaparral, Cismontane woodland/perennial deciduous shrub/Apr-Sep/50-1,160	Y	Y	N	Not expected to occur. No suitable vegetation present.
Meconella oregana	Oregon meconella	None/None/1B.1	Coastal prairie, Coastal scrub/annual herb/ Mar-Apr/820-2,030	Y	Y	N	Not expected to occur. No suitable vegetation present.
Micropus amphibolus	Mt. Diablo cottonweed	None/None/3.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Valley and foothill grassland; Rocky/annual herb/Mar–May/150–2,705	Y	Y	N	Not expected to occur. No suitable vegetation present.
Microseris paludosa	marsh microseris	None/None/1B.2	Cismontane woodland, Closed-cone coniferous forest, Coastal scrub, Valley and foothill grassland/perennial herb/Apr-June (July)/15-1,160	Y	Y	N	Not expected to occur. No suitable vegetation present.

Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
Monardella sinuata ssp. nigrescens	onardella sinuata ssp. nigrescens northern curly-leaved None/None/1B.2 monardella		Chaparral, Coastal dunes, Coastal scrub, Lower montane coniferous forest; Sandy/annual herb/(Apr)May–July(Aug–Sep)/0–985	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Monolopia gracilens	woodland woollythreads	None/None/1B.2	Broadleafed upland forest, Chaparral, Cismontane Y woodland, North Coast coniferous forest, Valley and Y foothill grassland/annual herb/(Feb)Mar-July/ 330-3,935 Cismontane woodland, Valley and foothill Y		Y	N	Not expected to occur. No suitable vegetation present.
Pentachaeta bellidiflora	white-rayed pentachaeta	FE/SE/1B.1			Y	N	Not expected to occur. No suitable vegetation present.
Piperia michaelii	Michael's rein orchid	None/None/4.2	Chaparral, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal scrub, Lower montane coniferous forest/perennial herb/Apr-Aug/10-3,000	Y	Y	N	Not expected to occur. No suitable vegetation present.
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	None/None/1B.2	Chaparral, Coastal prairie, Coastal scrub/annual herb/Mar-June/10-525	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Plagiobothrys diffusus	San Francisco popcornflower	None/SE/1B.1	Coastal prairie, Valley and foothill grassland/annual herb/Mar–June/195–1,180	Y	Y	N	Not expected to occur. No suitable vegetation present.
Plagiobothrys glaber	hairless popcornflower	None/None/1A	Marshes and swamps, Meadows and seeps/annual herb/Mar-May/50-590	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Polemonium carneum	Oregon polemonium	None/None/2B.2	Coastal prairie, Coastal scrub, Lower montane coniferous forest/perennial herb/Apr-Sep/0-6,000	Y	Y	N	Not expected to occur. No suitable vegetation present.
Polygonum marinense	Marin knotweed	None/None/3.1	Marshes and swamps/annual herb/(Apr)May–Aug (Oct)/0–35	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Ranunculus lobbii	Lobb's aquatic buttercup	None/None/4.2	Cismontane woodland, North Coast coniferous forest, Valley and foothill grassland, Vernal pools/annual herb (aquatic)/Feb-May/50-1,540	Y	Y	N	Not expected to occur. No suitable vegetation present.
Sanicula maritima	adobe sanicle	None/SR/1B.1	Chaparral, Coastal prairie, Meadows and seeps, Valley and foothill grassland/perennial herb/ Feb-May/100-785	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no



Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
							suitable vegetation present.
Senecio aphanactis	chaparral ragwort	None/None/2B.2	Chaparral, Cismontane woodland, Coastal scrub/annual herb/Jan-Apr(May)/50-2,620	Y	Y	N	Not expected to occur. No suitable vegetation present.
Silene scouleri ssp. scouleri	Scouler's catchfly	None/None/2B.2	Coastal bluff scrub, Coastal prairie, Valley and foothill grassland/perennial herb/(Mar–May) June– Aug(Sep)/0–1,965	Y	Y	N	Not expected to occur. No suitable vegetation present.
Silene verecunda ssp. verecunda	San Francisco campion	None/None/1B.2	Chaparral, Coastal bluff scrub, Coastal prairie, Coastal scrub, Valley and foothill grassland/perennial herb/(Feb)Mar-July(Aug)/100-2,115	Y	Y	N	Not expected to occur. No suitable vegetation present.
Spergularia macrotheca var. longistyla	long-styled sand-spurrey	None/None/1B.2	Marshes and swamps, Meadows and seeps/perennial herb/Feb-May/0-835	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Stebbinsoseris decipiens	Santa Cruz microseris	None/None/1B.2	Broadleafed upland forest, Chaparral, Closed-cone coniferous forest, Coastal prairie, Coastal scrub, Valley and foothill grassland/annual herb/Apr– May/35–1,640	Y	Y	N	Not expected to occur. No suitable vegetation present.
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	None/None/1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland/annual herb/(Mar)Apr–Sep (Oct)/ 310–3,280	Y	Y	N	Not expected to occur. No suitable vegetation present.
Streptanthus glandulosus ssp. niger	Tiburon jewelflower	FE/SE/1B.1	Valley and foothill grassland/annual herb/ May-June/100-490	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Stuckenia filiformis ssp. alpina	northern slender pondweed	None/None/2B.2	Marshes and swamps/perennial rhizomatous herb (aquatic)/May–July/985–7,050	Y	Y	N	Not expected to occur. No suitable vegetation present.
Suaeda californica	California seablite	FE/None/1B.1	Marshes and swamps/perennial evergreen shrub/July-Oct/0-50	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Symphyotrichum lentum	Suisun Marsh aster	None/None/1B.2	Marshes and swamps/perennial rhizomatous herb/(Apr)May–Nov/0–10	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Trifolium amoenum	two-fork clover	FE/None/1B.1	Coastal bluff scrub, Valley and foothill grassland/annual herb/Apr-June/15-1,360	Y	Y	N	Not expected to occur. No suitable vegetation present.



Scientific Name	Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Blooming during survey?	Elevation appropriate?	Habitats Appropriate?	Potential to Occur
Trifolium hydrophilum	saline clover	None/None/1B.2	Marshes and swamps, Valley and foothill grassland, Vernal pools/annual herb/Apr-June/0-985	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Triphysaria floribunda	San Francisco owl's-clover	None/None/1B.2	Coastal prairie, Coastal scrub, Valley and foothill grassland/annual herb/Apr-June/35-525	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Triquetrella californica	coastal triquetrella	None/None/1B.2	Coastal bluff scrub, Coastal scrub/moss/35-330	Y	N	N	Not expected to occur. The site is outside of the species' known elevation range and there is no suitable vegetation present.
Viburnum ellipticum	oval-leaved viburnum	None/None/2B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest/perennial deciduous shrub/ May–June/705–4,590	Y	Y	N	Not expected to occur. No suitable vegetation present.

Appendix B

Special-Status Wildlife Potentially Occurring within the BSA

	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Amphibians					
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	FT/ST, WL	Annual grassland, valley-foothill hardwood, and valley- foothill riparian habitats; vernal pools, other ephemeral pools, and (uncommonly) along stream courses and man- made pools if predatory fishes are absent	N	Not expected to occur. No suitable vegetation or aquatic habitat present. Site is developed. Historic CNDDB occurrence records approximately 3 miles east are extirpated.
Dicamptodon ensatus	California giant salamander	None/SSC	Known from wet coastal forests and chaparral near streams and seeps from Mendocino Co. south to Monterey Co. and east to Napa Co. Aquatic larvae found in cold, clear streams, occasionally in lakes and ponds. Adults known from wet forests under rocks and logs near streams and lakes.	N	Not expected to occur. No CNDDB occurrences within 5 miles of the site. No suitable vegetation or aquatic habitat present.
Rana boylii pop. 1	foothill yellow-legged frog - north coast DPS	FPE/SE	Rocky streams and rivers with open banks in forest, chaparral, and woodland	N	Not expected to occur. No suitable vegetation or upland habitat present. Site is on Oakland Inner Harbor Channel within the Oakland Estuary Channel, and the Alameda-Oakland Ferryway causes existing disturbance and turbidity not suitable for this species to persist.
Rana draytonii	California red-legged frog	FT/SSC	Lowland streams, wetlands, riparian woodlands, livestock ponds; dense, shrubby or emergent vegetation associated with deep, still or slow-moving water; uses adjacent uplands	N	Not expected to occur. No suitable vegetation or adjacent upland habitat present. Site is developed. Historic CNDDB occurrence records approximately 4 miles east are extirpated.
Birds					
Accipiter cooperii (nesting)	Cooper's hawk	None/WL	Nests and forages in dense stands of live oak, riparian woodlands, or other woodland habitats often near water	Y	Low potential to occur. Although site is partially on water, no suitable woodland vegetation present. CNDDB occurrence records from 2003 are approximately 2.5 miles northeast of the site at Lake Merritt.
Aquila chrysaetos (nesting and wintering)	golden eagle	None/FP, WL	Nests and winters in hilly, open/semi-open areas, including shrublands, grasslands, pastures, riparian areas, mountainous canyon land, open desert rimrock terrain; nests in large trees and on cliffs in open areas and forages in open habitats	N	Not expected to occur. No suitable vegetation or riparian habitat present. No CNDDB occurrence records within 5 miles of the site.
Ardea alba (nesting colony)	great egret	None/None	Nests and roosts in large trees over water or on islands, both in freshwater and marine estuarine habitats; forages in wetlands, including marshes, streams, ditches, and fish-rearing ponds, but also in irrigated pastures and croplands	Y	Low potential to occur. Estuary habitat onsite is heavily disturbed. No CNDDB occurrence records within 5 miles of the site.
Ardea herodias (nesting colony)	great blue heron	None/None	Nests in large trees or snags; forages in wetlands, water bodies, watercourses, and opportunistically in uplands, including pasture and croplands	Y	Low potential to occur. Suitable aquatic foraging habitat onsite. No CNDDB occurrence records within 5 miles of the site.
Asio flammeus (nesting)	short-eared owl	BCC/SSC	Grassland, prairies, dunes, meadows, irrigated lands, and saline and freshwater emergent wetlands	N	Not expected to occur. No suitable vegetation, dunes, or emergent wetlands present. No CNDDB occurrence records within 5 miles of the site.



	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Athene cunicularia (burrow sites and some wintering sites)	burrowing owl	BCC/SSC	Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows	N	Not expected to occur. No suitable vegetation or soils to support animal burrows present. No CNDDB occurrence records within 5 miles of the site.
Branta hutchinsii leucopareia (wintering)	cackling (=Aleutian Canada) goose	FPD/WL	Winters in lacustrine, fresh emergent wetlands, and moist grasslands, croplands, pastures, and meadows	N	Not expected to occur. No suitable vegetation or emergent wetlands present. No CNDDB occurrence records within 5 miles of the site.
Charadrius nivosus nivosus (nesting)	western snowy plover	FT, BCC/SSC	On coasts nests on sandy marine and estuarine shores; in the interior nests on sandy, barren or sparsely vegetated flats near saline or alkaline lakes, reservoirs, and ponds	Y	Low potential to occur. Disturbed estuary habitat onsite. CNDDB occurrence records from 1979 approximately 5 miles southeast of the site.
Circus hudsonius (nesting)	northern harrier	BCC/SSC	Nests in open wetlands (marshy meadows, wet lightly-grazed pastures, old fields, freshwater and brackish marshes); also in drier habitats (grassland and grain fields); forages in grassland, scrubs, rangelands, emergent wetlands, and other open habitats	N	Low potential to occur. No suitable vegetation or march habitat present. However, open ocean immediately adjacent to site. No CNDDB occurrence records within 5 miles.
Coturnicops noveboracensis	yellow rail	BCC/SSC	Nesting requires wet marsh/sedge meadows or coastal marshes with wet soil and shallow, standing water	Y	Low potential to occur. No suitable vegetation or mesic soil present. Historic CNDDB occurrence records from 1905 approximately 3 miles southeast of the site are presumed extant. Site is on artificial land over historic coastal brackish marsh.
Egretta thula (nesting colony)	snowy egret	None/None	Nests in dense marshes and trees; forages in wetlands or aquatic habitats, including estuaries, emergent wetlands, slow-moving rivers, irrigation ditches, and wet fields	Y	Low potential to occur. No vegetation present, although suitable aquatic and disturbed estuarine habitat occurs onsite. No CNDDB occurrence records within 5 miles.
Elanus leucurus (nesting)	white-tailed kite	None/FP	Nests in woodland, riparian, and individual trees near open lands; forages opportunistically in grassland, meadows, scrubs, agriculture, emergent wetland, savanna, and disturbed lands	N	Not expected to occur. Although disturbed lands onsite, no suitable vegetation or emergent wetlands present. No CNDDB occurrence records within 5 miles.
Falco peregrinus anatum (nesting)	American peregrine falcon	FPD/FP, SCD	Nests on cliffs, buildings, and bridges; forages in wetlands, riparian, meadows, croplands, especially where waterfowl are present	Y	Low potential to occur. Suitable aquatic foraging habitat with waterfowl present onsite. CNDDB occurrence records from 2014 approximately 2.5 miles east of the site. May prey on waterfowl in Oakland Estuary Channel. Known to nest in SF Bay on artificial structures, but unlikely to nest within the BSA due to lack of suitable nesting locations.
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	BCC/SSC	Nests and forages in emergent wetlands including woody swamp, brackish marsh, and freshwater marsh	Y	Low potential to occur. CNDDB occurrence records from 1989 located 2.8 miles northwest of the site. No suitable vegetation or wetlands present. Aquatic habitat onsite is disturbed tidal estuary on artificial land that was historic brackish marsh.



	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
<i>Haliaeetus leucocephalus</i> (nesting and wintering)	bald eagle	FPD/FP, SE	Nests in forested areas adjacent to large bodies of water, including seacoasts, rivers, swamps, large lakes; winters near large bodies of water in lowlands and mountains	Y	Low potential to occur. Site is on large body of water but no suitable vegetation present. May forage, but not suitable for nesting. No CNDDB occurrence records within 5 miles.
Hydroprogne caspia (nesting colony)	Caspian tern	None/None	Coastal estuarine, saltmarsh, and barrier islands; nests on islands in rivers and salt lakes	Y	Low potential to occur. Disturbed coastal estuary onsite but no suitable vegetation present. No CNDDB occurrence records within 5 miles.
Laterallus jamaicensis coturniculus	California black rail	None/FP, ST	Tidal marshes, shallow freshwater margins, wet meadows, and flooded grassy vegetation; suitable habitats are often supplied by canal leakage in Sierra Nevada foothill populations	N	Not expected to occur. No suitable vegetation present. Historic CNDDB occurrence records approximately 1 mile southeast of the site are possibly extirpated. CNDDB occurrence records from 2009 are 3 miles north past SF Bay.
Melospiza melodia maxillaris	Suisun song sparrow	None/SSC	Nests and forages in tidal salt and brackish marsh	N	Not expected to occur. No suitable marsh habitat present. No CNDDB occurrence records within 5 miles of the site.
Melospiza melodia pusillula	Alameda song sparrow	BCC/SSC	Nests and forages in tidal saltmarsh	Y	Low potential to occur. No suitable vegetation present. Historic CNDDB occurrence records from 1900 onsite are presumed extant. Multiple occurrences from 2004 within 3 miles of the site. However, Oakland estuary channel is heavily disturbed with existing marine commercial development and unlikely to support this species.
Melospiza melodia samuelis	San Pablo song sparrow	BCC/SSC	Nests and forages in tidal and muted tidal saltmarsh	N	Not expected to occur. No marsh habitat present. No CNDDB occurrence records within 5 miles of the site.
Nycticorax nycticorax (nesting colony)	black-crowned night-heron	None/None	Nests in dense-foliaged trees and dense fresh or brackish emergent wetlands associated with marshes, ponds, reservoirs, and estuaries	Y	Low potential to occur. Disturbed coastal estuary onsite but no suitable vegetation present. No CNDDB occurrence records within 5 miles.
Pandion haliaetus (nesting colony)	Osprey	None/WL	Wetlands where fish are present. Nests within site of permanent water and will nest on artificial structures.	Y	Low potential to occur. May forage in the Oakland Estuary channel and not likely to nest on artificial structures onsite. Known to nest at Alameda Point (2017).
Rallus obsoletus obsoletus	Ridgway's rail	FE/FP, SE	Coastal salt or brackish marshes	N	Not expected to occur. No suitable vegetation present for cover, nesting, or foraging. CNDDB occurrence records from 2006 located 3 miles southeast of the site. Site is on artificial fill over historic brackish marsh

	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Riparia riparia (nesting)	bank swallow	None/ST	Nests in riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with sandy soils; open country and water during migration	Y	Low potential to occur. No suitable vegetation present. Although coastal habitat onsite could support this species during migration, no sandy soils or cliffs for nesting. No CNDDB occurrences within 5 miles of the site.
Rynchops niger (nesting colony)	black skimmer	BCC/SSC	Nests on barrier beaches, shell banks, spoil islands, and saltmarsh; forages over open water; roosts on sandy beaches and gravel bars	Y	Low potential to occur, May forage over Oakland estuary channel's open water or nest along disturbed shoreline onsite. No CNDDB occurrence records within 5 miles of the site.
Sternula antillarum browni (nesting colony)	California least tern	FE/FP, SE	Forages in shallow estuaries and lagoons; nests on sandy beaches or exposed tidal flats	Y	Low potential to occur. Site is developed so no vegetation present. However, project is on Oakland estuary channel which is tidal with disturbed shoreline. CNDDB occurrence records from 1996 approximately 1.5 miles west of the site are on Alameda point, an extant successful breeding colony. May use the estuary for foraging while in CA from April-August.
Xanthocephalus xanthocephalus (nesting)	yellow-headed blackbird	None/SSC	Nests in marshes with tall emergent vegetation, often along borders of lakes and ponds; forages in emergent wetlands, open areas, croplands, and muddy shores of lacustrine habitat	N	Not expected to occur. No suitable vegetation, emergent wetland, or lacustrine habitat present. No CNDDB occurrence within 5 miles.
Nannopterum auritum (nesting colony)	double-crested cormorant	None/WL	Nests in riparian trees near ponds, lakes, artificial impoundments, slow-moving rivers, lagoons, estuaries, and open coastlines; winter habitat includes lakes, rivers, and coastal areas	Y	Low potential to occur. Disturbed estuary habitat onsite along coast. CNDDB occurrence records from 1988 approximately 3 miles northwest of the site. No nesting or roosting habitat present, but may forage within Oakland Estuary channel or perch on artificial dock structures onsite.
Fishes					
Acipenser medirostris pop. 1	green sturgeon - southern DPS	FT/None	Spawns in deep pools in large, turbulent, freshwater rivers; adults live in oceanic waters, bays, and estuaries	Y	High potential to occur. Suitable estuarine habitat present for adults to persist. CNDDB occurrence records onsite from 2016. Site is in critical habitat for this species.
Archoplites interruptus (within native range only)	Sacramento perch	None/SSC	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley	N	Not expected to occur. No suitable aquatic habitat present. CNDDB occurrence records from 1980 located approximately 8 miles north.
Eucyclogobius newberryi	tidewater goby	FE/None	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County, to the mouth of the Smith River	Y	Low potential to occur. Suitable brackish aquatic habitat present. CNDDB occurrence records 2 miles northeast are from an unknown year in the 1900's, in Lake Merritt.
Mylopharodon conocephalus	hardhead	None/SSC	Low- to mid-elevation streams in the Sacramento–San Joaquin drainage; also present in the Russian River	Ν	Not expected to occur. No CNDDB occurrences within 10 miles of the site. No



	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
					suitable vegetation or aquatic habitat present.
Oncorhynchus mykiss	steelhead - central valley and central CA coast DPS	FT/None	Anadromous, migrating to central bay waters between freshwater spawning and rearing areas in the Central Valley and Pacific Ocean. San Francisco Bay waters surrounding Alameda Island are designated critical habitat.	Y	Moderate potential to occur. May migrate seasonally through waters in the project site (Central Valley is all waters of SF Bay north of Bay Bridge). Spawning runs and emigrating steelhead use tributaries of SF Bay as migration corridor to ocean.
Oncorhynchus tshawytscha	Chinook salmon - central valley winter run	FE/SE (winter), FT/ST (spring run), None/CSS (fall/late fall)	Winter run: Anadromous, adults migrate to central bay waters from November through December. Juveniles migrate through SF bay en route to the pacific ocean as a wildlife corridor. Spring run: adults in SF bay during migratory period in spring, while juveniles have potential to inhabitat Bay in the fall, winter, and spring.	Y	Moderate potential to occur. Suitable foraging habitat present within San Francisco Bay for all subspecies. All runs may occur during respective outmigration periods or as holding habitat prior to spawning runs.
Spirinchus thaleichthys	longfin smelt	FC/ST	Aquatic, estuary	Y	Moderate potential to occur. Suitable estuarine habitat present. CNDDB occurrence records in the vicinity from 2010. Known to inhabit waters of the Central Bay.
Thaleichthys pacificus	eulachon	FT, BCC/None	Found in Klamath River, Mad River, and Redwood Creek and in small numbers in Smith River and Humboldt Bay tributaries	N	Not expected to occur. No suitable tributaries or rivers onsite. No CNDDB occurrence records within 10 miles.
Invertebrates					
Adela oplerella	Opler's longhorn moth	None/None	Serpentine grassland	N	Not expected to occur. No suitable vegetation or soils present. No CNDDB occurrence records within 10 miles.
Banksula incredula	incredible harvestman	BCC/None	Known only from the type locality San Bruno Mountain, San Mateo County. Trailside talus slope with Franciscan sandstone and dense chaparral canopy.	N	Not expected to occur. No suitable vegetation present. No CNDDB occurrence records within 3 miles.
Bombus caliginosus	obscure bumble bee	None/None	Inhabits the west coast from Washington to Southern California, as far south as the San Jacinto Mountains. Seen on plants belonging to Asteracea, Fabaceae, and Ericaceae families. Habitats include open grassy coastal prairies and coast range meadows.	N	Not expected to occur. No suitable vegetation or floral sources onsite. Historic CNDDB occurrence records 0.5 miles north of the site are presumed extant.
Bombus crotchii	Crotch bumble bee	None/None	Open grassland and scrub communities supporting suitable floral resources.	N	Not expected to occur. No suitable vegetation or floral resources present onsite.
Bombus occidentalis	western bumble bee	None/None	Once common and widespread, species has declined precipitously from central California to southern British Columbia, perhaps from disease	N	Not expected to occur. No suitable vegetation present. Historic CNDDB occurrence records approximately 3 miles north from 1965 are presumed extant.
Caecidotea tomalensis	Tomales isopod	None/None	Inhabits localized freshwater ponds or streams with still or near-still water in several Bay Area counties	N	Not expected to occur. No freshwater wetland habitat present. No CNDDB occurrences within 10 miles.
Callophrys mossii bayensis	San Bruno elfin butterfly	FE/None	Coastal chaparral, on steep north-facing slopes, and in fog- belt of the mountains near San Francisco Bay	N	Not expected to occur. No suitable vegetation or north-facing slopes present.

	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Cicindela hirticollis gravida	sandy beach tiger beetle	None/None	Inhabits areas adjacent to non-brackish water along the coast of California from San Francisco Bay to northern Mexico	N	Not expected to occur. No suitable vegetation present. Historic CNDDB occurrence records from 1920 approximately 4 miles west are extirpated.
Danaus plexippus pop. 1	monarch	FC/None	Wind-protected tree groves with nectar sources and nearby water sources	N	Not expected to occur. No suitable vegetation present. CNDDB occurrence records from 2014 located 4 miles west of the site.
Dufourea stagei	Stage's dufourine bee	None/None	Ground-nesting	N	Not expected to occur. Site is developed with no suitable soils for ground nesting.
Euphydryas editha bayensis	Bay checkerspot butterfly	FT/None	Serpentine or serpentine-like grasslands	N	Not expected to occur. No suitable vegetation or soils present. CNDDB occurrence records from 1980 located 6 miles east are extirpated.
Gonidea angulata	western ridged mussel	None/None	Primarily creeks and rivers and, less often, lakes; originally in most of state, now extirpated from Central and Southern California	N	Not expected to occur. No suitable lacustrine habitat present.
Helminthoglypta nickliniana bridgesi	Bridges' coast range shoulderband	None/None	Inhabits open hillsides of Alameda and Contra Costa Counties	N	Not expected to occur. No suitable vegetation or hillsides present.
Hydroporus leechi	Leech's skyline diving beetle	None/None	Aquatic	Y	Not expected to occur. Although suitable aquatic habitat is present, no CNDDB occurrence records within 10 miles of the site.
Icaricia icarioides missionensis	Mission blue butterfly	FE/None	Coastal chaparral and coastal grasslands; host plants are silver lupine (<i>Lupinus albifrons</i>), summer lupine (<i>L. formosus</i>), and many colored lupine (<i>L. variicolor</i>)	N	Not expected to occur. No suitable vegetation or host plants present.
Icaricia icarioides pheres	Pheres blue butterfly	None/None	Coastal dunes of San Francisco	N	Not expected to occur. No suitable vegetation or coastal dunes present.
Ischnura gemina	San Francisco forktail damselfly	None/None	Endemic to the San Francisco Bay Area	Y	Low potential to occur. Site is within SF Bay. CNDDB occurrence records located 9 miles southwest from 1997.
Lichnanthe ursina	bumblebee scarab beetle	None/None	Inhabits coastal sand dunes from Sonoma County south to San Mateo County	N	Not expected to occur. No suitable vegetation present.
Microcina leei	Lee's micro-blind harvestman	None/None	Xeric habitats in the San Francisco Bay region	N	Not expected to occur. No suitable vegetation or xeric habitat present. CNDDB occurrence records from 1983 located 6 miles north are presumed extant.
Microcina tiburona	Tiburon micro-blind harvestman	None/None	Open, hilly grassland habitat in areas of serpentine bedrock	N	Not expected to occur. No suitable vegetation or soils present.
Pomatiopsis californica	Pacific walker	None/None	Freshwater	N	Not expected to occur. No suitable freshwater habitat present. Historic CNDDB occurrence records 1 mile north of the site are extirpated

	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Speyeria callippe callippe	callippe silverspot butterfly	FE/None	Native grassland and associated habitats in the San Francisco Bay area	N	Not expected to occur. No suitable vegetation present, although site is within SF Bay. CNDDB occurrences from 2010 located 8 miles southwest.
Trachusa gummifera	San Francisco Bay Area leaf-cutter bee	None/None	(blank)	N	Not expected to occur. No suitable vegetation present.
Tryonia imitator	mimic tryonia (=California brackish water snail)	None/None	Inhabits coastal lagoons, estuaries, and saltmarshes, from Sonoma County south to San Diego County	Y	Low potential to occur. Suitable estuary habitat present. CNDDB occurrence records from an unknown year within 3 miles of the site in Lake Merritt are extirpated.
Vespericola marinensis	Marin hesperian	None/None	Found in moist spots in coastal brushfield and chaparral vegetation in Marin County	N	Not expected to occur. No suitable vegetation present.
Mammals					
Aeorestes cinereus	northern hoary bat	None/None	Forest, woodland riparian, and wetland habitats; also juniper scrub, riparian forest, and desert scrub in arid areas; roosts in tree foliage and sometimes cavities, such as woodpecker holes	Y	Low potential to occur. No suitable vegetation present. Suitable wetland habitat with artificial cavities. No CNDDB occurrences within 5 miles of the site.
Antrozous pallidus	pallid bat	None/SSC	Grasslands, shrublands, woodlands, forests; most common in open, dry habitats with rocky outcrops for roosting, but also roosts in man-made structures and trees	N	Not expected to occur. No suitable vegetation or dry habitats present. Man- made structures onsite could support roosting. CNDDB occurrence records from 1945 located 5 miles north are presumed extant.
Corynorhinus townsendii	Townsend's big-eared bat	None/SSC	Mesic habitats characterized by coniferous and deciduous forests and riparian habitat, but also xeric areas; roosts in limestone caves and lava tubes, man-made structures, and tunnels	N	Not expected to occur. No suitable vegetation present. Man-made structures onsite could support roosting and area is mesic. However, CNDDB occurrences from 1938 located 6 miles north are possibly extirpated.
Dipodomys heermanni berkeleyensis	Berkeley kangaroo rat	None/None	Open, grassy hilltops and open spaces in chaparral and blue oak/digger pine woodlands	N	Not expected to occur. No suitable vegetation present. Historic CNDDB occurrences from 1916 located 6 miles north are presumed extant.
Enhydra lutris nereis	southern sea otter	FT/SSC, FP	Nearshore marine environments	Y	Low potential to occur. Nearshore marine habitat present but heabily disturbed by industrial and commercial marine development. No CNDDB occurrences within 5 miles of the site. NOAA occurrences?? Potential underwater acoustic impacts from pile driving.
Erethizon dorsatum	North American porcupine	None/None	Forested habitats in the Sierra Nevada, Cascade, and Coast ranges, with scattered observations from forested areas in the Transverse Ranges (CDFW 2018).	N	Not expected to occur. No suitable vegetation present. No CNDDB occurrence records within 5 miles

	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Eumetopias jubatus	Steller (=northern) sea-lion	FPD/SSC	Beaches, ledges, and rocky reefs	Y	Low potential to occur. Site lies on Oakland Inner Harbor Channel; sea lions may rest on man-made structures onsite or locally migrate within Oakland estuary channel. No CNDDB occurrence records within 5 miles. NOAA occurrences? Potential underwater acoustic impacts from pile driving.
Lasionycteris noctivagans	silver-haired bat	None/None	Old-growth forest, maternity roosts in trees, large snags 50 feet aboveground; hibernates in hollow trees, rock crevices, buildings, mines, caves, and under sloughing bark; forages in or near coniferous or mixed deciduous forest, stream or river drainages	N	Not expected to occur. No suitable vegetation or caves present. No suitable stream or river drainages onsite. Historic CNDDB occurrence records from 1920 located 3.5 miles northeast are presumed extant.
Lasiurus blossevillii	western red bat	None/SSC	Forest, woodland, riparian, mesquite bosque, and orchards, including fig, apricot, peach, pear, almond, walnut, and orange; roosts in tree canopy	N	Not expected to occur. No suitable vegetation present. No CNDDB occurrence records within 5 miles.
Microtus californicus sanpabloensis	San Pablo vole	BCC/SSC	Saltmarshes of San Pablo Creek	N	Not expected to occur. No suitable vegetation present. Site is not on or adjacent to San Pablo Creek.
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	None/SSC	Forest habitats with a moderate canopy and moderate to dense understory	N	Not expected to occur. No suitable vegetation present. No CNDDB occurrences within 5 miles of the site.
Nyctinomops macrotis	big free-tailed bat	None/SSC	Rocky areas; roosts in caves, holes in trees, buildings, and crevices on cliffs and rocky outcrops; forages over water	Y	Low potential to occur. Development onsite could support roosting and Oakland estuary channel could support foraging. Historic CNDDB occurrence records from 1916 located 5 miles north are presumed extant.
Reithrodontomys raviventris	salt-marsh harvest mouse	FE/FP, SE	Saline emergent wetlands, preference for pickleweed saline emergent wetlands; also uses adjacent grasslands	N	Not expected to occur. No suitable vegetation or emergent wetlands present. CNDDB occurrences from 1986 located approximately 3 miles southeast.
Scapanus latimanus insularis	Angel Island mole	None/None	Confined to Angel Island; moist soil under chaparral	N	Not expected to occur. No suitable vegetation or moist soils present. Site is not on Angel island.
Scapanus latimanus parvus	Alameda Island mole	BCC/SSC	Confined to Alameda Island; variety of habitats including annual and perennial grasslands	Y	Low potential to occur. No suitable vegetation present although site is on Alameda Island. Historic CNDDB occurrence records approximately 0.5 miles south of the site are presumed extant. Multiple historic occurrences within 3 miles.
Sorex vagrans halicoetes	salt-marsh wandering shrew	None/SSC	Saltmarsh inundated daily by tidal waters	N	Not expected to occur. No suitable vegetation or natural saltmarsh present. Tidal waters are disturbed daily. No CNDDB occurrence records within 5 miles.

	Common Name	Status (Federal/ State)	Habitat	Appropriate habitats?	Potential to Occur
Taxidea taxus	American badger	None/SSC	Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils	N	Not expected to occur. No suitable vegetation or xeric habitat present. No CNDDB occurrence records within 5 miles.
Zapus trinotatus orarius	Point Reyes jumping mouse	None/SSC	Wet, marshy coastal meadows, coast redwood forests, riparian thickets, and grassy areas in coniferous forests	N	Not expected to occur. No suitable vegetation present. No CNDDB occurrence records within 5 miles.
Reptiles					
Emys marmorata	western pond turtle	None/SSC	Slow-moving permanent or intermittent streams, ponds, small lakes, and reservoirs with emergent basking sites; adjacent uplands used for nesting and during winter	N	Not expected to occur. No suitable upland habitat or lacustrine/riparian habitat present. No CNDDB occurrence records within 5 miles.
Masticophis lateralis euryxanthus	Alameda whipsnake	FT/ST	Open areas in chaparral and scrub habitat; also adjacent grassland, oak savanna, and woodland	N	Not expected to occur. No suitable vegetation present. Historic CNDDB occurrence records from 1953 located 6 miles east.
Thamnophis sirtalis tetrataenia	San Francisco garter snake	FE/FP, SE	Wide range of habitats including grasslands or wetlands adjacent to ponds, marshes, and sloughs	N	Not expected to occur. No suitable vegetation or freshwater wetlands present. CNDDB occurrence records from 2014 located 6 miles southwest.

Appendix C

Alameda Main Street Ferry Terminal Refurbishment Project Hydroacoustic Impact Assessment

ALAMEDA MAIN STREET FERRY TERMINAL REFURBISHMENT PROJECT HYDROACOUSTIC ASSESSMENT

Alameda, California

November 1, 2022

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EXECUTIVE SUMMARY

This report summarizes the results of an acoustic assessment performed to evaluate the effects of construction activity noise on aquatic species. The construction activities for the refurbishment of the Alameda Main Street (AMS) Ferry Terminal includes replacement of the terminal bridge and foundation, gangway replacement, float demolition and replacement, and utility upgrades. The purpose of this assessment is to predict construction noise levels that may occur during the project so that permitting regulatory agencies can address concerns and answer questions raised about the potential project effects on sensitive habitat and aquatic species. The assessment focuses on predicting underwater noise levels from pile-driving activities. Because the design and construction details are preliminary at this time, an analysis that predicts conditions that are expected to cause reasonably worst-case acoustic conditions were analyzed. Under this worst-case scenario, piles would be driven using both vibratory and impact hammers. Note that impact pile driving would only occur if vibratory driving were not able to install piles to their tip elevation. Results of this assessment are summarized as follows:

- 48-inch-diameter steel pipe pile (Monopile): Impact pile driving of these piles in water could cause acoustic impacts at distances extending out to 4,200 meters (m) and 1,010 m for the root-mean-square (RMS) (150 decibel [dB] re 1 micropascal [μPa]) and Cumulative sound exposure level (SEL) (187 dB re 1μPa²-sec) respectively for the adopted fish thresholds. Note that sounds would travel further to the west. Distances where sound levels exceed the marine mammal thresholds could extend out to about 997 m for the Level A Injury Zone for Pinnipeds while extending out to about 4,200 m for the Level B Harassment Zones. Vibratory driving of these piles would result in impact distances extending out to 158 m for the RMS (150 dB re 1μPa) adopted fish threshold, while resulting in Level B Harassment Zones of extending out to the mouth of the Middle Harbor at 4,200 m for the marine mammal thresholds. Use of attenuation methods (e.g., air bubble curtains), would reduce these distances.
- 36-inch steel pipe pile (guide piles & donut fender piles): Impact driving of these piles in water could result in sounds above thresholds extending out to the mouth of the Middle harbor at 4,200 m and 1,166 m for the RMS (150 dB re 1µPa) and Cumulative SEL (187 dB re 1µPa²-sec) respectively for the adopted fish thresholds. Distances where sound levels exceed the marine mammal thresholds could extend out to about 1,311 m for the Level A Injury Zone for Pinnipeds while extending out to about 1,848 m for the Level B Harassment Zones. Vibratory driving of these piles would result in impact distances extending out to 117 m for the RMS (150 dB re 1µPa) adopted fish threshold, while resulting in Level B Harassment Zones of extending out to 4,200 m for the marine mammal thresholds. Use of attenuation methods (e.g., air bubble curtains), would reduce these distances.
- **24-inch steel pipe pile:** These piles would be driven on land, which could result in impact distances extending out to 736 m and 64 m for the RMS (150 dB re 1µPa) and Cumulative

SEL (187 dB re 1μ Pa²-sec) respectively for the adopted fish thresholds. Distances where sound levels exceed the marine mammal thresholds could extend out to about 63 m for the Level A Injury Zone for Pinnipeds while extending out to about 158 m for the Level B Harassment Zones. Vibratory driving of these piles would result in impact distances extending out to 5 m for the RMS (150 dB re 1μ Pa) adopted fish threshold, while resulting in Level B Harassment Zones of extending out to 541 m for the marine mammal thresholds.

Note, the maximum anticipated distances to various fish and marine mammal thresholds calculated for each type of pile using NMFS guidelines, are constrained by bends in the Oakland Estuary and relatively shallow water bathymetry near the edge of the shipping channel ~ 4,200 m to the west of the ferry terminal site and ~1,700 m to the east. Substantial noise from piling activity is not anticipated to propagate past these bends. The computed distances for vibratory driving using the standard attenuation rate (15 Log of the distance) are 11.6 to 15.8 km, which extend beyond the harbor mouth. However, measurements in the Bay have shown greater attenuation rates of 18 Log of the distance that reduce this distance to 3.6 to 4.6 km. Given this higher attenuation rate and the narrow channel that sound would propagate, sounds above the threshold would not extend beyond the Middle Harbor.

Attachment A depicts the areas where sound effects above thresholds are predicted.
INTRODUCTION

The San Francisco Bay Area Water Emergency Transportation Authority (WETA) is proposing the Alameda Main Street (AMS) Ferry Terminal Refurbishment Project (project) to support WETA ferry operations within the Oakland Inner Harbor.

The project site is located at 2990 Main Street in Alameda (City), California and includes the existing AMS Ferry Terminal, which consists of a trestle, steel float structure, aluminum gangway, and bridge structure. The site is designated under the General and Maritime Industry land use and zoned as General Industrial (M-2). Much of the project site is within the Oakland Inner Harbor, with a portion of the bridge structure extending onto the landside of the City. The landside of the project site consists of various bay rocks, rip-rap, and dirt/sand. The project site is accessible by vehicle via Main Street and by ferry within the Oakland Inner Harbor. The project is within a developed area of the City and is bounded by the Oakland Inner Harbor to the north, industrial uses to the east, the San Francisco Bay Trail, AMS Ferry Terminal parking lot, and residential uses to the south, as well as the Main Street Dog Park and undeveloped land uses to the east.

Project elements would include replacement of the existing bridge walkway and foundation, and replacement of the gangway, float, guide piles, and upgrades to utilities at the project site. All project features would be compliant with Americans with Disabilities Act (ADA) standards. These details rely on project plans and are further described, below.

Terminal Bridge and Foundation Replacement. Project activities would involve demolishment of existing bridge/walkway and bridge foundation and replacement with a new aluminum truss bridge. Onshore and landside support would be installed and would consist of a 48-inch (in) monopile and two 24-in pipe piles with cap beams, respectively.

Gangway Replacement. The project would include removal of the existing 60-foot gangway and replacement with an 80-foot covered aluminum gangway.

Float Demolition/Replacement. The existing terminal float would be removed and replaced-inkind with a new steel float. Ramps that had been previously installed on the float would be removed, protected in place, and reused once the new float is installed. Float ramps would be shifted to the west to provide additional room for a longer gangway. The four (4) existing 30-foot guide piles would be removed and replaced with four (4) new 36-in guide piles. To achieve a more safe, efficient berthing capacity and enable ingress and egress in a timely manner, float demolition/replacement activities would also involve installation of two (2) new 36-in steel pipe piles and two (2) 72-in donut fender piles.

Utility Upgrades. Utility upgrades associated with the project would involve replacement of existing razor equipment, installation of electrical service for replacement lighting, ramp controls, and outlets and a new potable water line. The new potable water line will connect to an existing line at the Ferry Terminal restroom facility. The new line will be used for intermittent terminal cleaning activities as needed. No other utility improvements are planned. The bridge, gangway, and float structures are designed to accommodate additional conduit related to an electric shorepower system that is to be constructed in the future as part of a separate project. The

shorepower system will allow for charging of electric ferry vessels that will berth at AMS Ferry Terminal.

Overall, the footprint of the project site is expected to increase the AMS Ferry Terminal shade area by approximately 830 square feet. No changes in operational demand (i.e., an increase in ferry users) are anticipated, and no physical impacts beyond the project boundaries (see Figure 2) are anticipated as part of the project. Vehicular and pedestrian access to the AMS Ferry Terminal is not anticipated to change.

The water depth at the project site varies between 14-in to 28-in mean lower low water (MLLW). Most construction activities will occur above or at the waterline. The only elements that will extend below the mudline are the new piles that will have a maximum tip elevation of approximately 110-in MLLW.

This study is an assessment of potential underwater noise levels generated by planned construction activities involved with the refurbishment of the AMS Ferry Terminal. The study was requested in order to aid regulatory biologists in assessing underwater sound impacts on fish and marine species that may be present in the area when construction occurs. This assessment is based on information provided by project designers consisting of a location map, draft layout sheets, estimated pile-driving data, a review of potential construction activities to be conducted at the site, a review of related studies, the modeling, and a semi-quantitative analysis of underwater noise levels. This study assesses the sound levels associated with potential pile-driving activities that could affect aquatic species. This study does not address environmental impacts associated with the project.

UNDERWATER SOUNDS FROM PILE-DRIVING ACTIVITIES

Fundamentals of Underwater Noise

Impact pile driving can produce high underwater sound levels. When a pile-driving hammer strikes a pile, a pulse is created that propagates through the pile and radiates sound into the water, the ground, and the air. Sound pressure pulse as a function of time is referred to as the waveform. In terms of acoustics, these sounds are described by the peak pressure, the root-mean-square (RMS) pressure, and the sound exposure level (SEL). The peak pressure is the highest absolute value of the measured waveform and can be a negative or positive pressure peak. For pile-driving pulses, RMS level is determined by analyzing the waveform and computing the average of the squared pressures over the time that comprises that portion of the waveform containing the sound energy (Richardson et al. 1995; ISO 18406:2017(E).). The pulse RMS has been approximated in the field for pile-driving sounds by measuring the signal with a precision sound level meter set to the "impulse" RMS setting and is typically used to assess impacts to marine mammals. Another measure of the pressure waveform that can be used to describe the pulse is the sound energy itself. The total sound energy in the pulse is referred to in many ways, most commonly as the "total energy flux" (Finerran 2002). The "total energy flux" is equivalent to the un-weighted SEL for a plane wave propagating in a free field, a common unit of sound energy used in airborne acoustics to describe short-duration events. The unit used is decibels (dB) re 1 micropascal $(\mu Pa)^2$ -second

(sec). In this report, peak pressure levels are expressed as the absolute maximum pressure of a pulse in dB re 1 μ Pa; however, in other literature, peak pressure levels can take varying forms, such as pascals or pounds per square inch. The total sound energy in an impulse accumulates over the duration of that pulse and the duration of a pile driving event. Figure 1 illustrates the acoustical characteristics of an underwater pile-driving pulse. Table 1 includes the definitions of terms commonly used to describe underwater sounds.

The variation of instantaneous pressure over the duration of a sound event is referred to as the waveform. The waveform can provide an indication of rise time or the rapidity with which pressure fluctuates with time; however, rise time differences are not clearly apparent for pile-driving sounds because of the numerous rapid fluctuations that are characteristic of this impulse type. A plot showing the accumulation of sound energy over the duration of the pulse (or at least the portion of time during which much of the energy accumulates) illustrates the differences in source strength and rise time. An example of the underwater acoustical characteristics of a typical pile-driving pulse is shown on Figure 1.

SEL is an acoustic metric that provides an indication of the amount of acoustical energy contained in a sound event. For pile driving, the typical event can be one pile-driving pulse or many pulses, such as pile driving for one pile or for one day of pile driving. Typically, SEL is measured for a single strike and a cumulative condition. The cumulative SEL associated with the driving of a pile can be estimated using the single-strike SEL value and the number of pile strikes through the following equation:

$SEL_{cumulative} = SEL_{single-strike} + 10log(#of pile strikes)$

For example, if a single-strike SEL for a pile is 165 dB, and it takes 1,000 strikes to drive the pile, the cumulative SEL is 195 dBA (165 dB + 30 dB = 195 dB), where $10 * \text{Log}_{10}(1000) = 30$.

Term	Definition
Peak Sound Pressure, unweighted (dB)	Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure. This pressure is expressed in this report as a dB (referenced to a pressure of 1 μ Pa) but can also be expressed in units of pressure, such as μ Pa or pounds per square inch.
RMS Sound Pressure Level, (NMFS Criterion) dB re 1 µPa	The squared root of the average of the squared pressures over the time that comprises that portion of the waveform containing 90 percent of the sound energy for one pile-driving impulse. ¹ This measure is typically used to assess acoustical impacts on marine mammals.

TABLE 1Definition of Underwater Acoustical Terms

¹ The underwater sound measurement results obtained during a Pile Installation Demonstration Project indicated that most pile-driving impulses occurred over a 50- to 100-msec period. Most of the energy was contained in the first 30 to 50 msec. Analysis of that underwater acoustic data for various pile strikes at various distances demonstrated that the acoustic signal measured using the standard "impulse exponential-time-weighting" (35-msec rise time) correlated to the RMS (impulse) used by NMFS.

Notes: msec = millisecond(s)

NMFS = National Marine Fisheries Service

SEL, dB re 1 µPa ² -sec	Proportionally equivalent to the time integral of the squared pressure and is described in this report in terms of dB re 1 μ Pa ² -sec over the duration of the impulse. Similar to the unweighted SEL standardized in airborne acoustics to study noise from single events.
Cumulative SEL	Measure of the total energy received through a pile-driving event (here defined as pile driving that occurs within a day).
Waveforms, µPa over time	A graphical plot illustrating the time history of positive and negative sound pressures of individual pile strikes shown as a plot of μ Pa over time (i.e., seconds).
Frequency Spectra, dB over frequency range	A graphical plot illustrating the distribution of sound pressure vs. frequency for a waveform; dimension in RMS pressure and defined frequency bandwidth.



FIGURE 1 Underwater Acoustical Characteristics of a Pile-driving Pulse

Underwater Sound Thresholds

Fish

In 2008, NOAA's NMFS; U.S. Fish and Wildlife Service; California, Oregon, and Washington Departments of Transportation; California Department of Fish and Game; and the U.S. Federal Highway Administration agreed in principle to interim criteria to protect fish from pile-driving activities. The agreed-upon criteria are presented in Table 2.

TABLE 2Adopted Fish Criteria

Interim Criteria for Injury	Sound Levels Agreed-upon in Principle
Peak	206 dB re 1 µPa (for all sizes of fish)
Cumulative SEL	187 dB re 1 μ Pa ² -sec – for fish size of 2 grams or greater ^a 183 dB re 1 μ Pa ² -sec – for fish size of less than 2 grams ^a

^a Applies to pile strikes of 150 dB SEL (single strike) or greater.

The adopted criteria listed in Table 2 are for pulse-type sounds (e.g., impact pile driving) and do not address sound from vibratory driving. The SEL criteria are not applied to vibratory driving sounds. The in-water areas with project sound levels above 150 dB RMS are considered by NMFS to be acoustically affected given possible behavioral changes in fish; however, these levels are not anticipated to trigger any mitigation requirements (Caltrans 2020).

Marine Mammals

Under the Marine Mammal Protection Act, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild" (NMFS 2018). Level B harassment is defined as "any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to migration, breathing, nursing, breeding, feeding or sheltering" (NMFS 2018).

Table 3 outlines the current adopted Level A and Level B (behavioral harassment) criteria. The application of the 120-dB RMS threshold for vibratory pile driving can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. For continuous sounds, NMFS Northwest Region has provided guidance for reporting RMS sound pressure levels. RMS levels are based on a time-constant of 10 seconds; RMS levels should be averaged across the entire event. For impact pile driving, the overall RMS level should be characterized by integrating sound for each acoustic pulse across 90 percent of the acoustic energy in each pulse and averaging all the RMS levels for all pulses.

NMFS has provided marine mammal acoustic technical guidance for predicting the onset of permanent threshold shift (PTS) and temporary threshold shifts in marine mammal hearing from sound sources (NMFS 2018). For this project location, the functional hearing groups are expected to be limited to phocid pinnipeds (harbor seals), and otariid pinnipeds (California sea lions). For impact pile driving, the majority of the acoustic energy is confined to frequencies below 2 kilohertz (kHz), and there is very little energy above 20 kHz. Similarly, much of the acoustic energy for vibratory driving is in the frequency range below 2.5 kHz. The underwater acoustic criteria for phocid and otariid pinnipeds are provided in Table 3. Table 4 lists the functional hearing groups and their hearing ranges as defined by the NMFS guidance (NMFS 2018).

	Underwater Noise Thresholds (dB re 1 µPa)								
Species	Vibratory	Impact	Marine	PTS SEL _{cum} Threshold					
	Pile-driving	Pile-driving	Mammal	Peak – dB	•				
	Disturbance	Disturbance	Hearing	$SEL_{cum} - dB$	re 1 µPa ² -sec				
	Threshold	Threshold	Group (see Table 4)	Impulsive	Non-Impulsive				
	(Level B	(Level B		(Impact Pile	(Vibratory Pile				
	Harassment)	Harassment)		Driving)	Driving)				
			Phocid	218 dB Peak	201 dB SEL _{cum}				
Pinnipeds	120 dB RMS	160 dB RMS	THOCIG	185 dB SEL _{cum}	201 ub SELcum				
	120 uD KWIS	100 dD KMS	Otariid	232 dB Peak	219 dB SEL _{cum}				
			Otalliu	203 dB SEL _{cum}	219 UD SELcum				

 TABLE 3
 Underwater Acoustic Criteria for Pinnipeds

TABLE 4Definition of Marine Mammal Hearing Group for Pinnipeds

Marine Mammal Hearing	Groups
Functional Hearing Group	Functional Hearing Range
Phocid Pinnipeds – true seals, including harbor seals	50 Hz to 86 kHz
Otariid Pinnipeds – sea lions and fur seals	60 Hz to 39 kHz
Otarita i initipeds – sea nons and fur sears	00 HZ 10 39 KHZ

Note: Hz = hertz

PROJECT UNDERWATER SOUND-GENERATING ACTIVITIES

The primary type of activity that has the potential to elevate underwater noise levels is the installation of piles using an impact pile driver. For this project however, vibratory driving is expected to be used for majority of the pile installation with the possibility of using an impact hammer if piles hit refusal prior to the required tip elevation. Pile installation activities for the project include installation of a single (1) 48-inch steel pipe monopile in water for the terminal bridge along with two (2) 24-inch steel pipe piles with concrete cap beams on land. The project also involves installation of four (4) 36-inch guide piles and two (2) 36-inch donut fender piles in water for the terminal float.

Pile driving in the water causes sound energy to radiate directly into the water by vibrating the pile between the surface of the water and the riverbed, and indirectly as a result of ground-borne vibration at the riverbed. Airborne sound does not make a substantial contribution to underwater sound levels because of the attenuation of sound at the air/water interface. Pile driving on land would generate low-frequency ground-borne vibration that could cause localized sound pressures in the water that are radiated from the streambed. A minimum water depth is required to allow sound to propagate. For pile-driving sounds, the minimum depth is 1 m (3 feet). Pile-driving activities conducted on land near water bodies have been found to transmit low-frequency sound into the water. The mechanisms for transmitting this sound into the water are complex and difficult, if not impossible, to predict.

Table 5 summarizes the proposed pile-driving activities, the number of piles anticipated per day, and the duration of the pile driving activity for vibratory driving.

New Structure	Pile Type	Pile Location	Duration/Estimated Blows per Pile ¹	Piles per Day
Terminal Bridge and Foundation Replacement	48-inch steel pipe	In Water	45 mins vibrate 1,015 strikes impact	1
Terminal Bridge and Foundation Replacement	24-inch steel pipe	On Land	45 mins vibrate 1,015 strikes impact	2
Float Replacement (Guide piles & Donut Fender piles)	36-inch steel pipe	In Water	45 mins vibrate 1,015 strikes impact	6

TABLE 5Pile-driving Activities for the Proposed Project

¹Impact driving if needed, assumes about 20 to 30 minutes of driving with a total of about 1,015 strikes per pile.

Predicted Underwater Sound Levels from Construction

This assessment predicts underwater sound levels associated with the different piling activities that are anticipated. Piling activities include the impact and/or vibratory installation of steel piles. The prediction of sound levels associated with this activity are based on measurements from similar activities.

The prediction of sound levels from pile-driving activities proposed for this project relies on data collected from other sites with similar conditions. The following studies were identified and used to aid in predicting underwater noise levels and calculating the distances to thresholds for fishes and marine mammals discussed in this report.

Underwater Sound Levels from Project Pile Driving

Data in the following studies were reviewed for the various pile-driving activities summarized in Table 6. The values in Table 6 are for sound levels measured at 10 m (33 feet) from the piles for conditions similar to those that would occur at this project. Detailed information on the measurements that make up these levels below are provided in the references.

D · · ·			Sound	Pressure I	Level in	
Driving Mothod	Pile Type	Size	dB re 1	µPa at 10	Meters	Notes
Method			Peak	RMS	SEL	
Impact	Steel pipe pile on land	24-inch	195	178	166	Assumed 15 dB lower than levels in water using data from Naval Base Kitsap, Bangor, WA
Impact	Steel pipe pile in water	36-inch	211	194	181	Naval Base Kitsap at Bangor Test Pile Program, Bangor, WA
Impact	Steel pipe pile in water	48-inch	215	200	187	Anchorage Port Modernization Program – Test Pile Program (POA 2016)
Vibrate	Steel pipe pile on land	24-inch	185	146	146	Assumed 15 dB lower than levels in water using data from Naval Base Kitsap, Bangor, WA
Vibrate	Steel pipe pile in water	36-inch	200	166	166	Naval Base Kitsap at Bangor Test Pile Program, Bangor, WA
Vibrate	Steel pipe pile in water	48-inch	200	168	168	Anchorage Port Modernization Program – Test Pile Program (POA 2016)

TABLE 6Measured Levels for Pile-driving Activities

Table 7 shows the predicted sound levels expected at 10-m (33-foot) distances from different piledriving activities expected from the project. Included are the unattenuated sound levels (peak, RMS, SEL) expected, also at 10 m (33 feet) from the piles. Table 7 also shows expected attenuated levels that correspond to a 5-dB reduction because of different attenuation mechanisms like bubble curtains or isolation casing that may be used during the in-water pile-driving activities. These levels, which have been taken from past projects, provide an estimate of the levels to be expected from the piledriving activities proposed for the project. Impacts on fishes and marine mammals are then calculated using these levels (both unattenuated and attenuated). No methods are available to further attenuate land-based pile-driving sounds.

Driving		G •	Sound Pressure Level Measured in dB re 1 µPa at 10 Meters						
Method	Pile Type	Size	U	nattenua	ted		Attenuated ^a		
			Peak	RMS	SEL	Peak	RMS	SEL	
Impact	Steel pipe pile on land	24-inch	195	178	166		om piles driv be further att		
Impact	Steel pipe pile in water	36-inch	211	194	181	206	189	176	
Impact	Steel pipe pile in water	48-inch	215	200	187	210	195	182	
Vibrate	Steel pipe pile on land	24-inch	185	146	146		om piles driv be further att		
Vibrate	Steel pipe pile in water	36-inch	200	166	166		enuation expo vibrated pile		
Vibrate	Steel pipe pile in water	48-inch	200	168	168		enuation expo vibrated pile		

TABLE 7 Sound Levels Used for Predicting Underwater Sound Impacts

^a Attenuated condition assumes minimum 5-dB lower sounds.

Predicted Impacts on Fishes

Table 8 shows the anticipated distances (in meters and in feet) to the various adopted interim fish thresholds. Distances are shown for both unattenuated and attenuated piles (5-dB attenuation). Also, when the piles are installed with a vibratory hammer, the cumulative SEL thresholds for fish do not apply, and the 150-dB RMS level provides an estimated zone of possible acoustic effects. The distance to each threshold was computed using the transmission loss coefficient of 15 times the Log₁₀ of the distance, as recommended by NMFS when there is no site-specific information for the area. This attenuation rate was used in the computations; however, it should be noted that attenuation rates of 18 times the Log₁₀ of the distance were measured during pile driving for the San Francisco-Oakland Bay Bridge East Span project (Caltrans 2020)². Cumulative SEL was further computed by adding 10 times the Log₁₀ of the number of impact pile strikes. Impact strikes used in these computations are the sum of the anticipated strikes per pile times the number of piles per day.

Note that sound propagation in the Oakland Inner Harbor is limited by bends in the Oakland Estuary and relatively shallow water bathymetry near the shipping channel boundaries. Substantial sound is not anticipated to travel beyond 4,200 m to the west (out the shipping channel) and 1,700 m east of the project site (where the channel bends). Therefore, the distance for noise impacts from this project is limed to 4,200 m west and 1,700 m east under the worst-case conditions.

² Technical Guidance for Assessment of the Hydroacoustic Effects of Pile Driving on Fish, Chapter I.9 San Francisco-Oakland Bay Bridge East Span Replacement Project page I-229

Driving Method	Pile Type	Piles Estimated Size per Strikes Strikes		No. of Condition ^a		Distance to Adopted Fish Thresholds																					
Methou	турс		Day	per Pile		Peak	RMS	Cumula	tive SEL																		
						206 dB ^b	150 dB ^b	187 dB ^c	183 dB ^c																		
Impact	Steel pile on land	24-in	2	1,015°	Unattenuated	d	736 m [2,414 ft]	64 m [209 ft]	117 m [383 ft]																		
	Steel pile			Unattenuated	22 m [71 <i>ft</i>]	4,200/1,700 ^g m [13,780/5,577 ft]	1,166 m [3,825 ft]	1,166 m [3,825 ft]																			
Impact	in water	36-in	6	1,015 ^e	Attenuated	10 m [33 <i>ft</i>]	3,981/1,700 ^g m [13,061/5,577 ft]	541 m [1,775 ft]	541 m [1,775 ft]																		
Income	Steel pile	40	1	1.0158	Unattenuated	40 m [131 ft]	4,200/1,700 ^g m [13,780/5,577 ft] ^g	1,010 m [3,314 ft]	1,866 m [6,123 ft]																		
Impact	in water	48-in	48-in	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	48-1N	40-111	48-1N	48-1N	40-111	1 1,015	1 1,015	1 1,015	1	1,015	1,015	1 1,015	1,015°	Attenuated	18 m [61 ft]	4,200/1,700 ^g m [13,780/5,577 ft]	469 m [1,538 ft]	866 m [2,842 ft]
Vibrate	Steel pile on land	24-in	2	^f	Unattenuated	d	5 m [18 ft]	N/A	N/A																		
Vibrate	Steel pile in water	36-in	6	f	Unattenuated	d	117 m [383 ft]	N/A	N/A																		
Vibrate	Steel pile in water	48-in	1	f	Unattenuated	d	158 m [520 ft]	N/A	N/A																		

 TABLE 8
 Distance to Adopted Fish Thresholds for All Piles

^a Attenuated condition assumes 5-dB lower sounds.

^bdB re 1 μPa

° dB re 1 µPa²-sec

^d Within the near-field of the sound source - < 10 meters [33 feet]

^e Assuming impact hammer usage for 20-30 mins with about 1015 strikes per pile.

^f Piles vibrated in at 45 minutes each (2,700 sec.).

^gConstrained by bends in the Oakland Estuary and relatively shallow water bathymetry near the shipping channel, 4,200 m [13,780 ft] west and 1, 700 m [5,577 ft] east.

Predicted Impacts on Marine Mammals

The following threshold distances were computed to assess impacts on pinnipeds:

- Distance to onset PTS isopleth for each hearing group (considered Level A impacts)
 - o Unattenuated
 - o Attenuated
- Distance for unweighted 120-dB vibratory and 160-dB impulse behavior isopleth (considered Level B impacts)
 - o Unattenuated
 - o Attenuated

The Companion User Spreadsheet (Version 2.2 [2020]) to the *NMFS Technical Guidance for Assessing the Effects of Anthropogenic Noise on Marine Mammal Hearing* was used to predict zones where the onset of PTS to marine mammal hearing could occur. A spreading loss calculation is included in the spreadsheet to predict the distance to the onset PTS from accumulated SEL and peak sound pressure. The spreadsheet incorporates a frequency weighting function that accounts for sensitivity for different hearing groups when computing the accumulated SEL. These are

referred to as weighting frequency adjustments. The default weighting frequency adjustments are 2 kHz for impact pile driving and 2.5 kHz for vibratory driving. Because the onset of PTS based on SEL_{cum} is computed as further from the pile than it would be using peak sound pressure computations, the onset of PTS is based on SEL computations; therefore, the onset of PTS based on peak sound levels is not provided in this assessment.

The extent of the Level B Zone was calculated using the 10-meter (33-foot) sound levels and applying a transmission loss coefficient of 15 times the Log_{10} of the distance, as recommended by NMFS when there is no site-specific information for the area. Substantial sound is not expected to propagate outside the Middle Harbor because of the narrow propagation path westward combined with the higher sound attenuation rates that have been measured in the Bay (see Caltrans 2020)³.

Table 9 presents the anticipated distances to the adopted marine mammal thresholds (Level A and Level B Zones). When the piles are installed with a vibratory hammer, the cumulative SEL thresholds do not apply, and the peak PTS thresholds that apply to marine mammals will not be reached. Distances are shown for both unattenuated and attenuated pile-driving activities expected from the project, for the estimated number of strikes and piles per day proposed.

Attenuation Methods

Air bubble curtains, either confined or un-confined, have been shown to reduce sound pressure levels for pile driving in water by up to about 5 to 20 dB within 300 meters of the pile. However, in accordance with Caltrans guidance, only a 5-dB reduction was used for calculating the distances to the fish and marine mammal thresholds (Caltrans 2020). The amount of attenuation may be more, especially at distant locations from the pile because of the contribution of sound propagating through the bottom substrate. At the Benicia-Martinez Bridge and San Francisco-Oakland Bay Bridge projects (Caltrans 2020), more than 10 dB of sound reduction was obtained using bubble curtains. At the Humboldt Bay Seismic Retrofit Project, reductions of between 12 and 16 dB were achieved using either an unconfined bubble ring or a bubble ring in an isolation casing, with the best results being the unconfined bubble ring (Caltrans 2020).

The design of the specific bubble ring configuration will depend on several factors, such as the depth of water and the water current, and must be designed individually for each project and location within the project. Air bubble curtain systems are used during production pile driving to reduce underwater sound pressures. Typically, a system consists of stacked rings to generate air bubbles throughout the entire water column surrounding the piles, even with currents. A bubble curtain system is generally composed of air compressors, supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipes, and a frame. The frame is used to facilitate transportation and placement of the system, keep the aeration pipes stable, and provide ballast to counteract the buoyancy of the aeration pipes during pile-driving operations. Bubble curtain designs consist of single or multiple concentric layers of perforated aeration pipes (stacked vertically). Pipes in any layer are arranged in a geometric pattern that allows the pile-driving operation to be completely enclosed by bubbles for the full depth of the water column. The lowest layer of perforated aeration pipe is designed to ensure contact with the mud line without sinking

³ Technical Guidance for Assessment of the Hydroacoustic Effects of Pile Driving on Fish, Chapter I.9 San Francisco-Oakland Bay Bridge East Span Replacement Project page I-229

into the bottom substrates. A proper combination of bubble density and closeness of bubbles to the pile is most effective. Numerous smaller bubbles are more effective because they displace more water between the bubbles. This pattern has to be maintained throughout the water column.

	The driving fred they better it and b zones																	
Driving Method	Pile Type	Size	Piles per Day	Estimated No. of Strikes per	Condition ^a	Level A Inj Using S Thres	EL _{cum} hold	Level B Harassment Zone										
			Day	Pile	-		peds	Lone										
						Phocid	Otariid											
Impact	Steel pipe pile on land	24- inch	2	1,015°	Unattenuated	63 m [207 ft]	b	158 m [518 ft]										
Impact nine nile	36-				6	1,015 ^e	Unattenuated	1,311 m [4,301 ft]	96 m [314 ft]	1,848/1,700 ^d m [6,061/5,577 ft]								
Impuer	in water	inch	0	1,015	Attenuated	609 m [1,998 ft]	44 m [144 ft]	858 m [2,815 ft]										
Impact	Steel	ipe pile 48-	1	1.015 ^e	Unattenuated	997 m [3,271 ft]	73 m [239 ft]	4,200/1,700 ^d m [13,780/5,577 ft]										
Impact	in water		inch	inch	inch	inch	inch	inch		1,010	,				1,015	Attenuated	463 m [1,519 ft]	34 m [111 ft]
Vibrate	Steel pipe pile on land	24- inch	2	^c	Unattenuated	b	b	541 m [1,775 ft]										
Vibrate	Steel pipe pile in water	36- inch	6	c	Unattenuated	24 m [78 ft]	b	4,200/1,700 ^d m [13,780/5,577 ft]										
Vibrate	Steel pipe pile in water	48- inch	1	¢	Unattenuated	10 m [33 ft]	b	4,200/1,700 ^d m [13,780/5,577 ft]										

TABLE 9Distance to the Adopted Marine Mammal Thresholds for Different
Pile-driving Activities – Level A and B Zones

^a Attenuated condition assumes 5-dB lower sounds.

 $^{\rm b}$ Within the near-field of the sound source - < 10 meters [33 feet]

^c Piles vibrated in at 45 minutes each.

^d Constrained by bends in the Oakland Estuary and relatively shallow water bathymetry near the shipping channel, 4,200 m [13,780 ft] west and 1, 700 m [5,577 ft] east.

Illustration of Impacts

Attachment A includes Google Earth maps displaying the extent of both fish injury zones and marine mammal Level A and B Zones around the proposed project site for the piles driven.

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U.S. Department of the Navy (Navy). 2012. *Acoustic Monitoring Report Test Pile Program*. Prepared for Naval Base Kitsap at Bangor, WA. Prepared by Illingworth & Rodkin, Inc. April 27.

Attachment A

Maps Illustrating the 187-dB Cumulative SELs, 206dB Peak Adopted Fish Injury Zones and Marine Mammal Level A and B Zones (Source: Google Earth 2022)



Figure A1 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 24-inch Steel pile on Land impact driven



Figure A2 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 36-inch Steel pile impact driven



Figure A3 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 48-inch monopile impact driven



Figure A4 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 24-inch Steel pile on Land driven using a vibratory hammer



Figure A5 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 36-inch Steel pile driven using a vibratory hammer



Figure A6– Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 48-inch monopile driven using a vibratory hammer



Figure A7 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 24-inch Steel pile on Land impact driven



Figure A8 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 36-inch Steel pile impact driven



Figure A9 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 48-inch monopile impact driven



Figure A10 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 24-inch Steel pile on Land driven using a vibratory hammer



Figure A11 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 36-inch Steel pile driven using a vibratory hammer



Figure A12 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 48-inch monopile driven using a vibratory hammer

Appendix D

WETA Alameda Main Street Ferry Refurbishment Project Preliminary Geotechnical Report



WETA ALAMEDA MAIN STREET FERRY REFURBISHMENT PROJECT ALAMEDA, CALIFORNIA

PRELIMINARY GEOTECHNICAL REPORT

SUBMITTED TO

Mr. James Connolly COWI North America, Inc. 555 12th Street, Suite 1700 Oakland, CA 94607

> PREPARED BY ENGEO Incorporated

January 14, 2022 Revised January 19, 2022

PROJECT NO. 19542.000.001



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GEOTECHNICAL ENVIRONMENTAL WATER RESOURCES CONSTRUCTION SERVICES COASTAL/MARINE GEOTECHNICS

> Project No. 19542.000.001

January 14, 2022 Revised January 19, 2022

Mr. James Connolly COWI North America, Inc. 555 12th Street, Suite 1700 Oakland, CA 94607

Subject: WETA Alameda Main Street Ferry Refurbishment Project Alameda, California

PRELIMINARY GEOTECHNICAL REPORT

Dear Mr. Connolly:

We are pleased to present this preliminary geotechnical report for the proposed Water Emergency Transportation Authority (WETA) Alameda Main Street Ferry Refurbishment project located in Alameda, California. This report presents our preliminary geotechnical observations and findings, as well as our conclusions and recommendations for the project. We understand that a design-build contractor will be selected for the future phases of this project and that this preliminary report will serve as a basis-of-design document.

We performed analyses for preliminary design of the new foundation elements in collaboration with you and published several letters presenting our findings. As the design evolved, we updated our analyses to reflect the changes. We incorporated the most recent iteration of all of our analyses in this report to provide a single document for reference in preliminary design. These include the results summarized in the following correspondence.

- 1. Preliminary Piling Recommendations, letter dated November 8, 2021, and revised November 15, 2021.
- 2. Preliminary Kinematic Loading on Piles, letter dated November 23, 2021.
- 3. Lateral Pile Analysis for Float Piles and Donut Piles, letter dated December 13, 2021.
- 4. Lateral Pile Analysis and Revised p-y Springs for Shore-side Piles, electronic-mail delivered December 13, 2021.
- 5. Lateral Pile Analysis and Revised p-y Springs for Monopile, electronic-mail delivered December 15, 2021.

Based on the results of our exploration, the planned improvements at the site are feasible from a geotechnical standpoint. Recommendations presented in this report should be implemented through the project design and construction.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated PROFESSION Teresa Klotzback, PE (Her SONG No. 3153 James Yang, GE tk/jsy/jaf/cjn ECHN CAL

Jeff Fippin,

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- APPENDIX F Vertical Pile Capacity Analysis
- **APPENDIX G** Lateral Pile Analysis: Soil Springs
- APPENDIX H Lateral Pile Analysis: Response



1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

We prepared this preliminary geotechnical report for design of the WETA Alameda Main Street Ferry Refurbishment project located in Alameda, California. The purpose of this report is to provide an assessment of geotechnical conditions associated with the proposed development, provide subsurface data for design builder teams, and to provide preliminary recommendations for design. Our services included the following tasks.

- Review of available literature and geologic maps.
- Review of historic geotechnical reports in our files.
- Review of historic aerial photographs.
- Review of geotechnical exploration data provided to us.
- Performance of a subsurface field exploration and laboratory testing program.
- Interpretation of subsurface field exploration data.
- Analysis of geotechnical data and evaluation of potential geotechnical concerns.
- Preparation of recommendations and this report.

For our use, we received the following documents:

- 1. H.V. Anderson Engineers and DCC Engineering Co., Inc.; As-built Plans and Calculations, Alameda Gateway Ferry Terminal; 1991.
- 2. W.B. Clausen Structural Engineer; Alameda Ferry, Bridge Repair, Construction Plans; 2007.
- 3. eTrac; Hydrographic and Topographic Survey, Alameda Main Street Ferry Terminal Refurbishment; electronic transmittal dated October 26, 2021.
- 4. COWI North America, Inc.; Permit Drawings, Alameda Main Street Ferry Terminal Refurbishment Project; December 20, 2021.

In addition, we reviewed the following documents from surrounding projects from our database of subsurface investigations:

- 1. Dames & Moore; Foundation Investigations, Proposed Expansion of Ship Repair Facilities; 1944.
- 2. Peter Kaldveer and Associates, Inc.; Soil Investigation, Alameda Naval Air Station Housing; 1981.
- 3. Subsurface Consultants, Inc; Geotechnical Investigation, Oakland Harbor Navigation Improvement (-50 Foot) Project, Port of Oakland; 1999.
- 4. ENGEO; Preliminary Geotechnical Exploration, Alameda Point Development; 2003.
- Moffatt & Nichol Engineers; Widening of Inner Harbor Turning Basin, Port of Oakland, Phase 1B – Bulkhead, Dredging, and Partial Demolition of Piers 2 & 5, Alameda County, California; July 1, 2004.



We prepared this report for the exclusive use of our client and project consultants for the design of this project. If any changes are made in the character, design, or layout of the development, we must be contacted to review the conclusions and recommendations contained in this report to evaluate whether modifications are recommended. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROPOSED DEVELOPMENT

As shown in the permit drawings dated December 20, 2021, the ferry terminal refurbishment will consist of construction of replacement bridge, gangway, and float structures. New piles will be constructed to support the new structures. Exhibit 1.2-1, below, shows the planned new structures and associated pile foundations.



EXHIBIT 1.2-1: Proposed Improvements

1.3 ELEVATION DATUM

The elevation datum used for this project is the Mean Lower Low Water (MLLW). Elevations shown in this report are project datum unless noted otherwise.



2.0 FINDINGS

2.1 SITE HISTORY

We reviewed historical aerial photographs and topographic maps available through <u>www.historicaerials.com</u>, University of California Santa Barbara's (UCSB's) online aerial photograph frame finder tool, Google Earth imagery, and the documents provided to us, as listed in Section 1.1. The following summarizes the site history based on review of historical site documents.

TABLE 2.1-1: Summary of Site History based on Review of Historical Aerials and Topographical Maps

<u> 1850s – 1930s</u>

The location of the existing ferry terminal is outside the limits of the earliest topographic map of Alameda Island and the surrounding tidal marsh. In the 1910s through 1930s, Alameda Island underwent significant dredging and filling operations to straighten and extend the shoreline to near its current condition. Specifically, the project site underwent significant filling operations between 1911 and 1918.

1857 Topographic Map

Historic Fill Map, 1911 - Present*



* Lime Green with Red Hatch = original limits of tidal marsh, Gray = filled land circa 1911, Red Hatch = filled land 1911-1918, Tan = filled land 1918-1930



<u> 1940s – 1970s</u>

By 1946, a timber wharf structure was constructed at the location of the project site. By 1965, a large warehouse structure was constructed adjacent to the project site. Additional filling and extension of the shoreline since the timber wharf was constructed can be seen in aerial photographs from 1958 and 1965.

1965 Historic Aerial

1947 Historic Aerial



<u> 1980s – 1990s</u>

By 1980, the previous timber wharf structure was demolished with a new pier constructed in its place. By 1988, the shore-side warehouse structure was demolished. By 1993, the current shore-side ferry building, parking lot, and gangway were constructed along the existing pier. A new dock was also constructed by this time.

1980 Historic Aerial

1993 Historic Aerial




2000s - Present

The walkway and dock structure underwent changes within this timeframe. Repairs on the gangway were performed sometime after issuance of repair plans in 2007.

2002 Historic Aerial

2021 Aerial



2.2 REGIONAL GEOLOGIC SETTING

The site is located within the California Coast Ranges, which are a series of northwesterly trending uplifted ranges and intervening valleys. The Coast Ranges were formed by Miocene to Quaternary tectonic activity within the San Andreas Fault zone at the boundary between the North American and Pacific Plates.

According to geologic mapping by Witter (2006), the site is underlain by artificial fill deposits over bay mud (afbm). Regional geologic mapping by Graymer (2000) describes the site as underlain by artificial fill deposits, as depicted on Figure 3. In general, the stratigraphy of the site vicinity, from youngest to oldest, consists of, (1) artificial fill, a heterogeneous surficial layer of fill material composed of sand, gravel, and clay, (2) Young Bay Mud deposits, a highly compressible fat to lean silty clay, (3) San Antonio Formation, a fine clean to silty sand, and (4) Old Bay Clay, a moderate to very dense silt or clay with interbedded sand deposits.

2.3 PREVIOUS GEOTECHNICAL INVESTIGATIONS

The following historical explorations were performed within the immediate vicinity of the project site:

- In 1943 and 1944, Dames & Moore drilled nine borings on the project site, shore-side and offshore, to depths of up to approximately 150 feet. The quality of the scanned report is poor; however, we were able to use one of the boring logs to aid in our review.
- A previous on-site exploration completed by Cooper-Clark in 1967 is graphically depicted in the calculation set by H.V. Anderson from 1991. The exploration included a boring drilled approximately 65 feet below mudline, close to the location of the future monopile.



In addition to the explorations described above, the following geotechnical studies were performed in the vicinity of the project site:

- In 1981, Peter Kaldveer and Associates drilled one boring immediately south of Main Street to a depth of 100 feet as part of the geotechnical investigation Alameda Naval Air Station Housing.
- In 1997, Subsurface Consultants, Inc. drilled one boring across the channel to a depth of at least 45 feet. The geologic unit thicknesses are described in Table 1 of the geotechnical report for Port of Oakland.
- Our preliminary geotechnical report for Alameda Point, dated 2003, provides geotechnical information for the greater Alameda Island, including the project site. The report provides estimated contours of elevation of base of Young Bay Mud, geologic cross sections, and a map of historic fill operations.
- Immediately east of the project site is the Turning Basin for the Port of Oakland. In the plans for widening of the Turning Basin by the Moffatt & Nicholl Engineers, dated 2004, a number of shore-side and offshore borings are graphically depicted to depths of up to approximately 100 feet.

We provide the previous exploration data used in formulating these preliminary conclusions and recommendations in Appendix B and the approximate locations of the borings are shown on Figure 2.

2.4 FIELD EXPLORATION

We performed a limited subsurface exploration program comprising two cone penetration tests (CPTs). The locations of the CPTs, 1-sCPT01 and 1-sCPT02, are shown in Figure 2. We performed our field exploration on October 28, 2021. We approximated the locations of our explorations located by estimating from site features and by GPS. We estimated existing ground-surface elevations at the exploration locations using the hydrographic and topographic survey prepared by eTrac (electronic transmittal dated October 26, 2021). The locations and elevations of our explorations should be considered accurate only to the degree implied by the methods used. We permitted and backfilled our explorations in accordance with Alameda County Public Works Agency requirements. As required, we also prepared a Work Plan for our geotechnical exploration that was reviewed and approved by City of Alameda for encroachment.

1-sCPT01 experienced shallow refusal after multiple attempts, and the CPT crew terminated 1-sCPT02 at an approximate depth of 115 feet below the existing ground surface. The CPT had a 20-ton compression-type cone with a 10-square-centimeter (cm²) base area, an apex angle of 60-degrees, and a friction sleeve with a surface area of 225 cm². The cone, connected with a series of rods, was pushed into the ground at a constant rate. Cone readings were collected at approximately 5-centimeter (cm) intervals with a penetration rate of 2 cm per second in accordance with ASTM D5778. Measurements include the tip resistance to penetration of the cone (Qc), the resistance of the surface sleeve (Fs), and undrained pore pressure (U) (Robertson and Campanella, 1988). We measured the shear-wave velocity (V_s) at 1-sCPT02 to aid in the site response analysis. CPT logs, shear-wave velocity data, and pore pressure dissipation test results are presented in Appendix A. We graphically depict the subsurface conditions encountered at the time of the exploration in the geologic cross section (Figure 8).



2.5 SUBSURFACE CONDITIONS

Based on review of the available geotechnical exploration data and our understanding of the site history, the site can be divided into two generalized subsurface profiles – shore-side and offshore. As described in Section 2.1, numerous dredging and filling activities occurred throughout the history of the site, with material likely dredged from San Francisco Bay then placed as fill material on the existing marshland. Due to loading from fill placement shore-side, the underlying soil behaves differently from the same geologic unit offshore.

In general, the deposits encountered at the project site include, from youngest to oldest, (1) artificial fill, (2) Young Bay Mud deposits, and (3) San Antonio Formation. Offshore, artificial fill was not encountered in the explorations we reviewed. We provide additional generalized description of the deposits noted above, in the following sections. We provide an idealized geologic cross section through the project site in Figure 8.

ARTIFICIAL FILL

As a consequence of the land reclamation and prior construction activities at the project site, a heterogeneous surficial layer of fill material exists shore-side. The fill material comprises a mixture of sand, gravel, and clayey materials, much of which was likely dredged from San Francisco Bay and placed on an existing marshland.

At the project site, we estimate the artificial fill to vary between 10 and 20 feet in thickness. The fill consistency is generally loose to medium dense.

YOUNG BAY MUD

The explorations encountered Young Bay Mud (YBM) directly underneath the artificial fill. The YBM encountered consists of greenish gray to blue gray soft, plastic clay and silt as well as clayey and silty sand. YBM is highly compressible and typically very soft with strength increasing with depth.

The YBM shore-side differs from the YBM offshore. Due to the placement of fill many years ago, the YBM shore-side is stiffer and has already experienced some amount of compression. The YBM offshore is typically softer, with strength increasing more slowly with depth as compared to the YBM shore-side. At the project site, we estimate the YBM to be approximately 70 feet in thickness.

SAN ANTONIO FORMATION

The San Antonio formation is composed of alluvium deposited in environments ranging from alluvial fans and flood plains to lakes and beaches, and is sometimes interbedded with YBM or Old Bay Clay. This unit is generally moderately dense to very dense sand and stiff to hard silt and clay. At the project site, we do not have explorations that penetrate beyond the San Antonio Formation.

2.6 **GROUNDWATER CONDITIONS**

During our exploration, we performed pore-pressure dissipation testing in our CPT explorations. At 1-sCPT1, the pore-pressure dissipation testing indicated groundwater approximately 6½ feet



below ground surface (bgs). We did not achieve equilibrium at 1-sCPT2 to estimate depth to groundwater.

The Seismic Hazard Zone Report for Oakland West (CGS, 2003) indicates a historic high groundwater at a depth of 5 feet or less. For the purpose of our analyses, we used a design groundwater Elevation of 5 feet (MLLW), which corresponds to a depth of 5 feet below the average shore-side elevation surrounding the ferry terminal.

2.7 SEISMICITY

Numerous small earthquakes occur every year in the San Francisco Bay Region, and larger earthquakes have been recorded and can be expected to occur in the future. The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site. An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 11,700 years) (Bryant and Hart, 2007).

Figure 5 shows the approximate locations of these faults and significant historic earthquakes recorded within the San Francisco Bay Region. The nearest active faults are the Hayward and San Andreas faults. We list other active faults in proximity to the site in Table 2.7-1.

FAULT NAME	MAXIMUM MOMENT MAGNITUDE (Mw)	CLOSEST DISTANCE FROM SITE (miles)	FAULT MECHANISM
Hayward (No) [0]	7.2	5.4	Strike Slip
San Andreas (Peninsula) [11]	7.9	13.7	Strike Slip
Hayward (So) [7]	6.8	6.9	Strike Slip
Hayward (No) [1]	7.0	5.4	Strike Slip
Hayward (No) [2]	6.9	6.1	Strike Slip
Calaveras (No) [0]	7.2	14.0	Strike Slip
San Gregorio (No) [4]	7.8	17.3	Strike Slip

TABLE 2.7-1: Closest Active Faults Capable of Producing Significant Ground Shaking at the Site

The Uniform California Earthquake Rupture Forecast (UCERF 3) (Field et al, 2015) estimates the 30-year probability for a magnitude 6.7 or greater earthquake in the San Francisco region at approximately 72 percent, considering the known active seismic sources in the region.

3.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

3.1 SEISMIC DESIGN CRITERIA

Based on our discussions with you, we followed the guidelines presented in ASCE 61: Seismic Design of Piers and Wharves as they relate to seismic design criteria. ASCE 61 recommends the following seismic design scenarios be considered in evaluation of seismic hazard and performance:

TABLE 3.1-1:	ASCE 61	Seismic Design Scenarios	
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SCENARIO	GROUND MOTION PROBABILITY OF EXCEEDANCE OR SEISMIC HAZARD LEVEL
Operating Level Earthquake (OLE)	50 Percent in 50 years (72-year return period)



SCENARIO	GROUND MOTION PROBABILITY OF EXCEEDANCE OR SEISMIC HAZARD LEVEL
Contingency Level Earthquake (CLE)	10 Percent in 50 years (475-year return period)
Design Earthquake (DE)	Design earthquake per ASCE 7

3.1.1 Site Class Determination

As described in Section 2.5, the site can be divided into two generalized subsurface profiles – shoreside and offshore. The shore-side subsurface profile consists of loose to medium dense sandy artificial fill, soft YBM, and dense sandy or stiff clayey San Antonio Formation. The offshore subsurface profile consists of softer (relative to shore-side) YBM overlying San Antonio Formation.

As described in Section 2.4, we performed two cone penetration tests (CPTs), 1-sCPT01 and 1-sCPT02. Of the two CPTs, the CPT contractor pushed 1-sCPT02 to a depth of 115 feet below the ground surface (bgs) and measured shear-wave velocity. We estimated a V_{S30} (shear wave velocity averaged over the top 30 meters [100 feet]) value of 419 feet per second (200 meters per second) based on the V_S profile measured at 1-sCPT02, as shown in Exhibit 3.1.1-1.





Based on the measured V_{S30} , we classified the site as borderline Site Class E. However, due to presence of the loose sandy material below the estimated groundwater table (about 5 feet below ground surface), the site is characterized as potentially liquefiable and is classified as a Site Class F.



3.1.2 Site Response Analysis

For a Site Class F condition, ASCE 61 requires that a site-specific ground response analysis be performed to develop the DE, OLE, and CLE ground motion parameters, and references the site response analysis procedures outlined in the ASCE document titled "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," (ASCE/SEI 7-16).

We performed a site-specific ground response analysis and attached the report containing the results of our analysis in Appendix C.

3.2 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, ground lurching, liquefaction, lateral spreading, and tsunami. The following sections present a discussion of these hazards as they apply to the site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, landslides, flooding or seiches is considered low to negligible at the site.

3.2.1 Ground Rupture

Since there are no known active faults crossing the property and the site is not located within an Earthquake Fault Special Study Zone, ground rupture is unlikely at the subject property.

3.2.2 Ground Shaking

Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the actual forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

3.2.3 Liquefaction

Soil liquefaction is a temporary loss of strength due to increased pore pressure that develops during cyclic loading, such as imposed by earthquakes. The soil considered most susceptible to liquefaction is clean, loose, saturated, uniformly graded, fine-grained sand; however research indicates that low-plasticity silt and clay is also potentially liquefiable (or subject to cyclic softening). The California Geological Survey mapped the site within an area susceptible to earthquake-induced liquefaction (Figure 6).

To evaluate the liquefaction potential of the site soil, we performed liquefaction analysis on 1-sCPT02. We assigned peak ground accelerations (PGA) associated with the OLE, CLE, and MCE_R scenarios. The PGAs used are based on the results of our site response analysis, as provided in the report in Appendix C. We performed our analyses using a moment magnitude of



7.2 associated with the Hayward fault. We used a design groundwater level of 5 feet in our analysis, as described in Section 2.6. We evaluated liquefaction potential at the site using the computer program, Cliq.

We performed our liquefaction analyses using the methods developed by Idriss and Boulanger (2008) and Robertson (2009). We evaluated the potential liquefaction-induced ground settlements and summarize these for each method and provide the complete analysis results in Appendix D.

SEISMIC DESIGN SCENARIO	PGA (g)	IDRISS & BOULANGER (2008)	ROBERTSON (2009)
OLE	0.252	3⁄4	0.4
CLE	0.297	1	1/2
MCER	0.546	1¼	1

TABLE 3.2.3-1: Total Liquefaction-Induced Ground Settlement Based on 1-sCPT02 (inches)

The analysis results indicate that potential liquefaction-induced ground settlement up to approximately 1 inch may occur during the CLE event. As described in Section 2.5, the soil profile shore-side consists of artificial fill over YBM. Based on our analysis, the potentially liquefiable soil deposits are within the artificial fill between 5 and 20 feet below ground surface. Due to the heterogeneity of the artificial fill with alternating layers of clay and silty sand the entire layer does not appear to be liquefiable; rather, our analysis of liquefaction of the artificial fill results in a factor of safety less than 1.0 specifically for the sandy layers within the fill.

3.2.3.1 Liquefaction-Induced Surface Rupture

We evaluated the capping effect of overlying non-liquefiable soil using the methods provided by Ishihara (1985) and Youd and Garris (1995). For liquefaction-induced ground failure to occur, the pore water pressure generated within the liquefied strata must exert a force sufficient to break through the overlying soil and vent to the surface resulting in sand boils or fissures.

Based on the results of our analysis, the liquefiable sandy layers within the fill are cumulatively less than 3 feet in thickness, with a non-liquefiable cap of 5 feet. Based on our analysis, this non-liquefiable soil thickness should be sufficient to result in the risk of sand boils forming to be low.

3.2.3.2 Lateral Spreading

Lateral spreading is a flow failure within a nearly horizontal soil zone (possibly due to liquefaction in sand layers) that causes the overlying soil mass to move toward a free face or down a gentle slope. We distinguish this phenomenon from seismic slope stability, which is a failure of soft soil due to seismic loading. Generally, the effects of lateral spreading are most significant at the free face or the crest of a slope and diminish with distance from the slope. The topographic and hydrographic survey performed by eTrac indicates an approximately 60-foot, $3\frac{1}{2}$:1 (horizontal:vertical) slope from the top of slope to the bottom of the channel.

Due to the heterogeneity of the fill and the nominal thicknesses of liquefiable layers within the fill, we opine that the risk of lateral spreading is low; however, our slope stability analysis shows that



the slope is subject to seismic-induced slope deformations that are not tied to lateral spreading. We discuss our findings related to slope stability in Section 3.3.

3.2.4 Tsunamis

The project site is mapped within a tsunami hazard zone on the California Geologic Survey 2021 tsunami hazard map for the County of Alameda, indicating that it is within inundation limits corresponding to a 975-year average return period tsunami event. We show the limits of potential inundation on Figure 7.

3.3 SLOPE STABILITY

We developed an idealized geologic cross-section (section A-A'), shown in Figure 8, based on existing and historical data, for use in our slope stability analyses. We performed two-dimensional limit-equilibrium slope stability analyses of the existing slope based on cross-section A-A'. We used the computer slope stability software Slide2 Version 9.019 (Rocscience, 2021), and analyzed stability of the slope using Spencer's method of slices (Spencer, 1967) with circular failure surfaces. We performed slope stability analyses under the following conditions:

- Static loading
- Post-liquefaction flow
- Calculation of yield acceleration to estimate seismically induced lateral displacement

In evaluating the potential lateral movement of the slope under seismic conditions, we used the methodology presented in the report, "Seismic Analysis and Design of Retaining Walls, Buried Structures, Slopes, and Embankments; Report 611," published by the National Cooperative Highway Research Program (Anderson et al., 2009). The methodology requires calculation of a yield acceleration, k_y , which is the horizontal acceleration (in terms of the gravitational constant, *g*) at which the slope will initiate failure during a seismic event, corresponding to a factor of safety of 1.

3.3.1 Estimation of Soil Properties

For the purposes of slope stability evaluation, we estimated strength parameters for the site soil from previous laboratory data and correlations with the CPT logs from our current investigation.

Under seismic conditions, we modeled soil identified as not likely to liquefy using Mohr-Coulomb or undrained strength soil parameters. We modeled liquefiable fill with residual shear strengths that we estimated using the recent CPT data and the correlation presented in the report "Soil Liquefaction during Earthquakes" published by Idriss and Boulanger (2008).

We summarize the soil parameters used in our analysis in the table below.

MATERIAL	STRENGTH TYPE	STRENGTH PROPERTIES	
Fill	Mohr-Coulomb	Friction angle, φ = 32 degrees (°)	
Liquefied fill – Seismic Condition only	Undrained (residual)	Undrained strength, $S_u = 200$ pounds per square foot (psf)	

TABLE 3.3.1-1: SUBSURFACE MODEL SOIL PROPERTIES



MATERIAL	STRENGTH TYPE	STRENGTH PROPERTIES
YBM – Shore-side	Undrained	$S_u = 550$ psf at the top of YBM layer, increasing at a rate of 16 psf per foot depth; this assumed behavior mimics the effects of consolidation from existing fill.
YBM – Offshore	Undrained	$S_u = 100 \text{ psf}$ at the elevation corresponding to top of shore- side YBM layer, increasing at a rate of 13 psf per foot depth; this assumed behavior mimics the effects of normally consolidated soil and historic dredging to form the shoreline slope.
San Antonio Formation	Mohr-Coulomb	φ = 35°

3.3.2 Results of Slope Stability Analyses

Appendix E graphically shows the results of our static, post-liquefaction flow stability analyses, and yield acceleration calculations. The results are summarized in the table below.

TABLE 3.3.2-1: Summary of Slope Stability Analyses

CROSS SECTION	MIN STATIC FS	PSEUDO-STATIC Ky ANALYSIS	MIN POST- LIQUEFACTION FS
A-A'	2.3	See Section 3.3.3	1.5

The results of the static analysis indicate the slope is acceptably stable under static loading. The results of the post-liquefaction analyses indicate that the risk of flow failure of the potentially liquefiable soil is low.

3.3.3 Seismically-Induced Slope Displacements

As described in Section 3.3, we evaluated the potential lateral movement of the slope under seismic conditions by calculating a yield acceleration resulting in an overall slope stability factor of safety equal to 1. We calculated a yield acceleration of 0.17g, as shown in Appendix E. This yield acceleration corresponds to slip surfaces that extend from the surface to near the base of the YBM layer. We also analyzed for potential displacement along a failure surface through the liquefied fill. Our results indicate that localized, shallow failure resulting in relatively large soil displacement may occur; however, as shown in our results in Appendix E, the failure surfaces do not encroach within the location of the future monopile and shore-side piles and this potential displacement should not adversely impact operations of the facility due to the shallow nature. Some shoreline and revetment repair may be required after a large earthquake at the site if liquefaction is triggered and shallow slope movement occurs.

We estimated displacement using Anderson et al., 2009 and the earthquake response spectra presented in Section 3.1.2. We provide estimated soil displacement at each pile location for the DE, OLE, and CLE event in Table 3.3.3-1. Assuming a normal distribution for the method used to calculate displacement, the variation could be as large as half to two times the estimated displacements provided in Table 3.3.3-1.



TABLE 3.3.3-1: ESTIMATED MAXIMUM SOIL DISPLACEMENTS

EVENT	MAXIMUM SOIL DISPLACEMENT (INCHES)		
EVENI	Monopile	Shore-side piles	
DE	4	4	
OLE	1/2	1/2	
CLE	3	3	

We provide the results of our slope stability and soil displacement analysis in Appendix E. To model the effect of the lateral soil movement acting against the pile as a displacement field, we recommend assuming that the soil displacement is equal to zero at the base of the slip surface (as shown in red in the analysis output) and linearly increases to the full value of displacement at the ground surface.

3.4 **NEW PILE DESIGN**

Based on our discussions with you, we understand that the ferry terminal refurbishment will include construction of the following piles:

- Offshore monopile will consist of a 48-inch-diameter pipe pile with 1-inch wall thickness.
- Offshore float piles will consist of 36-inch-diameter pipe piles with 1¹/₄-inch wall thickness.
- Offshore donut piles will consist of 36-inch-diameter pipe piles with 1-inch wall thickness.
- Shore-side piles will consist of 24-inch-diameter pipe piles with 5/8-inch wall thickness.

3.4.1 Vertical Capacities

As requested by you, we calculated allowable vertical capacities for the monopile and shore-side piles.

We provide allowable vertical capacities in the table below, along with the minimum depth of embedment below mudline or surface grade to achieve the allowable capacity. Due to liquefaction during the OLE, CLE, and DE scenarios, our calculations neglect capacity in the liquefiable artificial fill shore-side. We also provide the downdrag load caused by settlement of the liquefiable artificial fill. Vertical pile capacity charts showing vertical capacity versus foundation depth are presented in Appendix F.

TABLE 3.4.1-1: Deep Foundations

PILE	PILE TYPE	ALLOWABLE CAPACITY (KIPS)	DEPTH OF EMBEDMENT INTO SOIL TO ACHIEVE ALLOWABLE CAPACITY (FT)	DOWNDRAG LOAD (KIPS)
Monopile	48-inch pipe pile	650	110	N/A
Shore-side piles	24-inch pipe pile	500	110	40

3.4.2 Lateral Capacities

We used the software LPILE v2015 to estimate the lateral capacity and pile response for the piles described in Section 3.4.



3.4.2.1 Soil Properties Used in Analysis

For each pile location, we used the following parameters to model the soil resistance to lateral loading. For the YBM, referenced in the tables below as the Soft Clay (Matlock) model, we estimated the cohesion using the strength increase for offshore and shore-side conditions as described in Section 3.3.1.

TABLE 3.4.2.1-1: Soil Parameters - Monopile

SOIL TYPE	THICKNESS (feet)	UNIT WEIGHT (pcf)	COHESION (psf)	FRICTION ANGLE (deg)
N/A – pile above mudline	33			
Soft Clay (Matlock)	62	33	367 to 1173	
API Sand (O'Neill)	100	63		35

TABLE 3.4.2.1-2: Soil Parameters – Float Piles and Donut Piles

SOIL TYPE	THICKNESS (feet)	UNIT WEIGHT (pcf)	COHESION (psf)	FRICTION ANGLE (deg)
N/A – pile above mudline	Float piles: 40 Donut piles: 46			
Soft Clay (Matlock)	45	33	370 to 840	
API Sand (O'Neill)	100	63		35

TABLE 3.4.2.1-3: Soil Parameters – Shore-side Piles

SOIL TYPE	THICKNESS (feet)	UNIT WEIGHT (pcf)	COHESION (psf)	FRICTION ANGLE (deg)
API Sand	11	120		32
Liquefied Sand	4	58		
Soft Clay (Matlock)	76	33	550 to 1766	
API Sand (O'Neill)	100	63		35

3.4.2.2 Soil Springs

We prepared p-y springs for the monopile and for the shore-side piles. We prepared the p-y springs assuming a top of pile elevation of approximately 13 feet for the monopile and the shore-side piles. We provide a summary of the p-y springs as Appendix G.

3.4.2.3 Lateral Pile Response

We evaluated the pile deflection, moment, and shear responses for the conditions presented in Table 3.4.2.3-1, as requested by you. We present the deflection, moment, and shear diagrams in Appendix H.

TABLE 3.4.2.3-1: Lateral Pile Conditions Analyzed
--

PILE	LOADING SCENARIO
Monopile	Lateral soil movement acting against the pile based on the results of our slope stability and soil displacement analysis described in Section 3.3.3. We modeled the soil displacement under the scenario resulting in greatest lateral displacement – the DE scenario. We modeled the lateral displacement as 4 inches at the



PILE	LOADING SCENARIO
	mudline decreasing to zero at the base of the slip surface, 52 feet below the mudline.
	We were not provided with inertial loading of the monopile at the time of this writing. We can provide deflection, moment, and shear diagrams under inertial loading in a supplemental letter, if requested. Additionally, we can provide recommended combination factors to analyze the inertial and kinematic demands concurrently.
Shore-side piles	Lateral soil movement acting against the pile based on the results of our slope stability and soil displacement analysis described in Section 3.3.3. We modeled the soil displacement under the scenario resulting in greatest lateral displacement – the DE scenario. We modeled the lateral displacement as 4 inches at surface grade decreasing to zero at the base of the slip surface, 47 feet below surface grade.
	We were not provided with inertial loading of the shore-side piles at the time of this writing. We can provide deflection, moment, and shear diagrams under inertial loading in a supplemental letter, if requested. Additionally, we can provide recommended combination factors to analyze the inertial and kinematic demands concurrently.
Float piles	Lateral load of 72 kips applied at Elevation 12½ feet. Assumed axial load of 18 kips under free-head condition.
Donut piles	Lateral load of 5 kips applied at Elevation 16½ feet. Assumed axial load of 18 kips under free-head condition.

3.4.3 Minimum Pile Embedment

The piles must be embedded sufficiently deep to satisfy the vertical and lateral demands with the capacities described in Sections 3.4.1 and 3.4.2. Settlement may occur if the piles are terminated within the YBM under relatively larger vertical loads; therefore, we recommend that the monopile and shore-side piles, which will support the new bridge and gangway structures, be embedded into the San Antonio Formation.

4.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents preliminary geotechnical recommendations for design of the improvements discussed in Section 1.2 for the Alameda Main Street Ferry Refurbishment Project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, designers, and contractors. The conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted principles and practices currently employed in the area; there is no warranty, express or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks; therefore, we are unable to guarantee or warrant the results of our services.



This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data are representative of the actual subsurface conditions across the site. Considering possible underground variability of soil and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, we must be notified immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, the proper regulatory officials must be notified immediately.

This document must not be subject to unauthorized reuse, that is, reuse without our written authorization. Such authorization is essential because it requires us to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to our documents. Therefore, we must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If our scope of services does not include on-site construction observation, or if other persons or entities are retained to provide such services, we cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.



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FIGURES

- FIGURE 1:Vicinity MapFIGURE 2:Site PlanFIGURE 3:Regional Geologic MapFIGURE 4:Historic High GroundwaterFIGURE 5:Regional Faulting and Seismicity MapFIGURE 6:Seismic Hazards Zone MapFIGURE 7:Tsunami Inundation Map
- FIGURE 8: Cross Section A-A'







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EXPLANATION

ALL LOCATIONS ARE APPROXIMATE





O Sand boil

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Pipeline break



Absence of ground failure noted

FEET

- X Location of multiple ground effects. (See corresponding symbols)
 - Areas within which multiple failures were recorded. Symbols show failure types,



- Stretch of highway along which multiple failures were recorded. Symbols show failure types.
- 174 Number assigned to ground failure site (adapted from Youd and Hoose (1978) and Tinsley and others (1998) by Knudsen and others (2000))
- 20 -
- Depth to ground water, in feet (5, 10, 20 foot contours)
- Geotechnical borings used in liquefaction evaluation
- Ground-water level data provided by the California State Water Resources Control Board
- B Bedrock
 - See "Bedrock and Surficial Geology" in Section 1 of report for descriptions of units.

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Expect Excellence

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BASE MAP SOURCE ESRI, GEBCO, DELORME, NATURALVUE COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATA SET (NED) AT 30 METER RESOLUTION U.S.G.S. QUATERNARY FAULT DATABASE, 2020 U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800-PRESENT) U.S.G.S OPEN-FILE REPORT 96-705



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CTION A-A'	PROJECT NO.: 1954	FIGURE NO.	
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APPENDIX A

CONE PENETRATION TEST DATA

Cone Penetration Test Summary and Standard Cone Penetration Test Plots





21-56-23219 ENGEO Incorporated Alameda Main Street Ferry Terminal 28-Oct-2021 28-Oct-2021

CONE PENETRATION TEST SUMMARY									
Sounding ID File Name Date Cone Assu					Final Depth (ft)	Northing ² (m)	Easting ² (m)	Elevation ³ (ft)	Refer to Notation Number
1-sCPT01	21-56-23219_SP01	28-Oct-2021	811:T1500F15U35	6.4	13.78	4182827	562136	11	4
1-sCPT02	21-56-23219_SP02	28-Oct-2021	811:T1500F15U35	6.4	115.73	4182824	562183	12	5

1. The assumed phreatic surface was based on the shallowest pore pressure dissipation tests performed within or nearest the sounding. Hydrostatic conditions are assumed for the calculated parameters.

2. The coordinates were acquired using consumer grade GPS equipment, datum: WGS 1984 / UTM Zone 10S.

3. Elevations are referenced to the ground surface and were acquired from the Google Earth Elevation for the recorded coordinates.

4. Seven total attempts were made at the location to pre-punch, but none were successful.

5. The assumed phreatic surface is based on the pore pressure dissipation test at 1-SCPT1.





 Dissipation, Ueq not achieved The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes. Seismic Cone Penetration Test Tabular Results





Job No:21-56-23219Client:ENGEOProject:Alameda Main Street Ferry TerminalSounding ID:1-sCPT01Date:10:28:21 10:37

Seismic Source:BeamSeismic Offset (ft):1.87Source Depth (ft):0.00Geophone Offset (ft):0.81

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs							
Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)		
2.89	2.08	2.79					
12.40	11.59	11.74	8.95	12.30	728		
13.78	12.97	13.10	1.36	1.61	844		



Job No:21-56-23219Client:ENGEOProject:Alameda Main Street Ferry TerminalSounding ID:1-sCPT02Date:10:28:21 09:06

Seismic Source:BeamSeismic Offset (ft):1.87Source Depth (ft):0.00Geophone Offset (ft):0.81

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs						
Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)	
2.46	1.65	2.49				
6.00	5.19	5.52	3.03	3.75	806	
9.19	8.37	8.58	3.06	3.61	849	
12.53	11.72	11.87	3.29	5.25	626	
19.09	18.28	18.38	6.51	16.01	407	
22.31	21.50	21.58	3.20	5.92	541	
25.53	24.71	24.78	3.21	9.28	345	
28.71	27.90	27.96	3.17	11.06	287	
32.32	31.50	31.56	3.60	16.27	221	
35.60	34.79	34.84	3.28	9.75	336	
38.78	37.97	38.01	3.18	11.80	269	
42.26	41.45	41.49	3.47	11.62	299	
45.44	44.63	44.67	3.18	10.51	303	
48.62	47.81	47.85	3.18	9.87	322	
51.84	51.03	51.06	3.21	9.33	344	
55.28	54.47	54.50	3.44	8.37	412	
58.46	57.65	57.68	3.18	7.93	401	
61.84	61.03	61.06	3.38	7.45	454	
65.13	64.31	64.34	3.28	7.78	421	
68.24	67.43	67.46	3.12	6.71	464	
71.46	70.65	70.67	3.22	6.32	508	
74.80	73.99	74.02	3.35	7.20	465	
78.02	77.21	77.23	3.21	7.30	441	
81.30	80.49	80.51	3.28	7.02	468	
84.91	84.10	84.12	3.61	7.08	509	
88.09	87.28	87.30	3.18	7.08	449	
91.37	90.56	90.58	3.28	5.82	564	
94.65	93.84	93.86	3.28	4.51	727	
97.87	97.06	97.07	3.21	4.90	656	
101.21	100.40	100.42	3.35	4.37	767	
104.50	103.68	103.70	3.28	3.59	914	



Job No:21-56-23219Client:ENGEOProject:Alameda Main Street Ferry TerminalSounding ID:1-sCPT02Date:10:28:21 09:06

Seismic Source:BeamSeismic Offset (ft):1.87Source Depth (ft):0.00Geophone Offset (ft):0.81

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs							
Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)		
107.78	106.96	106.98	3.28	4.66	704		
110.99	110.18	110.20	3.22	3.59	896		
114.17	113.36	113.38	3.18	4.27	745		

Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots





Job No: Client: Project: Start Date: End Date: 21-56-23219 ENGEO Incorporated Alameda Main Street Ferry Terminal 28-Oct-2021 28-Oct-2021

CPTu PORE PRESSURE DISSIPATION SUMMARY						
Sounding ID	File Name	Cone Area (cm ²)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U _{eq} (ft)	Calculated Phreatic Surface (ft)
1-sCPT01	21-56-23219_SP01	15	395	13.78	7.3	6.4
1-sCPT02	21-56-23219_SP02	15	370	94.65	Not Achieved	



Job No: 21-56-23219 Date: 10/28/2021 10:37 Site: Alameda Main Street Ferry Terminal Sounding: 1-sCPT01 Cone: 811:T1500F15U35 Area=15 cm²




Job No: 21-56-23219 Date: 10/28/2021 09:06 Site: Alameda Main Street Ferry Terminal Sounding: 1-sCPT02 Cone: 811:T1500F15U35 Area=15 cm²





APPENDIX B

PREVIOUS EXPLORATION DATA



Representation of the second


SECTION D CA

DRILLRIG Rotary Wash	SURFAC	E ELEVATION	111.	0 Feet	±[LOGGE	DBA I	F.M./M	.в.	
DEPTH TO GROUNDWATER 5' (see Note 3)	BORING	DIAMETER	6 In	ches		DATE D	RILLED	10/3	1/80	
DESCRIPTION AND CLASSIFIC	CATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FL)	WATER CONTENT 1°.1	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (XSF)	
DESCRIPTION AND REMARKS	COLO	CONSIST.	SOIL TYPE	(FEET)	SAMI	PENET RESIS (BLOW	CONTE	DRY DI (PC)	UNCCT COMPR STRE	
SAND (fine- to coarse-grained), silty with some gravel	brow	n medium dense	SM		T X	15				
SILT, clayey with traces of sand (fine-grained)	mottle grey- brown	-	ML			27*	<u> </u>			
(FILL)										
CLAY with some silt and traces of shells (Bay Mud)	mottle grey- black		CL			1			an a	
SAND (fine-grained) with some silt, clay and shells	grey	medium dense	SP		\times	41*	21	106		
		very dense				30				
CLAY, silty with traces of shells (Bay Mud)	grey	soft	CL			2				
				- 35 -		5*				
	<u> </u>	FXI		ATORY	/ P			L G		
Peter Kaldveer and Associate	is	EXPLORATORY BORING LOG ALAMEDA NAVAL AIR STATION HOUSING Alameda, California								
Geotechnical Consultants	-	PROJECT NO		DAT		LIOFN	BORING			
		K529-31 January 198						- 1	7	

SECTION D. CA.

DRILLRIG Rotary Wash	SURFACE	ELEVATION	111.0	Feet	+	LOGGE	<u>n ry</u>	ΈM	/М.В.
	BORING D		6 Inc			-	RILLED		1/80
DESCRIPTION AND CLASSIFIC	ATION				r (NO HO L	(°c.)		
DESCRIPTION AND REMARKS	COLOR	CONSIST,	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATEH CONTENT (*c)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
.CLAY, silty with traces of shells (Bay Mud) (continued)	grey	firm	СН	- 41 -					
	•			- 45 -	2	push 300 psi			
						-			
(grading with less shells)		soft		 - 55 - 		2			
(grading with organics)		stiff	•		X	16*			
						analana at ina di sa ata in			
(grading with traces of organics)		firm		- 75 - - 75 - 		7			
		EXPI		TORY		RING			
Peter Kaldveer and Associates		EXPLORATORY BORING LOG ALAMEDA NAVAL AIR STATION HOUSING Alameda, California							
Geotechnical Consultants	PROJECT NO. DATE BORING							17	

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SECTION D CA

DRILLAIG Rotary Wash	SURFACE ELEVATION 111.0 Feet ± LOGGED BY F.M./M.B.								
DEPTH TO GROUNDWATER 5' (see Note 3)	BORING D	······································	6 Inc					10/3	
DESCRIPTION AND CLASSIFI									
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL	DEPTH (FEET)	SAMPLER	(BLOWS/FT.)	WATER CCNTENT (°«)	ORY DENSITY (PCF)	UHCONFINED COMPRESSIVE STRENGTH IKSF)
CLAY, silty with traces of 'organics (Bay Mud) (continued)	grey	firm	Сн	- 81 _	ä	ĽĽ	Ŭ	DR	58
SAND (fine-grained) with silt, clayey	grey	medium dense	SC	- 85 -				ŧ	
				 - 90	5	3*		-	
			- - - - - -						
SILT, clayey with sand (fine-			ML	95 -					
Bottom of Boring = 100 Feet	green	stiff		-100-	1	7			
Notes: 1. The stratification lines represent the approximate boundaries between soil types and the transitions may be gradual. 2. For an explanation of penetration resistance values marked with an asterisk (*), see page A-1. 3. Groundwater level measured 3 days after drilling.				105					
Peter Kaldveer and Associates	EXPLORATORY BORING LOG								
Geotechnical Consultants	Alameda, California								
	PROJECT NO. DATE BORING K529-31 January 1981 NO. 1						17		

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ta Point Imber ⁽¹⁾	Coordinat	tes ⁽²⁾ (feet)	Ground Surface or Mudline Elevation ⁽³⁾ (feet)	Depth of Data Point Relative to Ground Surface or Mudline (feet)		Table Elevation	Depth t		eologic Unit (Blank if U		und Surface o countered)	or Mudline		Elev	ation of Top o	f Geologic I	Jnit (feet)			Thicknes	s of Geolog	ic Unit (fee	:t)	Type of Data Point (5)	Report Containing Original Data	Date of Data Collection	Remarks
.OW-398	Easting 6028338.7	Northing 2121769.9	-35.2	13.1			Fill	Young Bay Mud	San Antonio	Older Bay Mud	Alameda Formation	Bedrock	Pill	Younger Bay Mud	San Antonio Formation "		Alameda Formation	Bedrock	Fill	Younger Bay Mud	San Antonio	Older Bay Mu		-			
.TC-366	6044677.3	2116600.9	-42.8	10.0				0	5					-35.2	-40.2					5	>8	Day Mu	u roimadon	EB		5/15/97	No groundwater data availa
.TC-368 .TC-394	6044687.3	2116339.7	-39.9	15.0				<u> </u>	0	7.7		<u> </u>		-42.8	-45.3 -39.9	-47.6		<u> </u>	<u> </u>	2.5	>8			EB		7/31/97	No groundwater data availa
.TC-394	6044716.9 6045009.4	2115776.8 2115946.9	-44.4 -40.7	7.7					0	2.6					-44.4	-47		<u> </u>			7.7			EB EB		7/31/97	No groundwater data availa
TW-378	6044749.7	2115428.3	-24.7	14.8				0	0			ļ			-40.7						>13			EB		8/4/97 8/4/97	No groundwater data availa No groundwater data availa
99.DW02	6039780.05	2125602.04	11.8	40.5	8	3.8	0	16.5	25				11.8	-24.7	-34.7						>5			EB		9/15/97	No groundwater data availa
	6039789.96 6039795.41		<u>11.8</u> 11.63	25	8	3.8	0	14.5					11.8	-2.7	-13.2				16.5	8.5 >11	>16	_		MW	Kleinfelder, 1997	10/14/97	
160.DW01		2126697.82	10.05	40 63.5	6.5 6.5	5.13 3.55	0	14.5 26	28				11.63	-2.87	-16.37				14.5	13.5	>12	-	+	MW MW		5/29/97 5/29/97	
	6039414.58	2123993.65	13.76	15			0	7.5	<u> </u>	56		<u> </u>	10.05 13.76	-15.95 6.26		-45.95			26	30		>8		MW	·····	6/4/97	······································
738.DW01 807.BM01	6039422.18	2123992.04 2125775.48	13.83	39			0	9.5	24.5				13.83	4.33	-10.67		<u> </u>		9.5	>8	216			MW		5/30/97	No groundwater data availa
73.G1	6038755	2125775.48	12.42	23.5 69	-33.5		0	11					12.42						11	>13	>15			MW		6/2/97 6/3/97	No groundwater data availa
73.G2	6038045	2125978	-44	85.5	-45	1		0		7				-32.5		-39.5				7		>62	+	GB	Geomatrix Consultants, 1997	4/24/97	No groundwater data availa
73.G3	6030434	2120368	-17.5	52	-17.5	0		0	9	47.5				-17.5	-26.5	-44 -65			ļ			>86		GB		4/17/97	
73.G4 73.G5	6031673 6033562	2119705 2121269	-10 -13.5	63 68.5	-10	0		0	19	57				-10	-20.5	-67		<u> </u>	<u> </u>	9 19	38.5 38	>5	+	GB GB	······································	5/5/97	
73.G6	6034025	2121209	-13.5	<u> </u>	-13.5	0		0	17.5	62.5				-13.5	-31	-76				17.5	45	>6	1	GB		5/9/97	· · · · · · · · · · · · · · · · · · ·
73.G7	6034657	2120161	-30	101	-30	0		0	2	28 43				-39	-41	-67				2	26	>9		GB		5/8/97	
73.G8 73.G9	6033403 6034547	2118707 2118521	13.5 12	91.5 135.5			0	19	27	84			13.5	-5.5	-13.5	-70.5			19	10	<u>33</u> 57	>58	ļ	GB		5/1/97	
3.G10	6035735	2118521 2118097	12.5	<u>135.5</u> 91			0	15	25	82			12	-3	-13	-70			15	10	57	>54		GB GB		4/23/97	No groundwater data avail
3.G11	6036481	2117837	13	91			0	10 14	27 26	83 88			12.5 13	2.5	-14.5	-70.5			10	17	56	>8		GB		4/18/97	No groundwater data avail No groundwater data avail
3.G12 3.G13	6037206	2117617	11	91.5	3	8	0	13	60	84			11	-1 -2	-13 -49	-75			14 13	12 47	62	>3		GB		4/17/97	No groundwater data avai
3.G14	6037759 6038262	2117198 2117133	13 13.5	<u>141.5</u> 91.5			0	19	36	88			13	-6	-23	-75			13	4/	<u>24</u> 52	>8		GB GB		4/21/97	
3.G15	6039374	2116808	12.5	91.5			0	13.5 8	28	88			13.5	0	-14.5	-74.5			13.5	14.5	60	>4	1	GB		4/26/97	No groundwater data avai No groundwater data avai
3.H1	6033833	2121380	12.6	36			0	18	21 22	88			12.5 12.6	4.5	-8.5	-75.5			8	13	67	>4		GB		4/25/97	No groundwater data avai
3.H2 3.H3	6034252 6037093	2120944	11.9	42.5			0	31	34				11.9	-19.1	-9.4	+			18	4	>14			GB	***	4/14/97	No groundwater data avai
3.H4	6037601	2121134 2120193	13.5	<u>31.5</u> 51			0	11	17				13.5	2.5	-3.5				11	6	>9		<u> </u>	GB GB		4/15/97	No groundwater data avail
/3.H5	6035894	2118751	12.9	36			0	<u>19</u> 11	<u>42</u> 17				11 12.9	-8	-31				19	23	>9			GB		4/15/97	No groundwater data availa No groundwater data availa
73.H6 73.H7	6038404	2118909	13.8	43.5			0	10	29				12.9	1.9 3.8	-4.1	+			11 10	<u>6</u> 19	>19			GB		4/16/97	No groundwater data avail:
5.07	6037137	2117853	13.5	45.5			0	9	34				13.5	4.5	-20.5				9	25	>15			GB GB		4/16/97	No groundwater data availa
75.1	6036291	2123379	12	551			0	18	21	66	120	600														4/16/97	No groundwater data availa Elevation estimated from topo i
								10		- 00	130	502	12	-6	-9	-54	-118	-490	18	3	45	64	372	GB	USGS, 1992	12/10/90	other data; no groundwater
75.2	6039011	2114129	5	468			0	13	46	84	130	463	5	-11	-41	-79	-125	-458	16	30	38	46	333	GB			Elevation estimated from topo
76.1	6051927	2120605	20	201			0											+20				40	333	GB		5/20/91	other data; no groundwater No datum referenced; no groun
5.GB1	6037240	2126510	-42.7	21	-44.6	1.9		0	4	103	157		20	-42.7	16	-83	-137		4		99	54	>44	GB	USGS, 1991	4/22/91	data available.
5.GB2 5.GB3	6037083.2 6036580	2126783.8	9.0	88.5	13	-4	0	27	48	51.5			9	-18	-39	-49.7			27	7	26	>14		GB	SCI - this report	9/20/97	
5.GB4	6033840	2125730 2124280	-45 -4.8	17.5 32.5	-49.3 -8.5	4.3 3.7		0	6	12				-45	-51	-57			- 21	6	3.5	>37		GB GB		8/15/97 9/10/97	
GB5	6030950	2123640	-8.5	52	-10.2	1.7		0	<u> </u>	51				-4.8	-34.8					30	>2.5			GB		9/23/97	
.GB6 .GB7	6031000	2123550	-9.2	53.5	-11	1.8		0	24	51.5				-8.5 -9.2	-33.5	-59.5				25	26	>1		GB		10/2/97	
.GB8	6037190 6025980	2126660 2120710	-36	33.5	-39 -38	3		0		18				-36		-54				<u>24</u> 18	27.5	>2		GB GB		10/1/97	
.GB9	6024100	2119660	-43.3	6	-30	2.7		0						-33						>41.5				GB		9/9/97 9/26/97	
GB10	6026250	2119560	-37.1	42.5	-41	3.9		0						-43.3 -37.1						>6				GB		9/22/97	
GB11 GB12	6028880 6032920	2119150 2117980	-32	65 35	-33.7	1.7		0	37	62.5				-32	-69	-94.5				<u>>42.5</u> 37	25.5	>2.5		GB GB		9/24/97	
JB13A	6032870	2117750	12.5	9.5	-36	1.9		0	1					-34.1	-35.1					1	>34	/2.5		GB		10/3/97 9/19/97	
B13B	6032826.5	2117821.6	12.5	266	9	3.5	0	25	33	85	178		12.5 12.5	-12.5	20.5	70.5	165.5		>9.5					GB			No groundwater data availa
GB14 GB15	6037100 6041220	2116590	-19.5	52	-20.6	1.1		0	34	50	-/~		14.3	-12.5	-20.5 -53.5	-72.5 -69.5	-165.5		25	8 34	52		>88	GB		7/30/97	
B16	6041220	2115410 2115211.5	-12 8.6	<u> </u>	-16 5.5	4		0	20					-12	-32					20	16 >35.5	>2	<u>├</u>	GB GB		9/18/97	
GB 17	6044310	2115640	-23.5	42.5	-28	3.1 4.5	0	7 0	54 3.5	77 24			8.6	1.6	-45.4	-68.4			7	47	23	>2.5		GB		9/29/97 8/1/97	
B18	6044087.0	2115354.7	9.8	76	6.5	3.3	0	10	40	58.5			9.8	-23.5 -0.2	-27 -30.2	-47.5			-10	3.5		>18.5		GB		9/15/97	·····
GB 19 GB 20	6044680 6044671.9	2115270 2115125.4	-18.2	59	-21	2.8		0	5	32.5		+		-18.2	-23.2	-48.7			10	<u>30</u> 5	18.5 27.5	>17.5		GB GB		9/23/97	
GB21	6044667.9	2115036.3	9.1	92.5	4	6	0	16.5	36	57			10	-6.5	-26	-47			16.5	19.5	27.5	>35.5		GB		9/13/97 9/19/97	
B22	6045120	2115680	-29	34.5	-33.5	4.5	0	17	35.5 4	57 18.5			9.1	-7.9	-26.4	-47.9			17	18.5	21.5	>14		GB		9/24/97	No groundwater data avail
	6045400.1	2115503.9	9.8	83	4	5.8	0	22	31	55			9.8	-29 -12.2	-33 -21.2	-47.5 -45.2				4	14.5	>16		GB		9/13/97	
B24 B25	6045471.8 6046040	2115444.4 2115860	9.9	104.5	-27.5	3.9	0	7	24.5	56.5			9.9	2.9	-14.6	-46.6			22	9 17.5	24 32	>28 >48	├ 	GB GB		8/5/97	
B26		2115512.6	9.2	200.5	-27.5	2.7 3.2	0	0 10	13 47	26 85	120			-24.8	-37.8	-50.8				13	13	>18		GB		8/7/97 9/12/97	
B27	6044910	2116850	-8.9	53.5	-12	3.1	0	10	4/	42	130		9.2	-0.8	-37.8 -18.9	-75.8	-120.8		10	37	38	45	>70.5	GB		8/12/97	
B28 B29	6043176.3 6043010	2116562.7	12.2	90	9	3.2	0	9	27	65	h		12.2	3.2	-18.9	-50.9 -52.8			10 9		32	>11.5		GB		9/16/97	
	6036337.0	2116310 2126080.3	-27.3 10.9	37.5 315	-29	1.7		0	8	29		ŀ		-27.3	-35.3	-56.3			y	18	38	>25 >8.5		GB GB		8/14/97	·····
W2C	6036970.4	2124294.0	13.1	231.5	8.5	2.4	0	28		57.5 68.5	124		10.9	-17.1	-25.1	-46.6	-113.1		28	8	21.5		>191			9/17/97 7/22/97	
	6029798.0	2120647.1	14.3	243.5	9	5.3	-0-1		43	79.5	134		13.1 14.3		-12.4 -28.7	-55.4	-120.9		25.5		43	65.5	>97.5	MW		7/29/97	No groundwater data avail
	6034296.1 6037335.3	2120879.1	12	223.5			0		23	82.5	156		14.5		-28.7	-65.2 -70.5	-169.7		<u>43</u> 23		<u>36.5</u> 59.5		>59.5			8/13/97	
	5.566100.0	2120909.3	13.2	200.8		1	0	13	20	94	141		13.2	0.2	-6.8	-80.8	-127.8		13	7	<u> </u>	73.5	>67.5 >59.8			8/26/97	No groundwater data avail

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TABLE 1. DATA POINT LITHOLOGY SUMMARY Oakland Harbor Navigation Improvement (-50 Foot) Project Port of Oakland



APPENDIX C

SITE RESPONSE ANALYSIS



Project No. 19542.000.001

January 14, 2022

Mr. James Connolly COWI North America, Inc. 555 12th Street, Suite 1700 Oakland, CA 94607

Subject: WETA Alameda Main Street Ferry Refurbishment Project Alameda, California

SITE-RESPONSE ANALYSIS

Dear Mr. Connolly:

This document summarizes our site-response analysis for the subject site located in Alameda, California. We performed the analysis using subsurface and geophysical data collected by us, as described in our geotechnical report dated January 14, 2022, and previous exploration data provided to us. We followed the guidance in the 2014 version of the American Society of Civil Engineers (ASCE) document titled "Seismic Design of Piers and Wharves," (ASCE/COPRI 61-14). ASCE 61-14 recommends that three scenarios be considered in the design: Design Earthquake (DE), Operating Level Earthquake (OLE), and Contingency Level Earthquake (CLE). As described in Section 3.1.1 of our geotechnical report, we classified the site as Site Class F, and as described in Section 2.5 of our geotechnical report, the site can be divided into two subsurface profiles – onshore and offshore. For a Site Class F condition, ASCE 61-14 requires that a site-specific ground response analysis be performed to develop the DE, OLE, and CLE spectra and ground motion parameters; ASCE 61-14 references the site-response analysis procedures outlined in the ASCE document titled "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," (ASCE/SEI 7-16).

Our analysis involved the following steps, which are described in further detail below.

- Developing the following response spectra for the base-of-profile:
 - Risk-Targeted, Maximum-Rotated Maximum Considered Earthquake (MCE_R) and DE.
 - OLE 72-year return period event
 - CLE 475-year return period event
- Selecting and scaling a suite of ground-motion time histories to be compatible with the base-of-profile spectra.
- Developing subsurface one-dimensional liquefiable and non-liquefiable soil profiles for use in the site-response analysis for both onshore and offshore subsurface conditions based on site data from our geotechnical exploration and from previous studies within the project vicinity.
- Propagating ground motions through ground models to obtain surface-to-base response spectral ratios (calculated period by period) under MCE_R, OLE, and CLE scenarios.

- Obtaining response spectra at the ground surface by multiplying the base motions by the average of the aforementioned ratios.
 - Note-1: We enveloped the results from Onshore, Offshore, liquefiable, and non-liquefiable profiles to obtain one surface spectrum for each scenario.
 - Note-2: The MCE_R and DE response spectra at the ground surface were compared with 80-percent of the code spectra per Chapter 21 of ASCE 7-16, and the maximum response was taken.

BASE-OF-PROFILE CONDITION AND SEISMIC HAZARD ANALYSIS

As described in Section 2.5 of the geotechnical report, we encountered a thick layer of soft Young Bay Mud (YBM) above dense and stiff San Antonio Formation onshore and offshore. Based on the shear wave velocity profiled measured in 1-sCPT02, we established the base-of-profile in our analysis model at the top of the San Antonio Formation, where the shear wave velocity is estimated to be significantly greater than that of the YBM; the YBM has a measured shear wave velocity low as 200 feet per second (ft/s) with in the San Antonio Formation we measured velocities greater than 800 ft/s. We established the base-of-profile condition with a V_{S30}^{-1} of 860 feet per second (ft/sec), as described below, which corresponds to a Site Class D condition. We completed the following steps to develop the response spectra for the base-of-profile condition:

- Performing probabilistic seismic-hazard analysis (PSHA) to develop:
 - Risk-targeted, maximum-rotated response spectra corresponding to a 2-percent probability of exceedance in 50 years (2,475-year return period) for the MCE_R scenario
 - Response spectrum corresponding to a 50-percent probability of exceedance in 50 years (72-year return period) for the OLE scenario
 - Response spectrum corresponding to a 10-percent probability of exceedance in 50 years (475-year return period) for the CLE scenario
- For the MCE_R and DE conditions only:
 - Performing deterministic seismic-hazard analysis (DSHA) to develop an 84th-percentile maximum-rotated response spectrum
 - Comparing the DSHA response spectrum with the Deterministic Lower Limit in accordance with Section 21.2.2 of ASCE 7-16 and Supplement No. 1
 - Comparing the risk-targeted and maximum-rotated probabilistic and the max-rotated deterministic response spectra to obtain the site-specific MCE_R response spectrum for the base-of-profile condition
 - Multiplying the site-specific MCE_R response spectrum by two-thirds to obtain the sitespecific DE spectrum for the base-of-profile condition
 - Comparing the MCE_R and DE response spectra developed in the previous step with their corresponding 80-percent Site Class D mapped response spectra to develop the recommended site-specific MCE_R and DE response spectra at the base-of-profile

¹ Time-averaged shear wave velocity in the upper 30 meters (100 feet) of soil profile.

Ground Motion Models and Site Parameters

We used four semi-empirical ground motion models (GMMs) from the Next Generation Attenuation West 2 (NGA West 2) project in the seismic-hazard analysis for this project. These include Abrahamson et al. (2014), Boore et al. (2014), Campbell and Bozorgnia (2014), and Chiou and Youngs (2014). We performed our analysis using all four GMMs for a spectral damping of 5 percent of critical damping. We used the logic-tree approach and assigned equal weight (0.25) to the four GMMs in our analysis.

The ground-motion models incorporate "site parameters" to model how subsurface soil will amplify or attenuate ground motions as they propagate from deeper, underlying bedrock. These site parameters include:

- Time-averaged shear-wave velocity over the top 100 feet or 30 meters (V_{S30})
- Depth at which the shear-wave velocity (Vs) reaches 3,280 feet/sec or 1.0 kilometer/sec (z1.0)
- Depth at which V_s reaches 8,200 feet/sec or 2.5 kilometers/sec (z_{2.5})

The V_S measurements collected at 1-sCPT02 are relevant to the onshore condition, and terminate approximately 25 feet, or 7½ meters, into the San Antonio Formation. We used V_S correlations with mean effective stress to extend the profile to 30 meters into the San Antonio Formation for the onshore condition. For the offshore condition, we assumed the same V_S profile from 1-sCPT02 in the upper 7½ meters of the San Antonio Formation would apply; however, we adjusted the depth to the top of the layer to the estimated average depth to the San Antonio Formation based on previous offshore explorations. We then used the same V_S correlation with mean effective stress to extend the profile to 30 meters into the San Antonio Formation.

For the onshore condition, we estimated a V_{S30} value of 873 feet/sec (266 meters/sec). For the offshore condition, we estimated a V_{S30} value of 845 feet/sec (258 meters/sec). Based on our review of the onshore and offshore V_{S30} values, as well as the soil profiles above the San Antonio Formation, we decided that an "averaged" profile with an average value of 860 feet/sec (262 meters/sec) for V_{S30} would be appropriate for subsequent analyses.

This base-of-profile condition corresponds to Site Class D, per Chapter 20 of ASCE 7-16. We used the USGS Bay Area Velocity Model version 8.3.0 Basin Depth models as implemented in the USGS Site Data Application Software (OpenSHA) to estimate $z_{1.0}$ and $z_{2.5}$, and subtracted the depth to the base-of-profile. We used $z_{1.0}$ and $z_{2.5}$ values of 604 and 2,730 feet (184 and 832 meters) in our analysis, respectively.

Probabilistic Seismic-Hazard Analysis

Fault Database and Probabilistic Model

We performed a probabilistic seismic-hazard analysis (PSHA) for the project site for a return period of 2,475 years (MCE_R), 72 years (OLE), and 475 years (CLE). We utilized the Third California Earthquake Rupture Forecast model (UCERF3). This is the most up-to-date rupture forecast model for the state of California; use of the latest fault database is required by ASCE 7-16. We calculated the seismic hazard using the standard methodology for hazard analysis (McGuire, 2004). The seismic-hazard calculations can be represented by the following equation, which is an application of the total-probability theorem.

$$H(a) = \sum_{i} v_{i} \iint P[A > a | m, r] f_{Mi}(m) f_{Ri|Mi}(r, m) dr dm$$

In this equation, the hazard H(a) is the annual frequency of earthquakes that produce a ground motion amplitude A higher than a. Amplitude A may represent peak ground acceleration, velocity, or it may represent spectral pseudo-acceleration (PSa) at a given frequency. The summation in the equation shown extends over all sources (i.e. over all faults and areas). In the above equation, v_i is the annual rate of earthquakes (with magnitude higher than some threshold M_i) in source i, and f_{Mi} (m) and $f_{Ri|Mi}$ (r,m) are the probability density functions on magnitude and distance, respectively. P[A > a/m, r] is the probability that an earthquake of magnitude m at distance rproduces a ground-motion amplitude A at the site that is greater than a. Seismic sources may be either faults or area sources; the specification of source geometries and the calculation of f_{Ri}/Mi , are performed differently for these two types of sources.

Disaggregation of the Seismic Hazard: for Use in MCE_R Base-of-Profile Spectrum Formulation

We disaggregated the hazard associated with the 2,475-year return period (DE) seismic hazard at the peak ground acceleration, and at periods of 0.5, 1.0, and 2.0 seconds. These disaggregation results are presented in Appendix A. Since we did not perform a deterministic seismic-hazard analysis for formulation of the base-of-profile spectra for the OLE and CLE scenarios, we did not disaggregate the hazard associated with these scenarios.

We summarize the dominant scenarios and their relative contributions to the hazard at each period for the DE event in Table 1.

SOURCE	R	NUP	Mw	PERCENT CONTRIBUTION						
SCORCE	(km)	(miles)		PGA	0.5s	1.0s	2.0s			
Hayward (No) [1]	8.8	5.5	7.31	24.9	26.7	28.8	28.6			
Hayward (No) [0]	8.7	5.4	7.32	21.8	23.6	25.7	25.9			
San Andreas (Peninsula) [11]	22.1	13.8	7.97	12.6	16.9	19.0	24.3			
Hayward (So) [7]	11.1	6.9	6.88	5.0	5.3	4.9	3.6			
Hayward (No) [2]	9.8	6.1	7.08	3.3	3.5	3.4	3.0			
Calaveras (No) [0]	22.5	14.0	7.37	2.4	3.0	2.5	2.1			
San Gregorio (North) [4]	27.8	17.3	7.79	< 1.0	2.4	2.5	2.9			
Hayward (So) [6]	16.0	10.0	6.78	< 1.0	2.1	< 1.0	< 1.0			

TABLE 1: Summary of Disaggregation Results for a 2,475-Year Return Period*

*Based on USGS Unified Hazard Tool: Dynamic Conterminous U.S. 2014 (update) (v4.2.0)

These results represent sources contributing at least one percent to the seismic hazard at the site for the spectral periods considered and for the given return period. Gridded or areal sources are not presented. The assigned moment magnitudes (M_W) are based on values assigned according to UCERF 3, and the numbers in square brackets after the fault names correspond to fault subsections assigned by UCERF 3.

Deterministic Seismic-Hazard Analysis for Use in MCE_{R} Base-of-Profile Spectrum Formulation

The deterministic seismic-hazard analysis (DSHA) involves developing the 84th percentile (i.e., lognormal mean plus one standard deviation) maximum-rotated response spectrum for a spectral damping of 5 percent of critical damping considering characteristic magnitudes of significant faults, without background seismicity, and the aforementioned ground-motion models. However, it is important to note that the definition of the characteristic magnitude is ambiguous when using the UCERF3 model due to its complexity. Based on our communications with developers of UCERF3 and the 2020 NEHRP Provisions, in deterministic analyses, "scenario" earthquakes with significant contribution to hazard should be used in lieu of "characteristic" earthquakes when using UCERF3. We identified the scenario earthquakes by considering the results of the disaggregation. Accordingly, we considered the scenarios in Table 1, as described below.

We considered the magnitudes in Table 1 and associated distances (R_{RUP} , R_{JB} , R_X) to calculate the deterministic spectrum. We estimated additional ground motion model parameters (e.g., rupture width, depth to top of rupture, etc.) for each fault/scenario based on fault-specific information published on the United States Geologic Survey (USGS) website. Our analyses, along with considering the percent contribution to the hazard, indicate controlling events on the Hayward Fault with a moment magnitude (M_W) of 7.32 within 5.4 miles (8.7 kilometers) of the site, at periods smaller or equal to 6 seconds, and on the San Andreas Fault with a M_W of 7.97 within 13.8 miles (22.1 kilometers) of the site, at periods longer than 6 seconds.

Resulting Base-of-Profile Response Spectrum

MCER and DE Spectra

Following the steps described above, we developed probabilistic and deterministic median-component (RotD50) response spectra. To convert the RotD50 response spectra to maximum-rotated response spectra, we applied the maximum rotation factors discussed in Shahi and Baker (2014). We also applied the mapped risk factors defined in Section 21.2.1.1 of ASCE 7-16 to the probabilistic response spectrum in order to develop a risk-targeted spectrum. We then compared the maximum-rotated deterministic response spectrum with the lower limit deterministic response spectrum defined in Section 21.2.2 of ASCE 7-16 and Supplement No. 1 to finalize the deterministic spectrum.

According to Section 21.2.3 of ASCE 7-16, the MCE_R is controlled by the lesser of the maximum-rotated and risk-targeted probabilistic and the 84^{th} percentile maximum-rotated deterministic response spectra. At this site, the spectral accelerations associated with the deterministic response spectrum are less than the probabilistic response spectrum. Additionally, the MCE_R and DE are not permitted to be lower than 80 percent of the mapped MCE_R and DE spectra (i.e., the code minimum), respectively. Exhibit 1 presents the development of the max-rotated 84^{th} percentile deterministic and risk-targeted and max-rotated probabilistic response spectra for the spectra. Exhibits 2 and 3 depict the recommended site-specific MCE_R and DE spectra for the base-of-profile condition at project site, respectively.

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EXHIBIT 2: Site-Specific MCE_R Response Spectra at the Base-of-Profile Condition







OLE and CLE Spectra

We developed RotD50 (average component) response spectra corresponding to a 50 percent probability of exceedance in 50 years (72-year return period) for the OLE response spectra, and corresponding to a 10 percent probability of exceedance in 50 years (475-year return period) for the CLE response spectra. ASCE 61 does not require these response spectra to be rotated for the maximum direction.

Exhibits 4 and 5 present the recommended site-specific OLE and CLE response spectra for the base-of-profile condition at project site.



EXHIBIT 4: Site-Specific OLE Response Spectra at the Base-of-Profile Condition





HORIZONTAL GROUND-MOTION SELECTION AND SCALING

We selected and scaled a suite of ground-motion time histories consisting of 11 pairs of horizontal, orthogonal acceleration records for use in our site-response analysis from the NGA West 2 database (Ancheta et al., 2014). We scaled the selected ground-motions to the base-of-profile, site-specific MCE_R, DE, OLE, and CLE target spectra shown in Exhibits 2 through 5. We selected spectral scaling rather than spectral matching as scaling more closely preserves the critical features of the ground-motions. In order to guide our ground-motion selection, we considered disaggregation of the seismic hazard for return periods of 2,475 years, 475 years, and 72 years, corresponding to the MCE_R, CLE, and OLE target response spectra, respectively. We considered the dominant magnitudes, source distances, and fault mechanisms. We also developed criteria for significant duration, D_{5-95} , based on the Kempton and Stewart (2006) model, and Arias Intensity, I_A, based on the Abrahamson et al. (2016) model. Tables 2 through 4 provide summaries of the selected ground motion suites.

We selected two to five ground motions with a velocity pulse based on the criteria in Hayden et al. (2014) and Shahi and Baker (2011). We selected pulse-like ground motions with pulse periods ranging from 0.9 to 10.4 seconds, with an average pulse period of 4.2 seconds.

Per Section 21.1.1 of ASCE 7-16, we spectrally scaled the ground motions such that the average response spectrum is in agreement with the base target response spectra. Specifically, we scaled the GMs such that the average median-component (RotD50) response spectrum of all ground motions is in satisfactory agreement with the target spectrum. We limited the scale factors to be less than 3.5. We also applied a scaled factor of 2/3 to the MCE_R ground motions to develop a suite based on target DE response spectrum. Table 2 through 4 present the ground motions characteristics and Exhibits 6 through 8 show the RotD50 response spectra for each ground motion, along with the mean and base target response spectra.

TABLE 2: Ground Motions and Scale I	Factors Used in the	Site-response Analysis	(MCE _R Target
Response Spectrum)			

EARTHQUAKE	RSN	PULSE PERIOD (sec)	Mw	R _{RUP} (km)	FAULT TYPE	V _{S30} (m/s)	D ₅₋₉₅ (sec)	Scaled la (m/s)	SCALE FACTOR
Imperial Valley-06	179	4.8	6.53	7.1	Strike Slip	209	10.3	9.5	2.60
Superstition Hills-02	723	2.4	6.54	1.0	Strike Slip	349	11.0	13.4	1.90
Loma Prieta	776	-	6.93	27.9	Reverse Oblique	282	28.8	16.0	2.70
Loma Prieta	803	5.6	6.93	9.3	Reverse Oblique	348	11.1	10.9	2.90
Northridge-01	1045	3.0	6.69	5.5	Reverse	286	8.8	6.0	2.00
Kobe_Japan	1101	-	6.90	11.3	Strike Slip	256	19.4	10.6	2.30
Kocaeli_Turkey	1176	4.9	7.51	4.8	Strike Slip	297	15.1	7.5	2.40
Chi-Chi_Taiwan	1203	-	7.62	16.0	Reverse Oblique	233	32.8	13.9	2.70
Iwate_Japan	5814	-	6.90	31.1	Reverse	248	48.3	14.4	2.50
El Mayor- Cucapah_ Mexico	5823	-	7.20	19.5	Strike Slip	242	51.2	24.3	3.25
Darfield_New Zealand	6923	-	7.00	30.5	Strike Slip	255	20.1	10.0	2.50

EXHIBIT 6: RotD50 Response Spectra of the Ground Motions Used in Site-response Analysis (MCE_R Target Response Spectrum)



TABLE 3:	Ground Motions	and Scale	Factors Used	d in the	Site-response	Analysis (CLE Targ	get
Response	Spectrum)						

EARTHQUAKE	RSN	PULSE PERIOD (sec)	Mw	R _{RUP} (km)	FAULT TYPE	V _{s30} (m/s)	D ₅₋₉₅ (sec)	Scaled Ia (m/s)	SCALE FACTOR
Imperial Valley-02	6	-	6.95	6.1	Strike Slip	213	24.2	12.1	2.75
Loma Prieta	778	-	6.93	24.8	Reverse Oblique	216	13.3	5.5	2.35
Loma Prieta	803	5.6	6.93	9.3	Reverse Oblique	348	11.1	5.7	2.10
Landers	900	7.5	7.28	23.6	Strike Slip	354	18.9	6.8	2.75
Chi-Chi_Taiwan	1491	10.4	7.62	7.6	Reverse Oblique	350	28.9	9.4	2.80
Cape Mendocino	3749	-	7.01	20.4	Reverse	355	15.0	3.3	1.60
Montenegro_ Yugoslavia	4458	2.0	7.10	5.8	Reverse	319	26.0	9.1	2.25
Chuetsu- oki_Japan	4860	-	6.80	23.2	Reverse	278	23.2	7.2	1.90
El Mayor- Cucapah_Mexico	5827	-	7.20	15.9	Strike Slip	242	34.5	9.5	1.25
Darfield_New Zealand	6890	-	7.00	17.6	Strike Slip	204	20.0	6.9	2.50
Duzce_Turkey	1602	0.9	7.14	12.0	Strike Slip	294	9.0	2.4	0.80

EXHIBIT 7: RotD50 Response Spectra of the Ground Motions Used in Site-response Analysis (CLE Target Response Spectrum)



TABLE 4: Ground Motions and Scale Factors Used in the Site-response An	nalysis (OLE Target
Response Spectrum)	

EARTHQUAKE	RSN	PULSE PERIOD (sec)	Mw	R _{RUP} (km)	FAULT TYPE	V _{S30} (m/s)	D ₅₋₉₅ (sec)	Scaled la (m/s)	SCALE FACTOR
Imperial Valley-02	6	-	6.95	6.1	Strike Slip	213	24.2	2.7	1.30
Imperial Valley-06	162	-	6.53	10.5	Strike Slip	231	14.8	1.4	1.25
Superstition Hills-02	725	-	6.54	11.2	Strike Slip	317	13.7	1.5	0.85
Loma Prieta	754	-	6.93	20.8	Reverse Oblique	295	13.4	1.0	1.40
Loma Prieta	766	1.7	6.93	11.1	Reverse Oblique	271	11.0	0.8	0.80
Northridge-01	949	-	6.69	8.7	Reverse	298	13.5	1.8	1.10
Kobe_Japan	1116	-	6.90	19.2	Strike Slip	256	11.6	0.8	1.00
Montenegro_Yugo slavia	4458	2.0	7.10	5.8	Reverse	319	26.0	1.2	0.80
Chuetsu- oki_Japan	4860	-	6.80	23.2	Reverse	278	23.2	2.2	1.05
El Mayor- Cucapah_Mexico	5827	-	7.20	15.9	Strike Slip	242	34.5	3.0	0.70
Darfield_New Zealand	6961	-	7.00	16.5	Strike Slip	296	20.3	1.7	1.85

EXHIBIT 8: RotD50 Response Spectra of the Ground Motions Used in Site-response Analysis (OLE Target Response Spectrum)



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SITE-RESPONSE ANALYSIS

In order to perform a site-response analysis, a model of the soil profile is required. Each soil layer in the model is defined by a thickness, shear-wave velocity (V_S), and unit weight (γ). Additionally, nonlinear modulus reduction (G/G_{max}) and damping ratio (D) curves are required for each layer. This section describes how we developed the site-response models and the analysis procedures.

V_s Profile Development

To perform a site-response analysis, a profile of the shear-wave velocity (V_S) as a function of depth is required. As described earlier in this report, we developed two idealized V_S profiles for onshore and offshore subsurface conditions. We present this idealized profile in Exhibit 9.



EXHIBIT 9: Idealized V_S Profile Considered in Site-response Analysis

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Modulus Reduction and Damping Curves

Nonlinear modulus reduction (G/G_{max}) and damping (D) curves are required for each soil layer considered in the site-response analysis. For the fill material in the onshore profile, we assigned G/G_{max} and D curves based on the confining pressure and material-dependent relationships provided in Darendeli (2001). We estimated the parameters for the Darendeli (2001) model from the available CPT, borings, and laboratory data.

At large strains (greater than approximately 0.5 percent), the G/G_{max} curves from empirical relationships are unbounded by laboratory measurements and can imply unrealistic shear strengths. Thus, when large strains are expected in the site-response analysis, it is necessary to adjust the large-strain portions of the G/G_{max} curves to account for the soil shear strength. Accordingly, we adjusted the high-strain G/G_{max} values in all layers to reflect the estimated shear strength of the soil. We estimated shear strengths based on CPT and boring data.

We estimated the undrained shear strength (S_u) for cohesive soil using CPT correlations based on tip resistance. For granular soil, we used a friction angle of 32 degrees based on the available blow count data. We converted the friction angle to shear strength by taking the tangent and multiplying by the vertical effective stress.

For YBM, we used the G/G_{max} and damping curves that were specifically developed for this type of material and are used widely in the Bay Area projects. These curves are shown below in Exhibit 6.



EXHIBIT 10: Modulus Reduction (G/Gmax) and Damping Curves for YBM and the DEEPSOIL fit

Analysis Procedures

We used the General Quadratic/Hyperbolic (GQ/H) constitutive model, as implemented in DEEPSOIL v7.1 (Groholski et al. 2016; Hashash et al. 2017), to perform non-linear (NL) site-response analyses. Note that NL analyses are performed in the time domain and solve for the dynamic response of multi-degree-of-freedom systems subject to base excitation (Kim et al., 2016).

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Thus, the NL analyses did not directly use the G/G_{max} and damping curves above. Rather, the constitutive model parameters are calibrated such that the nonlinear behavior implied by the G/G_{max} and damping curves is captured.

We performed two analyses for the onshore profile. We performed a site-response analysis that assumes no liquefaction occurs ("non-liquefied analysis") and an analysis, which accounts for the generation of excess pore pressures and liquefaction in the fill material ("liquefied analysis"). We considered both cases because it is uncertain whether the fill will liquefy during intense ground shaking. For the offshore profile, we only performed the non-liquefied analysis since there was no fill present in this profile.

We performed the non-liquefied analysis at the DE level with ground motions scaled to the DE target response spectrum. In order to perform this analysis, we scaled the MCE_R -level ground motions by a factor of 2/3 and propagated them through the profile. We used the amplification factors from the analysis to calculate a DE response spectrum at the surface, and then multiplied by a factor of 1.5 to develop a non-liquefied surface MCE_R response spectrum.

We performed the liquefied analysis using MCE_R -level ground motions, because these ground motions are more likely to induce high excess pore pressures and liquefaction. Our liquefied analysis used the pore water pressure generation and dissipation model based on Sand-Vucetic-Dobry (Vucetic and Dobry, 1988; Matasovic and Vucetic, 1995) as described in the DEEPSOIL v7.1 manual. This set of analyses comprises effective stress analyses with generation and dissipation of pore water pressure. We selected the associated parameters based on subsurface data from Harding Lawson Associates (1984) and Gregg Drilling (2021), shear wave velocity profile presented in Exhibit 9, and suggested values in the DEEPSOIL v7.1 manual.

We also performed both analyses for the CLE and OLE spectra using the associate scaled ground motions.

Results

We calculated amplification factors (AF) for the profile and each ground motion and we present them in Appendix B.

We calculated the surface response spectrum for each ground motion by applying the period-dependent amplification factors to the appropriate base-of-profile response spectrum (DE-level or MCE_R -level).

SURFACE MCE_R AND DE RESPONSE SPECTRA

We used the Site AF values in Exhibits 11 and 12 to develop MCE_R response spectra for the non-liquefied and liquefiable conditions, as shown in Exhibit 15. Note that since we performed the non-liquefied analysis on DE-level ground motions, we multiplied the mean surface response spectrum by a factor of 1.5 to obtain an MCE_R -level response spectrum.

Based on the measured shear-wave velocity, the time-averaged shear wave velocity in the upper 30 meters (V_{S30}) of the project site is 128 meters per second (420 feet per second). Per Section 20.3.3 and Table 20.3-1 of ASCE 7-16, the project site is a Site Class E in the absence of liquefaction. Therefore, we developed the 80 percent of mapped spectrum, accordingly. We also used F_a of 1 and F_v of 4 to develop the mapped spectra. We show the mapped MCE_R response

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spectrum for Site Class E (defined in Chapters 11 and 21 of ASCE 7-16) and 80 percent of this mapped spectrum (i.e., the code minimum) in Exhibit 11. In order to develop the recommended surface MCE_R for the site, we compared the code minimum to the surface response spectra from our site-response analyses and enveloped the results. The final site-specific surface MCE_R response spectrum is shown in Exhibit 11 and tabulated in Table 5. In addition, the DE response spectrum (2/3 of the MCE_R response spectrum) is provided in Table 5 and shown in Exhibit 12. Table 6 summarizes the site-specific design acceleration parameters per Section 21.4 and 21.5 of ASCE 7-16.



EXHIBIT 11: Recommended surface MCE_R response spectrum

EXHIBIT 12: Recommended surface DE response spectrum



PERIOD (seconds)	RECOMMENDED SPECT	RAL ACCELERATION (g)
PERIOD (Seconds)	MCER	DE
0.01	0.50	0.34
0.02	0.53	0.35
0.03	0.55	0.37
0.05	0.63	0.42
0.075	0.75	0.50
0.1	0.83	0.55
0.15	0.86	0.58
0.2	0.93	0.62
0.25	1.04	0.70
0.3	1.16	0.77
0.32	1.20	0.80
0.4	1.27	0.85
0.5	1.20	0.80
0.75	1.20	0.80
1	1.20	0.80
1.5	1.20	0.80
1.6	1.20	0.80
2	0.96	0.64
3	0.64	0.43
4	0.48	0.32
5	0.38	0.26
6	0.32	0.21
7.5	0.26	0.17
8	0.24	0.16
10	0.15	0.10

TABLE 5: Recommended Surface MCE_R and DE Response Spectra

TABLE 6: Design Acceleration Parameters based on ASCE 7-16 Section 21.4 and 21.5

ACCELERATION PARAMETER	VALUE (g)
Mapped MCE _R Spectral Response Acceleration at Short Periods, Ss	1.5
Mapped MCE _R Spectral Response Acceleration at 1-second Period, S ₁	0.6
MCE _R Spectral Response Acceleration at Short Periods, S _{MS}	1.2
MCE _R Spectral Response Acceleration at 1-second Period, S _{M1}	1.92
Design Spectral Response Acceleration at Short Periods, S _{DS}	0.8
Design Spectral Response Acceleration at 1-second Period, SD1	1.28
Site-Specific Peak Ground Acceleration, PGA _M	0.55

SURFACE OLE AND CLE RESPONSE SPECTRA

We used the Site AF values in Exhibits 13 and 14 to develop OLE and CLE response spectra for the non-liquefied and liquefiable conditions, as shown in Exhibits 13 and 14. Per ASCE 61-14, there is no code minimum associated with the CLE and the OLE. The spectral values for the OLE and CLE response spectra are presented in Table 7.



EXHIBIT 13: Recommended surface OLE response spectrum

EXHIBIT 14: Recommended surface CLE response spectrum



DEDIOD (secondo)	RECOMMENDED SPECT	RAL ACCELERATION (g)
PERIOD (seconds)	OLE	CLE
0.01	0.25	0.30
0.02	0.27	0.33
0.03	0.39	0.44
0.05	0.42	0.51
0.075	0.49	0.60
0.1	0.54	0.70
0.15	0.58	0.68
0.2	0.66	0.72
0.25	0.68	0.68
0.3	0.74	0.73
0.32	0.72	0.75
0.4	0.71	0.86
0.5	0.66	0.82
0.75	0.59	0.72
1	0.57	0.74
1.5	0.35	0.68
1.6	0.33	0.70
2	0.24	0.56
3	0.12	0.39
4	0.07	0.24
5	0.05	0.16
6	0.04	0.12
7.5	0.02	0.07
8	0.02	0.07
10	0.01	0.05

TABLE 7: Recommended Surface OLE and CLE Response Spectra

The similarities between the total and effective stress analyses at the OLE and CLE level are due to negligible excess pore pressure generation at these ground-motion intensities. Conversely, there is significant excess pore pressure generation at the MCE_R level, which is demonstrated by the differences between the total and effective stress analyses.

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If you have any questions or comments regarding this letter, please contact us and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Teresa Klotzback, PE

Nicas 1 -

Chris Nicas, PE

tk/bh/ch/jaf/dt

Bahareh Heidarzadeh, PhD, PE PROFESSION

No. 2631 ∕Fippi'n, GĽ ef OF C٨

Attachments: References Appendix A – Disaggregation Results Appendix B – Amplification Ratios and Surface Response Spectra



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APPENDIX A

Disaggregation Results

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the <u>U.S. Seismic Design Maps web tools</u> (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

∧ Input	
Edition	Spectral Period Peak Ground Acceleration
Dynamic: Conterminous U.S. 2014 (u Latitude	Time Horizon
Decimal degrees 37.79105	Return period in years 2475
Longitude Decimal degrees, negative values for western longitudes	
-122.294051	
Site Class	
259 m/s (Site class D)	

Hazard Curve \checkmark Uniform Hazard Response Spectrum Hazard Curves 1e+0 3.0 -1e-1 1e-2 Annual Frequency of Exceedence 2.5 1e-3 1e-4 Ground Motion (g) 2.0 -1e-5 · Time Horizon 2475 years Peak Ground Acceleration 0.10 Second Spectral Acceleration 0.20 Second Spectral Acceleration 0.30 Second Spectral Acceleration 0.75 Second Spectral Acceleration 0.50 Second Spectral Acceleration 0.30 Second Spectral Acceleration 0.40 Second Spectral Acceleration 0.40 Second Spectral Acceleration 0.50 Second Spectral Acceleration 1e-6 · 1.5 1e-7 1e-8 1e-9 1.0 -1e-10 Spectral Period (s): **PGA** Ground Motion (g): **0.8689** 1e-11 0.5 1e-12 · 1e-13 0.0 1e-14 1e-2 1e-1 1e+0 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 Ground Motion (g) Spectral Period (s) Component Curves for Peak Ground Acceleration 1e+0 -1e-1 1e-2 Annual Frequency of Exceedence 1e-3 1e-4 1e-5 · 1e-6 -1e-7 1e-8 1e-9 -1e-10 Time Horizon 2475 years Time Hori
 System
 Grid
 Slab
 Interface
 Fault 1e-11 1e-12 -1e-13 -1e-14 -1e-2 1e-1 1e+0 Ground Motion (g) View Raw Data



Summary statistics for, Deaggregation: Total

Deaggregation targets	Recovered targets					
Return period: 2475 yrs	Return period: 3251.3702 yrs					
Exceedance rate: 0.0004040404 yr ⁻¹	Exceedance rate: 0.00030756264 yr ⁻¹					
PGA ground motion: 0.86887138 g						
Totals	Mean (over all sources)					
Binned: 100 %	m: 6.97					
Residual: 0 %	r: 11.78 km					
Trace: 0.04 %	ε.: 1.82 σ					
Mode (largest m-r bin)	Mode (largest m-r-ε₀ bin)					
m: 7.51	m: 7.09 r: 9.2 km ε₀: 1.66 σ					
r: 8.95 km						
ε ₀ : 1.52 σ						
Contribution: 13.33 %	Contribution: 9.72 %					
Discretization	Epsilon keys					
r: min = 0.0, max = 1000.0, Δ = 20.0 km	ε0: [-∞2.5)					
m: min = 4.4, max = 9.4, Δ = 0.2	ε1: [-2.52.0)					
ε: min = -3.0, max = 3.0, Δ = 0.5 σ	ε2: [-2.01.5)					
	ε3: [-1.51.0)					
	ε4: [-1.00.5)					
	ε5: [-0.50.0)					
	ε6: [0.00.5]					
	ε7: [0.5 1.0) ε8: [1.0 1.5)					
	εθ: [1.5 2.0)					
	ε10: [2.02.5)					

Deaggregation Contributors

Source Set 💪 Source	Туре	r	m	٤0	lon	lat	az	%
UC33brAvg_FM32	System							39.73
Hayward (No) [0]		8.65	7.24	1.60	122.207°W	37.824°N	64.08	21.76
San Andreas (Peninsula) [11]		22.13	7.93	2.07	122.488°W	37.664°N	230.41	6.32
Hayward (So) [7]		11.07	6.81	1.97	122.172°W	37.786°N	92.96	2.46
Hayward (No) [1]		8.77	6.99	1.72	122.212°W	37.832°N	58.10	1.87
Hayward (No) [2]		9.78	6.92	1.84	122.239°W	37.865°N	30.30	1.68
Calaveras (No) [0]		22.51	7.22	2.37	122.049°W	37.842°N	75.24	1.15
UC33brAvg_FM31	System							39.09
Hayward (No) [1]		8.82	7.22	1.62	122.212°W	37.832°N	58.10	22.99
San Andreas (Peninsula) [11]		22.13	7.93	2.07	122.488°W	37.664°N	230.41	6.28
Hayward (So) [7]		11.07	6.82	1.97	122.172°W	37.786°N	92.96	2.57
Hayward (No) [2]		9.78	6.95	1.83	122.239°W	37.865°N	30.30	1.66
Calaveras (No) [0]		22.51	7.22	2.37	122.049°W	37.842°N	75.24	1.21
UC33brAvg_FM31 (opt)	Grid							10.74
PointSourceFinite: -122.294, 37.805		5.22	5.59	1.55	122.294°W	37.805°N	0.00	3.27
PointSourceFinite: -122.294, 37.805		5.22	5.59	1.55	122.294°W	37.805°N	0.00	3.27
UC33brAvg_FM32 (opt)	Grid							10.45
PointSourceFinite: -122.294, 37.805		5.22	5.59	1.55	122.294°W	37.805°N	0.00	3.15
PointSourceFinite: -122.294, 37.805		5.22	5.59	1.55	122.294°W	37.805°N	0.00	3.15

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the <u>U.S. Seismic Design Maps web tools</u> (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

∧ Input	
Edition Dynamic: Conterminous U.S. 2014 (u	Spectral Period 0.50 Second Spectral Acceleration
Latitude Decimal degrees	Time Horizon Return period in years
37.79105	2475
Longitude Decimal degrees, negative values for western longitudes	
-122.294051	
Site Class	
259 m/s (Site class D)	
Hazard Curve \checkmark Uniform Hazard Response Spectrum Hazard Curves 1e+0 3.0 -1e-1 1e-2 Annual Frequency of Exceedence 2.5 1e-3 1e-4 Ground Motion (g) 2.0 -Spectral Period (s): 0.5 1e-5 · Time Horizon 2475 years Peak Ground Acceleration 0.10 Second Spectral Acceleration 0.20 Second Spectral Acceleration 0.50 Second Spectral Acceleration 0.50 Second Spectral Acceleration 2.00 Second Spectral Acceleration 2.00 Second Spectral Acceleration 2.00 Second Spectral Acceleration 2.00 Second Spectral Acceleration 3.00 Second Spectral Acceleration 4.00 Second Spectral Acceleration 5.00 Second Spectral Acceleration Ground Motion (g): 2.2033 1e-6 · 1.5 1e-7 1e-8 · 1e-9 1.0 1e-10 1e-11 0.5 1e-12 · 1e-13 0.0 1e-14 1e-2 1e-1 1e+0 2.0 2.5 3.0 3.5 4.0 4.5 5.0 0.0 0.5 1.0 1.5 Ground Motion (g) Spectral Period (s) Component Curves for 0.50 Second Spectral Acceleration 1e+0 -1e-1 Annual Frequency of Exceedence 1e-2 1e-3 1e-4 1e-5 1e-6 1e-7 1e-8 Time Horizon 2475 years Time Hori
 System
 Grid
 Slab
 Interface
 Fault 1e-9 1e-10 -1e-11 1e-2 1e-1 1e+0 Ground Motion (g) View Raw Data



Component



Summary statistics for, Deaggregation: Total

Deaggregation targets	Recovered targets					
Return period: 2475 yrs	Return period: 3143.6814 yrs Exceedance rate: 0.00031809839 yr ⁻¹					
Exceedance rate: 0.0004040404 yr ⁻¹ 0.5 s SA ground motion: 2.2032876 g						
Totals	Mean (over all sources)					
Binned: 100 %	m: 7.24					
Residual: 0 % Trace: 0.07 %	r: 13.44 km ε₀: 1.79 σ					
Mode (largest m-r bin)	Mode (largest m-r-ɛ₀ bin)					
m: 7.51	m: 7.51					
r: 8.99 km	r: 8.74 km					
ε.: 1.46 σ	ε ₀ : 1.31 σ					
Contribution: 14.96 %	Contribution: 10.68 %					
Discretization	Epsilon keys					
r: min = 0.0, max = 1000.0, ∆ = 20.0 km	ε0: [-∞2.5)					
m: min = 4.4, max = 9.4, Δ = 0.2	ε1: [-2.52.0)					
ε: min = -3.0, max = 3.0, Δ = 0.5 σ	ε2: [-2.01.5)					
	£3: [-1.51.0)					
	ε4: [-1.00.5) ε5: [-0.5 0.0)					
	ε6: [0.00.5]					
	ε7: [0.51.0)					
	ε8: [1.01.5)					
	ε9: [1.52.0)					
	ε10: [2.02.5)					
	ε11: [2.5+∞]					

Deaggregation Contributors

Source Set 💪 Source	Туре	r	m	ε ₀	lon	lat	az	%
UC33brAvg_FM32	System							46.1
Hayward (No) [0]		8.65	7.26	1.55	122.207°W	37.824°N	64.08	23.5
San Andreas (Peninsula) [11]		22.13	7.93	1.92	122.488°W	37.664°N	230.41	8.4
Hayward (So) [7]		11.07	6.82	1.94	122.172°W	37.786°N	92.96	2.6
Hayward (No) [1]		8.77	7.03	1.70	122.212°W	37.832°N	58.10	1.9
Hayward (No) [2]		9.78	6.96	1.82	122.239°W	37.865°N	30.30	1.7
Calaveras (No) [0]		22.51	7.24	2.25	122.049°W	37.842°N	75.24	1.4
San Gregorio (North) [4]		27.80	7.76	2.16	122.594°W	37.711°N	251.42	1.1
Hayward (So) [6]		16.01	6.78	2.31	122.129°W	37.735°N	113.12	1.0
JC33brAvg_FM31	System							45.4
Hayward (No) [1]		8.82	7.24	1.57	122.212°W	37.832°N	58.10	24.
San Andreas (Peninsula) [11]		22.13	7.92	1.92	122.488°W	37.664°N	230.41	8.
Hayward (So) [7]		11.07	6.83	1.94	122.172°W	37.786°N	92.96	2.
Hayward (No) [2]		9.78	6.98	1.81	122.239°W	37.865°N	30.30	1.
Calaveras (No) [0]		22.51	7.24	2.25	122.049°W	37.842°N	75.24	1.
San Gregorio (North) [4]		27.80	7.76	2.16	122.594°W	37.711°N	251.42	1.
Hayward (So) [6]		16.01	6.78	2.31	122.129°W	37.735°N	113.12	1.0
JC33brAvg_FM31 (opt)	Grid							4.2
PointSourceFinite: -122.294, 37.805		5.06	5.83	1.85	122.294°W	37.805°N	0.00	1.0
PointSourceFinite: -122.294, 37.805		5.06	5.83	1.85	122.294°W	37.805°N	0.00	1.0
JC33brAvg_FM32 (opt)	Grid							4.
PointSourceFinite: -122.294, 37.805		5.06	5.84	1.84	122.294°W	37.805°N	0.00	1.0
PointSourceFinite: -122.294, 37.805		5.06	5.84	1.84	122.294°W	37.805°N	0.00	1.0

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the <u>U.S. Seismic Design Maps web tools</u> (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

∧ Input	
Edition Dynamic: Conterminous U.S. 2014 (u	Spectral Period 1.00 Second Spectral Acceleration
Latitude Decimal degrees 37.79105	Time Horizon Return period in years 2475
Longitude Decimal degrees, negative values for western longitudes -122.294051	
Site Class 259 m/s (Site class D)	





Summary statistics for, Deaggregation: Total

Return period: 2970.4507 yrs Exceedance rate: 0.00033664925 yr ⁻¹
Mean (over all sources)
m: 7.34
r: 13.39 km
ε.: 1.75 σ
Mode (largest m-r-ɛ₀ bin)
m: 7.51
r: 8.74 km
ε.: 1.3 σ
Contribution: 11.29 %
Epsilon keys
ε0: [-∞2.5)
ε1: [-2.52.0)
ε2: [-2.01.5)
ε3: [-1.51.0)
ε4: [-1.00.5)
ε5: [-0.50.0)
ε6: [0.00.5)
ε7: [0.51.0)
ɛ8: [1.01.5)
ε9: [1.52.0) ε10: [2.02.5)
ɛ11: [2.5 +∞]

Deaggregation Contributors

Source Set 💪 Source	Туре	r	m	ε ₀	lon	lat	az	%
UC33brAvg_FM32	System							48.0
Hayward (No) [0]		8.65	7.28	1.51	122.207°W	37.824°N	64.08	25.6
San Andreas (Peninsula) [11]		22.13	7.94	1.93	122.488°W	37.664°N	230.41	9.5
Hayward (So) [7]		11.07	6.83	1.99	122.172°W	37.786°N	92.96	2.3
Hayward (No) [1]		8.77	7.06	1.67	122.212°W	37.832°N	58.10	1.98
Hayward (No) [2]		9.78	7.00	1.81	122.239°W	37.865°N	30.30	1.7
San Gregorio (North) [4]		27.80	7.78	2.23	122.594°W	37.711°N	251.42	1.2
Calaveras (No) [0]		22.51	7.29	2.35	122.049°W	37.842°N	75.24	1.2
UC33brAvg_FM31	System							47.2
Hayward (No) [1]		8.82	7.26	1.53	122.212°W	37.832°N	58.10	26.8
San Andreas (Peninsula) [11]		22.13	7.94	1.93	122.488°W	37.664°N	230.41	9.4
Hayward (So) [7]		11.07	6.84	1.98	122.172°W	37.786°N	92.96	2.4
Hayward (No) [2]		9.78	7.02	1.79	122.239°W	37.865°N	30.30	1.7
Calaveras (No) [0]		22.51	7.29	2.35	122.049°W	37.842°N	75.24	1.2
San Gregorio (North) [4]		27.80	7.77	2.23	122.594°W	37.711°N	251.42	1.2
UC33brAvg_FM31 (opt)	Grid							2.3
UC33brAvg_FM32 (opt)	Grid							2.3

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the <u>U.S. Seismic Design Maps web tools</u> (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

∧ Input	
Edition Dynamic: Conterminous U.S. 2014 (u	Spectral Period 2.00 Second Spectral Acceleration
Latitude Decimal degrees 37.79105	Time Horizon Return period in years 2475
Longitude Decimal degrees, negative values for western longitudes -122.294051	
Site Class 259 m/s (Site class D)	





Component



Summary statistics for, Deaggregation: Total

Deaggregation targets	Recovered targets					
Return period: 2475 yrs	Return period: 2867.1112 yrs					
Exceedance rate: 0.0004040404 yr ⁻¹	Exceedance rate: $0.00034878312 \text{ yr}^{-1}$					
2.0 s SA ground motion: 0.84039399 g						
Totals	Mean (over all sources)					
Binned: 100 %	m: 7.46					
Residual: 0 %	r: 14.01 km					
Trace: 0.09 %	ε.: 1.7 σ					
Mode (largest m-r bin)	Mode (largest m-r-ε₀ bin)					
m: 7.51	m: 7.51					
r: 8.94 km	r: 8.74 km					
ε ₀ : 1.35 σ	ε ₀ : 1.33 σ					
Contribution: 19.12 %	Contribution: 18.7 %					
Discretization	Epsilon keys					
r: min = 0.0, max = 1000.0, ∆ = 20.0 km	ε0: [-∞2.5)					
m: min = 4.4, max = 9.4, Δ = 0.2	ε1: [-2.52.0)					
ε: min = -3.0, max = 3.0, Δ = 0.5 σ	ε2: [-2.01.5)					
	ε3: [-1.51.0)					
	ε4: [-1.00.5)					
	ε5: [-0.50.0)					
	ε6: [0.00.5)					
	ε7: [0.51.0) ε8: [1.01.5)					
	εθ: [1.0 1.5) εθ: [1.5 2.0)					
	ε10: [2.02.5]					
	ε11: [2.5+∞]					

Deaggregation Contributors

Source Set 💪 Source	Туре	r	m	٤ ₀	lon	lat	az	%
UC33brAvg_FM32	System							49.2
Hayward (No) [0]		8.65	7.32	1.47	122.207°W	37.824°N	64.08	25.8
San Andreas (Peninsula) [11]		22.13	7.97	1.83	122.488°W	37.664°N	230.41	12.1
Hayward (No) [1]		8.77	7.12	1.65	122.212°W	37.832°N	58.10	1.7
Hayward (So) [7]		11.07	6.87	2.05	122.172°W	37.786°N	92.96	1.7
Hayward (No) [2]		9.78	7.07	1.80	122.239°W	37.865°N	30.30	1.4
San Gregorio (North) [4]		27.80	7.79	2.20	122.594°W	37.711°N	251.42	1.4
Calaveras (No) [0]		22.51	7.37	2.33	122.049°W	37.842°N	75.24	1.0
UC33brAvg_FM31	System							48.4
Hayward (No) [1]		8.82	7.31	1.49	122.212°W	37.832°N	58.10	26.7
San Andreas (Peninsula) [11]		22.13	7.97	1.83	122.488°W	37.664°N	230.41	12.0
Hayward (So) [7]		11.07	6.88	2.04	122.172°W	37.786°N	92.96	1.8
Hayward (No) [2]		9.78	7.08	1.78	122.239°W	37.865°N	30.30	1.5
San Gregorio (North) [4]		27.80	7.78	2.20	122.594°W	37.711°N	251.42	1.4
Calaveras (No) [0]		22.51	7.36	2.34	122.049°W	37.842°N	75.24	1.0
UC33brAvg_FM31 (opt)	Grid							1.1
UC33brAvg_FM32 (opt)	Grid							1.1



APPENDIX B

Amplification Ratios

19542.000.001 January 14, 2022





Offshore Non-Liquefiable Profile CLE Scenario





Onshore Non-Liquefiable Profile CLE Scenario





Onshore Liquefiable Profile CLE Scenario





Offshore Non-Liquefiable Profile OLE Scenario





Onshore Non-Liquefiable Profile OLE Scenario





Onshore Liquefiable Profile OLE Scenario





Offshore Non-Liquefiable Profile DE Scenario





Onshore Non-Liquefiable Profile DE Scenario





Onshore Liquefiable Profile MCE_R Scenario



APPENDIX D

LIQUEFACTION ANALYSIS

OLE: IDRISS & BOULANGER

LIQUEFACTION ANALYSIS REPORT

Project title : Alameda Main St Ferry Terminal

Location : Alameda, CA





CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:43:37 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:43:37 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:43:37 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

OLE: ROBERTSON

LIQUEFACTION ANALYSIS REPORT

Project title : Alameda Main St Ferry Terminal

Location : Alameda, CA



Input parameters and analysis data



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:44:05 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:44:05 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq CPT name: 1-sCPT02



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:44:05 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

OLE: Idriss & Boulanger

OLE: Robertson





CLE: IDRISS & BOULANGER

LIQUEFACTION ANALYSIS REPORT

Project title : Alameda Main St Ferry Terminal

Location : Alameda, CA





CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:42:16 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:42:16 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq 2



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:42:16 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

CLE: ROBERTSON ENGEC

LIQUEFACTION ANALYSIS REPORT

Project title : Alameda Main St Ferry Terminal

Location : Alameda, CA







CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:41:13 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq


CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:41:13 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq 2



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:41:13 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

CLE: Idriss & Boulanger







MCER: IDRISS & BOULANGER

LIQUEFACTION ANALYSIS REPORT

Project title : Alameda Main St Ferry Terminal

Location : Alameda, CA





CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:45:50 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

brittleness/sensitivity, strain to peak undrained strength and ground geometry



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:45:50 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq 2



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:45:50 PM Project file: G:\Active Projects_18000 to 19999\19542\19542000001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

MCER: ROBERTSON

LIQUEFACTION ANALYSIS REPORT

Project title : Alameda Main St Ferry Terminal

Location : Alameda, CA



Input parameters and analysis data



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:46:58 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:46:58 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq CPT name: 1-sCPT02



CLiq v.3.3.3.4 - CPT Liquefaction Assessment Software - Report created on: 1/12/2022, 4:46:58 PM Project file: G:\Active Projects_18000 to 19999\19542\1954200001\Analysis\Liquefaction\Alameda Ferry Terminal - CLE.clq

MCE_R: Idriss & Boulanger

MCE_R: Robertson







APPENDIX E

SLOPE STABILITY ANALYSIS

STATIC ANALYSIS



K_Y ANALYSIS: DE SCENARIO



K_Y ANALYSIS: OLE SCENARIO



K_Y ANALYSIS: CLE SCENARIO



K_Y ANALYSIS: FAILURE THROUGH LIQUEFIED MATERIAL



POST-LIQUEFACTION FLOW ANALYSIS



POST-LIQUEFACTION FLOW ANALYSIS: FAILURE THROUGH LIQUEFIED MATERIAL

-	Safety Factor 0.0 0.3											
300	0.5		Material Name	Color	Unit Weight (Ibs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Cohesion Change (psf/ft)	Datum (ft)
-	1.0 1.3 1.5		Fill		120	120	Mohr- Coulomb	0	32			
	1.8		YBM - Onshore		65	100	Undrained	550		FDepth	16	
-	2.3		San Antonio Formation		125	125	Mohr- Coulomb	0	35			
200	2.8		YBM - Offshore		65	100	Undrained	100		FDatum	13	0
Ñ	3.3		Liquefied fill		120	120	Undrained	200		Constant		
- 100	4.0 4.3 4.5 4.8 5.0 5.3 5.5 5.8 6.0+	W •										
-100	400	500	600		700	800		900	1 1 1 1	1000	1100	
	400	500 Projec			100					1000	1100	
1						Alameda Ma	ain Street F	erry Term	inai			
	ENG		sis Description			Pos	t-liquefactio					
			zed by		ТК		Compa			ENC		
	NTERPRET 9.020	Date			1/12/22		File Na	ome	Section	A - Post-liqu	uefaction Flow.slm	d



APPENDIX F

VERTICAL PILE CAPACITY ANALYSIS

48-inch Monopile



Allowable Axial Capacity (kips)



Allowable Axial Capacity (kips)

24-inch Shore-side Piles



APPENDIX G

LATERAL PILE ANALYSIS: SOIL SPRINGS

Section	Monopile - 48" Diameter											
Upper Bound												
Material	Depth Below Mudline (ft.)	Elevation (MLLW ft.)	P0 (lbs/in)	Y0 (in)	P1 (lbs/in)	Y1 (in)	P2 (lbs/in)	Y2 (in)	P3 (lbs/in)	Y3 (in)	P4 (lbs/in)	Y4 (in)
YBM	0.1	-20.1	0	0	185	1.23	309	5.69	463	19.20	463	20.40
YBM	61.9	-81.9	0	0	1757	1.23	3221	7.57	4392	19.20	4392	20.40
San Antonio	62.1	-82.1	0	0	26821	0.40	37511	0.81	40673	1.51	40747	1.61
San Antonio	107.0	-127.0	0	0	64005	0.56	89513	1.12	97060	2.09	97235	2.23

Section	Monopile - 48" Diameter											
Lower Bound												
Material	Depth Below Mudline (ft.)	Elevation (MLLW ft.)	P0 (lbs/in)	Y0 (in)	P1 (lbs/in)	Y1 (in)	P2 (lbs/in)	Y2 (in)	P3 (lbs/in)	Y3 (in)	P4 (lbs/in)	Y4 (in)
YBM	0.1	-20.1	0	0	119	1.23	198	5.69	296	19.20	296	20.40
YBM	61.9	-81.9	0	0	1124	1.23	2061	7.57	2811	19.20	2811	20.40
San Antonio	62.1	-82.1	0	0	17166	0.40	24007	0.81	26031	1.51	26078	1.61
San Antonio	107.0	-127.0	0	0	40963	0.56	57288	1.12	62119	2.09	62230	2.23



Section Shoreside-24" Diameter

Oppor Dourid												
Material	Depth Below Grade (ft.)	Elevation (MLLW ft.)	P0 (lbs/in)	Y0 (in)	P1 (lbs/in)	Y1 (in)	P2 (lbs/in)	Y2 (in)	P3 (lbs/in)	Y3 (in)	P4 (lbs/in)	Y4 (in)
Artificial Fill (Non-liquefiable)	0.1	12.4	0	0	15	0.14	20	0.25	22	0.46	23	0.57
Artificial Fill (Non-liquefiable)	4.9	7.6	0	0	2474	0.22	3318	0.38	3673	0.60	3758	0.87
Artificial Fill (Liquefiable)	5.1	7.4	0	0	52	0.20	126	0.41	239	0.68	398	1.07
Artificial Fill (Liquefiable)	9.9	2.6	0	0	58	0.13	134	0.26	245	0.44	398	0.69
YBM	10.1	2.4	0	0	345	0.36	621	2.07	1034	9.60	1034	10.20
YBM	91.9	-79.4	0	0	1103	0.36	1985	2.07	3308	9.60	3308	10.20
San Antonio	92.1	-79.6	0	0	26685	0.27	37320	0.55	40466	1.02	40539	1.09
San Antonio	100.0	-87.5	0	0	30370	0.28	42473	0.57	46055	1.06	46137	1.13

Section	Shoreside-24" Diameter											
Lower Bound												
Material	Depth Below Grade (ft.)	Elevation (MLLW ft.)	P0 (lbs/in)	Y0 (in)	P1 (lbs/in)	Y1 (in)	P2 (lbs/in)	Y2 (in)	P3 (lbs/in)	Y3 (in)	P4 (lbs/in)	Y4 (in)
Artificial Fill (Non-liquefiable)	0.1	12.4	0	0	10	0.14	13	0.25	14	0.46	14	0.57
Artificial Fill (Non-liquefiable)	4.9	7.6	0	0	1583	0.22	2124	0.38	2351	0.60	2405	0.87
Artificial Fill (Liquefiable)	5.1	7.4	0	0	34	0.20	80	0.41	153	0.68	255	1.07
Artificial Fill (Liquefiable)	9.9	2.6	0	0	37	0.13	85	0.26	157	0.44	255	0.69
YBM	10.1	2.4	0	0	221	0.36	397	2.07	662	9.60	662	10.20
YBM	91.9	-79.4	0	0	706	0.36	1270	2.07	2117	9.60	2117	10.20
San Antonio	92.1	-79.6	0	0	17078	0.27	23884	0.55	25898	1.02	25945	1.09
San Antonio	100.0	-87.5	0	0	19437	0.28	27183	0.57	29475	1.06	29528	1.13





APPENDIX H

LATERAL PILE ANALYSIS: RESPONSE

Monopile response under lateral soil movement







Shore-side pile response under lateral soil movement







Float pile response under lateral loading







Donut pile response under lateral loading










Appendix E Hydroacoustic Assessment

ALAMEDA MAIN STREET FERRY TERMINAL REFURBISHMENT PROJECT HYDROACOUSTIC ASSESSMENT

Alameda, California

November 1, 2022

Prepared for:

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Prepared by:

Adwait Ambaskar James Reyff

ILLINGWORTH & RODKIN, INC.

Acoustics • Air Quality 429 East Cotati Avenue Cotati, CA 94931 (707) 794-0400

I&R Job No.: 22-105

EXECUTIVE SUMMARY

This report summarizes the results of an acoustic assessment performed to evaluate the effects of construction activity noise on aquatic species. The construction activities for the refurbishment of the Alameda Main Street (AMS) Ferry Terminal includes replacement of the terminal bridge and foundation, gangway replacement, float demolition and replacement, and utility upgrades. The purpose of this assessment is to predict construction noise levels that may occur during the project so that permitting regulatory agencies can address concerns and answer questions raised about the potential project effects on sensitive habitat and aquatic species. The assessment focuses on predicting underwater noise levels from pile-driving activities. Because the design and construction details are preliminary at this time, an analysis that predicts conditions that are expected to cause reasonably worst-case acoustic conditions were analyzed. Under this worst-case scenario, piles would be driven using both vibratory and impact hammers. Note that impact pile driving would only occur if vibratory driving were not able to install piles to their tip elevation. Results of this assessment are summarized as follows:

- 48-inch-diameter steel pipe pile (Monopile): Impact pile driving of these piles in water could cause acoustic impacts at distances extending out to 4,200 meters (m) and 1,010 m for the root-mean-square (RMS) (150 decibel [dB] re 1 micropascal [μPa]) and Cumulative sound exposure level (SEL) (187 dB re 1μPa²-sec) respectively for the adopted fish thresholds. Note that sounds would travel further to the west. Distances where sound levels exceed the marine mammal thresholds could extend out to about 997 m for the Level A Injury Zone for Pinnipeds while extending out to about 4,200 m for the Level B Harassment Zones. Vibratory driving of these piles would result in impact distances extending out to 158 m for the RMS (150 dB re 1μPa) adopted fish threshold, while resulting in Level B Harassment Zones of extending out to the mouth of the Middle Harbor at 4,200 m for the marine mammal thresholds. Use of attenuation methods (e.g., air bubble curtains), would reduce these distances.
- 36-inch steel pipe pile (guide piles & donut fender piles): Impact driving of these piles in water could result in sounds above thresholds extending out to the mouth of the Middle harbor at 4,200 m and 1,166 m for the RMS (150 dB re 1µPa) and Cumulative SEL (187 dB re 1µPa²-sec) respectively for the adopted fish thresholds. Distances where sound levels exceed the marine mammal thresholds could extend out to about 1,311 m for the Level A Injury Zone for Pinnipeds while extending out to about 1,848 m for the Level B Harassment Zones. Vibratory driving of these piles would result in impact distances extending out to 117 m for the RMS (150 dB re 1µPa) adopted fish threshold, while resulting in Level B Harassment Zones of extending out to 4,200 m for the marine mammal thresholds. Use of attenuation methods (e.g., air bubble curtains), would reduce these distances.
- **24-inch steel pipe pile:** These piles would be driven on land, which could result in impact distances extending out to 736 m and 64 m for the RMS (150 dB re 1µPa) and Cumulative

SEL (187 dB re 1μ Pa²-sec) respectively for the adopted fish thresholds. Distances where sound levels exceed the marine mammal thresholds could extend out to about 63 m for the Level A Injury Zone for Pinnipeds while extending out to about 158 m for the Level B Harassment Zones. Vibratory driving of these piles would result in impact distances extending out to 5 m for the RMS (150 dB re 1μ Pa) adopted fish threshold, while resulting in Level B Harassment Zones of extending out to 541 m for the marine mammal thresholds.

Note, the maximum anticipated distances to various fish and marine mammal thresholds calculated for each type of pile using NMFS guidelines, are constrained by bends in the Oakland Estuary and relatively shallow water bathymetry near the edge of the shipping channel ~ 4,200 m to the west of the ferry terminal site and ~1,700 m to the east. Substantial noise from piling activity is not anticipated to propagate past these bends. The computed distances for vibratory driving using the standard attenuation rate (15 Log of the distance) are 11.6 to 15.8 km, which extend beyond the harbor mouth. However, measurements in the Bay have shown greater attenuation rates of 18 Log of the distance that reduce this distance to 3.6 to 4.6 km. Given this higher attenuation rate and the narrow channel that sound would propagate, sounds above the threshold would not extend beyond the Middle Harbor.

Attachment A depicts the areas where sound effects above thresholds are predicted.

INTRODUCTION

The San Francisco Bay Area Water Emergency Transportation Authority (WETA) is proposing the Alameda Main Street (AMS) Ferry Terminal Refurbishment Project (project) to support WETA ferry operations within the Oakland Inner Harbor.

The project site is located at 2990 Main Street in Alameda (City), California and includes the existing AMS Ferry Terminal, which consists of a trestle, steel float structure, aluminum gangway, and bridge structure. The site is designated under the General and Maritime Industry land use and zoned as General Industrial (M-2). Much of the project site is within the Oakland Inner Harbor, with a portion of the bridge structure extending onto the landside of the City. The landside of the project site consists of various bay rocks, rip-rap, and dirt/sand. The project site is accessible by vehicle via Main Street and by ferry within the Oakland Inner Harbor. The project is within a developed area of the City and is bounded by the Oakland Inner Harbor to the north, industrial uses to the east, the San Francisco Bay Trail, AMS Ferry Terminal parking lot, and residential uses to the south, as well as the Main Street Dog Park and undeveloped land uses to the east.

Project elements would include replacement of the existing bridge walkway and foundation, and replacement of the gangway, float, guide piles, and upgrades to utilities at the project site. All project features would be compliant with Americans with Disabilities Act (ADA) standards. These details rely on project plans and are further described, below.

Terminal Bridge and Foundation Replacement. Project activities would involve demolishment of existing bridge/walkway and bridge foundation and replacement with a new aluminum truss bridge. Onshore and landside support would be installed and would consist of a 48-inch (in) monopile and two 24-in pipe piles with cap beams, respectively.

Gangway Replacement. The project would include removal of the existing 60-foot gangway and replacement with an 80-foot covered aluminum gangway.

Float Demolition/Replacement. The existing terminal float would be removed and replaced-inkind with a new steel float. Ramps that had been previously installed on the float would be removed, protected in place, and reused once the new float is installed. Float ramps would be shifted to the west to provide additional room for a longer gangway. The four (4) existing 30-foot guide piles would be removed and replaced with four (4) new 36-in guide piles. To achieve a more safe, efficient berthing capacity and enable ingress and egress in a timely manner, float demolition/replacement activities would also involve installation of two (2) new 36-in steel pipe piles and two (2) 72-in donut fender piles.

Utility Upgrades. Utility upgrades associated with the project would involve replacement of existing razor equipment, installation of electrical service for replacement lighting, ramp controls, and outlets and a new potable water line. The new potable water line will connect to an existing line at the Ferry Terminal restroom facility. The new line will be used for intermittent terminal cleaning activities as needed. No other utility improvements are planned. The bridge, gangway, and float structures are designed to accommodate additional conduit related to an electric shorepower system that is to be constructed in the future as part of a separate project. The

shorepower system will allow for charging of electric ferry vessels that will berth at AMS Ferry Terminal.

Overall, the footprint of the project site is expected to increase the AMS Ferry Terminal shade area by approximately 830 square feet. No changes in operational demand (i.e., an increase in ferry users) are anticipated, and no physical impacts beyond the project boundaries (see Figure 2) are anticipated as part of the project. Vehicular and pedestrian access to the AMS Ferry Terminal is not anticipated to change.

The water depth at the project site varies between 14-in to 28-in mean lower low water (MLLW). Most construction activities will occur above or at the waterline. The only elements that will extend below the mudline are the new piles that will have a maximum tip elevation of approximately 110-in MLLW.

This study is an assessment of potential underwater noise levels generated by planned construction activities involved with the refurbishment of the AMS Ferry Terminal. The study was requested in order to aid regulatory biologists in assessing underwater sound impacts on fish and marine species that may be present in the area when construction occurs. This assessment is based on information provided by project designers consisting of a location map, draft layout sheets, estimated pile-driving data, a review of potential construction activities to be conducted at the site, a review of related studies, the modeling, and a semi-quantitative analysis of underwater noise levels. This study assesses the sound levels associated with potential pile-driving activities that could affect aquatic species. This study does not address environmental impacts associated with the project.

UNDERWATER SOUNDS FROM PILE-DRIVING ACTIVITIES

Fundamentals of Underwater Noise

Impact pile driving can produce high underwater sound levels. When a pile-driving hammer strikes a pile, a pulse is created that propagates through the pile and radiates sound into the water, the ground, and the air. Sound pressure pulse as a function of time is referred to as the waveform. In terms of acoustics, these sounds are described by the peak pressure, the root-mean-square (RMS) pressure, and the sound exposure level (SEL). The peak pressure is the highest absolute value of the measured waveform and can be a negative or positive pressure peak. For pile-driving pulses, RMS level is determined by analyzing the waveform and computing the average of the squared pressures over the time that comprises that portion of the waveform containing the sound energy (Richardson et al. 1995; ISO 18406:2017(E).). The pulse RMS has been approximated in the field for pile-driving sounds by measuring the signal with a precision sound level meter set to the "impulse" RMS setting and is typically used to assess impacts to marine mammals. Another measure of the pressure waveform that can be used to describe the pulse is the sound energy itself. The total sound energy in the pulse is referred to in many ways, most commonly as the "total energy flux" (Finerran 2002). The "total energy flux" is equivalent to the un-weighted SEL for a plane wave propagating in a free field, a common unit of sound energy used in airborne acoustics to describe short-duration events. The unit used is decibels (dB) re 1 micropascal $(\mu Pa)^2$ -second

(sec). In this report, peak pressure levels are expressed as the absolute maximum pressure of a pulse in dB re 1 μ Pa; however, in other literature, peak pressure levels can take varying forms, such as pascals or pounds per square inch. The total sound energy in an impulse accumulates over the duration of that pulse and the duration of a pile driving event. Figure 1 illustrates the acoustical characteristics of an underwater pile-driving pulse. Table 1 includes the definitions of terms commonly used to describe underwater sounds.

The variation of instantaneous pressure over the duration of a sound event is referred to as the waveform. The waveform can provide an indication of rise time or the rapidity with which pressure fluctuates with time; however, rise time differences are not clearly apparent for pile-driving sounds because of the numerous rapid fluctuations that are characteristic of this impulse type. A plot showing the accumulation of sound energy over the duration of the pulse (or at least the portion of time during which much of the energy accumulates) illustrates the differences in source strength and rise time. An example of the underwater acoustical characteristics of a typical pile-driving pulse is shown on Figure 1.

SEL is an acoustic metric that provides an indication of the amount of acoustical energy contained in a sound event. For pile driving, the typical event can be one pile-driving pulse or many pulses, such as pile driving for one pile or for one day of pile driving. Typically, SEL is measured for a single strike and a cumulative condition. The cumulative SEL associated with the driving of a pile can be estimated using the single-strike SEL value and the number of pile strikes through the following equation:

$SEL_{cumulative} = SEL_{single-strike} + 10log(#of pile strikes)$

For example, if a single-strike SEL for a pile is 165 dB, and it takes 1,000 strikes to drive the pile, the cumulative SEL is 195 dBA (165 dB + 30 dB = 195 dB), where $10 * \text{Log}_{10}(1000) = 30$.

Term	Definition
Peak Sound Pressure, unweighted (dB)	Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure. This pressure is expressed in this report as a dB (referenced to a pressure of 1 μ Pa) but can also be expressed in units of pressure, such as μ Pa or pounds per square inch.
RMS Sound Pressure Level, (NMFS Criterion) dB re 1 µPa	The squared root of the average of the squared pressures over the time that comprises that portion of the waveform containing 90 percent of the sound energy for one pile-driving impulse. ¹ This measure is typically used to assess acoustical impacts on marine mammals.

TABLE 1Definition of Underwater Acoustical Terms

¹ The underwater sound measurement results obtained during a Pile Installation Demonstration Project indicated that most pile-driving impulses occurred over a 50- to 100-msec period. Most of the energy was contained in the first 30 to 50 msec. Analysis of that underwater acoustic data for various pile strikes at various distances demonstrated that the acoustic signal measured using the standard "impulse exponential-time-weighting" (35-msec rise time) correlated to the RMS (impulse) used by NMFS.

Notes: msec = millisecond(s)

NMFS = National Marine Fisheries Service

SEL, dB re 1 µPa ² -sec	Proportionally equivalent to the time integral of the squared pressure and is described in this report in terms of dB re 1 μ Pa ² -sec over the duration of the impulse. Similar to the unweighted SEL standardized in airborne acoustics to study noise from single events.
Cumulative SEL	Measure of the total energy received through a pile-driving event (here defined as pile driving that occurs within a day).
Waveforms, µPa over time	A graphical plot illustrating the time history of positive and negative sound pressures of individual pile strikes shown as a plot of μ Pa over time (i.e., seconds).
Frequency Spectra, dB over frequency range	A graphical plot illustrating the distribution of sound pressure vs. frequency for a waveform; dimension in RMS pressure and defined frequency bandwidth.



FIGURE 1 Underwater Acoustical Characteristics of a Pile-driving Pulse

Underwater Sound Thresholds

Fish

In 2008, NOAA's NMFS; U.S. Fish and Wildlife Service; California, Oregon, and Washington Departments of Transportation; California Department of Fish and Game; and the U.S. Federal Highway Administration agreed in principle to interim criteria to protect fish from pile-driving activities. The agreed-upon criteria are presented in Table 2.

TABLE 2Adopted Fish Criteria

Interim Criteria for Injury	Sound Levels Agreed-upon in Principle
Peak	206 dB re 1 µPa (for all sizes of fish)
Cumulative SEL	187 dB re 1 μ Pa ² -sec – for fish size of 2 grams or greater ^a 183 dB re 1 μ Pa ² -sec – for fish size of less than 2 grams ^a

^a Applies to pile strikes of 150 dB SEL (single strike) or greater.

The adopted criteria listed in Table 2 are for pulse-type sounds (e.g., impact pile driving) and do not address sound from vibratory driving. The SEL criteria are not applied to vibratory driving sounds. The in-water areas with project sound levels above 150 dB RMS are considered by NMFS to be acoustically affected given possible behavioral changes in fish; however, these levels are not anticipated to trigger any mitigation requirements (Caltrans 2020).

Marine Mammals

Under the Marine Mammal Protection Act, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild" (NMFS 2018). Level B harassment is defined as "any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to migration, breathing, nursing, breeding, feeding or sheltering" (NMFS 2018).

Table 3 outlines the current adopted Level A and Level B (behavioral harassment) criteria. The application of the 120-dB RMS threshold for vibratory pile driving can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. For continuous sounds, NMFS Northwest Region has provided guidance for reporting RMS sound pressure levels. RMS levels are based on a time-constant of 10 seconds; RMS levels should be averaged across the entire event. For impact pile driving, the overall RMS level should be characterized by integrating sound for each acoustic pulse across 90 percent of the acoustic energy in each pulse and averaging all the RMS levels for all pulses.

NMFS has provided marine mammal acoustic technical guidance for predicting the onset of permanent threshold shift (PTS) and temporary threshold shifts in marine mammal hearing from sound sources (NMFS 2018). For this project location, the functional hearing groups are expected to be limited to phocid pinnipeds (harbor seals), and otariid pinnipeds (California sea lions). For impact pile driving, the majority of the acoustic energy is confined to frequencies below 2 kilohertz (kHz), and there is very little energy above 20 kHz. Similarly, much of the acoustic energy for vibratory driving is in the frequency range below 2.5 kHz. The underwater acoustic criteria for phocid and otariid pinnipeds are provided in Table 3. Table 4 lists the functional hearing groups and their hearing ranges as defined by the NMFS guidance (NMFS 2018).

	Underwater Noise Thresholds (dB re 1 µPa)								
	Vibratory	ratory Impact		PTS SEL _{cum} Threshold					
	Pile-driving	Pile-driving	Marine Mammal	Peak – dB re 1 µPa					
Species	Disturbance	Disturbance	Hearing	$SEL_{cum} - dB$	re 1 µPa ² -sec				
	Threshold	Threshold	Group (see	Impulsive	Non-Impulsive				
	(Level B	(Level B	Table 4)	(Impact Pile	(Vibratory Pile				
	Harassment)	Harassment)		Driving)	Driving)				
			Phocid	218 dB Peak	201 dB SEL _{cum}				
Pinnipeds	Pinnipeds 120 dB RMS 160 dB R		THOCIG	185 dB SEL _{cum}	201 ub SELcum				
Timpeds	120 uD KWIS) dB RMS 160 dB RMS		232 dB Peak	219 dB SEL _{cum}				
			Otariid	203 dB SEL _{cum}	219 UD SELcum				

 TABLE 3
 Underwater Acoustic Criteria for Pinnipeds

TABLE 4Definition of Marine Mammal Hearing Group for Pinnipeds

Marine Mammal Hearing Groups							
Functional Hearing Group	Functional Hearing Range						
Phocid Pinnipeds – true seals, including harbor seals	50 Hz to 86 kHz						
Otariid Pinnipeds – sea lions and fur seals	60 Hz to 39 kHz						
	00 HZ to 39 KHZ						

Note: Hz = hertz

PROJECT UNDERWATER SOUND-GENERATING ACTIVITIES

The primary type of activity that has the potential to elevate underwater noise levels is the installation of piles using an impact pile driver. For this project however, vibratory driving is expected to be used for majority of the pile installation with the possibility of using an impact hammer if piles hit refusal prior to the required tip elevation. Pile installation activities for the project include installation of a single (1) 48-inch steel pipe monopile in water for the terminal bridge along with two (2) 24-inch steel pipe piles with concrete cap beams on land. The project also involves installation of four (4) 36-inch guide piles and two (2) 36-inch donut fender piles in water for the terminal float.

Pile driving in the water causes sound energy to radiate directly into the water by vibrating the pile between the surface of the water and the riverbed, and indirectly as a result of ground-borne vibration at the riverbed. Airborne sound does not make a substantial contribution to underwater sound levels because of the attenuation of sound at the air/water interface. Pile driving on land would generate low-frequency ground-borne vibration that could cause localized sound pressures in the water that are radiated from the streambed. A minimum water depth is required to allow sound to propagate. For pile-driving sounds, the minimum depth is 1 m (3 feet). Pile-driving activities conducted on land near water bodies have been found to transmit low-frequency sound into the water. The mechanisms for transmitting this sound into the water are complex and difficult, if not impossible, to predict.

Table 5 summarizes the proposed pile-driving activities, the number of piles anticipated per day, and the duration of the pile driving activity for vibratory driving.

New Structure	Pile Type	Pile Location	Duration/Estimated Blows per Pile ¹	Piles per Day
Terminal Bridge and Foundation Replacement	48-inch steel pipe	In Water	45 mins vibrate 1,015 strikes impact	1
Terminal Bridge and Foundation Replacement	24-inch steel pipe	On Land	45 mins vibrate 1,015 strikes impact	2
Float Replacement (Guide piles & Donut Fender piles)	36-inch steel pipe	In Water	45 mins vibrate 1,015 strikes impact	6

TABLE 5Pile-driving Activities for the Proposed Project

¹Impact driving if needed, assumes about 20 to 30 minutes of driving with a total of about 1,015 strikes per pile.

Predicted Underwater Sound Levels from Construction

This assessment predicts underwater sound levels associated with the different piling activities that are anticipated. Piling activities include the impact and/or vibratory installation of steel piles. The prediction of sound levels associated with this activity are based on measurements from similar activities.

The prediction of sound levels from pile-driving activities proposed for this project relies on data collected from other sites with similar conditions. The following studies were identified and used to aid in predicting underwater noise levels and calculating the distances to thresholds for fishes and marine mammals discussed in this report.

Underwater Sound Levels from Project Pile Driving

Data in the following studies were reviewed for the various pile-driving activities summarized in Table 6. The values in Table 6 are for sound levels measured at 10 m (33 feet) from the piles for conditions similar to those that would occur at this project. Detailed information on the measurements that make up these levels below are provided in the references.

D · · ·			Sound	Pressure I	Level in	
Driving Mothod	Pile Type	Size	dB re 1 µPa at 10 Meters			Notes
Method			Peak	RMS	SEL	
Impact	Steel pipe pile on land	24-inch	195	178	166	Assumed 15 dB lower than levels in water using data from Naval Base Kitsap, Bangor, WA
Impact	Steel pipe pile in water	36-inch	211	194	181	Naval Base Kitsap at Bangor Test Pile Program, Bangor, WA
Impact	Steel pipe pile in water	48-inch	215	200	187	Anchorage Port Modernization Program – Test Pile Program (POA 2016)
Vibrate	Steel pipe pile on land	24-inch	185	146	146	Assumed 15 dB lower than levels in water using data from Naval Base Kitsap, Bangor, WA
Vibrate	Steel pipe pile in water	36-inch	200	166	166	Naval Base Kitsap at Bangor Test Pile Program, Bangor, WA
Vibrate	Steel pipe pile in water	48-inch	200	168	168	Anchorage Port Modernization Program – Test Pile Program (POA 2016)

TABLE 6Measured Levels for Pile-driving Activities

Table 7 shows the predicted sound levels expected at 10-m (33-foot) distances from different piledriving activities expected from the project. Included are the unattenuated sound levels (peak, RMS, SEL) expected, also at 10 m (33 feet) from the piles. Table 7 also shows expected attenuated levels that correspond to a 5-dB reduction because of different attenuation mechanisms like bubble curtains or isolation casing that may be used during the in-water pile-driving activities. These levels, which have been taken from past projects, provide an estimate of the levels to be expected from the piledriving activities proposed for the project. Impacts on fishes and marine mammals are then calculated using these levels (both unattenuated and attenuated). No methods are available to further attenuate land-based pile-driving sounds.

Driving		G •	Sound	l Pressur		Aeasured i Meters	in dB re 1 µ	ıPa at 10
Method	Pile Type	Size	Unattenuated			Attenuated ^a		
			Peak	RMS	SEL	Peak	RMS	SEL
Impact	Steel pipe pile on land	24-inch	195	178	166		om piles driv be further att	
Impact	Steel pipe pile in water	36-inch	211	194	181	206	189	176
Impact	Steel pipe pile in water	48-inch	215	200	187	210	195	182
Vibrate	Steel pipe pile on land	24-inch	185	146	146		om piles driv be further att	
Vibrate	Steel pipe pile in water	36-inch	200	166	166		enuation expo vibrated pile	
Vibrate	Steel pipe pile in water	48-inch	200	168	168		enuation expo vibrated pile	

TABLE 7 Sound Levels Used for Predicting Underwater Sound Impacts

^a Attenuated condition assumes minimum 5-dB lower sounds.

Predicted Impacts on Fishes

Table 8 shows the anticipated distances (in meters and in feet) to the various adopted interim fish thresholds. Distances are shown for both unattenuated and attenuated piles (5-dB attenuation). Also, when the piles are installed with a vibratory hammer, the cumulative SEL thresholds for fish do not apply, and the 150-dB RMS level provides an estimated zone of possible acoustic effects. The distance to each threshold was computed using the transmission loss coefficient of 15 times the Log₁₀ of the distance, as recommended by NMFS when there is no site-specific information for the area. This attenuation rate was used in the computations; however, it should be noted that attenuation rates of 18 times the Log₁₀ of the distance were measured during pile driving for the San Francisco-Oakland Bay Bridge East Span project (Caltrans 2020)². Cumulative SEL was further computed by adding 10 times the Log₁₀ of the number of impact pile strikes. Impact strikes used in these computations are the sum of the anticipated strikes per pile times the number of piles per day.

Note that sound propagation in the Oakland Inner Harbor is limited by bends in the Oakland Estuary and relatively shallow water bathymetry near the shipping channel boundaries. Substantial sound is not anticipated to travel beyond 4,200 m to the west (out the shipping channel) and 1,700 m east of the project site (where the channel bends). Therefore, the distance for noise impacts from this project is limed to 4,200 m west and 1,700 m east under the worst-case conditions.

² Technical Guidance for Assessment of the Hydroacoustic Effects of Pile Driving on Fish, Chapter I.9 San Francisco-Oakland Bay Bridge East Span Replacement Project page I-229

Driving Method	Pile Type	Pile Piles No.		Estimated No. of Strikes		Distance to Adopted Fish Thresholds																			
Methou	турс		Day	per Pile		Peak	RMS	Cumula	tive SEL																
						206 dB ^b	150 dB ^b	187 dB ^c	183 dB ^c																
Impact	Steel pile on land	24-in	2	1,015°	Unattenuated	d	736 m [2,414 ft]	64 m [209 ft]	117 m [383 ft]																
	Steel pile				Unattenuated	22 m [71 <i>ft</i>]	4,200/1,700 ^g m [13,780/5,577 ft]	1,166 m [3,825 ft]	1,166 m [3,825 ft]																
Impact	in water	36-in	6	1,015 ^e	Attenuated	10 m [33 <i>ft</i>]	3,981/1,700 ^g m [13,061/5,577 ft]	541 m [1,775 ft]	541 m [1,775 ft]																
Income	Steel pile	40	1	1.0158	Unattenuated	40 m [131 ft]	4,200/1,700 ^g m [13,780/5,577 ft] ^g	1,010 m [3,314 ft]	1,866 m [6,123 ft]																
Impact	in water	48-in	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	48-1n	4 ð- 1n	1	1	1	1,015°	1 1,015 ^e	1,015	Attenuated	18 m [61 ft]	4,200/1,700 ^g m [13,780/5,577 ft]	469 m [1,538 ft]	866 m [2,842 ft]
Vibrate	Steel pile on land	24-in	2	^f	Unattenuated	d	5 m [18 ft]	N/A	N/A																
Vibrate	Steel pile in water	36-in	6	f	Unattenuated	d	117 m [383 ft]	N/A	N/A																
Vibrate	Steel pile in water	48-in	1	f	Unattenuated	d	158 m [520 ft]	N/A	N/A																

 TABLE 8
 Distance to Adopted Fish Thresholds for All Piles

^a Attenuated condition assumes 5-dB lower sounds.

^bdB re 1 μPa

° dB re 1 µPa²-sec

^d Within the near-field of the sound source - < 10 meters [33 feet]

^e Assuming impact hammer usage for 20-30 mins with about 1015 strikes per pile.

^f Piles vibrated in at 45 minutes each (2,700 sec.).

^gConstrained by bends in the Oakland Estuary and relatively shallow water bathymetry near the shipping channel, 4,200 m [13,780 ft] west and 1, 700 m [5,577 ft] east.

Predicted Impacts on Marine Mammals

The following threshold distances were computed to assess impacts on pinnipeds:

- Distance to onset PTS isopleth for each hearing group (considered Level A impacts)
 - o Unattenuated
 - o Attenuated
- Distance for unweighted 120-dB vibratory and 160-dB impulse behavior isopleth (considered Level B impacts)
 - o Unattenuated
 - o Attenuated

The Companion User Spreadsheet (Version 2.2 [2020]) to the *NMFS Technical Guidance for Assessing the Effects of Anthropogenic Noise on Marine Mammal Hearing* was used to predict zones where the onset of PTS to marine mammal hearing could occur. A spreading loss calculation is included in the spreadsheet to predict the distance to the onset PTS from accumulated SEL and peak sound pressure. The spreadsheet incorporates a frequency weighting function that accounts for sensitivity for different hearing groups when computing the accumulated SEL. These are

referred to as weighting frequency adjustments. The default weighting frequency adjustments are 2 kHz for impact pile driving and 2.5 kHz for vibratory driving. Because the onset of PTS based on SEL_{cum} is computed as further from the pile than it would be using peak sound pressure computations, the onset of PTS is based on SEL computations; therefore, the onset of PTS based on peak sound levels is not provided in this assessment.

The extent of the Level B Zone was calculated using the 10-meter (33-foot) sound levels and applying a transmission loss coefficient of 15 times the Log_{10} of the distance, as recommended by NMFS when there is no site-specific information for the area. Substantial sound is not expected to propagate outside the Middle Harbor because of the narrow propagation path westward combined with the higher sound attenuation rates that have been measured in the Bay (see Caltrans 2020)³.

Table 9 presents the anticipated distances to the adopted marine mammal thresholds (Level A and Level B Zones). When the piles are installed with a vibratory hammer, the cumulative SEL thresholds do not apply, and the peak PTS thresholds that apply to marine mammals will not be reached. Distances are shown for both unattenuated and attenuated pile-driving activities expected from the project, for the estimated number of strikes and piles per day proposed.

Attenuation Methods

Air bubble curtains, either confined or un-confined, have been shown to reduce sound pressure levels for pile driving in water by up to about 5 to 20 dB within 300 meters of the pile. However, in accordance with Caltrans guidance, only a 5-dB reduction was used for calculating the distances to the fish and marine mammal thresholds (Caltrans 2020). The amount of attenuation may be more, especially at distant locations from the pile because of the contribution of sound propagating through the bottom substrate. At the Benicia-Martinez Bridge and San Francisco-Oakland Bay Bridge projects (Caltrans 2020), more than 10 dB of sound reduction was obtained using bubble curtains. At the Humboldt Bay Seismic Retrofit Project, reductions of between 12 and 16 dB were achieved using either an unconfined bubble ring or a bubble ring in an isolation casing, with the best results being the unconfined bubble ring (Caltrans 2020).

The design of the specific bubble ring configuration will depend on several factors, such as the depth of water and the water current, and must be designed individually for each project and location within the project. Air bubble curtain systems are used during production pile driving to reduce underwater sound pressures. Typically, a system consists of stacked rings to generate air bubbles throughout the entire water column surrounding the piles, even with currents. A bubble curtain system is generally composed of air compressors, supply lines to deliver the air, distribution manifolds or headers, perforated aeration pipes, and a frame. The frame is used to facilitate transportation and placement of the system, keep the aeration pipes stable, and provide ballast to counteract the buoyancy of the aeration pipes during pile-driving operations. Bubble curtain designs consist of single or multiple concentric layers of perforated aeration pipes (stacked vertically). Pipes in any layer are arranged in a geometric pattern that allows the pile-driving operation to be completely enclosed by bubbles for the full depth of the water column. The lowest layer of perforated aeration pipe is designed to ensure contact with the mud line without sinking

³ Technical Guidance for Assessment of the Hydroacoustic Effects of Pile Driving on Fish, Chapter I.9 San Francisco-Oakland Bay Bridge East Span Replacement Project page I-229

into the bottom substrates. A proper combination of bubble density and closeness of bubbles to the pile is most effective. Numerous smaller bubbles are more effective because they displace more water between the bubbles. This pattern has to be maintained throughout the water column.

	The uniting field the stand b zones																			
Driving Method	Pile Type	Size	Piles per Day	Estimated No. of Strikes per		Level A Inj Using S Thres	EL _{cum} hold	Level B Harassment Zone												
			Day	Pile		Pinni	peds	Lone												
						Phocid	Otariid													
Impact	Steel pipe pile on land	24- inch	2	1,015°	Unattenuated	63 m [207 ft]	b	158 m [518 ft]												
Impact	Steel pipe pile	36-	6	1,015 ^e	Unattenuated	1,311 m [4,301 ft]	96 m [314 ft]	1,848/1,700 ^d m [6,061/5,577 ft]												
Impuer	in water	inch	0	1,015	Attenuated	609 m [1,998 ft]	44 m [144 ft]	858 m [2,815 ft]												
Impact	Steel pipe pile	48-	1	1.015 ^e	Unattenuated	997 m [3,271 ft]	73 m [239 ft]	4,200/1,700 ^d m [13,780/5,577 ft]												
Impact	in water	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	1	1,010	1,010	1,015	Attenuated	463 m [1,519 ft]	34 m [111 ft]	2,154/1,700 ^d m [7,067/5,577 ft]
Vibrate	Steel pipe pile on land	24- inch	2	c	Unattenuated	b	b	541 m [1,775 ft]												
Vibrate	Steel pipe pile in water	36- inch	6	¢	Unattenuated	24 m [78 ft]	b	4,200/1,700 ^d m [13,780/5,577 ft]												
Vibrate	Steel pipe pile in water	48- inch	1	¢	Unattenuated	10 m [33 ft]	b	4,200/1,700 ^d m [13,780/5,577 ft]												

TABLE 9Distance to the Adopted Marine Mammal Thresholds for Different
Pile-driving Activities – Level A and B Zones

^a Attenuated condition assumes 5-dB lower sounds.

 $^{\rm b}$ Within the near-field of the sound source - < 10 meters [33 feet]

^c Piles vibrated in at 45 minutes each.

^d Constrained by bends in the Oakland Estuary and relatively shallow water bathymetry near the shipping channel, 4,200 m [13,780 ft] west and 1, 700 m [5,577 ft] east.

Illustration of Impacts

Attachment A includes Google Earth maps displaying the extent of both fish injury zones and marine mammal Level A and B Zones around the proposed project site for the piles driven.

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Attachment A

Maps Illustrating the 187-dB Cumulative SELs, 206dB Peak Adopted Fish Injury Zones and Marine Mammal Level A and B Zones (Source: Google Earth 2022)



Figure A1 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 24-inch Steel pile on Land impact driven



Figure A2 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 36-inch Steel pile impact driven



Figure A3 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 48-inch monopile impact driven



Figure A4 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 24-inch Steel pile on Land driven using a vibratory hammer



Figure A5 – Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 36-inch Steel pile driven using a vibratory hammer



Figure A6– Fish Injury Zones – 206 dB Peak, 150 dB RMS and 187 SEL_{cum}; for 48-inch monopile driven using a vibratory hammer



Figure A7 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 24-inch Steel pile on Land impact driven



Figure A8 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 36-inch Steel pile impact driven



Figure A9 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 48-inch monopile impact driven



Figure A10 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 24-inch Steel pile on Land driven using a vibratory hammer



Figure A11 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 36-inch Steel pile driven using a vibratory hammer



Figure A12 – Marine Mammal Level A and B Zones – Phocid and Otariid Pinnipeds; for 48-inch monopile driven using a vibratory hammer

Appendix F Solid Waste Estimates

Total Description	Volume
Total CY for Steel Float	34.3
Total CY for Guide Piles	10.0
Total CY for Gangway	40.0
Total CY for Bridge Structure	60.0
Total CY for Bridge Structure Steel Support	5.0
Total CY for Approach Slab	13.0
Total CY for Electrical Mechanical	2.0
Total Overall Cubic Yards	164.3

		D	ebris Ge	eneratio	n for Perm	nits	
	QTY.	DIM	ENSION	IS	Maluma		
ITEM		Length	Width	Height	Volume	NOTES	
	EA	FT	FT	FT	(CY)		
STEEL FLOAT							
Тор	1	33.0	112.0	0.031	4.3	Keel is 3/8" thick	
Keel	1	33.0	112.0	0.031	4.3	Base is 3/8" thick	
Outer Walls							
North/South	2	112.0	0.03	5.9	1.5	Walls are 3/8" thick	
East/West	2	33.0	0.03	5.9	1.0	Walls are 3/8" thick	
Bulkheads							
North/South	5	111.9	0.03	5.9	3.2	Walls are 3/8" thick	
East/West	2	11.0	0.03	5.9	1.0	Walls are 3/8" thick	
Structrural Ribs							
Top/Bottom L8	10	111.9	0.	04	2.0	Assume L8x4x1/2	
Top/Bottom L7	10	111.9	0.	04	2.0	Assume L7x4x1/2	
Top/Bottom PL on L8/L7	24	111.9	0.50	0.04	3.0	Assume 6" long by 1/2" thick pl	
Vertical L6	40	5.3	0.	03	1.0	Assume L6x6x1/2"	
Vertical L5	60	5.3	0.	03	1.0	Assume L5x5x1/2"	
Horizontal L5	4	111.9	0.	03	1.0	Assume L5x5x1/2"	
PL on L5	4	111.9	0.50	0.04	1.0	Assume 6" long by 1/2" thick pl	
Fender Bracket	7	12.00		11	1.0	Assume W14x82	
Guide Pile Brackets	6	24.8		0.5	3.0	Conservative assume .5" thick of steel	
Misc. Steel	1		10% of		4.0		
Total CY fo	or Stee	el Float			34.3		
						Cross Sectional Area of piles with assumption of	
Guide Piles	4	0.6		100.0	10	30" ID with wall thickness of 1"	
Total CY fo	r Guid	e Piles			10		
Gangway Upper Frame/Canopy	1	3.5		60.0	8		
Gangway platform	1	12.3		60.0	28		
Gangway lateral/diagonal			ne 10% f				
bracing	1	gangway pla	and gar atform)	igway	4		
Total CY f	or Gar	ngway			40.0		
	-						
Bridge Upper Frame/Canopy	1	3.5		107.0	14		
Bridge platform	1	10.5	-	107.0	42		
Bridge lateral/diagonal bracing	1	(assun	ne 5% fr	om l			
					3		
613.33		gangway	and gar	ngway	3		
C12x30	4	13.00	and gar		0.12		
C12x30 Total CY for B	4	13.00	and gar	ngway			
Total CY for B	4 Bridge	13.00 Structure	and gar	ngway 06	0.12 60.0		
Total CY for B	4	13.00 Structure 75	and gar	ngway 06 22	0.12		
Total CY for B HP 14x73 Pile W18x76 Beam	4 Bridge	13.00 Structure 75 56.5	and gar 0. 0.	ngway 06 22 15	0.12 60.0		
Total CY for B	4 Bridge	13.00 Structure 75 56.5 13.00	and gar 0. 0. 2.00	ngway 06 22	0.12 60.0 1 1		
Total CY for B HP 14x73 Pile W18x76 Beam Concrete Abutment	4 Bridge	13.00 Structure 75 56.5 13.00	and gar 0. 0. 2.00	ngway 06 22 15	0.12 60.0 1 1 3		
Total CY for B HP 14x73 Pile W18x76 Beam Concrete Abutment Total CY for Bridge S	4 Bridge	13.00 Structure 75 56.5 13.00 rre Steel St	and gar 0. 0. 2.00 Jpport	ngway 06 22 15 3.50	0.12 60.0 1 1 3 5.0		
Total CY for B HP 14x73 Pile W18x76 Beam Concrete Abutment Total CY for Bridge S Approach Slab	4 Bridge 1 2 1 Structu	13.00 Structure 75 56.5 13.00 Ire Steel St 24.50	and gar 0. 0. 2.00 Jpport 10.00	ngway 06 22 15 3.50 0.5	0.12 60.0 1 1 3 5.0		
Total CY for B HP 14x73 Pile W18x76 Beam Concrete Abutment Total CY for Bridge S Approach Slab Approach Slab	4 Bridge 1 2 1 Structu 1 1 1	13.00 Structure 75 56.5 13.00 ire Steel St 24.50 3.5	and gar 0. 0. 2.00 Jpport 10.00	ngway 06 22 15 3.50	0.12 60.0 1 1 3 5.0 5 8		
Total CY for B HP 14x73 Pile W18x76 Beam Concrete Abutment Total CY for Bridge S Approach Slab	4 Bridge 1 2 1 Structu 1 1 1	13.00 Structure 75 56.5 13.00 ire Steel St 24.50 3.5	and gar 0. 0. 2.00 Jpport 10.00	ngway 06 22 15 3.50 0.5	0.12 60.0 1 1 3 5.0		
Total CY for B HP 14x73 Pile W18x76 Beam Concrete Abutment Total CY for Bridge S Approach Slab Approach Slab	4 Bridge 1 2 1 Structu 1 1 1	13.00 Structure 75 56.5 13.00 ire Steel St 24.50 3.5	and gar 0. 0. 2.00 apport 10.00	ngway 06 22 15 3.50 0.5	0.12 60.0 1 1 3 5.0 5 8	Assume full length of all structural elements by 6" x 3"	