Final

Environmental Assessment
Pier 6 Replacement Project
Naval Base San Diego
San Diego, California

January 2021

Prepared for: United States Department of the Navy

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DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT FOR THE ENVIRONMENTAL ASSESSMENT PREPARED FOR THE PIER 6 REPLACEMENT PROJECT, NAVAL BASE SAN DIEGO, SAN DIEGO, CALIFORNIA

Pursuant to the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) implementing the National Environmental Policy Act (NEPA), Department of the Navy (Navy) NEPA Regulations (32 CFR Part 775), and Chief of Naval Operations Instruction 5090.1E, the Navy gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement is not required for the replacement of Pier 6 at Naval Base San Diego (NBSD) in San Diego, California.

The Navy published a Notice of Availability of the Draft EA in the *San Diego Union-Tribune* from Friday, 3 April to Sunday, 5 April 2020. The Navy made the Draft EA available for public review on the Navy Region Southwest public website: https://www.cnic.navy.mil/navysouthwestprojects. The 15-day public comment period ended on 20 April 2020. The Navy did not receive any public comments on the Draft EA.

The Final EA includes revisions to the biological resources analysis related to coordination and consultation with the National Oceanic and Atmospheric Administration (NOAA) Fisheries as part of preparing the Essential Fish Habitat assessment and Incidental Harassment Authorization application.

Proposed Action: The purpose of the Proposed Action is to address deteriorating pier infrastructure at NBSD. Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and deck size to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern ships and, ultimately, Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces.

The Navy proposes to demolish the aging and inadequate Pier 6 and replace it with a new general-purpose pier having the infrastructure necessary to support modern Navy ships. The current dimensions of Pier 6 are 60 feet wide by 1,377 feet long. The replacement dimensions would be 120 feet wide by 1,500 feet long, reflecting the new standard width of a general berthing pier. The replacement of Pier 6 at NBSD would provide NBSD with four berths to support the Pacific Fleet with the requisite utilities, deck space, and berthing capacity for modern Navy ships.

Under the Proposed Action, there would be no change to operations at Pier 6 or in adjacent areas and no dredging at or adjacent to Pier 6. During demolition and reconstruction, the Navy would temporarily re-distribute berthing operations to other NBSD piers.

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Existing Conditions: NBSD is located approximately 3 miles southeast of downtown San Diego on San Diego Bay, between the community of Barrio Logan and the cities of National City and Chula Vista. East Harbor Drive divides NBSD in half: the industrial bayfront area to the west and the community support complex to the east. NBSD contains 12 piers, two channels, and various quay walls that extend along approximately 5.6 miles of shoreline.

Alternatives Analyzed: The Navy analyzed two alternatives in the EA: the Proposed Action (Alternative 1) and the No Action Alternative:

Proposed Action. In addition to the main pier replacement elements described above, the Proposed Action would include the installation of electrical utilities (including a switching station), potable water, sanitary sewer, steam, oily waste collection, and compensating ballast water collection systems. The Proposed Action would also include the installation of infrastructure to support power-intensive utility lines, if needed. Anti-Terrorism/Force Protection features would consist of a security crash gate and fencing, a pedestrian turnstile, a watchtower, a guardhouse, and high mast lighting.

No Action Alternative. Pursuant to CEQ Regulations for Implementing NEPA, the Navy also analyzed the No Action Alternative. This alternative represents the status quo in which the Navy would not replace Pier 6. Pier 6 would continue to deteriorate and pose unsafe working conditions and pier structural integrity would continue to decline. Infrastructure would continue to deteriorate, resulting in diminishing berthing and operational capacity and unreliable service, placing personnel and property at risk of mishaps.

Alternatives Considered but Not Carried Forward: The Navy considered but did not carry forward the following alternatives for detailed analysis:

Leasing a Pier. Leasing a pier is not feasible because there are no facilities available in the San Diego region to accommodate the berthing requirements of the Navy's Fleet, including requisite utility services and safety, security, and operational considerations.

Alternative Navy Installations. The Navy considered four other Navy Region Southwest Metro San Diego Installations: (1) Naval Base Point Loma, (2) Naval Air Station North Island, (3) Naval Amphibious Base Coronado, and (4) Navy Complex at the Broadway Pier. The Navy eliminated the first three installations from further consideration because of a lack of berthing and operational spaces at each sites. The Navy Complex at Broadway Pier is undergoing commercial replacement and would not be available for pier development.

Other Pier Designs. The Navy considered other potential pier replacement designs such as a double-deck, fixed concrete pier design and a double-deck floating concrete hybrid pier design. These designs would be narrower and slightly shorter, reducing their effective surface area. A double-deck, fixed concrete design would not be as efficient because the daily tidal range in San Diego Bay would disrupt necessary routine operations for some classes of ships. A hybrid pier design would be anticipated to result in similar impacts to resource areas as presented for Alternative 1, and would require greater capital investments for a smaller pier surface area.

Renovation-Modernization. The potential renovation of the existing Pier 6 would include repair of the structure, fendering system, and utilities, and installation of utilities to support ship services. This would require widening and structural upgrades of the pier, including installing more piles and constructing a new pier deck; thus, essentially constructing a replacement pier over time and would not be cost or operationally efficient. Renovation and modernization would be less reliable both in terms of durability and load response.

Alternative to Be Implemented: The Navy has selected the Proposed Action (Alternative 1) for implementation as it best meets the purpose and need of the project and would have no significant impacts on the human or natural environment.

Environmental Effects: The EA analyzed the following resource areas in detail: water resources and biological resources. Because potential impacts were considered to be negligible or nonexistent, the EA did not evaluate the following resources in detail: cultural resources, air quality, geological resources, land use, airspace, noise, infrastructure, transportation, public health and safety, hazardous materials and wastes, socioeconomics, and environmental justice.

Water Resources: The new Pier 6 would have approximately 1,032 fewer piles distributed over an area approximately twice as large as the existing Pier 6. Pile spacing would be wide enough to enhance water circulation as compared to current conditions.

Construction would comply with a site-specific construction Stormwater Pollution Prevention Plan. The Plan would specify Best Management Practices to prevent construction pollutants from contacting storm water, eliminate or reduce non-storm water discharges, and perform inspections. Upon completion of the proposed Pier 6, operations would continue to follow the Commander Navy Region Southwest Storm Water Best Management Practices Manual and Pier 6-specific Best Management Practices. Installation of the storm water treatment unit would improve water quality through the treatment of storm water runoff.

The Navy prepared a Coastal Consistency Negative Determination, with which the California Coastal Commission concurred on 24 August 2020, concluding that there would be no adverse effects on coastal resources or uses. The Navy has received a Clean Water Act Section 401 Water Quality Certification from the San Diego Regional Water Quality Control Board and has submitted an application for Clean Water Act Section 404/Rivers and Harbors Act Section 10 permit from the U.S. Army Corps of Engineers. Therefore, the Proposed Action would not have significant impacts to water resources.

Biological Resources: The Proposed Action would result in the loss or displacement of invertebrate species and fish occurring within the immediate construction area. Benthic invertebrate species from adjacent undisturbed areas are expected to recolonize disturbed benthic habitat and a typical epifaunal invertebrate community would develop on the new pilings. In-water work – including demolition and pile driving – would produce noise that would temporarily disturb any fish, marine mammals, and sea turtles in the immediate vicinity of the project area.

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The Proposed Action would result in a decrease in open water area and an increase in bay shading of 2.2 acres of open water (approximately 0.02 percent of the 12,000-acre bay). The project area does not support eelgrass beds, so the net effect of increased shading on benthic primary production would be negligible. Nonetheless, the Navy would contribute 0.0035 acres, or 152 square feet, to the Navy Eelgrass Mitigation Bank to offset this increase in bay shading.

Effects to Essential Fish Habitat would be relatively minor and localized, consisting of temporary noise and turbidity, and increased shading. The number and in-water surface area of pilings would be reduced, resulting in better circulation through the pier and less artificial substrate which is habitat for both native and introduced species.

Marine mammals protected under the Marine Mammal Protection Act and the federally listed green sea turtle and California least tern, protected under the Endangered Species Act, may be encountered in San Diego Bay, and may transit through the project area. The likelihood of encountering marine mammals, green sea turtles, or California least terns during construction is low because these species are highly mobile and they would be able to detect the noise and may temporarily avoid the area.

The maximum potential Level B harassment take of California sea lions is estimated at 1,000 individual incidents. However, any takes would likely have only a minor effect on individuals and no effect on the overall population. Potential impacts to green sea turtles from in-water construction activities would have minor, inconsequential effects. A qualified biological monitor would be present to look for marine mammal and green sea turtle activity in the vicinity of the project area. Workers would halt operations if any marine mammals or green sea turtles are observed within the project area. If individuals are observed within 20 meters of construction activity, operations would be suspended for at least 15 minutes following observations that the individual has vacated the area.

California least terns are present in the San Diego Bay environment. The Pier 6 project area does not have any special characteristics to attract or support the California least tern, such as extraordinary size, eelgrass beds, unique fish habitat, or an abundance of prey species. Thus, California least terns are not expected within the project area. Due to Pier 6's distance from known nesting and foraging areas and the localized nature of project impacts, project activities would not affect individuals, have a persistent effect on the species, or result in behavioral disruption of prey fish that could result secondary impacts to the species.

The Navy initiated informal consultation with NOAA Fisheries for potential impacts to Essential Fish Habitat and the federally listed green sea turtle. In addition, under Section 101 (a)(5)(D) of the Marine Mammal Protection Act, the Navy requested an Incidental Harassment Authorization for the anticipated take, by Level B behavioral harassment only, of California sea lions. On 21 December 2020, NOAA Fisheries concurred with the Navy's determination that the Proposed Action may affect, but is not likely to adversely affect species listed as threatened or endangered or critical habitats designated under the Endangered Species Act. On 22 January 2021, the Navy completed consultations for impacts to Essential Fish Habitat and California sea lions (via an Incidental Harassment Authorization). With the implementation of the identified impact avoidance and minimization measures in the EA, NOAA Fisheries concurred with the Navy's determination that there would be no adverse effect on these species' populations or habitats. Therefore, the Proposed Action would not have significant impacts to biological resources.

Finding: After review of the EA, which has been prepared in accordance with the requirements of Regulations for Implementing NEPA (40 CFR Parts 1500-1508) and Navy Regulations for the Implementation of NEPA (32 CFR Part 775), the Navy finds that the implementation of the Proposed Action would not significantly affect the quality of the human or natural environment. Therefore, preparation of an EIS is not necessary.

The EA prepared by the Navy addressing this action is on file and interested parties may obtain a copy from: Ms. Lisa Seneca, Naval Facilities Engineering Systems Command Southwest, 750 Pacific Highway, 12th Floor, San Diego, CA, 92132, or e-mail Lisa.Seneca@navy.mil.

9 MAR 21
Date

B. BOLIVAR
Rear Admiral, U.S. Navy
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Abstract

Designation: Environmental Assessment

Title of Proposed Action: Pier 6 Replacement Project

Project Location: Naval Base San Diego

Lead Agency for the EA: Department of the Navy

Affected Region: San Diego County, California

Action Proponent: Naval Base San Diego

Point of Contact: Pier 6 EA Project Manager
Naval Facilities Engineering Systems Command Southwest
750 Pacific Highway, Environmental, Floor 12
San Diego, CA 92132-0058

Date: January 2021

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) (42 U.S. Code Sections 4321-4370h), as implemented by the Council on Environmental Quality Regulations (CEQ) (40 Code of Federal Regulations [CFR] parts 1500-1508) and Navy regulations for implementing NEPA (32 CFR part 775). The Proposed Action is to demolish the aging and inadequate Pier 6 at Naval Base San Diego (NBSD) and replace it with a new general purpose pier having the infrastructure necessary to support modern Navy ships. The purpose of the Proposed Action is to address deteriorating pier infrastructure at NBSD. The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern Navy ships. This EA evaluated a range of alternatives and the No Action Alternative.

EXECUTIVE SUMMARY

Proposed Action

The United States (U.S.) Department of the Navy (Navy) proposes to demolish the aging and inadequate Pier 6 at Naval Base San Diego (NBSD), California, and replace it with a new general purpose pier having the infrastructure necessary to support modern Navy ships. The current dimensions of Pier 6 are 60 feet (18 meters) wide by 1,377 feet (420 meters) long. The proposed Pier 6 dimensions would be 120 feet (37 meters) wide by 1,500 feet (457 meters) long, reflecting the new standard width of a general berthing pier. The replacement of Pier 6 at NBSD would provide NBSD with four berths to support the Pacific Fleet with the requisite utilities, deck space, and berthing capacity for modern Navy ships.

Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to address deteriorating pier infrastructure at NBSD. Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and deck size to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern Navy ships and, ultimately, Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces.

Alternatives Considered

This Environmental Assessment (EA) carried forward for detailed analysis one action alternative that meets the purpose and need for the Proposed Action and the alternative selection criteria. The Navy considered and eliminated several other potential action alternatives for implementing the Proposed Action; however, after careful consideration, none of the other potential alternatives eliminated would meet the purpose and need of the Proposed Action. Therefore, this EA analyzes the Proposed Action (Alternative 1) and the No-Action Alternative in detail. Under Alternative 1, the Navy would demolish the existing Pier 6 and build a new conventional concrete single-deck pier. The No Action Alternative represents the status quo in which the Navy would not replace Pier 6 at NBSD.

Summary of Environmental Resources Evaluated in this EA

Council on Environmental Quality regulations, the National Environmental Policy Act (NEPA), and Navy instructions for implementing NEPA specify that an EA should address those resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact. Resources carried forward for detailed analysis in this EA include water resources and marine biological resources. This EA does not carry forward the following resource areas for detailed analysis because potential impacts would be non-existent or negligible: air quality, geological resources, cultural resources, terrestrial biological resources, land use, visual resources, airspace, noise, transportation, public health and safety, hazardous materials and wastes, socioeconomics and environmental justice, and infrastructure and utilities.

Summary of Potential Environmental Consequences of the Action Alternatives

Table ES-1 provides a tabular summary of potential impacts to resources associated with each alternative analyzed and a summary of impact avoidance and minimization measures.

Table ES-1 Summary of Potential Impacts and Impact Avoidance and Minimization Measures

Resource Area	*No Action Alternative*	*Alternative 1: Replace Pier 6*
Resources Dismissed from Detailed Analysis *(Air Quality, Geological Resources, Cultural Resources, Terrestrial Biological Resources, Land Use, Visual Resources, Airspace, Noise, Transportation, Public Health and Safety, Hazardous Materials and Wastes, Socioeconomics and Environmental Justice, and Infrastructure and Utilities)*	No Impacts. There would be no change in existing conditions; therefore, no impacts would occur.	Negligible or Non-Existent Impacts.
		As explained in Chapter 3 and summarized here, the Navy determined that impacts to these resource areas would be negligible or non-existent. Air Quality: Temporary demolition and construction emissions would not exceed *de minimis* levels. Geological Resources: Minor surficial modifications would not result in impacts to geology and topography. Alternative 1 would incorporate industry standard seismic engineering measures to minimize any potential effects of seismically induced ground movement. Cultural Resources: No known cultural resources would be impacted because no historic properties are present within the project area. Terrestrial Biological Resources: No impact to terrestrial biological resources because no sensitive terrestrial plant species or terrestrial threatened or endangered animals or their habitat occur within or near the limited upland portion of the project area. Land Use: No impacts because there would be no change to land use designation or existing activities. Visual Resources: No change to existing views or the viewshed at NBSD. The resulting pier would remain consistent with the military and industrial aesthetics of the surrounding area. Airspace: No change to airspace or airspace operations. Noise: Temporary demolition and construction noise (especially from pile driving) would be audible in the immediate vicinity but not exceed existing noise levels at sensitive noise receptors. Transportation: Temporary increase in traffic during construction of approximately 250 peak daily trips. Public Health and Safety: Activities would take place within NBSD property boundaries and restricted navigation zones, where the Navy provides emergency response services; no impacts to public emergency services. Hazardous Materials and Wastes: Demolition and construction activities would occur in accordance with all applicable regulations. Socioeconomics: Short-term increase in temporary jobs and spending to the local economy; no long-term increase in population or jobs. Environmental Justice and Protection of Children: Alternative 1 would be consistent with existing activities and would occur on NBSD which has restricted access. Alternative 1 would not disproportionately affect minority or low-income populations or children and there would be no disproportionate impact to the health and safety of children from implementation of the alternatives. Infrastructure and Utilities: Existing utility supply and local infrastructure would accommodate proposed electrical upgrades.
		Impact Avoidance and Minimization Measures for Public Safety and Hazardous Materials and Wastes*: The construction contractor would develop a rescue plan for all water activities, with specifications for the retrieval and rescue of personnel. The construction contractor would ensure all workers receive information on all relevant safety plans.

Table ES-1 Summary of Potential Impacts and Impact Avoidance and Minimization Measures

Resource Area	*No Action Alternative*	*Alternative 1: Replace Pier 6*
		Naval Ordnance Safety and Security Activity and/or Department of Defense Explosives Safety Board would review/approve the Explosives Safety Submission or Explosives Safety Submission Determination Request. The Navy would provide the NBSD Explosives Safety Officer with contractor points of contact for notification and evacuation during explosives handling at Piers 5 and 7. The Navy would inform the contractor of potential presence of unexploded ordnance (UXO). If workers encounter potential UXO, all work would stop pending Navy evaluation and notification to proceed. Contractors would abide by the provisions of the Hazardous Waste Management Plan for the San Diego Metro Area (Commander Navy Region Southwest 2007) to ensure management of hazardous waste in accordance with all applicable requirements. Contractors would not discharge oil, fuel, or chemicals to waters of the state. The contractor would develop and abide by site-specific Storm Water Pollution Prevention Plan (SWPPP), to include implementation of appropriate best management practices (BMPs). Any hazardous materials or wastes generated will be subject to Emergency Planning and Community Right-to-Know Act reporting requirements. Certified workers would remove and manage lead-based paint in compliance with all applicable federal, state, and local regulations. Certified workers would remove and manage asbestos containing materials in compliance with all applicable federal, state, and local regulations. The contractor would develop a Solid Waste Management Plan to characterize demolition and construction waste for proper reuse, recycling, or disposal. The Navy or the contractor would submit a Local Notice to Mariners (via U.S. Coast Guard District 11) at least 14 days prior to the start of the project. **No measures were identified for the other resource areas dismissed from detailed analysis.*
Water Resources	No Impact. There would be no change in existing conditions; therefore, no impacts would occur.	No Significant Impact.
		Removal and installation of pilings would result in minor and localized temporary variations in bathymetry around pilings; no impact to long-term bathymetry. Reduction in number of pilings would enhance circulation around Pier 6. Pile removal/installation activities would result in localized temporary resuspension of marine sediments; impacts would cease with the completion of pile driving. Potential for inadvertent releases of petroleum-products and debris during construction and demolition. **Impact Avoidance and Minimization Measures**: Adhere to NBSD's existing National Pollutant Discharge Elimination System Permit and develop and implement a SWPPP and associated BMPs. Develop and implement a Construction and Demolition Plan. Develop and implement a Spill Prevention Plan. Deploy a floating boom and cable net around the project area.

Table ES-1 Summary of Potential Impacts and Impact Avoidance and Minimization Measures

Resource Area	No Action Alternative	Alternative 1: Replace Pier 6
		Keep spill containment equipment on-hand as specified in the NBSD Facility Response Plan. Subject to the terms and conditions identified in the project-specific U.S. Army Corps of Engineers (USACE) Section 404 and Section 10 permit and San Diego Regional Water Quality Control Board Section 401 Permit, the Navy would deploy precautionary measures to alleviate turbidity associated with demolition and construction activities.
Marine Biological Resources	No Impact. There would be no change in existing conditions; therefore, no impacts would occur.	No Significant Impact.
		Temporary and minor impacts to nonvegetated soft bottom benthic communities resulting in potential loss or displacement of benthic organisms occurring in the immediate area during demolition and construction activities. No eelgrass or any other special aquatic sites are found in the project area, thus, no effects to special aquatic sites would occur. However, the increase in Bay shading of approximately 2.2 acres (0.9 hectare); impacts offset by through the Navy Eelgrass Mitigation Bank at a rate of (0.07%) for shading of areas less than -29 feet (-8.8 m) deep. Fish occurring in the immediate area may be lost or displaced during demolition or construction activities, either directly by pile removal or equipment and noise associated with these activities or indirectly by exposure to short-term changes in: suspended sediments; turbidity; dissolved oxygen; and light diffusion. Relatively minor but adverse temporary and permanent effects on essential fish habitat for Coastal Pelagic Species and Pacific Coast Groundfish; however, no effect on these habitats in terms of the Bay and Pacific fishery as a whole. Temporary reduction in the algal and invertebrate production associated with encrusting communities on the pilings. Impacts to breeding birds would be minimal because: (1) bird abundance in the project area is low; (2) the proposed project would only affect a relatively small area of San Diego Bay; and (3) impacts would cease upon construction completion. A small number of Level B -harassment takes of California sea lions related to behavioral alterations in response to demolition and installation noise would have a negligible short-term effect on individual California sea lions and no population-level impacts. No effect to California least tern (*Sterna antillarum browni*). May affect, but is not likely to adversely affect green sea turtle. **Impact Avoidance and Minimization Measures**: The contractor would use only clean construction materials suitable for use in the oceanic environment. The contractor would ensure no: debris; soil; silt; sand; sawdust; rubbish; cement or concrete washings thereof; chemical; oil or petroleum products from construction would be allowed to enter into or placed where it may be washed by rainfall or runoff into waters of the U.S. Upon completion of the project, any and all excess material or debris would be completely removed from the work area and disposed of in an appropriate upland site.

Table ES-1 Summary of Potential Impacts and Impact Avoidance and Minimization Measures

Resource Area	*No Action Alternative*	*Alternative 1: Replace Pier 6*
		Following the removal of all project-related materials and equipment, project lay-down areas would be thoroughly cleaned (no visible sediment or other contaminants) by the contractor. A *Caulerpa* survey (Surveillance Level) would be conducted prior to in-water project activities, consistent with National Marine Fisheries Service and California Department of Fish and Wildlife requirements. If Caulerpa was found in the project area during this survey, eradication techniques would be used in accordance with approved Caulerpa Control Protocols. The following avoidance and minimization measures would be followed during proposed pile driving activities. • Prior to the start of pile driving each day, or after a break in marine species monitoring efforts of more than 30 minutes, the Navy would not start pile driving until a visual sweep of the Bay has been completed. The visual sweep of the surrounding area would occur for at least 15 minutes prior to pile driving. • Prior to the start of pile driving, if any marine mammal(s) or green sea turtle(s) is observed approaching, or within, 66 feet (20 meters) of the pile being driven, the Navy would not start pile driving activities until either the animal(s) is observed leaving the shutdown radii, or 15 minutes have passed since the last observation. • During active pile driving, if any marine mammal(s) or green sea turtle(s) is observed approaching, or within, the shutdown radii (66 feet [20 meters] for marine mammals or green sea turtles), the Navy would stop pile driving activities. Pile driving could start again when either the animal(s) is observed leaving the shutdown radii, or 15 minutes have passed since the last observation. All stoppages and sightings of protected species within monitoring zones would be logged and available for submittal to the Navy. • Prior to the start of impact pile driving each day, or at any time pile driving has ceased for more than 30 minutes, the Navy would use a soft-start procedure consisting of three strikes form the impact hammer at 40 percent energy, followed by a 30 second waiting period, then two additional 3-strike sets. Full-powered pile driving would commence after a final 30-second wait period following the final 3-strike set. • If a marine mammal or sea turtle is struck by a project-related watercraft or piece of equipment, the Navy would immediately contact the NOAA Fisheries Stranding Coordinator, Justin Viezbicke, at (562) 980-3230. • After pile driving has stopped for the day, or if there will be a long break in-between pile driving, the Navy would perform a visual sweep of the Bay. The visual sweep of the surrounding area would occur for at least 30 minutes after pile driving has stopped.

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San Diego, California

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Abbreviations and Acronyms

Acronym	Definition
BMPs	best management practices
CAA	Clean Air Act
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cm	centimeter
CNIC	Commander, Navy Installations Command
CNRSW	Commander Navy Region Southwest
CO	carbon monoxide
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibels
dB SEL_{cum}	Decibels equivalent to a single exposure for the cumulative sound energy
dB PEAK	peak pressure
DoD	Department of Defense
DPS	distinct population segment
EA	Environmental Assessment
EFH	essential fish habitat
EO	Executive Order
ESA	Endangered Species Act
ESQD	explosive safety quantity distance
FMP	Fishery Management Plans
GHG	greenhouse gas
ha	hectare
HAPC	Habitat Areas of Particular Concern
HWMP	Hazardous Waste Management Plan
IHAs	Incidental Harassment Authorizations
INRMP	Integrated Natural Resources Management Plan
km	kilometer
L_{eq}	Energy Equivalent Levels
MBTA	Migratory Bird Treaty Act
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NAVFAC SW	Naval Facilities Engineering Systems Command Southwest
Navy	U.S. Department of the Navy
NBPL	Naval Base Point Loma
NBSD	Naval Base San Diego
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NO_x	oxides of nitrogen
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRSW	Navy Region Southwest
O_3	ozone
OPNAVINST	Office of the Chief of Naval Operations Instruction
PA	Programmatic Agreement
PAHS	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PFMC	Pacific Fishery Management Council
PM	particulate matter
PTS	permanent threshold shift
ROI	Region of Influence
RMS	root mean square
SDAB	San Diego Air Basin
SDSU	San Diego State University
SEL	sound exposure level
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPL	sound pressure level

Acronym	Definition
SWPPP	Storm Water Pollution Prevention Plan
TL	transmission loss
TTS	temporary threshold shift
UFC	Unified Facilities Criteria
μPa	micro Pascal
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
U.S.C.	U.S. Code
VOCs	volatile organic compounds
ZOIs	zones of influence

1 Purpose of and Need for the Proposed Action

1.1 Introduction

The United States (U.S.) Department of the Navy (Navy) proposes to demolish the aging and inadequate Pier 6 at Naval Base San Diego (NBSD), California (Figure 1-1) and replace it with a new general purpose pier having the infrastructure necessary to support modern Navy ships. Completed and ongoing military construction documentation prepared for this project (P-443) informs the scope of actions analyzed in this Environmental Assessment (EA) (Naval Facilities Engineering Systems Command Southwest [NAVFAC SW] 2019a; 2019b; 2019c).

The Navy has prepared this EA in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality (CEQ) Regulations, and Navy regulations for implementing NEPA.

1.2 Location

Naval Base San Diego is the Navy's premier Pacific Fleet surface force installation, providing comprehensive fleet support for 54 homeported ships and more than 150 tenant commands (CNIC 2019).

Pier 6 is located in San Diego Bay at NBSD. NBSD is a major installation for Navy ships assigned to the Pacific Fleet and the major West Coast logistics base for surface forces of the Navy, dependent activities, and other commands. The mission of NBSD is to deliver support and quality of life services to the Pacific Fleet, fighter and family. NBSD proper covers over 1,600 land acres (648 hectare [ha]) and 326 acres (132 ha) of water (Commander, Navy Installations Command [CNIC] 2019).

The Navy has 12 piers in the NBSD pier complex (Figure 1-2). There are seven piers of which (including Pier 6) are intended to serve deep-draft ships. Constructed by the Navy in 1945, Pier 6 is 60 feet (18 meters) wide and 1,377 feet (420 meters) long and begins at the intersection of West Vesta and Brinser Streets.

1.3 Purpose of and Need for the Proposed Action

Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and deck size (at only 60 feet [18 meters] wide) to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. A 2015 Load Capacity Analysis Report (NAVFAC SW 2015) cited Pier 6's overall condition as poor and in need of replacement. Due to Pier 6's limited width, utility deficiencies, and other infrastructure support limitations, only dock landing ships, guided-missile frigates, and older amphibious transfer dock ships can berth at Pier 6.

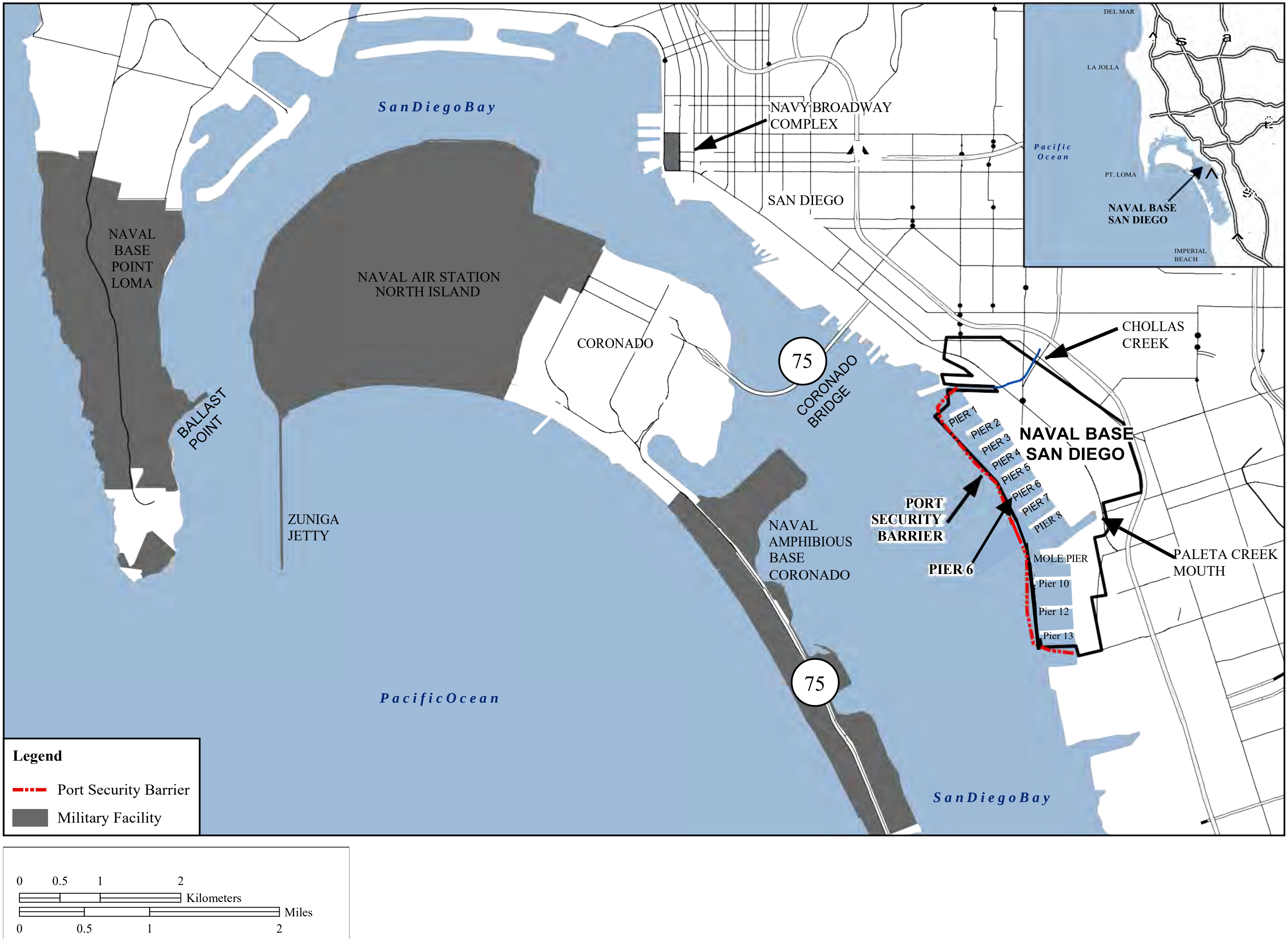


Figure 1-1 Regional Location of Naval Base San Diego

Figure 1-2
Pier 6 Location at Naval Base San Diego

Pier 6's deficiencies include the following:

- Width:
  - The limited width of Pier 6 restricts the amount and type of ship maintenance and large-load ship storing that can occur.
  - There is inadequate space for trash containers; when a trash container is on the pier, no traffic can pass.
  - Trucks and mobile truck cranes must travel on the center 17 feet (5 meters) of the pier only.
  - There is no adequate fire lane on Pier 6.
- Structural:
  - Pier 6 is not compliant with current structural or seismic criteria (i.e., Department of Defense [DoD] Unified Facilities Criteria [UFC] [DoD 2017]).
  - Concrete is spalling in many locations above and below deck, at pile caps, and at the top of concrete bearing piles.
  - There are cracked and broken concrete curbs on the deck edges in many areas; exposed sections of corroded steel reinforcement create unsafe working conditions to personnel, especially during berthing operations.
  - Maximum load limits restrict 35-ton crane and forklift use to limited areas.
  - By 2023, the Navy will prohibit all crane operations on Pier 6 due to the concrete deck's projected inability to structurally support the load of a crane.
- Utility Services:
  - Electrical, potable water, sanitary sewer, compressed air, and steam utilities on the pier are all in poor condition and/or inadequate to meet demands.

The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern Navy ships and ultimately, Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces. Unless the Navy replaces structurally deteriorating and operationally constrained piers such as Pier 6, NBSD will not be able to properly support the berthing of homeported ships. Unless replaced, Pier 6's structural integrity will continue to deteriorate and pose unsafe working conditions, especially during berthing operations.

1.4 Scope of Environmental Analysis

The environmental resource areas analyzed in detail in this EA include water resources and marine biological resources. The geographic study area for each resource analyzed may differ due to how the Proposed Action interacts with or affects the resource. For instance, a study area for marine sediments may only include the pier and immediately adjacent areas, whereas the marine biological resources study area may include a larger geographic region to reflect those areas potentially impacted by underwater noise.

1.5 Key Documents

Key documents are sources of information incorporated into this EA; documents are considered *key* because of similar actions, analyses, or impacts that may apply to this EA. CEQ guidance encourages incorporating documents by reference. Documents incorporated by reference in part or in whole include:

- **Environmental Assessment for Pier 8 Replacement, NBSD, CA.** In June 2016, the Navy prepared an EA analyzing the potential impacts associated with demolishing and replacing Pier 8 at NBSD (NAVFAC SW 2016). Because Pier 6 is adjacent to Pier 8 and the Pier 8 proposed action, alternatives, and resource areas are similar to the Pier 6 Proposed Action, this EA has incorporated portions of the Pier 8 EA as appropriate.
- **Environmental Assessment for Pier 12 Replacement and Dredging, NBSD, CA.** Consistent with the preceding Pier 8 EA discussion, because the Pier 12 proposed action, alternatives, and resource area analyses are similar to the Pier 6 Proposed Action, this EA has incorporated portions of the Pier 12 EA (NAVFAC SW 2011a) as appropriate.
- **Programmatic Agreement between the Commander NBSD and the California State Historic Preservation Officer (SHPO) regarding NBSD Undertakings, San Diego, CA.** This Programmatic Agreement documents the procedures and processes through which NBSD fulfills its commitment to compliance with applicable laws, regulations, and policies of cultural resources at NBSD (CNRSW 2014).
- **Integrated Natural Resources Management Plan (INRMP).** The NBSD INRMP (NBSD 2014) is a long-term planning document to guide NBSD in the management of natural resources to support the military mission, while protecting and enhancing installation resources for multiple use, sustainable yield, and biological integrity.
- **San Diego Bay INRMP.** The San Diego Bay INRMP (Navy Region Southwest and Unified Port of San Diego 2013) is a long-term, collaborative strategy for managing the Bay's natural resources, and the primary means by which the Navy and Port of San Diego jointly plan natural resources work in San Diego Bay.

1.6 Relevant Laws and Regulations

The Navy has prepared this EA based upon federal and state laws, statutes, regulations, and policies that are pertinent to the implementation of the Proposed Action, including the following:

- NEPA (42 U.S.C. sections 4321-4370h), which requires an environmental analysis for major federal actions that have the potential to significantly impact the quality of the human environment
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] parts 1500-1508)
- Navy regulations for implementing NEPA (32 CFR part 775), which provides Navy policy for implementing CEQ regulations and NEPA
- Clean Air Act (CAA) (42 U.S.C. sections 7401 et seq.)
- Clean Water Act (CWA) (33 U.S.C. sections 1251 et seq.)
- Coastal Zone Management Act (CZMA) (16 U.S.C. sections 1451 et seq.)
- National Historic Preservation Act (NHPA) (54 U.S.C. sections 300101 et seq.)

- Endangered Species Act (ESA) (16 U.S.C. sections 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (16 U.S.C. sections 1801 et seq.)
- Marine Mammal Protection Act (MMPA) (16 U.S.C. sections 1361 et seq.)
- Migratory Bird Treaty Act (MBTA) (16 U.S.C. sections 703-712)
- Rivers and Harbors Act (33 U.S.C. 403 section 10)
- Executive Order (EO) 11988, Floodplain Management
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks
- EO 13175, Consultation and Coordination with Indian Tribal Governments
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Chapter 5 presents a description of the Proposed Action’s consistency with these laws, policies and regulations, as well as the names of regulatory agencies responsible for their implementation.

1.7 Public and Agency Participation and Intergovernmental Coordination

Regulations from the CEQ (40 CFR part 1506.6) direct agencies to involve the public in preparing and implementing their NEPA procedures. The Navy published a Notice of Availability of the Draft EA for three consecutive days in the *San Diego Union-Tribune* (3, 4, and 5 April 2020) (Appendix F). The Notice of Availability described the Proposed Action and alternatives, requested public comments on the Draft EA, provided dates of a 15-day public comment period, and announced that a copy of the EA was made available for review via the Commander, Navy Region Southwest (CNRSW) website (https://www.cnic.navy.mil/navysouthwestprojects). The Navy did not receive any public comments.

The Navy consulted with National Oceanic and Atmospheric Administration (NOAA) Fisheries and the California Coastal Commission, obtained a Clean Water Act permit (401 Water Quality Certification) from the San Diego Regional Water Quality Control Board, and applied for a 404 Clean Water Act permit from the U.S. Army Corps of Engineers (USACE).

2 Proposed Action and Alternatives

2.1 Proposed Action

Under the Proposed Action, the Navy would demolish the existing Pier 6 and replace it with a new larger general purpose berthing pier. The proposed Pier 6 dimensions would be 120 feet (37 meters) wide by 1,500 feet (457 meters) long (NAVFAC SW 2019a). The Pier 6 replacement would provide NBSD with four berths to support the Pacific Fleet with the requisite utilities, deck space, and berthing capacity for modern Navy ships and rectify deteriorating infrastructure that – if not addressed – would severely limit the overall utility of the pier. Under the Proposed Action, there would be no change to operations at Pier 6 or in adjacent upland areas. The Proposed Action also does not include dredging at or adjacent to Pier 6.

No new ship homeporting actions are specifically planned as a part of the Proposed Action. Port loading at NBSD is coordinated between the CNRSW Port Operations Shore Infrastructure Plan (CNRSW 2010) and the Chief of Naval Operations Notional Strategic Laydown Plan. Ship berthing and pier operations (including pier maintenance) are included in these two plans and any potential operational impacts at Pier 6, both in water and on land, were analyzed as a part of the plan adoption process. Therefore, ship berthing operations associated with the Proposed Action are not addressed in this EA. While Pier 6 is being demolished and replaced, existing berthing operations would be temporarily re-distributed to the other NBSD piers.

2.2 Alternative Selection Criteria

NEPA's implementing regulations provide guidance on the consideration of alternatives to a federally proposed action and require rigorous exploration and objective evaluation of reasonable alternatives. Only those alternatives determined to be reasonable and meeting the purpose and need require detailed analysis. This EA has evaluated potential alternatives against the following selection criteria:

1. **Functional Pier Design.** A potential alternative must provide for a functional pier design that accounts for operational and safety considerations as influenced by tidal and seismic conditions in San Diego Bay, as well as efficiency and reliability to provide necessary support functions:
    a. *Tidal Conditions* - Accommodate ship berthing at a normal (astronomical) tidal range of 5.73 feet (1.74 meters) mean lower low water (MLLW) to mean higher high water and at an extreme high water of 8.35 feet (2.54 meters) (compared to MLLW) and at an extreme low water equal to -2.88 feet (-0.88 meters) (compared to MLLW). Must be capable of adaptation (to provide ship berthing) for a sea level rise of 3 feet (1 meter) that may occur within the facility's life cycle.
    b. *Water Depth* - Accommodate a dredge depth of 37 feet (11 meters) MLLW.
    c. *Seismic Conditions* - Supply life safety, no loss of operational performance, and no release of hazardous materials to the environment after a Level 2 seismic event.
    d. *Landside Facilities* - Provide landside ship service facilities and a bilge oily water wastewater treatment system.
2. **Secured Location.** A potential alternative must be in a secure setting in San Diego Bay.
3. **Safety.** A potential alternative must have the ability to safely accommodate ship explosive safety quantity distance (ESQD) arcs within Navy-controlled areas.

The presented selection criteria are the same as those used in the Pier 8 EA (NAVFAC SW 2016) because, after careful consideration, the Navy determined the Pier 8 EA selection criteria to be valid for this EA.

2.3 Alternatives Carried Forward for Analysis

Due to the purpose and need of this project and the associated specific geographic need for the project, the Navy has determined that Pier 6 is the only reasonable location for the Proposed Action; the Navy has not identified any other feasible location alternatives. Based on the reasonable alternative selection criteria, the Navy has identified one action alternative for implementing the Proposed Action. The project team initially explored alternative pier designs for replacing Pier 6; however, as explained in Section 2.4, the Navy has dismissed those potential alternatives from analysis. Therefore, this EA carries Alternative 1 forward for evaluation because it would meet the purpose and need for the Proposed Action. In addition, this EA analyzes the No Action Alternative.

2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. The No Action Alternative is the status quo in which the Navy would not demolish and replace Pier 6 at NBSD. Implementing the No Action Alternative would impede NBSD's ability to properly support the berthing of Navy ships. Pier 6 would continue to deteriorate and pose unsafe working conditions, especially during berthing operations, and pier structural integrity would continue to decline. Pier hardware, including mooring cleats and double-bitts, would continue to deteriorate, resulting in diminishing berthing and operational capacity and unreliable service, placing personnel and property at risk of mishaps. Support of mass loadouts of amphibious assault ships would decline, and increased ship nesting would be needed as berthing capacity is exceeded. The No Action Alternative would not meet the purpose and need for the Proposed Action; however, as required by NEPA, the No Action Alternative is carried forward for analysis and provides a baseline for measuring environmental consequences of the Proposed Action.

2.3.2 Alternative 1: Demolition of Pier 6 and Construction of a Conventional Concrete Single-Deck Replacement Pier 6

Under Alternative 1, the Navy would demolish the existing Pier 6 and replace it with a conventional concrete single-deck pier. The phased demolition and construction of Pier 6 would begin as early as June 2021 (but likely October 2021) and would last approximately 250 working days (which equates to approximately one calendar year).

The Navy would initiate the action with demolition of the existing pier (Phase I) and then initiate construction of the new pier (potentially concurrent with pier demolition activities) as demolition progress and space is available for workers to install the new pilings and pier structure (Phase II). While all in-water work (piling removal and installation) is anticipated to occur within a one-year (250 working day period), other non-in-water project activities would occur prior to and after the in-water work. Therefore, while the majority of work would occur within a one-year period, the total project duration would be approximately one and a half years.

Department of Defense and Navy principles for high performance and sustainable building requirements would be part of the design and construction of Pier 6 per federal laws and EOs. In addition, low impact development principles would be part of the design and construction, as appropriate.

2.3.2.1 Demolition of Pier 6 (Phase I)

Figure 2-1 presents a typical cross-section of the existing Pier 6.

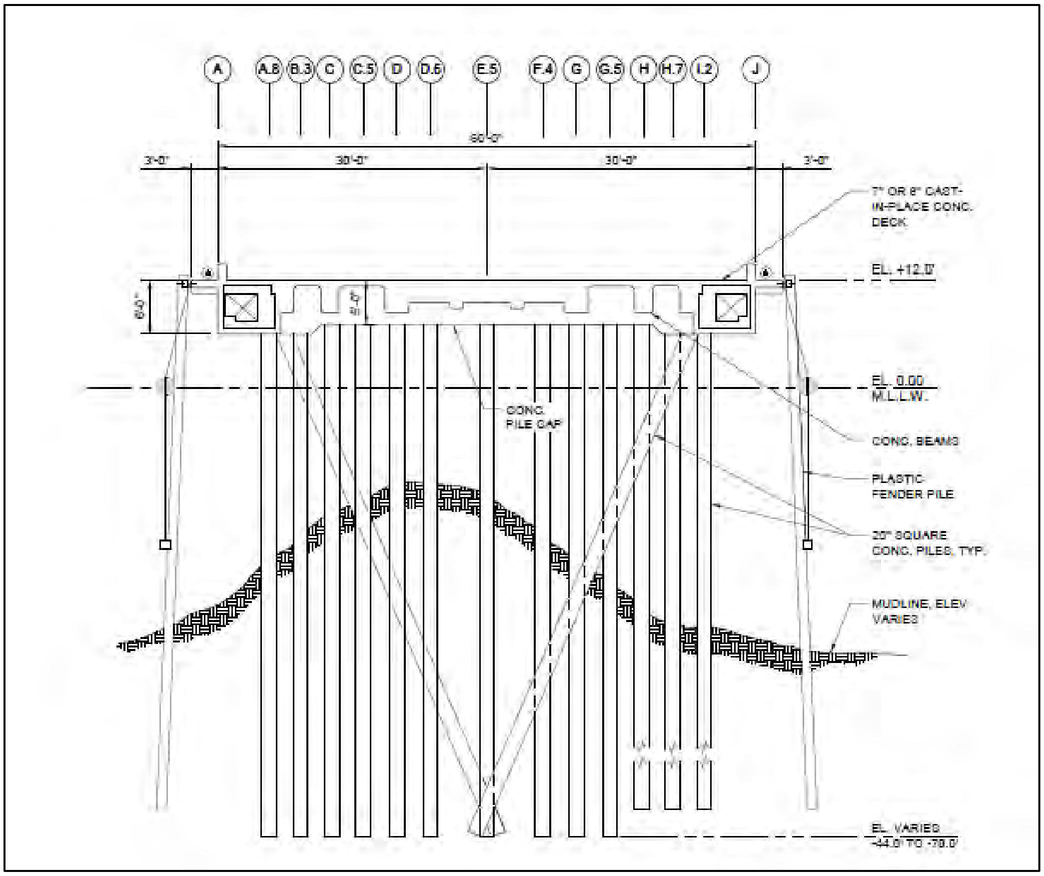


Figure 2-1 Existing Cross-Section of Pier 6 (typical)

The project would comply with the Navy approved Comprehensive Explosives Safety Submission (ESS) or Explosives Safety Submission Determination Request (ESS DR) to ensure the protection of personnel and Navy assets in the event of encountering historical ammunition that may be present within the project footprint. Following an initial hazardous materials survey and any necessary abatement, workers would disconnect, clean, and safe-out all utilities and then remove all electrical and mechanical equipment from the pier.

Pier demolition would take place bayward to landward and from the top down. First, fender piles and exterior appurtenances (such as utilities and the fuel piping systems) would be demolished above and below the pier deck. Then, the deck would be demolished using concrete saws and a barge-mounted excavator.

The pier deck would be sawcut and removed in large sections using a floating derrick crane before the crane would place the sections on a barge. Support craft would tow the barges loaded with concrete deck sections and piles to a concrete processing yard (at NBSD or offsite) to process the material.

As detailed in Table 2-1, all existing piles (totaling approximately 2,000 structural, fender, and other piles) would be removed (NAVFAC SW 2019b).

Table 2-1 Estimated Number and Types of Existing Piles to be Removed

Type of Piles	*Approximate Number of Piles*
Structural (20-inch square precast concrete piles)	1,669
Primary Fender System (24-inch square pre-stressed piles)	160
Loadout Ramp Cradle (20-inch square pre-stressed piles)	4
Secondary Fender System (12-inch composite piles)	111
Corner Fender Protection (12-inch composite piles)	38
Quaywall Fender (16-inch I-shape steel piles)	16
Total	**1,998**

Source: NAVFAC SW 2019b

Workers would initially attempt to extract the piles by securing the piles above the water line and applying upwards pressure to the piles (dead-pull). Workers may also use the dead-pull method with pile jetting (where an external high-pressure water jet is used to loosen the sediment around the pile). A vibratory hammer may also be used to loosen the piles prior to removal. The Navy anticipates approximately one-third of all existing piles would be removed via the dead-pull method.

If the piles could not be pulled out by these methods, workers would place a hydraulic cutter over each pile and lower it to the mudline (with or without diver assistance). If a cutter or clipper is used, the pile clipper would fit over the pile, apply pressure via a hydraulically actuated blade against the pile and a "gate," and would cut through the pile (including severing the rebar within the pile). An underwater hydraulic saw operated by a diver may also be used to remove piles. Workers would secure the pile above the water line and the hydraulic cutter or a diver with a saw would cut the pile at the mudline. A crane would remove the pile and set it onto a barge.

While the method of removal is still in development, one of the above methods, or a similar method, would be used for pile removal. The final pile removal method would be determined based on the most efficient and timely technique. At this time, the Navy anticipates a majority of the existing piles (approximately two-thirds) would be sawcut or clipped at the mudline, as removing all the piles would change the structural characteristics of the seafloor and affect the design of the replacement pier.

Based on similar work completed at other Navy piers, workers would remove on average approximately 8 piles per day, one pile at a time, subject to external factors (e.g., weather). Based on five working days per week, workers would require approximately 50 weeks (250 working days) to remove the piles.

Workers would remove portions of the existing quaywall pile cap to allow for extension of new utility services, etc. to the pier. In total, the Navy anticipates disturbing no more than 0.75 acres (0.3 ha) of developed upland areas adjacent to the pier. Similar to the procedure used for the Pier 8 replacement project, the Navy would crush concrete and separate out rebar in an upland laydown area adjacent to the pier. Trucks would haul concrete and debris to an off-site recycler for processing in compliance with recycling facility requirements. Trucks would then transport unrecyclable materials to a permitted landfill. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

2.3.2.2 Construction of a Conventional Concrete Single-Deck Replacement Pier 6 (Phase II)

Under Alternative 1, the Navy would construct a conventional concrete single-deck berthing pier measuring 120 feet (37 meters) wide by 1,500 feet (457 meters) long (NAVFAC SW 2019a) (Figure 2-2). The total surface area of Pier 6 would increase from approximately 1.9 acres (0.8 ha) to approximately 4.1 acres (1.7 ha), an increase of approximately 2.2 acres (0.9 ha). Figure 2-3 presents a schematic drawing of a typical cross-section of the proposed replacement Pier 6.

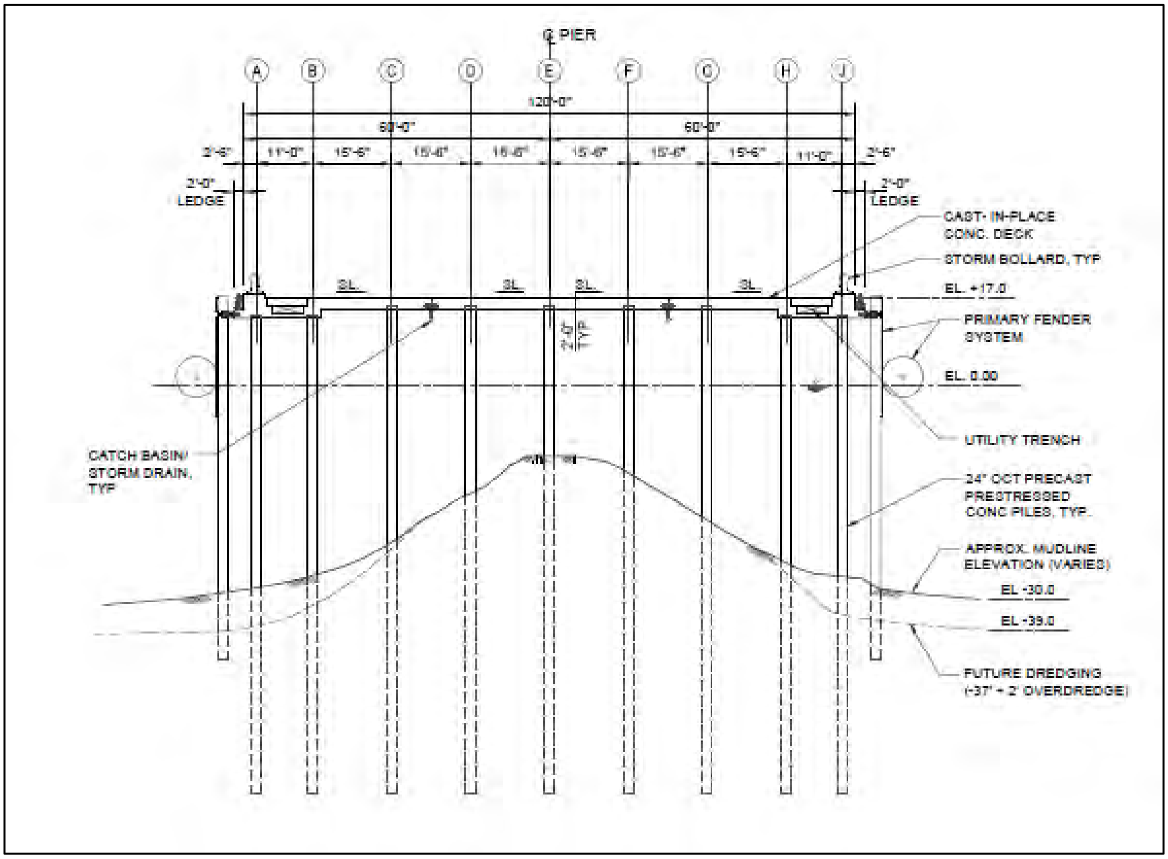
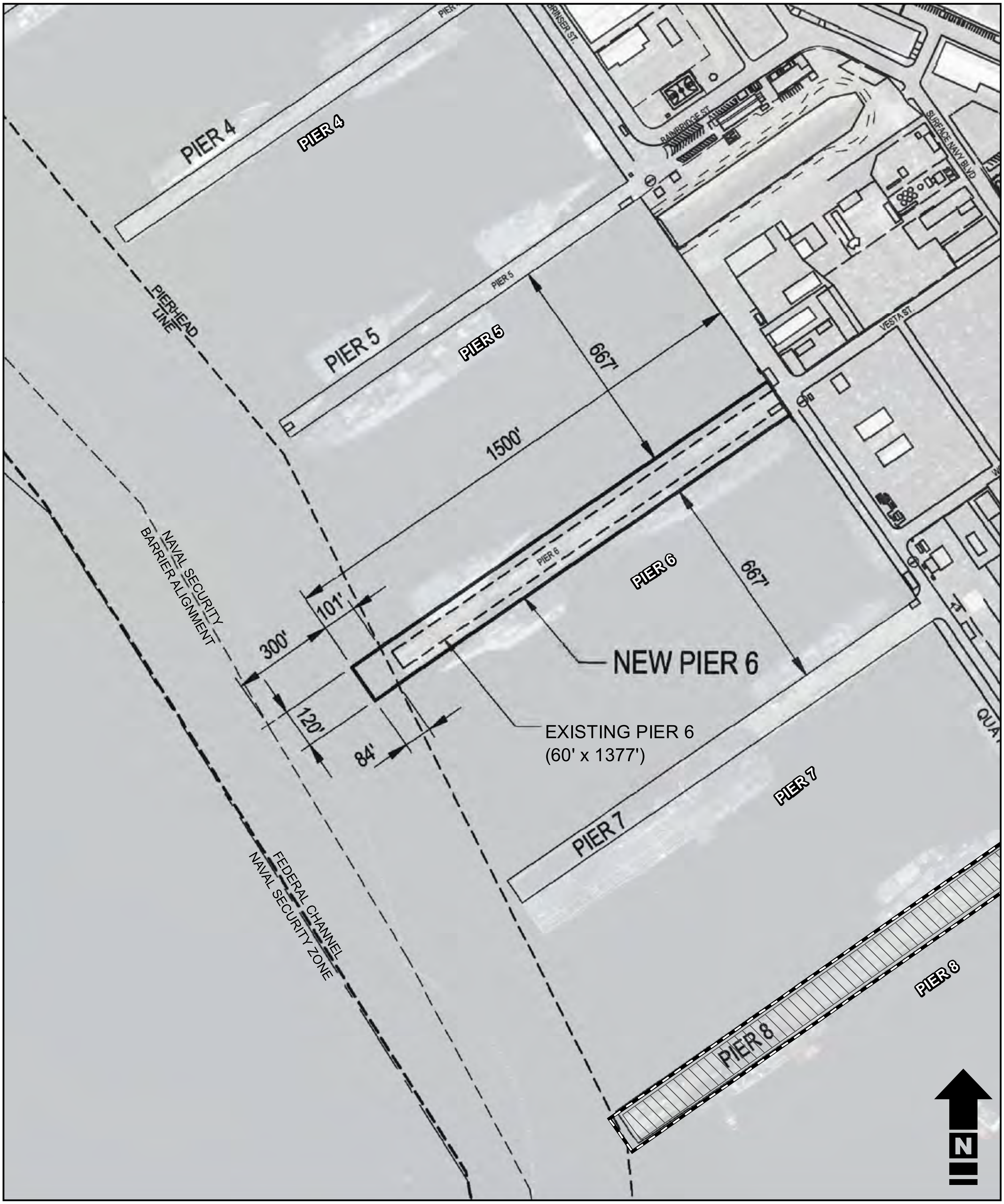


Figure 2-3 Cross-Section of Proposed Pier 6 (typical)



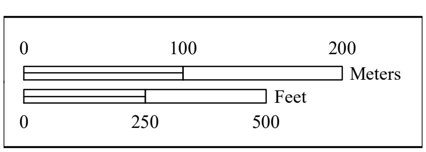


Figure 2-2 Pier 6 Replacement: Alternative 1

Table 2-2 summarizes the types and number of piles that workers would install using a floating crane and a diesel and/or hydraulic hammer (pile driver). Workers may also use high-pressure water jetting to assist pile driving. On average, workers would install 7 piles each day, one pile at a time. At an average daily rate of 7 piles per day, it would take workers approximately 140 working days to install all of the piles. In addition, approximately 15 additional structural test piles would be installed at the beginning of construction. Some or all of the structural test piles would likely be left in place as a permanent part of the project or be removed (Moffatt and Nichol 2019).

Table 2-2 Pile Types and Numbers Installed under Alternative 1

Type of Piles	*Number of Piles*
24-inch diameter structural test piles	15
24-inch diameter concrete octagonal structural piles	513
24-inch square fender system test piles	4
24-inch square concrete primary fender piles	204
16-inch diameter fiberglass secondary fender piles	200
16-inch diameter fiberglass corner fender piles	26
20-inch square precast concrete piles	4
Total	**966**

Source: NAVFAC SW 2019b

It is anticipated that overlap between pier demolition and pile installation activities would occur over the total 250 working-day in-water work period. Pile removal would begin on day 1 and progress at a rate of 8 piles per day, for an expected total of 250 days of pile removal. Pile installation is anticipated to begin after removal of one third of the piles, or approximately day 83 of pile removal, at a rate of 7 piles per day for expected 138 days of pile installation. Pile installation is expected to periodically occur alongside ongoing pile removal activities over 138 days of the remaining 167 project days of pile removal. Because pile installation cannot continue where demolition activities are incomplete, there would be 29 days (167 days – 138 days of pile installation) where only pile removal would occur after pile installation has started. Pile demolition would end on day 250 and pile installation would cease on day 250.

In summary, the 250-day in-water project period would include 112 days of pile removal-only activities and 138 days of concurrent pile removal and installation activities. These assumptions were used to estimate the in-water noise generated by the project and subsequent MMPA take of California sea lion (see Section 3.2, *Marine Biological Resources*).

The total length of the piles would range from approximately 85 feet (26 meters) (fender piles) to 110 feet (34 meters) (structural piles) (NAVFAC SW 2019d). The length of the portion of the piles in the water column would range from approximately 10 to 30 feet (3 to 9 meters), depending on pile type, location, and tide (NAVFAC SW 2019e). The use of concrete and fiberglass rather than creosote-treated wood pilings would be consistent with Navy policy and would be preferable because, unlike creosote-treated wood pilings, the new piles would not be a potential source of polycyclic aromatic hydrocarbons to the Bay.

Workers would construct the pier deck on-site with rebar-reinforced concrete. Pre-stressed concrete (structural) piles with cast-in-place concrete pile caps would support the concrete deck structure. All pile and deck construction for Pier 6 would follow current seismic standards and would be strong enough to support a 154 US ton (140 metric ton) crane (NAVFAC SW 2019a). The design would position the pier deck above the predicted high tides and tidal surges to ensure that sea water would not damage the deck or pier utilities network. All construction material deliveries would be via truck.

New utilities would include electrical, potable water, sanitary sewer, steam, oily waste, and compensating ballast water collection systems. Compressed air is not currently identified as a project component. The electrical utilities would include a switching station, primary and secondary distribution systems, telephone, coaxial and fiber optic communications, supervisory control and data acquisitions systems for energy monitoring and control, a fire alarm system, and storm water treatment system (NAVFAC SW 2019a).

Alternative 1 would include the installation of infrastructure to support 4160V [power-intensive] utility lines, if needed. If future requirements shift to where the Navy needs additional power-intensive deep-draft piers at NBSD, then the Navy would evaluate the effects of the future requirements under a separate NEPA document.

Anti-Terrorism/Force Protection features would consist of a security crash gate and fencing, pedestrian turnstile, watch tower, guard house and high mast lighting. The watch tower would be approximately 22 feet (7 meters) tall and have a surface footprint of approximately 50 square feet (5 square meters). A metal staircase would provide access to a single-story metal-roofed enclosed observation platform with a surrounding metal deck and 3 foot 6 inch (1 meter) high metal guardrail (NAVFAC SW 2019e).

2.4 Alternatives Considered but not Carried Forward for Detailed Analysis

2.4.1 Off-Site Alternatives

2.4.1.1 Leasing

Leasing a pier is not feasible because there are no facilities available in the San Diego region to accommodate the berthing requirements of the Navy's Fleet, including requisite utility services, ESQD arc requirements, security, and operational considerations. This potential leasing alternative would not meet Selection Criterion 2: Secured Location and Selection Criterion 3: Safety (refer to Section 2.2, *Alternative Selection Criteria*). Therefore, this EA does not carry forward a detailed analysis of the potential leasing alternative.

2.4.1.2 Alternative Navy Installations

As described in the Pier 8 EA (NAVFAC SW 2016) and revalidated during the Pier 6 EA planning process, the Navy considered four Navy Region Southwest (NRSW) Metro San Diego Installations that are offsite from NBSD for the proposed replacement pier: (1) Naval Base Point Loma, (2) Naval Air Station North Island, (3) Naval Amphibious Base Coronado, and (4) Navy Complex at the Broadway Pier (refer to Figure 1-1). The Navy eliminated the first three Navy installations from further consideration because ships already occupy berthing and operational spaces at these sites. The Navy Complex at Broadway Pier is undergoing commercial replacement and would not be available for pier development and berthing support for modern Navy ships. Therefore, this EA does not carry forward a detailed analysis of the four potential alternative Navy installations.

2.4.2 Other Pier Designs

The Navy considered other potential pier replacement designs such as a double-deck, fixed concrete pier design and a double-deck floating concrete hybrid pier design. Both designs would be narrower and slightly shorter, reducing their effective surface area (Navy 2019). Therefore, the Navy does not prefer these designs.

A double-deck, fixed concrete design would not be as efficient for accommodating many classes of ships that require support at NBSD because of the daily tidal range in San Diego Bay (NAVFAC SW 2016), which is approximately 5.6 feet (1.7 meters), with monthly maximum and minimum high and low tides resulting in tide swings of approximately 9 feet (2.7 meters) and occasionally as much as 10 feet (3 meters) (NOAA 2019). This tidal range would cause interferences between mooring lines and deck elevations relative to pier appurtenances, and deck elevations would not allow for the use of ramps (sideport ramps) for some classes of ships (NAVFAC SW 2016).

As substantiated by the Pier 8 EA analysis (NAVFAC SW 2016), the hybrid pier design would be anticipated to result in similar impacts to resource areas as presented for Alternative 1 and would require higher capital investments for a smaller pier surface area. Therefore, this EA does not carry forward a detailed analysis of potential pier design alternatives.

2.4.3 Renovation-Modernization

Renovation of the existing Pier 6 would include repair of the structure (i.e., pier deck, underdeck, pile caps, and piles), fendering system, and utilities, and installation of utilities to support ship services. Any renovation and modernization would require widening and structural upgrades of the pier, including installing more piles under the existing pier and constructing a new pier deck; thus, essentially resulting in construction of a replacement pier.

Renovation and modernization would involve replacing or updating each of the existing pier functions over time and would not be cost or operationally efficient. In addition, renovation and modernization would be less reliable both in terms of durability and load response and would not solve the mobile crane weight restriction of 35 tons. This alternative would not be a feasible alternative to the Proposed Action because it would not meet Alternative Screening Criterion 1: Functional Pier Design for seismic conditions (refer to Section 2.2, *Alternative Selection Criteria*). Therefore, this EA does not carry forward a detailed analysis of the potential renovation-modernization alternative.

3 Affected Environment and Environmental Consequences

This chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing any of the alternatives and an analysis of the potential direct and indirect effects of each alternative.

All potentially relevant environmental resource areas were initially considered for analysis in this Environmental Assessment (EA). In compliance with National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ), and 32 Code of Federal Regulations (CFR) Part 775 guidelines, the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to impacts. In addition, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact. This EA includes an analysis of potential environmental impacts associated with the implementation of Alternative 1 and the No Action Alternative.

This section includes the detailed analysis of water resources and marine biological resources because potential impacts to them are the primary relevant ones for the Proposed Action. Potential impacts to the following resource areas are considered to be negligible or non-existent so they were not carried forward for detailed analysis in this EA as explained below:

Air Quality. Naval Base San Diego (NBSD) is located within the San Diego Air Basin (SDAB), which covers all of San Diego County. Emission sources at NBSD include civilian and military personnel vehicles; commercial and military vehicles; military vessels and ships; heavy machinery; industrial equipment; portable powered equipment; building heating and cooling; vehicle maintenance; and tugboat activity within San Diego Bay.

Under the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) for criteria pollutants, while the California Air Resources Board (CARB) has established state standards, termed the California Ambient Air Quality Standards. SDAB is a serious nonattainment area for the 2008 8-hour ozone (O_3) NAAQS (84 Federal Register 44238); volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) are precursors to the formation of O_3. The SDAB is also a maintenance area for the carbon monoxide (CO) NAAQS (CARB 2016, USEPA 2015, SDAPCD 2016). The SDAB is in attainment of the nitrogen dioxide (NO_2), sulfur dioxide (SO_2), Lead, particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) NAAQS. The USEPA has determined *de minimis* thresholds to define the limit at which a project would require a formal Conformity Determination under the CAA General Conformity Rule.

Under the No Action Alternative, no demolition or construction activities would occur; as such, there would be no potential impact to air quality. Though implementation of Alternative 1 would generate relatively minor and temporary emissions that would not substantially contribute to emissions within the air basin, this analysis provides a quantitative analysis for comparison with the applicable *de minimis* threshold levels.

Total emissions resulting from the proposed demolition and construction activities under Alternative 1 were estimated using the pier demolition/construction data and timeline presented in Chapter 2, general air quality assumptions, and emission factors compiled from the following sources: OFFROAD Emission Factors (CARB 2017); CARB EMFAC2014 Model (CARB 2014); Category 3 engine emission limits for Marine Compression-Ignition Engines (40 CFR 1042.104), and Emission Factors from Analysis of Commercial Marine Vessel Emissions and Fuel Consumption Data (USEPA 2000). See Appendix A for a complete listing of sources and assumptions.

Table 3.0-1 presents the estimated demolition and construction emissions with implementation of Alternative 1. While the total project duration is anticipated to be approximately one and a half years, this air quality analysis conservatively assumes that all emissions would occur within one year.

Table 3.0-1 Alternative 1 – Combined Annual Emissions with Evaluation of Conformity

Emission Source	***Emissions (tons/year)***					
	CO[1]	***VOC[2]***	***NO_X[2]***	***SO_x***	***PM_{10}***	***$PM_{2.5}$***
Demolition Phase	23.51	7.91	29.40	1.52	1.83	1.65
Construction Phase	12.98	4.44	14.71	0.85	0.87	0.78
Total Annual Emissions	*36.49*	*12.35*	*44.11*	*2.37*	*2.70*	*2.43*
Annual Conformity *de minimis* Threshold[3]	100	50	50	N/A	N/A	N/A
Exceeds Conformity *de minimis* Threshold?	No	No	No	N/A	N/A	N/A

Notes: 1 SDAB is a maintenance area for the CO NAAQS and is in attainment of the NO_2, SO_2, Lead, PM_{10}, $PM_{2.5}$ NAAQS.
2 SDAB is a serious nonattainment area for the 2008 8-hour O_3 NAAQS (84 Federal Register 44238); VOCs and NO_x are precursors to the formation of O_3.
3 USEPA 2017a.

As shown in Table 3.0-1, even if all activity occurred within one year, the estimated combined emissions would be below all current conformity *de minimis* thresholds. This analysis is based on current nonattainment status and associated *de minimis* thresholds (as of January 2021) for the SDAB. Should the EPA re-classify the nonattainment status of the SDAB from serious to severe for 8-hour O_3 before implementation of the Proposed Action, the Navy would re-evaluate the potential emissions against any new *de minimis* thresholds.

Implementation of Alternative 1 would not increase operational emissions because there would be no change in operations at Pier 6. Therefore, Alternative 1 would conform to the SDAB State Implementation Plan and would not trigger a conformity determination under Section 176(c) of the CAA. The Navy has prepared a Record of Non-Applicability (refer to Appendix A) for CAA conformity in accordance with Navy CAA Conformity Guidance. Therefore, there would be a negligible impact to air quality from implementation of Alternative 1. Accordingly, air quality is not carried forward for detailed analysis in this EA.

Geological Resources. Under the No Action Alternative, no demolition or construction activities would occur. There would be no extensive excavation or grading; therefore, there would be no impacts to geological resources. Under Alternative 1, the proposed Pier 6 would be constructed in the same location as the existing Pier 6; therefore, only minor on-shore excavation and finish grading would be necessary to accommodate the proposed Pier 6. These minimal surficial modifications would not result in impacts to geology and topography.

San Diego is a seismically active region, as is most of southern California. Seismic hazards can include landslides, ground-shaking, surface displacement and rupture, liquefaction, and tsunamis. Implementation of Alternative 1 would adhere to the provisions of the UFC for Design of Piers and Wharves (UFC 2017). In addition, the Pier 6 design would incorporate industry standard seismic engineering measures to minimize any potential effects of seismically induced ground movement (Earth Mechanics 2019). Therefore, implementation of Alternative 1 would have a negligible impact to geological resources. Accordingly, geological resources are not carried forward for detailed analysis in this EA.

Cultural Resources. Under the No Action Alternative, no demolition or construction activities would occur; as such, there would be no potential to affect cultural resources. As described in the Pier 8 EA and Pier 12 EA (NAVFAC SW 2016, 2011a), previous cultural resources investigations confirm that no historic properties are present within the Pier 6 Area of Potential Effect (defined as the discrete site of the undertaking and any associated staging or laydown areas) (NAVFAC SW 2016).

The Naval Station San Diego Historic District (revised 2007) and the individually eligible Dry Dock No. 1 Site are not located near Pier 6 (more than 328 feet [100 meters] distant). NBSD is located on lands created by backfilling tidelands with excavated material in 1930 (NAVFAC SW 2016), thus precluding the potential for presence of buried archaeological deposits. Therefore, there are no archaeological sites or other cultural resources found within the Area of Potential Effect, as defined under the Programmatic Agreement (PA) between the Commander Naval Base San Diego the California State Historic Preservation Officer regarding Naval Base San Diego Undertakings, San Diego County, California (Commander Navy Installations Command 2014).

Consistent with Stipulation 6.A of the PA, Pier 6 and associated construction laydown areas would be outside the 328 feet (100 meter) Area of Potential Effect buffer of identified historic properties, the Naval Station San Diego Historic District (revised 2007), and individually eligible Dry Dock No. 1. Thus, consistent with Stipulation 8.A of the PA, Alternative 1 qualifies for a determination of “No Historic Properties Affected” (NAVFAC SW 2019f). Therefore, implementation of Alternative 1 would have no adverse effect on cultural resources. Accordingly, cultural resources are not carried forward for detailed analysis in this EA.

Terrestrial Biological Resources. Under the No Action Alternative, no demolition or construction activities would occur; therefore, there would be no impact to terrestrial biological resources. The industrial nature and mission of NBSD and Pier 6 preclude the existence of the suitable habitat necessary to support terrestrial biological resources. Section 3.2, *Marine Biological Resources*, analyzes potential impacts from Alternative 1 on marine species and habitat. Implementation of Alternative 1 would not impact terrestrial biological resources because sensitive terrestrial plant species or terrestrial threatened or endangered animals and their habitat do not occur within or near the limited upland portion of the project area. Therefore, there would be no impact. Accordingly, terrestrial biological resources are not carried forward for detailed analysis in this EA.

Land Use. Under the No Action Alternative, no demolition or construction activities would occur. There would be no changes to existing land use; therefore, no impacts to land use would occur. Under Alternative 1, the proposed demolition and replacement of Pier 6 and its associated utilities would not result in land use modifications. The existing military land use would continue to support NBSD operations and no land use compatibility issues would occur. The Navy conducted an effects analysis as part of its determination of the action's effects for purposes of federal consistency review under the Coastal Zone Management Act (CZMA). Refer to Section 5.1.1, *Coastal Zone Management*, for additional detail. Therefore, implementation of Alternative 1 would not affect land use. Accordingly, land use is not carried forward for detailed analysis in this EA.

Visual Resources. Under the No Action Alternative, no demolition or construction activities would occur. There would be no change to existing views or the viewshed at NBSD; therefore, no impacts to visual resources would occur. The height of existing Pier 6 is approximately 12 feet (4 meters) above mean lower low water level (MLLW) for its entire length. Under Alternative 1, the height of the proposed Pier 6 would be approximately 12.7 feet (3.9 meters) above MLLW at the quaywall and approximately 17 feet (5 meters) above MLLW at the end of the pier. The proposed watch tower would be approximately 22 feet (7 meters) tall (NAVFAC SW 2019c). The proposed Pier 6 would have the same general appearance as the existing Pier 6 and therefore, would visually blend in with the suite of piers in the vicinity and other piers along the NBSD waterfront. Views within San Diego Bay would remain consistent with the military and industrial nature of the surrounding area. Therefore, implementation of Alternative 1 would not affect visual resources. Accordingly, visual resources are not carried forward for detailed analysis in this EA.

Airspace. Under the No Action Alternative and Alternative 1 there would be no change to airspace; therefore, no impacts to airspace would occur. In addition, Alternative 1 would not result in the construction of any structures of any appreciable height; thus, implementation of Alternative 1 would not introduce any features that would impact airspace use or management. Accordingly, airspace is not carried forward for detailed analysis in this EA.

Noise. Noise levels are measured in decibels (dB), which are represented on a logarithmic scale. On this scale, everyday noises in air range from 30 dB for a quiet room to 90 dB for a vacuum cleaner at close range (Harris 1991). At a constant level of 70 dB, noise can be irritating and disruptive to speech; at louder levels, hearing losses can occur.

Airborne noise measurements are usually on an “A-weighted” scale that filters out very low and very high frequencies in order to replicate human sensitivity. It is common to add the “A” in order to identify that the measurement has been made with this filtering process (dBA). Shorter measurement durations (typically one hour) are described as Energy Equivalent Levels (L_{eq}) indicating the total energy contained by the sound over a given sample period. The L_{eq} for one hour is the energy average noise level during the hour.

The primary noise sources within the Pier 6 project area are ship-related activities on Pier 6; marine terminal operations; vehicular traffic; air traffic associated with Naval Air Station North Island, the U.S. Coast Guard Air Station, and San Diego International Airport; and vehicle traffic on nearby Interstate 5 (I-5). The City of San Diego noise ordinance limits airborne construction noise reaching a residential zone to a maximum 75 dBA during the 12-hour period from 7 A.M. to 7 P.M. (City of San Diego 2019). Similarly, noise levels emanating off-site from construction activities in National City may not exceed 75 dBA (L_{eq}) on weekdays during the day and 50 dBA (L_{eq}) during evening and night hours (7:00 P.M. through 7:00 A.M.) and on Sundays and holidays in residential zones at city boundaries (National City 2019).

Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. This analysis has identified two residential receptors representing the sensitive receptors closest to Pier 6: multi-family housing on Dalbergia Street in San Diego city limits and single-family homes on Roosevelt Avenue in National City limits. No sensitive receptors are located closer than these two residences. These residences are located approximately 4,000 feet (1,220 meters) and 4,200 feet (1,280 meters) from the base of Pier 6, respectively. Existing (baseline) noise levels at these locations under baseline conditions (due to their proximity to I-5) are dominated by freeway generated noise and are expected to be approximately 62 dBA at Dalbergia Street at 400 feet (122 meters) from I-5, and 76 dBA at Roosevelt Avenue at 80 feet (25 meters) from I-5, based on noise decay rates over distance (U.S. Federal Highway Administration 2003).

This focused analysis presents potential impacts from airborne noise. Section 3.2, *Marine Biological Resources,* presents the potential impacts of underwater noise on marine species. Under the No Action Alternative, no demolition or construction activities would occur; as such, there would be no change to the existing noise environment. Under Alternative 1, proposed demolition and construction activities would occur on weekdays during daylight hours. Demolition activities would use a range of standard equipment (cranes, excavators, jackhammers, backhoes, pavers, and dump trucks) and equipment such as air compressors and power generators that would produce noise. Demolition noise levels would be temporary, confined to the immediate project area, and the existing noise environment would mask project noise with increasing distance from the source (i.e., within 2,000 feet [610 meters]).

During construction, noise generated by the pile driver (while in use) would dominate the noise environment at Pier 6 and would almost exclusively determine the total sound level coming from the project site during construction activities. The maximum sound level of a piece of construction equipment may vary considerably depending on factors such as maintenance, age, activity, and load. Impact pile driving.

This analysis used airborne data for vibratory removal of steel piles for 18-inch and 24-inch piles (Naval Facilities Engineering Command Northwest 2015). Vibratory source levels at a distance of 50 feet (15 meters) were 88 dBA for the 18-inch piles, and 92 dBA for the 24-inch piles. While these piles are steel, they are likely louder than the concrete piles that would be removed, and are, therefore, considered as conservative.

For pile installation, this analysis initially considered data from NAVFAC SW (2018) in assessing airborne noise generated relative to similar piles proposed under the Proposed Action. These impact-driven piles included 16-inch concrete piles encased in a polymer shell, as well as 24 x 30-inch pre-cast concrete piles. For the 16-inch piles, mean source levels were 106 dBA (LZF_{max}), while the mean source levels for the 24 x 30-inch piles were 111 dBA (LZF_{max}). The preceding values are ”Z” weighted and not directly comparable to the presented noise regulatory standards. Therefore, this analysis uses data that indicates impact pile drivers generally produce a nominal peak noise level of approximately 105 dBA at a distance of 50 feet (15 meters) (Eaton 2000). Based on likely construction equipment and techniques used during the Proposed Action, when the pile driver is operating, it would be the predominant noise source in the immediate project area.

Noise levels decrease with increasing distance from the source. In addition, buildings effectively screen or noticeable reduce noise levels emanating from a site. Under normal conditions when sound propagation is unhindered by built-up terrain, noise decreases approximately 6 dB with each doubling of the distance. This means that at a distance of approximately 100 feet (30 meters) from the impact pile driver location, average noise levels would be approximately 99 dBA, at 200 feet (61 meters) 93 dBA, and approximately 87 dBA at 400 feet (122 meters). Similarly, noise from vibratory pile removal would generate average noise levels between 82 and 86 dBA at 100 feet (30 meters), 76 and 80 dBA at 200 feet (61 meters), and 70 and 74 dBA at 400 feet (122 meters).

Based on estimated average noise levels and distance from the source, average pile-driving related noise levels at the nearest sensitive noise receptors (approximately 4,000 feet [1,220 meters]) would range from approximately 52 to 69 dBA, even without numerically factoring in the acoustic screening offered by buildings and structures located between Pier 6 and the nearest sensitive noise receptors. These estimated noise levels are consistent with noise levels modeled during the Pier 12 replacement project, which were approximately 60 dBA at a distance of 3,700 feet (700 meters) (NAVFAC SW 2011a).

Potential average noise level ranges (without factoring in the building screening) would be less than the City of San Diego and National City construction ordinance limits of 75 dBA (L_{eq}), and less than current I-5 generated noise levels. In addition, demolition and construction noise generated under Alternative 1 would be generally consistent with the industrial nature of the area, would be temporary, and would be limited to normal working hours. Upon completion of the demolition and construction activities, the noise environment would revert to existing conditions. Therefore, implementation of Alternative 1 would have a temporary and negligible impact to the noise environment. Accordingly, noise is not carried forward for detailed analysis in this EA.

Transportation and Circulation. Under the No Action Alternative, no demolition or construction activities would occur and there would be no change to existing transportation and circulation; therefore, no impacts to transportation would occur. Implementation of Alternative 1 would result in a temporary increase in traffic during construction. Construction traffic would include worker commuting trips, the delivery and removal of materials and equipment, and the removal of debris. Of these three categories of trips, only worker trips would regularly coincide with typical weekday peak commuting periods (e.g., 7:00 A.M. to 9:00 A.M. and 4:30 P.M. to 6:30 P.M.), when traffic congestion is most pronounced. Other trips would occur in response to the needs of construction and would not necessarily be tied to commuting periods. The use of a floating crane and barges to haul construction debris would limit vehicular trips in the area immediately surrounding the construction site.

Given the location of Pier 6 and the types of construction activities involved, the volume of construction traffic would be similar to that of the Pier 8 project (NAVFAC SW 2016), which had a peak traffic generation of approximately 250 daily trips. This volume would be relatively minor, localized, and limited in duration. Alternative 1 would not involve the homeporting of additional ships and/or other activities that could result in additional operations-related traffic. Therefore, implementation of Alternative 1 would result in temporary, localized, and minor contributions to transportation and circulation, resulting in an overall negligible impact. Accordingly, transportation and circulation are not carried forward for detailed analysis in this EA.

Public Health and Safety. Under the No Action Alternative, no demolition or construction activities would occur and there would be no change to public health and safety. Under Alternative 1, proposed demolition and construction activities would take place within NBSD property boundaries and restricted navigation zones, where the Navy provides emergency response services. Alternative 1 would not involve or affect civilian public services such as police, fire, and schools because all activities would take place within the boundaries of NBSD. Implementation of Alternative 1 would therefore neither place any additional demand on public services such as fire protection and police protection, nor would it interfere with their operations. Workers already present in the local area are anticipated to meet the short-term increase in employment generated by Alternative 1, so there would be no change in demand for health care services and or public schools.

The Navy and contractors would continue to handle explosives in accordance with all applicable explosives safety requirements. To help ensure safety during the project demolition and construction activities, the NBSD Explosives Safety Officer would notify contractors when explosives handling occurs at Pier 5 and/or Pier 7 so that contractor personnel could be evacuated from the site during explosives handling operations. As part of the overall Installation Explosive Safety Quantity Distance (ESQD) Arc update at NBSD, the maximum Net Explosive Weight (NEW) limit for Pier 6 would increase from 1,500 pounds to 3,000 pounds of Hazard Class (H/C) 1.1 (NAVFAC SW 2019b). The ESQD limits of 1,250 feet (381 meters) for inhabited buildings and 750 feet (229 meters) for public traffic routes (navigable channels) are the same for 3,000 pounds H/C 1.1 and 1.2 as the limits are for 5,000 pounds H/C 1.3 and 1.4 (DoD 2008).

No inhabited buildings, other than the watchtower (located more than 1,250 feet (381 meters) from the explosives handling area), are part of Alternative 1. Completion of the site approval process and adherence to site approval requirements would ensure that implementation of Alternative 1 would not result in a significant impact to explosives safety and handling at NBSD, or pose a safety risk to contractor personnel involved in demolition and construction activities.

Proposed demolition and construction activities would occur in accordance with Navy regulations and plans. Only authorized Navy and contractor personnel would be allowed near work areas. Construction contractors would develop site-specific safety plans, including procedures for job hazard analysis, vehicle and equipment maintenance, and proper use of personal protective equipment. These documents would cover each phase of demolition and construction. The contractor would also develop a rescue plan for all water activities, with specifications for the retrieval and rescue of personnel. All personnel would receive briefings on all relevant safety plans. The contractor would also use standard noticing procedures to ensure that members of the public do not approach vessels engaged in project activities. Therefore, implementation of Alternative 1 would result in a negligible impact to health and safety. Accordingly, public health and safety are not carried forward for detailed analysis in this EA.

Executive Order (EO) 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires federal agencies to "make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." Under the No Action Alternative, no demolition or construction activities would occur; therefore, no impacts to the health and safety of children would occur. Under Alternative 1, the construction contractor would implement standard job site safety measures, which include securing equipment, materials, and vehicles, and neutralizing safety hazards during construction. Alternative 1 would occur on government property, where the Navy controls access to limit access to authorized persons only. This EA addresses potential air quality, noise, and transportation impacts to the nearby housing areas (to include the children within) in the relevant resource area sections. Under Alternative 1, no new land use activities that might potentially impact children would be introduced. Therefore, there would be no disproportionate impact to the health and safety of children from implementation of the alternatives.

Hazardous Materials and Wastes. Under the No Action Alternative, implementation of the Proposed Action would not occur and there would be no change associated with hazardous materials and wastes; therefore, no impacts to hazardous materials and wastes would occur. Under Alternative 1, the Navy and contractors would manage hazardous materials aboard NBSD in accordance with procedures established in Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.23G, *Navy Safety and Occupational Health Program Manual*. The Navy and contractors also manage hazardous wastes aboard NBSD according to OPNAVINST 5090.1E *Environmental and Natural Resources Program Manual* and the *Hazardous Waste Management Plan (HWMP) for the San Diego Metro Area* (Commander, NRSW 2007). There are no fuel pipelines to NBSD piers and the Navy does not have hazardous materials storage facilities on Pier 6. Section 3.1, *Water Resources*, and Section 3.2, *Marine Biological Resources*, address the potential impacts from an inadvertent spill.

Pier 6 is located within Navy's Munitions Response Program Site 100. Based on historical records at NBSD, historic munitions and explosives of concern may be present in the sediments at Pier 6 which could present an explosive safety hazard. This includes Unexploded Ordnance (UXO) and/or Discarded Military Munitions (DMM). To manage this potential hazard, the contractor would comply with an Explosives Safety Submission (ESS) or Explosives Safety Submission Determination Request (ESS DR) in compliance with Naval Ordnance Safety and Security Activity (NOSSA) requirements. Implementation of Alternative 1 would not begin without NOSSA and/or the Department of Defense Explosives Safety Board approval of the ESS or ESS DR.

Prior to demolition, contractors would conduct a lead survey and asbestos survey. If detected, trained, state-certified and licensed lead paint removal contractors would perform lead abatement. Contractors would capture and properly contain all removed materials/residue. The contractor would use catch devices and sheeting in the work area to ensure that lead-based paint chips, flakes, or dust would not enter San Diego Bay. If asbestos-containing materials are determined to be present, properly trained and licensed abatement contractors would perform asbestos abatement in accordance with all applicable regulations. In addition, prior to demolition and offsite transport, contractors would sample the vaults located beneath Pier 6 that previously contained polychlorinated biphenyl (PCB) transformers for traces of PCBs. The sample analysis results would dictate the appropriate disposal options. There are no Installation Restoration Program sites identified for investigation or cleanup in the vicinity of Pier 6.

To limit the amount of waste sent to Miramar Landfill, the contractor would prepare a solid waste management plan that would detail the types and quantities of waste expected to be generated; actions that would be taken to divert construction and demolition waste stream from landfilling; a list of the specific waste materials that would be salvaged for resale; reuse; or recycling; and identification and justification for materials that cannot be reused/recycled. Accordingly, hazardous materials and wastes are not carried forward for detailed analysis in this EA.

Socioeconomics and Environmental Justice. Under the No Action Alternative, the Proposed Action would not occur; therefore, there would be no impact to socioeconomics and environmental justice.

Implementation of Alternative 1 would result in an infusion of direct and indirect revenue to the local and regional economy over the life of the project. Proposed demolition and construction activities would require direct skilled and laborer construction jobs with various building trades. The majority of construction jobs would likely be filled from regional workers; there would be no anticipated increase in housing demand, law enforcement, fire protection, emergency medical services, or school enrollment. Workers are anticipated to spend money on food, lodging, incidentals, and gas, resulting in a temporary economic enhancement to the local economy and neighboring communities. There would be no change in neighborhood make-up or demographics.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations* requires that "each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health effects of its programs, policies, and activities on minority populations and low income populations."

Portions of National City immediately adjacent to the southeast of NBSD have low-income population. During project demolition/construction, the low-income population might detect construction noise generated by Alternative 1; however, the noise levels at this distance (greater than 4,000 feet [1,219 meters]) would be less than existing noise levels from other sources (e.g., vehicles and airplanes). Alternative 1 would not substantially affect human health or the environment. The activity would take place within the NBSD property boundaries isolated from the general population; thus, there would be no impact to any populations, including minority populations and low-income populations. The estimated construction noise levels in the low-income areas would not exceed the City of San Diego and National City Daytime Weekday Ordinance limits for noise, so there would be no significant airborne noise impact (refer to *Noise*, page 3-4). Project demolition and construction would result in temporary, localized, and minor contributions to vehicular traffic on roadways adjacent to NBSD. Therefore, implementation of Alternative 1 would not disproportionately affect minority or low-income populations or children. Accordingly, socioeconomics and environmental justice are not carried forward for detailed analysis in this EA.

Infrastructure and Utilities. Under the No Action Alternative, demolition and construction activities would not occur. There would be no changes to the existing public services and utility connections to the existing Pier 6; therefore, under the No Action Alternative, no impacts to infrastructure and utilities would occur.

The replacement of Pier 6 would include installing upgraded electrical, potable water, sanitary sewer, steam, oily waste, storm water treatment system, and compensating ballast water collection systems. Initial planning documentation has indicated that the existing utility supply and local infrastructure would accommodate the proposed electrical upgrades, to include the recent electrical utility upgrades at NBSD (NAVFAC SW 2011a; 2016; 2019a). Because there would be no change in operations there would be no anticipated change in potable water, steam, sewer, or ballast water collection system requirements. Implementation of Alternative 1 would include storm water treatment systems to manage storm water on the pier. Furthermore, there are no known submarine or buried utility cables or pipelines within the project footprint. Therefore, no impacts to infrastructure and utilities would occur and utilities are not carried forward for detailed analysis in this EA.

3.1 Water Resources

This discussion of water resources includes bathymetry and circulation, marine water quality, and marine sediments. This discussion does not address groundwater, wetlands, or floodplains because due to the in-water nature and location of the project, no impact to groundwater would occur; there are no wetlands located within the project area; and no impacts to floodplains would occur.

Bathymetry is the topography of the sea floor. Circulation describes the movement of water within a water body. Marine waters include oceanic waters from the surface to the bottom, extending seaward from the high tide line.

Surface water generally consists of wetlands, lakes, rivers, and streams. Under Section 303(d) of the Clean Water Act (CWA), a Total Maximum Daily Load is the maximum amount of a pollutant a water body can assimilate without causing an exceedance of water quality standards and the impairment of beneficial uses. A water body is impaired if water quality analyses conclude that exceedances of water quality standards occur.

Marine sediments are the solid fragments of organic and inorganic matter created from weathering rock transported by water, wind, and ice (glaciers) and deposited at the bottom of bodies of water. Through the downward movement of organic and inorganic particles in the water column, bottom sediments concentrate substances that are otherwise scarce in the water column (e.g., metals).

3.1.1 Regulatory Setting

Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredge or fill into wetlands and other Waters of the United States. Any discharge of dredge or fill into Waters of the United States requires a permit from the U.S. Army Corps of Engineers (USACE). Section 10 of the Rivers and Harbors Act provides for USACE permit requirements for any in-water construction. USACE and some states require a permit for any in-water construction. The construction of piers, wharfs, bulkheads, pilings, marinas, docks, ramps, floats, moorings, and like structures require permits from the USACE.

The CWA establishes federal limits, through the National Pollutant Discharge Elimination System (NPDES) program, on the amounts of specific pollutants that activities can discharged into surface waters to restore and maintain the chemical, physical, and biological integrity of the water. The NPDES program regulates the discharge of point (i.e., end of pipe) and nonpoint sources (i.e., storm water) of water pollution.

Waters of the U.S. include (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow perennially or have continuous flow at least seasonally (e.g., typically 3 months), and (4) wetlands that directly abut such tributaries under Section 404 of the CWA, as amended, and are regulated by USEPA and the USACE. The CWA requires that California establish a Section 303(d) list to identify impaired waters and establish Total Maximum Daily Loads for the sources causing the impairment.

The California NPDES storm water program requires construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre (0.4 ha) or more to obtain coverage under an

NPDES Construction General Permit for storm water discharges. Construction or demolition that necessitates an individual permit also requires preparation of a Notice of Intent to discharge storm water and a Storm Water Pollution Prevention Plan (SWPPP). As part of the 2010 Final Rule for the CWA, titled *Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category*, activities covered by this permit must implement non-numeric erosion and sediment controls and pollution prevention measures.

3.1.2 Affected Environment

The marine waters within the project area (seaward of the high tide line) are navigable waters of the U.S. under the CWA (33 U.S. Code [U.S.C.] section 1344) and Rivers and Harbors Act (33 U.S.C. section 403). The USACE regulates in-water work affecting navigable waters under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act, respectively.

3.1.2.1 Bathymetry and Circulation

San Diego Bay is a narrow, crescent-shaped natural embayment oriented northwest-southeast with an approximate length of 15 miles (24 kilometers [km]) (refer to Figure 1-1). The width of the Bay ranges from 0.2 to 3.6 miles (0.3 to 5.8 km), and depths range from -74 feet (-23 meters) mean lower low water (MLLW) near the tip of Ballast Point (refer to Figure 1-1) to less than 4 feet (1 meter) at the southern end (Merkel & Associates 2009). About half of the Bay is less than 15 feet (5 meters) deep and most of it is less than 50 feet (15 meters) deep (Merkel & Associates 2009).

The bathymetry of the Bay floor near Pier 6 is typical of that found in areas surrounding piers in San Diego Bay, i.e., a gradual deepening toward the center and mouth of the Bay. Depths in the project area vary from moderately deep (12 to 20 feet [3 to 6 meters] below MLLW) to deep (>20 feet [6 meters] below MLLW) (NRSW and Unified Port of San Diego 2013). As exemplified on Figure 2-1, there is a sloped mound of sediment underneath the center of the pier running the length of the pier (i.e., from quaywall to head) (NAVFAC 2012).

Based on previous surveys for adjacent piers, the bottom at Pier 6 consists of unvegetated mud (Merkel and Associates 2014). The slope of the bottom is relatively steep along the bulkhead wall and pier face, from a depth of approximately -15 feet (-5 meters) MLLW underneath the pier to a depth of approximately -30 feet (-9 meters) MLLW at the Bay-ward edge of the pier (NAVFAC SW 2019c).

The San Diego Bay’s crescent shape and narrow bay mouth affect circulation, tides, salinity, and temperature variations. Tidal flushing rates depend on distance from the mouth of San Diego Bay, season, and amplitude of the tidal cycle. The incoming tide brings cold ocean water from deeper areas; warmer bay surface waters then replace the colder water when the tide ebbs. These tidal processes lead to strong vertical mixing (NAVFAC SW 2016).

3.1.2.2 Marine Water Quality

Pier 6 is located adjacent to the Pueblo-San Diego sub-watershed portion of the San Diego Bay watershed. The Paleta Creek channel outlet runs between Pier 8 and the Mole Pier (refer to Figure 1-2).

The CNRSW Storm Water Best Management Practices Policies and Procedures Manual (CNRSW 2017) provides information and guidance on required best management practices (BMPs) for all operations conducting industrial work on all Navy wharves, piers, and quaywalls at San Diego Metro area installations (including Pier 6 at NBSD). Accordingly, workers conduct operations at Pier 6 in accordance with the Manual. In the event of an inadvertent hazardous materials release, Navy and contractor personnel follow procedures in the Naval Base San Diego Facility Response Plan to contain the release and properly dispose of any spilled materials in compliance with the California Code of Regulations (CCR) Title 14.

Section 303(d) of the CWA requires states to conduct biennial assessment of waters that do not meet protective water quality standards, and develop lists of "water quality limited segments" for impaired water bodies. For the 2016 reporting year, the USEPA listed all of San Diego Bay as an impaired water body on the CWA Section 303(d) list due to mercury, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHS) (USEPA 2019a). The USEPA also listed the San Diego Bay shoreline at 32nd Street Naval Station (for the 2016 reporting year) as impaired with the causes listed as benthic macroinvertebrates (cause unknown) and sediment toxicity (USEPA 2019b). Finally, the USEPA listed the Paleta Creek waterbody (for the 2016 reporting year) as impaired due to copper and lead (USEPA 2019c).

3.1.2.3 Marine Sediments

In 2012 the Navy completed a dredged material characterization study at along the northern quaywall and the first approximately 500 feet (152 meters) of the northern side of Pier 6 (NAVFAC SW 2012). The study revealed that sediments in the Pier 6 area consist of sands, silts, and clays, with sands (very fine sands) and silts constituting the bulk of the sediment.

The study found chemicals of concern within sediments collected from the Pier 6 dredge area. These included several trace metals, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyl (PCB) congeners. Metals of concern primarily included copper, mercury, and zinc. Other metals of concern were arsenic, cadmium, lead, and silver (NAVFAC SW 2012). The Navy has since performed maintenance dredging in this area, resulting in cleaner sediment than found in the 2012 study.

Currents and bottom stresses between the piers are generally too weak to cause significant sediment resuspension. About half of resuspended sediments settle out within the vicinity of the piers (NAVFAC SW 2016).

3.1.3 Environmental Consequences

This analysis determines whether long-term irreversible changes to bathymetry and circulation, water chemistry, marine sediments, or overall water quality would occur with implementation of the alternatives.

3.1.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change associated with water resources. The Navy would continue to implement BMPs to minimize impacts to water resources. Therefore, no significant impacts to water resources would occur with implementation of the No Action Alternative.

3.1.3.2 Alternative 1

Bathymetry and Circulation

> **Water Resources Potential Impacts:**
>
> - Minor and localized variations in bathymetry around pilings
> - Increased circulation around Pier 6
> - Localized and temporary resuspension of sediments
> - Inadvertent releases of petroleum-products and debris

Under Alternative 1 there would be no change to overall bathymetry. Minor and localized variations in bathymetry would occur around the piles as workers remove and install the piles; however, these minor variations would be temporary as currents and deposition would fill in the low areas.

Barges, tugs, and other vessels would move about the work area. All these operations would increase water movement in the area where infrastructure removal occurs, but this impact would be confined to the duration of the deconstruction period and work area. Small-scale, localized increases in water movements associated with deconstruction and demolition activities would not affect overall bay circulation, as tidal activity drives that circulation.

At this time, the Navy anticipates a majority of the existing piles (approximately two-thirds) would be sawcut or clipped at the mudline. The pile remnants would be at or below the mudline and new sediment would be anticipated to eventually cover the top of the pile remnants.

Once construction is complete, the resulting Pier 6 would have approximately 1,032 fewer piles distributed over an area approximately twice as large as the existing Pier 6. This pile spacing would be wide enough so that the resulting Pier 6 would not form a barrier to local circulation and would enhance circulation. Therefore, implementation of Alternative 1 would not result in significant impacts to bathymetry and circulation.

Marine Water Quality

The Navy would abide by the provisions stipulated in the CWA Section 401 Water Quality Certification from the San Diego Regional Water Quality Control Board and a CWA Section 404/Rivers and Harbors Act Section 10 permit from the USACE (Appendix D). These permits apply to all in-water component activities.

Potential sources of impacts to water quality associated with demolition activities would include residue inside pipelines, debris and dust from disassembling concrete and asphalt decks, petroleum products associated with asphalt debris, vessel and equipment fuels, and bottom sediments resuspended by pile removal action and demolition vessel movement.

Dust and debris from demolition activities could form floating scum on the water surface and increase turbidity by contributing additional material to the water column. To minimize the potential for this happening, the contractor would implement a NBSD-approved project-specific Storm Water Pollution Prevention Plan (SWPPP). The SWPPP would identify appropriate site-specific BMPs that would be implemented to minimize and contain dust and debris. As a part of the BMPs outlined in the SWPPP, the demolition contractor would provide a floating boom around the project area to contain floating surface debris, and use catch devices and sheeting. The contractor would also prepare and implement a Construction and Demolition Plan that would cover all phases of the work and specify the materials, equipment, and procedures workers would use to contain all construction and demolition waste and debris, including dust.

Oily residue in pipelines, vessel and equipment fuels and hydraulics, and asphalt debris are potential sources of petroleum waste. The demolition contractor would develop and receive Base approval of a Spill Prevention Plan to address spill prevention and containment procedures within their equipment and vessels. Contractors would limit the potential for accidental releases of petroleum and debris from vessels and equipment by ensuring proper maintenance, inspection, and operation of vessels and equipment, and implementing a site-specific SWPPP and Spill Prevention Plan. Per the NBSD Facility Response Plan, contractors would report any petroleum release or petroleum sheen observed on the water surface to NBSD Port Operations and the U.S. Coast Guard (USCG) National Response Center.

In the event of an accidental release, clean-up procedures would take place. In accordance with the NBSD Facility Response Plan, booms and other spill containment equipment kept on hand would be immediately deployed, the source of the release would be determined and secured, and the NBSD Fire Department would respond to clean up the spill. These procedures would avoid/minimize impacts to water quality from petroleum products associated with demolition activities.

Construction of the proposed Pier 6 would include installing approximately 966 piles with a pile driver, which would result in localized, short-term disturbances of bottom sediments. Because there would be fewer pile installations than removals, and the process of pile driving displaces a smaller volume of sediment than pile removal, constructing the proposed Pier 6 would cause fewer disturbances, and therefore less resuspension of bottom sediments, than the action of removing the existing Pier 6 piles.

Implementation of Alternative 1 would limit the impact to water quality from turbidity and suspended sediments to the Pier 6 area and possibly adjacent Navy piers. Impacts would cease with the completion of pile driving. The construction contractor would follow the same project-specific precautionary measures to reduce turbidity during demolition and comply with the Regional Water Quality Control Board and USACE permit requirements. Adherence to the SWPPP requirements would further minimize the potential for spills of construction-related materials and hazardous materials.

The Navy anticipates disturbing no more than 0.75 acres (0.3 ha) of developed upland areas adjacent to the pier to crush and process concrete and rebar, establish utility connections, etc. As such, the maximum area of disturbance would be below the trigger of 1 acre (0.4 ha) that would necessitate obtaining coverage under a project-specific NPDES Construction General Permit for storm water discharges. However, the contractor would develop, receive Base approval of, and implement a site-specific construction SWPPP and associated BMPs consistent with NBSD's existing NPDES Permit under their Municipal Storm Water Management Plan. The SWPPP would specify BMPs to prevent construction pollutants from contacting storm water, eliminate or reduce non-storm water discharges, and perform inspections of all BMPs. The SWPPP would also include BMPs to minimize potential impacts related to the on-shore construction components, such as: preventing erosion; the use of sediment barriers; inlet covers; covering stockpiles; inspecting equipment and vehicles for drips; and placing drip pans beneath vehicles and equipment.

Upon completion of the proposed Pier 6, operations would continue to follow the CNRSW Storm Water Best Management Practices Policies and Procedures Manual (CNRSW 2017) and Pier 6-specific BMPs. In addition, the installation of a storm water treatment unit at Pier 6 would improve water quality through the treatment of storm water runoff. Therefore, implementation of Alternative 1 would not result in significant impacts to marine water quality.

Marine Sediments

This analysis examined the potential for disturbance to marine sediments resulting in turbidity issues during pile removal activities. This analysis determined turbidity would not migrate beyond the immediate construction footprint during the removal of piles for the following reasons:

- A good portion of the existing piles would be sawcut or clipped at the mudline, as removing all the piles would change the structural characteristics of the seafloor and therefore pier design to ensure structural stability, capacity, etc. (a "Swiss-cheese effect").
- Any turbidity that could result from the clipper being placed at the mudline of the pile would be minimal because the clippers would be lowered slowly down the pile to avoid snagging.
- The piles to be removed would be removed via dry pull or vibratory hammer.
- Jetting would not be required for removal of piles.

The installation of new piles would likely be done using jetting and pile driving. Similarly, turbidity is not anticipated to migrate outside of the immediate vicinity of Pier 6 during pile installation due to the following reasons:

- A slow current velocity, 0-0.2 knots slack to peak, between piers.
- Jetting would only be used for a part of each pile installation. The pile would be set into place and sink into the seafloor due to the weight of the pile only.
- Jetting would occur from the tip of the pile once the pile is already below the seafloor surface. The water discharge into the sediment would cause an increase in pressure within the interstitial spaces below the surface of the sediment which would reduce the amount of sediment potentially re-suspended into the water column.
- The seafloor sediment forced into re-suspension would remain relatively low in the water column which would allow the sediment to fall out of suspension relatively quickly reducing the potential for sediment to migrate away from the immediate project footprint.
- Jetting would only be used for a portion of the installation process. Pile driving would be necessary to reach the required pile tip elevation.
- Each pile installation would involve placing a pile for installation and setting up equipment for the installation. The pause between each pile installation would allow for any sediment to fall out of suspension.

The installation of a turbidity curtain would not likely result in a decrease in turbidity migrating outside the project footprint due to the following reasons:

- The seafloor underneath the existing pier is substantially shallower (-20 ft MLLW) than the seafloor adjacent to the pier in the active berthing area (-37 ft MLLW). The rapid elevation changes in the seafloor, the density of piles within the pier footprint, and the tempo of construction activities would make it impracticable to enclose the immediate area of active pile driving.
- The current primarily moves northward in San Diego Bay and the turbidity created by pile installation would be generated primarily at the seafloor. The installation and maintenance of a turbidity curtain perpendicular to the prevailing current direction in water depths of -37 ft MLLW to contain turbidity primarily at the seafloor would be extremely difficult and likely ineffective.

- The tide cycle results in currents moving north-south, changing direction with the tide cycle. Installing a large turbidity curtain on the structures associated with the pier would likely result in damage to the curtain coming into contact with the piles as the tide changes direction.
- The amount of force exerted on the curtain, resulting from the tidal currents and/or the decrease in volume of the water column underneath the pier, would result in tearing of the curtain or the curtain billowing from the seafloor. Either situation would allow turbidity at the seafloor to migrate and the restriction of water movement creating a "jet" effect. The jet effect could accelerate migration of turbidity beyond the project footprint, rather than just letting turbidity fall out of suspension naturally in between each pile installation.

In-water activities associated with pile removal and installation would cause disturbance of bottom sediments and increased turbidity as a result of sediment resuspension. However, the sediment resuspension and increased turbidity would be short-term and limited to the areas of bottom disturbance and localized to the immediate Pier 6 area. The Navy would install a debris boom around all pile removal/installation activities and regularly monitor the area. Debris would be collected and disposed of at an approved upland location. Any sheens detected would be addressed in compliance with the Navy's spill response policy at NBSD. In addition, the aforementioned BMPs and storm water treatment measures would further minimize the potential for impacts to marine sediment quality. Therefore, implementation of Alternative 1 would not result in significant impacts to marine sediments or turbidity.

<u>Summary</u>

In conclusion, for the reasons discussed in the preceding paragraphs, implementation of Alternative 1 would not result in significant impacts to water resources.

3.2 Marine Biological Resources

3.2.1 Definition of Resource

This section describes native and naturalized plants and animals and the habitats in which they occur within areas that may be directly or indirectly affected by the Proposed Action. The terrestrial area affected by the project is entirely developed, and, as a result, terrestrial biological resources are of negligible importance and are not discussed. For the purposes of this EA, these resources are divided into three major categories: 1) Habitats and Communities; 2) Fish and Wildlife; and 3) Threatened and Endangered Species.

The purpose of the Endangered Species Act (ESA) is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires action proponents to consult with the U.S. Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Administration (NOAA) Fisheries to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species or result in the destruction or adverse modification of designated critical habitat. Consultation is not required for actions that would have no effect on listed species. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the Department of Defense (DoD) where an Integrated Natural Resources Management Plan (INRMP) has been developed that, as determined by the

Department of Interior or Department of Commerce Secretary, provides a benefit to the species subject to critical habitat designation.

All marine mammals are protected under the provisions of the Marine Mammal Protection Act (MMPA). The MMPA prohibits any person or vessel from "taking" marine mammals in the U.S. or on the high seas without authorization. The MMPA defines "take" to mean "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal."

Birds, both migratory and most native-resident bird species, are protected under the Migratory Bird Treaty Act (MBTA), and their conservation by federal agencies is mandated by EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. Under the MBTA it is unlawful by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, or possess migratory birds or their nests or eggs at any time, unless permitted. The 2003 National Defense Authorization Act gave the Secretary of the Interior authority to prescribe regulations to authorize the Armed Forces the incidental taking of migratory birds during authorized military readiness activities. The final rule authorizing the DoD to take migratory birds in such cases includes a requirement that the Armed Forces must confer with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate adverse effects of the Proposed Action if the action would have a significant negative effect on the sustainability of a population of a migratory bird species.

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) provides for the conservation and management of the fisheries. Under the MSFCMA, essential fish habitat (EFH) consists of the waters and substrate needed by fish to spawn, breed, feed, or grow to maturity.

Sound propagation characteristics are different in water than in air. Sound levels are calculated as a ratio of the measured acoustic energy to a reference value. The reference level for airborne sound is 20 micro Pascal (µPa), consistent with the minimum level detectable by humans. However, a reference level of one µPa is used for underwater sound because a reference based on the threshold of human hearing in air is not appropriate (NOAA 2019). Also, the source levels for different types of noise and activities are measured at different distances, depending on the activity. For instance, airborne source levels are measured at 50 feet (15 meters), while underwater source data is collected at 3.3 feet (1 meter) for sonar, or 33 feet (10 meters) for pile driving.

Airborne sound can be transmitted into the water. However, the amount of acoustic energy directly transmitted from a source is limited due to refraction and reflection. Sound transmission in shallow water is also influenced by reflection losses from the bottom and the surface, refraction from sound speed gradients, reflection and refraction from shallow bottom layers, and scattering from rough surfaces. As a result, waterborne sounds can only be meaningfully compared to airborne sounds if a 26-dB correction factor is added to airborne sound levels (NOAA 2019).

3.2.2 Affected Environment

The following description of existing conditions is based primarily on the following references:

- The San Diego Bay Integrated Natural Resources Management Plan (INRMP) (NRSW and Unified Port of San Diego 2013);
- NBSD INRMP (Navy 2014);
- 2017 San Diego Bay Eelgrass Inventory Update (Merkel & Associates 2018);

- 2010 Characterization of Essential Fish Habitat in San Diego Bay (NAVFAC SW 2010);
- Fish surveys conducted in San Diego Bay by Allen et al. (2002), Pondella and Associates (Vantuna Research Group 2006, 2009), Williams et al. (2015, 2016), and Martinez-Takeshita et al. (2015);
- Draft Wharf Shading Study for the Pier 8 Replacement and Demolition Project, Naval Base San Diego. Prepared for NAVFAC SW (Merkel & Associates 2014);
- San Diego Bay Avian Species Surveys 2016-2017 (Tierra Data, Inc. 2018);
- California Least Tern (*Sterna antillarum browni*) and Western Snowy Plover (*Charadrius nivosus nivosus*) (Post et al. 2018); and
- EA for Pier 8 Replacement at Naval Base San Diego (NAVFAC SW 2016).

Other references are cited where applicable.

3.2.2.1 Habitats and Communities

Habitats in San Diego Bay are differentiated by elevation or depth, substrate, and manmade or natural biological features. Habitats associated within the project area include: 1) developed *Shoreline and Artificial Substrates* (e.g., pier pilings and decking) at Pier 6 and 2) *Shallow Subtidal*, 3) *Moderately Deep Subtidal*, and 4) *Deep Subtidal* habitats of the Bay (NRSW and Unified Port of San Diego 2013). Each of the latter three habitats have individual marine benthic (bottom), water column, and open water elements. Depths in the project area vary from moderately deep (12 to 20 feet [4 to 6 meters] below MLLW) to deep (>20 feet [6 meters] below MLLW) (NRSW and Unified Port of San Diego 2013). Habitats and associated biological communities of the affected environment are described below per each habitat type: Shoreline and Artificial Substrates; Shallow Subtidal, Moderately Deep Subtidal, and Deep Subtidal.

In 2019, an analysis of the ambient noise in waters adjacent to NBSD (Dahl and Dall'Osto 2019) conducted on behalf of the Navy identified background noise near Pier 6 at 126 dB (L_{50} - a statistical descriptor of the sound level exceeded for 50% of the time measurement period). This value is used as a local baseline ambient noise value for all noise sources, including demolition and construction activities.

<u>Shoreline and Artificial Substrates</u>

The shoreline of the affected environment consists of developed adjacent upland and artificial substrates. Artificial substrates consist of pier pilings; bulkheads; rock riprap; floating docks; seawalls; mooring systems; artificial reefs; and derelict ships and ship parts. These substrates form extensive artificial habitat in the northern and central parts of the Bay. Collectively, manmade structures support a wealth of invertebrates and seaweeds. California spiny lobster (*Panulirus interruptus*), along with a variety of crabs; worms; mussels; barnacles; echinoderms (sea stars and sea urchins); sponges; sea anemones; and tunicates (sea squirts) are all known to inhabit artificial substrates in San Diego Bay (NRSW and Unified Port of San Diego 2013). These structures provide microhabitats and support communities similar to those of natural rocky shores, which are lacking in San Diego Bay. These areas may also provide refuge and feeding areas for juvenile and predatory fishes. Riprap niches are often filled with invertebrate fauna. Small mobile invertebrates including nemertean worms (ribbon worms); amphipods; shrimp; decorator crabs; and gastropods are common on piles (NRSW and Unified Port of San Diego 2013). Seventy-four percent (45.4 miles [73 km]) of the shoreline of San Diego Bay is armored by man-made structures to protect developed sites (NRSW and Unified Port of San Diego 2013).

Although a number of potential negative impacts have been attributed to overwater structures (Nightingale and Simenstad 2001; NOAA Fisheries 2013), wharves, docks, and piers in San Diego Bay provide increased three-dimensional substrate and cover that locally increases the productivity of benthic organisms as well as the species richness and abundance of fish compared to more open waters (Merkel & Associates 2014). It should be noted, however, that many of the species that inhabit artificial structures in San Diego Bay, e.g., the recently discovered bryozoan *Watersipora subovoidea*, are nonindigenous and may displace or have other detrimental effects on native species (Ruiz and Geller 2015).

A previous study of pier-associated biota at NBSD, including fish and encrusting and infaunal invertebrate communities, conducted in 2013 along the edges, underneath, and in the open water adjacent to neighboring Piers 8 and 2 (a larger pier) is utilized here as a proxy for Pier 6 (Merkel & Associates 2014). That study found a high diversity and abundance of fish associated with both piers, although abundance dropped markedly in the deeper recesses under the middle of the piers, as compared with low diversity and abundance in the adjacent deep subtidal habitat. The abundance and biomass of benthic infauna were also higher at the piers compared to the deep subtidal habitat. Pier pilings were found to be heavily encrusted with oysters; mussels; and barnacles in the intertidal zone; and a subtidal epibiota of sponges; hydroids; and tunicates.

Shallow Subtidal (-2.2 to -12 feet [0.7 to 3.7 meters] MLLW)

Shallow subtidal habitats are highly productive and important in San Diego Bay, in part due to the presence of eelgrass (*Zostera marina*) beds and algal mats on shallow sandy to muddy substrates in many areas of the Bay (Merkel & Associates 2009, 2018; NAVFAC SW 2002, 2011b; (NRSW and Unified Port of San Diego 2013). However, except to the extent that this depth range exists where shoreline and artificial substrates extend into deeper waters, shallow subtidal habitats do not occur in the affected areas, and there is no suitable substrate at the appropriate depth for eelgrass. Currently, a small eelgrass bed occurs near the former location of Pier 14 at the south end of NBSD. Otherwise, the nearest eelgrass beds are found approximately 1.5 miles (2.4 km) west and 1.5 miles (2.4 km) south of Pier 6, on the opposite shore of the Bay and at the mouth of the Sweetwater River, respectively (Merkel & Associates 2009, 2018) (Figure 3-1).

Moderately Deep Subtidal (-12 to -20 feet [3.7 to 6 meters] MLLW)

Approximately 2,219 acres (898 ha) (17 percent) of Bay surface area falls into the moderately deep category, primarily in the south-central Bay and in inlets of the North Bay (NRSW and Unified Port of San Diego 2013). For both the moderately deep and deep subtidal (see below) habitats, primary production by phytoplankton occurs in the overlying water column; benthic primary production is limited because of low light penetration and lack of algal mats and eelgrass beds. The base of the food chain for the benthic community is provided instead by organic detritus that originates in shallower water and drifts/sinks into deeper water.

Fauna residing in subtidal benthic habitats (across all depths) include: the warty sea cucumber (*Apostichopus parvimensis*) and a diversity of infaunal species such as suspension feeders, burrower, and tube builders. Feeding by nematode and polychaete worms; clams; gastropod mollusks; brittlestars; crabs; isopods; and a wide variety of smaller crustaceans transforms detritus and small invertebrates into usable food for large invertebrates and fishes.

Path: Q:\3151_AquaticResources\SanDiegoMaintenanceDredging\MXD\ReportFigures\2019\Pier6_EIR\Pier6_Eelgrass.mxd, chris.nixon 7/18/2019

1 inch = 2,000 feet

0 1,000 2,000 Feet

Pier 6

Eelgrass (Merkel, 2017)

Least Tern Foraging Area

Least Tern Nesting Site (NAVFAC SW & Unified Port of San Diego(2013) Least Tern

Nesting Sites (Inset)

Figure 3-1 Surveyed Eelgrass Locations and California Least Tern Nesting and Foraging Areas Pier 6 Naval Base San Diego, San Diego CA

The soft bottom benthos provides other functional roles besides serving as a prey base for fish and birds. Less conspicuous mollusks, polychaete worms, small crustaceans, and other invertebrates living at the bottom of the Bay mineralize organic wastes as it accumulates, consume algae, and return essential chemicals and organic matter to the water column (NRSW and Unified Port of San Diego 2013).

Typical fish species include round stingray (*Urobatis halleri*), spotted sand bass (*Paralabrax maculatofasciatus*), California halibut (*Paralichthys californicus*), and barred sand bass (*Paralabrax nebulifer*) (NRSW and Unified Port of San Diego 2013).

Deep Subtidal (>-20 feet [6 meters] MLLW)

Deep subtidal habitat includes the overlying surface water, water column, and sediments for areas greater than 20 feet (6 meters) in depth, constituting about 4,440 acres (1,797 ha) (34 percent) of the Bay surface area and is associated primarily with navigational channels. Most of the project area for Pier 6 is deep subtidal, ranging from 20 to 39 feet (6 to 12 meters) deep; the shallowest area is adjacent to the sea wall (Merkel & Associates 2014).

The deep subtidal water column is home to phytoplankton and zooplankton, including species that spend their entire lives (holoplankton), or only a portion of their life cycle, e.g., as eggs, larvae, or juveniles (meroplankton), in the plankton. For the meroplankton, which includes many fish and invertebrates, an important function of the deep subtidal environment is transport into and out of the relatively warm, sheltered waters of the Bay which provide nursery habitats. The most common fish species found in this habitat are round stingray, spotted sand bass, and bat ray (*Myliobatis californica*) (NRSW and Unified Port of San Diego 2013; Merkel & Associates 2014).

3.2.2.2 Fish and Wildlife

This section includes fisheries and EFH, birds, and marine mammals potentially occurring within the affected environment. Threatened and endangered wildlife species, including sea turtles, are discussed in Section 3.2.2.3, *Threatened and Endangered Species*.

Fisheries

Numerous surveys have been conducted over the last few decades in the San Diego Bay region to quantify fish diversity and abundance. The Vantuna Research Group (Allen *et al*. 2002; Williams *et al*. 2015 and 2016 and Martinez-Takeshita *et al*. 2015) have conducted the most comprehensive surveys of the Bay. These surveys have generally found much lower abundance, biomass, and diversity of fishes in the south-central Bay than in other parts of the Bay.

It should be noted that the south-central Bay sites sampled in these studies were across the Bay from NBSD at Glorietta Bay and the Naval Amphibious Base, and probably are not representative of the fish community associated with the NBSD piers. These and other works related to fish and EFH were characterized by Merkel & Associates (2014) and NAVFAC SW (2010). A total of 109 species of bottom-living and open-water fishes occur in the Bay.

There is a greater variety of fish species in the North Bay than in the South Bay, and the greatest fish diversity can be found at artificial reefs. Increased levels of flushing around the North Bay also increases food availability, the supply of larval recruits, and water quality (NAVFAC SW 2010). Eelgrass beds in particular are recognized as highly productive and important nursery habitat for a number of fish species in San Diego Bay, but they do not occur in the project area (NRSW and Unified Port of San Diego 2013; Merkel & Associates 2014). While there is no commercial fishing within the Bay, seven fish species inhabiting the Bay support commercial fisheries elsewhere in Southern California waters. Examples of notable fishery populations found in the Bay include California halibut and white seabass (*Atractoscion nobilis*). At least 58 species are involved in the recreational catch (NRSW and Unified Port of San Diego 2013).

While no surveys have been conducted at Pier 6, Merkel & Associates (2014) have provided lists of San Diego Bay fish that are associated with deep subtidal versus manmade structural habitats, based on the surveys of Piers 2 and 8 (to the east and west of Pier 6 respectively). Despite much less intensive sampling than in the deep subtidal habitat, a large number of species have been documented around piers and other artificial structures, including most of the common species found in San Diego Bay. When comparably sampled, piers have been found to support a greater abundance and diversity of fish than adjacent open-water areas.

During surveys identified in Merkel and Associates (2014), fish species observed in transects along the edges of and/or underneath Piers 2 and 8 included spotted sand bass (*Paralabrax maculatofasciatus*); barred sand bass (*Paralabrax nebulifer*); kelp bass (*Paralabrax clathratus*); black croaker (*Cheilotrema saturnum*); round stingray (*Urobatis halleri*); yellowfin croaker (*Umbrina roncador*); white sea bass (*Atractoscion nobilis*); midshipman (*Porichthys* sp.); sargo (*Anisotremus davidsonii*); slough anchovy (*Anchoa delicatissima)*; giant kelpfish (*Heterostichus rostratus*); and bay blenny (*Hypsoblennius gentilis*) (Merkel & Associates 2014). The same species would be expected to occur along Pier 6.

In contrast, in the deep subtidal habitat away from the piers, only one fish species, the black croaker, was observed (next to a tire on the bottom), although other species considered likely to use this habitat include spotted sand bass, round stingray, barred sand bass, midshipman, and gobies (Family Gobiidae). California spiny lobsters were also observed under Pier 2 but were not observed and are not likely to occur in the open deep subtidal habitat. Similar results would be expected in open water away from Pier 6.

<u>EFH</u>

Many marine habitats are critical to the productivity and sustainability of marine fisheries. The 1996 amendments to the MSFCMA set forth the EFH provisions to identify and protect important habitats of federally managed marine and anadromous fish species. Section 305(b)(2) of the amended MSFCMA directs each Federal Agency to consult with NOAA Fisheries with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH identified under the MSFCMA. Implementing regulations for this requirement are at 50 CFR 600. Because the project area is located within an area designated as EFH for two Fishery Management Plans (FMPs) – The Pacific Coast Groundfish (Pacific Fishery Management Council [PFMC] 2016a) and the Coastal Pelagic Species (PMFC 2016b) – and may adversely affect EFH, the U.S. consulted with NOAA Fisheries. As such, a written assessment of the effects of the Proposed Action on EFH is provided in Appendix B and is summarized in this EA.

Of the 109 species of fish previously identified in San Diego Bay, ten are managed by NOAA Fisheries. Four are managed under the Coastal Pelagic Species FMP (PFMC 2016b): northern anchovy (*Engraulis mordax*); Pacific sardine (*Sardinops sagax*); Pacific mackerel (*Scomber japonicus*); and jack mackerel

(*Trachurus symmetricus*). Six species are covered under the Pacific Groundfish FMP (PFMC 2016a) and occur, although not in abundance, in San Diego Bay: California scorpionfish (*Scorpaena guttata*); grass rockfish (*Sebastes rastrelliger*); English sole (*Parophrys vetulus*); curlfin sole (*Pleuronichthys decurrens*); leopard shark (*Triakis semifasciatus*); and soupfin shark (*Galeorhinus galeus*) (NAVFAC SW 2010; NRSW and Unified Port of San Diego 2013). These species are discussed briefly below and are discussed in detail in Merkel & Associates (2014).

Coastal pelagic species are those fish that live in the water column as opposed to groundfish species that live near the sea floor. The coastal pelagic species fishery includes four finfish: (northern anchovy, Pacific sardine, Pacific [chub] mackerel, and jack mackerel) and the invertebrate, market squid (PFMC 2016b). Pelagic species can generally be found anywhere from the surface to 3,300 feet (1,005 meters) deep. San Diego Bay is entirely within the boundary of EFH for coastal pelagic species finfish. All, except for market squid, are likely to occur in the Bay. Finfish are highly transient and two, northern anchovy and Pacific sardine, can be found throughout San Diego Bay. Jack mackerel and Pacific mackerel are typically found in the North, North-Central, and South-Central Ecoregions of the San Diego Bay (Allen *et al*. 2002). All coastal pelagic fish species have been documented to occur in deep subtidal habitat, and all but the jack mackerel – which is less common and hence less likely to have been detected in the few surveys conducted – have been documented around manmade structures (Merkel & Associates 2014).

The Pacific Coast Groundfish FMP manages 91 species over a large ecologically diverse area covering the entire West Coast of the continental United States (PFMC 2016a). Although groundfish are those fish considered demersal (fish that live on or near the seabed), they occupy diverse habitats at all stages in their life histories. EFH areas may be large because a species' pelagic eggs and larvae are widely dispersed, for example, or comparatively small as is the case with the adults of many nearshore rockfishes which show strong affinities to a particular location or type of substrate. Appendix B provides descriptions of six designated FMP groundfish species that are known to occur in the Bay; however, the species rarity in all or parts of the Bay makes it unlikely that any would occur in the project area (Merkel & Associates 2014). These species are California scorpionfish, grass rockfish, English sole, curlfin sole, leopard shark, and soupfin shark.

In addition to designating EFH, the PFMC is also responsible for identifying Habitat Areas of Particular Concern (HAPC) for federally managed species. EFH that is considered to be particularly important to the long-term productivity of populations of one or more managed species, or to be particularly vulnerable to degradation, also may be identified by NOAA Fisheries as a HAPC. Two HAPCs, estuarine habitats and eelgrass, a species of seagrass, occur in San Diego Bay (NAVFAC SW 2010); however, no HAPC occurs within the project area.

Special Aquatic Sites

In addition to EFH and HAPC, the USEPA defined Special Aquatic Sites as geographic areas, large or small, possessing special ecological characteristics of: productivity; habitat; wildlife protection; or other important and easily disrupted ecological values (USEPA, 40 CFR section 230.3[q-1]). There are no special aquatic sites located within or in the immediate vicinity of the proposed project area.

Birds

The MBTA of 1918 (16 U.S.C. 703 *et seq*.) and the Migratory Bird Conservation Act (16 U.S.C. 715-715d; 715e; 715f-715r) of 18 Feb 29, (45 Stat. 1222) are the primary legislation in the United States established to conserve migratory birds. These statutes implement the United States' commitment to four treaties, or conventions, with Canada, Mexico, Russia, and Japan for the protection of a shared migratory bird resource.

The MBTA prohibits: the taking; killing; or possessing of migratory birds; or the parts; nests; or eggs of such birds, unless permitted. The species of birds protected by the MBTA appears in Title 50, section 10.13, of the (50 CFR 10.13) and represent almost all avian families found in North America. In general, there are only three species that are not protected by the MBTA and they include: the rock pigeon (*Columba livia*); European starling (*Sturnus vulgaris*); and house sparrow (*Passer domesticus*).

Migratory bird conservation relative to non-military readiness is addressed separately in a Memorandum of Understanding (MOU) developed in accordance with EO 13186, signed 10 January 2001, "Representatives of Federal Agencies to Protect Migratory Birds." The MOU between the DoD and the USFWS was signed on 31 July 2006.

The project area is located on the mainland side of central San Diego Bay and includes man-made structures and open water habitat. Bird abundance and diversity are relatively low in the project area compared to the opposite (Coronado) shore and the South Bay (NRSW and Unified Port of San Diego 2013; Tierra Data, Inc. 2018). A number of species covered by the MBTA are found within the project area, including the species mentioned below. A number of the species covered under the MBTA are also federally or state-listed as threatened or endangered. However, there are also many other species that occur in and around San Diego Bay and the project area that are not otherwise listed as threatened or endangered that would fall under the MBTA. These include species that are transiting or migrating through the area.

San Diego Bay is part of a major bird migratory pathway, the Pacific Flyway, and supports large populations of over-wintering birds traveling between northern breeding grounds and southern wintering sites, with over 300 migratory and resident bird species documented to use the Bay (Navy and Port of San Diego 2013; Tierra Data, Inc. 2018). The most common birds along the developed NBSD shoreline and adjacent deep subtidal waters are waterfowl (ducks) and seabirds (gulls and terns), and would likely include the following species: surf scoter (*Melanitta perspicillata*), eared grebe (*Podiceps nigricollis*), brant (*Branta bernicla*), scaup species (*Aythya* spp.), bufflehead (*Bucephala albeola*), elegant tern (*Thalasseus elegans*), western gull (*Larus occidentalis*), California gull (*Larus californicus*), Forster's tern (*Sterna forsteri*), California brown pelican (*Pelecanus occidentalis*), Heermann's gull (*Larus heermanni*), double-crested cormorant (*Phalacrocorax auritus*), mallard (*Anas platyrhynchos*), and great blue heron (*Ardea herodias*) (Tierra Data, Inc. 2018). Several species, as noted below, are considered sensitive by the USFWS or California Department of Fish and Wildlife (CDFW). For more detailed information on the California least tern, see Section 3.2.2.3, *Threatened and Endangered Species*.

Bird species that are not threatened or endangered but are of state or federal concern that have the potential to occur in the vicinity of the proposed project include the common loon (*Gavia immer*); double-crested cormorant; osprey (*Pandion haliaetus*); gull-billed tern (*Sterna nilotica*); California gull; black skimmer; great blue heron; black-crowned night heron (*Nycticorax nycticorax*); Forster's tern; and the elegant tern. Most of these species are considered sensitive only where breeding or nesting occurs. These birds use intertidal flats, shallow water habitat, or manmade structures for foraging or resting, similar to areas adjacent to the project area.

Marine Mammals

Marine mammals are protected from "taking" under the MMPA of 1972. Taking is defined as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." The term harassment is defined under the MMPA as any act of pursuit, torment, or annoyance that has the potential to do one or both of the following:

- Injure a marine mammal or marine mammal stock in the wild (Level A); and/or
- 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 (Level B).

Marine mammals in San Diego Bay include: the California sea lion (*Zalophus californianus*), which often rests on buoys and other structures and occurs throughout the Bay; coastal bottlenose dolphin (*Tursiops truncatus*), which is regularly seen in the northern part of the Bay; Pacific harbor seal (*Phoca vitulina*), which frequently enters the northern part of the Bay; common dolphins (*Delphinus* spp.), which are rare visitors in the northern part of the Bay; and the California gray whale (*Eschrichtius robustus*), which is occasionally sighted near the mouth of the Bay during its winter migration (NRSW and Unified Port of San Diego 2013). There are no known haulouts or rookery sites for sea lions or harbor seals in the project vicinity. Therefore, no airborne exposures to project-related pile driving are anticipated. As a result, an analysis of potential airborne exposures is not needed, and will not be discussed further in this document.

California sea lions are primarily observed north of the Coronado Bridge (Merkel and Associates 2008; Sorensen and Swope 2010; Graham and Saunders 2014; Tierra Data Inc. 2016) and sighting rates in the project area would be expected to be low based on Sorenson and Swope (2010), and more recent monitoring efforts conducted in late 2019 and early 2020 in support of a quaywall repair project at the northern end of NBSD (Chollas Creek Quaywall Repairs, unpublished data). The more recent data recorded California sea lion observations at an average of 0.69 animals per monitoring day based on 9 individuals observed over 13 days of effort (Chollas Creek Quaywall Repairs, unpublished data). Given that there is a lack of density data in the project area, an accepted observation protocol is to assume that for every California sea lion observed there is one more unseen because California sea lions tend to travel in groups of two or more (Melin et al 2018).

3.2.2.3 Threatened and Endangered Species

Table 3.2-1 lists the federally threatened or endangered species known to occur or having the potential to occur in or adjacent to the project area. The only Federally listed threatened or endangered species known to occur within the vicinity of the project area are the California least tern and green sea turtle (*Chelonia mydas*), each of which is described in more detail below. There is no designated critical habitat for these species in the project area.

California Least Tern

The California least tern was listed as endangered in 1970; there is currently no designated critical habitat for this species (USFWS 2006). It is the smallest North American tern and is found along: seacoasts; beaches; bays; estuaries; lagoons; lakes; and banks of rivers and lakes.

Table 3.2-1 Federally Listed Species that May Occur in the Area Affected by the Project

Species	*Status*	*Habitat*	*Occurrence*
California least tern (*Sterna antillarum browni*)	Endangered	Bays; estuaries; lagoons; shoreline; river mouths; sandy unvegetated strips. Resident. Localized breeding.	Locally common summer resident and migrant, feeding in bay and ocean waters. Nesting colonies outside of the project area within San Diego Bay. Foraging habitat is present across the Bay, outside of the project area.
Green sea turtle (*Chelonia mydas*)	Threatened	Warm oceans, eelgrass beds. Non-breeding migrant.	Primarily occurs in the South Bay. Recent data suggests sea turtles are expanding their home ranges northward; one turtle has been seen at the USS Midway Museum, 4 miles (6 km) north of the proposed project area. Feeds on marine algae and sea grasses, such as eelgrass. No known breeding sites occur in San Diego Bay.

Notes: Endangered = Listed as *endangered* under the federal Endangered Species Act.
Threatened = Listed as *threatened* under the federal Endangered Species Act.

California least terns are surface-feeding fish eaters who are opportunistic in their search for prey, eating fish that are small enough to catch including anchovies and smelt (NRSW and Unified Port of San Diego 2013). California least terns frequently forage in the open water of the oceans and bays, and although eelgrass is an important habitat for several of their prey species, terns do not demonstrate any preference for feeding in eelgrass (NRSW and Unified Port of San Diego 2013).

Within the San Diego Bay region there are six key California least tern foraging areas. Two are located outside of the Bay in the shallow ocean waters off of Coronado and Silver Strand Beach; a third is at the mouth of the Bay; one is across the Bay from the project sites along the Silver Strand; one is in Harbor Drive Channel; and the sixth is in southern San Diego Bay, within the Sweetwater Marsh National Wildlife Refuge. The foraging area located nearest to the project area is approximately 1.3 miles (2.1 km) west of Pier 6 on the opposite side of the Bay (refer to Figure 3-1, as mapped in the Final EA for the Pier 8 Replacement Project [NAVFAC SW 2016]). This foraging area corresponds to zone of high California least tern prey abundance (NRSW and Unified Port of San Diego 2013); whereas the vicinity of Pier 6 is characterized by the lowest abundance of California least tern prey species in San Diego Bay (NRSW and Unified Port of San Diego 2013). Because there are no foraging areas within the immediate vicinity of the project area and prey abundance is so low, California least terns are not expected to occur within the project area (Tierra Data, Inc. 2011).California least terns are residents in San Diego Bay from late spring to early fall, with the breeding season beginning 1 April and ending 15 September. There are six recognized California least tern nesting colonies in the Bay, spanning from an area near the San Diego International Airport at the northern portion of the Bay to the Sweetwater Marsh National Wildlife Refuge in the southern portion of the Bay (refer to Figure 3-1; USFWS and Navy 2004). Central portions of the Bay house the largest nesting populations in the Bay (USFWS and Navy 2004).

California least terns nest in open expanses of sand or light-colored dirt on or near beaches and the shores of coastal bays. The nest is a small depression that may be natural, man-made, or excavated by the birds. One to four eggs are laid, although most nests have two or three. This species forages over shallow waters within 2 to 3 miles (3.2 to 4.8 km) of the nest, feeding primarily on small fish, including silversides (Atherinidae family) and northern anchovy (Massey and Atwood 1985).

The California least tern nesting population in the Bay has increased dramatically from 187 in 1993 to an estimated 1,314 in 2016 (Navy 2006; Frost 2017) due to coordinated management strategies with the USFWS and the Navy on Navy lands. These strategies include predator management, California least tern monitoring, site preparation of California least tern nesting colonies, and biological information gathering (USFWS and Navy 2004; Post et al. 2018).

Due to a lack of foraging or nesting habitat, California least terns are not likely to occur within the project area. The closest California least tern nesting colonies to the project area are located approximately 1.8 miles (2.9 km) across the Bay at North Delta Beach, South Delta Beach, and Naval Amphibious Base Ocean Beach, all of which are on Navy land. All three nesting sites have foraging areas nearby on the west side of the Bay. Other nesting colonies within the Central and South Bay are found at "D" Street, Chula Vista Wildlife Reserve (2 miles [3.2 km] south of Pier 6), and South Bay Refuge (4 miles [6.4 km] south of Pier 6), with the foraging areas located at the southwestern-most portion of the South Bay (USFWS and U.S. Navy 2004). All of these nesting areas, with the exception of the airport location, have been used annually since 1994. Abundance of California least tern prey species is low in the vicinity of Pier 6 (NRSW and Unified Port of San Diego 2013) (refer to Figure 3-1).

The Navy has previously implemented an extensive program of: research; monitoring; protection; nest site enhancement; and avoidance measures to minimize the take of California least terns from Navy activities under an MOU between the USFWS Ecological Services and Refuges and the NAVFAC SW and NRSW (USFWS and Navy 2004, NRSW 2008).

With regard to the Proposed Action, the Pier 6 project area is not designated as a nesting or forage area in the Tern MOU; the project area does not have any special characteristics such as extraordinary size, eelgrass beds, unique fish habitat, or an abundance of California least tern prey species; and California least terns are not expected to occur within the project area.

Green Sea Turtle

The green sea turtle is the only species of marine reptile found in San Diego Bay. The San Diego Bay green sea turtle population is part of the East Pacific distinct population segment (DPS), which is federally listed as threatened under the ESA. Critical habitat has not been designated for the East Pacific DPS.

The Bay represents one of the green sea turtle's northernmost foraging habitats (MacDonald et al. 2012). As this species is considered rare along the California coast, the resident turtles in San Diego Bay are considered both "noteworthy" and "extremely interesting" by members of the scientific community (Macdonald et al. 1990). The number of turtles using the Bay is estimated to range between 40 and 60 animals most months of the year, increasing to 100 animals during peak migratory periods (Eguchi 2017). Based on the number of juveniles observed during the late 1980s and early 1990s, there appears to be some recruitment into the population (MacDonald and Dutton 1992). Although it was previously accepted that green sea turtles were not historic residents of San Diego Bay, scientists have concluded that green sea turtles would naturally have sought out the Bay, especially during summer months (Macdonald et al. 1990).

During the day, green sea turtles in San Diego Bay reside in the deeper portion of the now-defunct south bay power plant discharge channel, whereas at night, they feed in the South Bay eelgrass beds, including those near Coronado Cays (NRSW and Unified Port of San Diego 2018; Stinson 1984). Green sea turtles are carnivorous from hatching until they reach juvenile size, at which point they gradually transition to a primarily herbivorous diet; they have also been described as opportunistic feeders, feeding on jellyfish, ctenophores, bivalves, and gastropods, if such prey items are readily available (Lemons et al. 2011).

Adult green sea turtles around the world are primarily herbivorous grazers of marine algae and grasses. Recent stable isotope diet analysis suggests that the San Diego Bay population also consumes various invertebrates, making this population predominantly omnivorous (Lemons et al. 2011). Stomach content analysis has revealed that San Diego Bay green sea turtles also consume red algae (*Polysiphonia* sp.), sea lettuce (*Ulva* sp.), and various species of invertebrates found in the south bay (MacDonald and Dutton 1992; Lemons et al. 2011). A study by Seminoff et al. (2006) has broadened our understanding of green turtle foraging in San Diego Bay, indicating that adult green turtles in this population are likely more omnivorous than previously thought.

Between 2009 and 2011, the Navy, Port of San Diego, NOAA Fisheries, and San Diego State University (SDSU) initiated tracking efforts to determine the movement patterns of green sea turtles in San Diego Bay. Using a combination of manual and automated acoustic telemetry, turtles' home ranges and movements throughout the Bay were recorded and analyzed. Results from this study suggested at the time that the South Bay serves as important green sea turtle habitat. The study also found individual home range areas tend to be 0.81 to 3.4 square miles (2.09 to 8.70 square km) in size, and that each turtle primarily uses one or two areas (MacDonald et al. 2012). The home ranges of all turtles in the study were found to be exclusively located in the South Bay, near abundant eelgrass pastures and the power plants' warm water effluent (MacDonald et al. 2012).

In 2009, the South Bay power plants decreased operations by 50 percent, shutting down two of four units, and were fully decommissioned by 31 December 2010 (Hill 2011). In an effort to evaluate how turtle behavior may have changed as a result of the power plant closures, the Navy and the Marine Turtle Ecology & Assessment Program at the NOAA Fisheries Southwest Fisheries Science Center initiated a satellite tagging effort in order to detect fine-scale movements of turtles in the Bay. The data collected since the inception of the post-closure program in 2011 indicates that turtles' movements in the Bay are changing. Turtle home ranges increased in size by 12 percent when comparing pre-closure tags (2007-2010) with post-closure tags (2011-2016). The 50 percent Utilization Distribution, which generally shows the most utilized areas or core home range, increased in size by 0.07 square miles (0.2 square km) and shifted to the northern side of outflow jetty. Overall, there was a trend of northern movement of home ranges following the power plant closure.

It was also determined that turtles in San Diego Bay may associate with or seek out thermal refugia, when possible, to avoid low water temperatures. The cold water temperature inactivity threshold for East Pacific green turtles may be lower than previously thought (Madrak et al. 2016). In a recent study, there was a significant negative relationship between turtle size and water temperature after power plant closure, which led researchers to conclude that East Pacific green turtles exhibit clear responses in habitat use to changes in water temperature (Madrak et al. 2016).

In the aforementioned telemetry study, turtle home ranges were found to extend from the south end of San Diego Bay northward to approximately to the Sweetwater River (NRSW and Unified Port of San Diego 2018). Given the lack of eelgrass and limited food resources on NBSD, occurrence in the project area would likely be limited to migratory or transiting individuals.

A federal recovery plan for the species lists the following threats as pertinent to the San Diego Bay population (NOAA Fisheries and USFWS 1998):

- Limited information concerning turtles' home range and foraging patterns impedes habitat delineation and subsequent protection.
- Persistent marine debris, including plastic and other anthropogenic waste, remains a concern with respect to potential mortalities through entanglement or blockage of turtles' digestive tracts.
- Reduction and/or fragmentation of foraging habitat caused by dredging and shoreline development.
- Disturbance and/or behavior modification as a result of various anthropogenic activities, most notably dredging and construction involving pile driving. Little information is available on defined thresholds or potential population-level impacts.
- Mortalities caused by collisions with motorized vessels transiting the Bay.

3.2.3 Environmental Consequences

The analysis identifies the potential significance of impacts to marine biological resources based on: (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource to proposed activities; and, (4) the duration of ecological ramifications. For example, an impact would be considered significant if it would permanently reduce the population size or distribution of a protected species.

3.2.3.1 No Action Alternative

Under the No Action Alternative, the demolition and replacement of Pier 6 would not occur. Existing conditions would remain unchanged. Therefore, no significant impacts to marine biological resources would occur with implementation of the No Action Alternative.

3.2.3.2 Alternative 1

Impacts to marine biological resources associated with this alternative would be primarily from demolition of existing Pier 6 and construction of a new Pier 6. Activities described below that could potentially impact marine biological resources include turbidity and noise associated with pier demolition and construction, as well as the replacement of the existing structural habitat of the pier by a new structure with a larger top surface area and fewer pilings.

Marine Biological Resources Potential Impacts:

- Increase in bay shading of approximately 2.2 acres (0.9 ha)
- Minor and short-term impacts to species
- Level B harassment takes of a small number of California sea lions related to behavioral alterations
- No effect to the California least tern
- May affect, but is not likely to adversely affect green sea turtle

Habitats and Communities

Pier demolition and construction activities for the Conventional Concrete Pier Alternative would cause minor and short-term impacts to existing nonvegetated soft bottom benthic communities within the project area. Organisms occurring in the immediate area may be lost or displaced during demolition or construction activities, either directly by equipment and noise associated with these activities or indirectly by exposure to short-term changes in suspended sediments, turbidity, dissolved oxygen, and light diffusion. Potential impacts to plankton communities could include a localized decrease in primary productivity due to reduced photosynthesis. However, sediment resuspension, increased turbidity, or chemical changes would be limited to the areas of bottom disturbance and would persist for less than one hour following disturbance. Therefore, the increased turbidity would not significantly impact benthic or water column habitats in the project area.

Pier demolition would impact benthic community resources (infauna and epifauna) by disturbing some organisms due to pile removal. Some infaunal species (e.g., polychaete worms) and some epifaunal species (e.g., sea cucumbers) would be disturbed or lost as a result of these activities, including existing pier piling epifauna (e.g., sea stars), due to pile removal.

Alternative 1 would result in a decrease in open water area and an increase in bay shading of 2.2 acres (0.9 ha). Pursuant to the methodology described in Marine Taxonomic Services (2020), the Navy is currently mitigating project-related increases in Bay shading occurring over waters that are -29 feet (-8.8 meters) or less. Below -29 feet (-8.8 meters) MLLW, light penetration is reduced to 1% of ambient light at the Bay surface which does not support photosynthesis. Mitigation of bay shading is currently offset through the Navy Eelgrass Mitigation Bank at a rate of (0.07%) of increased shading of areas less than -29 feet (-8.8 m) MLLW depth. In the case of Pier 6, only portions of the expanded pier closer to the quaywall would cover any areas less than -29 feet (-8.8 m) in depth while all of the Bay-side length expansion would cover waters greater than -29 feet (-8.8 m) MLLW in depth. Of the 0.9 ha (2.2 acres) of increased bay shading, only 0.2 ha (0.5 acres) would cover waters less than -29 feet (-8.8 m) MLLW in depth. Based on the 0.7% mitigation rate described above, the Navy would contribute 0.0014 ha (0.0035 acres), or 152 square feet (14 square meters) to the Navy Eelgrass Mitigation Bank.

In practice, the Navy Eelgrass Mitigation Bank has responsibility for negotiating any identified eelgrass impacts with NOAA Fisheries and the USACE. After completing any NRSW-NOAA Fisheries eelgrass impact negotiation reached via Essential Fish Habitat consultation and multi-year post action surveys, the Mitigation Bank Review Team (NRSW, NOAA Fisheries, USACE, and USFWS) would review actual eelgrass impacts to determine a final debit to the Bank. NRSW would then request that NOAA Fisheries and USACE record the negotiation results by debiting the NRSW's eelgrass mitigation bank ledger.

Further, benthic invertebrate species are expected to recolonize the disturbed benthic habitat within a relatively short period of time from adjacent undisturbed areas, and a typical epifaunal invertebrate community would gradually develop on the new pilings. Therefore, implementation Alternative 1, including habitat offsets in the Navy Eelgrass Mitigation Bank, would not result in significant impacts to the benthic communities due to pier demolition or construction.

Concrete, steel, and asphalt debris would be removed via barge cranes and/or wharf cranes, then transported for recycling or disposed of in a landfill. Due to the limited area and duration of sediment resuspension that would occur, pier demolition would have a low potential for mobilizing sediment contaminants into the water column. Therefore, significant impacts to water quality or aquatic life would not occur.

Because no eelgrass or any other special aquatic sites are found in the project area, no effects to special aquatic sites would occur due to any project activities. Even though the invasive algae *Caulerpa taxifolia* has never been recorded in San Diego Bay (NRSW and Port of San Diego 2013), a *Caulerpa* survey (Surveillance Level) would be conducted prior to in-water project activities, consistent with NOAA Fisheries and CDFW requirements (NOAA Fisheries 2008). If *Caulerpa taxifolia* was found in the study area during this survey, NOAA Fisheries approved Caulerpa Control Protocols would be followed (NOAA Fisheries 2008). Therefore, implementation of Alternative 1 would not result in impacts to special aquatic sites.

<u>Fish and Wildlife</u>

Fisheries

Fish species occurring in the immediate area may be displaced during demolition or construction activities, either directly by equipment and noise associated with these activities or indirectly by exposure to short-term changes in suspended sediments, turbidity, and changes in light diffusion during pier demolition and construction activities. As discussed in Section 3.1.3.2, *Water Resources*, sediment resuspension and increased turbidity would be limited to the areas of bottom disturbance and would persist for less than one hour following the disturbance. Fish present during project activities should be capable of avoiding project equipment and areas affected by increased turbidity and increased noise from pile driving and concrete removal.

As described above, this alternative would result in an increase in Bay shading of 2.2 acres (0.9 ha). Due to the characteristics of the fish species and the affected area, the relatively small increase in shading and artificial substrate would not have an effect outside the immediate area of Pier 6, and therefore would not have a long-term adverse effect on fish in San Diego Bay (see also Appendix B).

As described in the Navy's EFH Assessment as provided to NOAA Fisheries (see Appendix B), most if not all fish species occurring in the area routinely experience turbid and noisy conditions due to natural processes such as wave action and sounds generated by fishes and invertebrates, and anthropogenic activities such as ship traffic and construction throughout the Bay. In general, fish are likely to be temporarily disturbed or to leave the immediate project area of demolition and construction until activities cease. These effects are considered minimal due to their limited temporal and geographic scale. Fish species would return to the project area following the completion of in-water activities. Therefore, implementation of this alternative would not result in significant impacts to fish communities.

Essential Fish Habitat

A written assessment of the effects of the Proposed Action on EFH is provided in Appendix B and is discussed here in brief. Of the 109 species of fish previously identified in San Diego Bay, ten are managed by NOAA Fisheries. Four are managed under the Coastal Pelagic Species FMP (PFMC 2016b): northern anchovy (*Engraulis mordax*); Pacific sardine (*Sardinops sagax*); Pacific mackerel (*Scomber japonicus*); and jack mackerel (*Trachurus symmetricus*). Six species are covered under the Pacific Groundfish FMP (PFMC 2016a) and occur, although not in abundance, in San Diego Bay: California scorpionfish (*Scorpaena guttata*); grass rockfish (*Sebastes rastrelliger*); English sole (*Parophrys vetulus*); curlfin sole (*Pleuronichthys decurrens*); leopard shark (*Triakis semifasciatus*); and soupfin shark (*Galeorhinus galeus*) (NAVFAC SW 2010; NRSW and Unified Port of San Diego 2013). All of these species are highly transient, are not tied to artificial substrates, and routinely experience turbid and noisy conditions from natural processes and ship traffic with San Diego Bay.

Noise associated with demolition and pile-driving activities would temporarily displace EFH species within a limited scope, although no fish would be injured. Other effects would occur from increased suspended sediments and turbidity and increased underwater noise levels from demolition and pile-driving activities. These impacts would result in minimal adverse effects per the MSFCMA and are not considered significant under NEPA.

Generally, impacts from in-water components of Alternative 1 would be the same as described above for other fish communities. Effects would occur from increased suspended sediments and turbidity and increased underwater noise levels from pier demolition and construction activities. Based on observations of turbidity caused by bottom disturbances in areas similar to the project sites, turbidity plumes are expected to be limited to the areas of bottom disturbance and would persist for less than one hour following disturbance (NAVFAC SW 2016 and AMEC 2008).

Subject to the terms and conditions identified in the project-specific USACE Clean Water Act Section 404 and Rivers and Harbors Act Section 10 permit, the Navy would deploy precautionary measures to alleviate turbidity associated with demolition and construction activities. Precautionary measures are provided in Table 3.3-2 on page 3-49. Other precautionary measures may be developed during the USACE permitting process.

EFH species expected to occur in the project area are highly mobile and not closely tied to artificial substrates, so would likely leave the project area during demolition and return when these activities are completed. Pier removal would reduce the algal and invertebrate production associated with encrusting communities on the pilings. Hence, there would be minor, short-term adverse effects on EFH from pier removal that would not be significant. On 20 November 2020, NOAA Fisheries concurred with the Navy's EFH Assessment (Appendix B).

On a small scale, water circulation may change slightly, but any such change would be negligible given that the boundaries, bathymetry, configuration, and use of Pier 6 would remain essentially unchanged with the exception of shading an additional 2.2 acres (0.9 ha) of open water (approximately 0.02 percent of the 12,000-acre Bay). Once construction is complete, the resulting Pier 6 would have approximately 1,032 fewer piles distributed over an area approximately twice as large as the existing Pier 6. This pile spacing would be wide enough so that the resulting Pier 6 would not form a barrier to local circulation and would enhance circulation. The site does not support eelgrass beds, so the net effect of increased shading on benthic primary production would be negligible.

To the extent that structural and/or shaded habitats are preferred or avoided by certain species, utilization of the project sites by different fish species may shift slightly toward or away from the project site, relative to the existing condition. In the short term, during construction activities, the proposed project would adversely affect EFH for various federally managed fish species under the Pacific Coast Groundfish and Coastal Pelagic Species FMPs by generation of noise and water quality impacts associated with demolition and construction activities. However, these effects would be restricted to project demolition and construction and, therefore, would be less than significant. In addition, due to the characteristics of the EFH species that may potentially occur in the project area and the habitat characteristics of the area itself, the small increase in shading (2.2 acres [0.9 ha]) of additional coverage representing approximately 0.02 percent of the 12,000-acre Bay) and artificial substrate would not have an effect outside the immediate area of Pier 6, and, therefore, would not have long-term adverse effects on EFH for coastal pelagic or Pacific Coast Groundfish species in San Diego Bay or beyond.

In summary, adverse effects to EFH would be relatively minor and localized, consisting of temporary noise and turbidity, and an increased area of shading. The number and in-water surface area of pilings would be reduced, resulting in better circulation through the pier and less artificial substrate which is habitat for both native and introduced species. As required, the Navy has prepared an EFH Assessment (Appendix B) to evaluate these effects. On 20 November 2020, NOAA Fisheries concurred with the Navy's EFH Assessment (Appendix B).

Birds

Prior to demolition, the pier would be surveyed for active nests. If a nest is discovered, it would be avoided until it is no longer active. Responses to noise from pile driving would be limited to short-term behavioral or physiological responses (e.g., alert response, startle response, and temporary increase in heart rate). However, human activity such as vessel or boat movement, and equipment setting and movement, could cause birds to flee the activity area before the onset of pile driving. If seabirds were in the activity area, they would likely flee the area prior to, or just after, the initial strike of the pile at the beginning of the soft start procedure, a slow increase in pile driving to allow any undetected animals in the area to voluntarily depart. In-air pile driving noise would not disrupt major behavior patterns, such as: migrating; breeding; feeding; and sheltering, or result in serious injury to any seabirds.

Information regarding the impacts from acoustic sources on seabirds and the ability for seabirds to hear underwater is virtually unknown. The exposure to underwater sounds by seabirds, other than pursuit diving species, is likely to be very limited due to spending a very short time under water (plunge-diving or surface-dipping) or breeding only at the water surface. Pursuit divers may remain under water for minutes, increasing the chance of underwater sound exposure. However, assuming that a seabird disturbed by an underwater sound would avoid the stressor by swimming to the surface, a physiological impact, such as hearing loss, would only occur if a seabird is close to an intense sound source.

Birds are generally less susceptible to both temporary and permanent threshold shift than mammals (Saunders and Dooling 1974), so an underwater sound exposure would have to be intense and of a sufficient duration to cause temporary or permanent threshold shift. Avoiding the sound by returning to the surface would further limit the potential for extended or multiple sound exposures underwater. Therefore, any impacts would be short-term, localized, and would not impact bird populations.

Project activities would result in increases in noise and human activity and decreases in water quality in the project area during demolition and construction. In-water construction impacts would also alter fish behavior due to increased underwater noise levels (discussed above), which may make fish more or less available as prey. The impact to breeding birds, however, would be minimal because: (1) bird abundance in the project area is low; (2) the proposed project would only affect a relatively small area of San Diego Bay; and (3) impacts would cease upon construction completion.

These impacts would not be significant because of their limited duration and because birds on the water regularly experience the noise and disturbance of passing vessels, while the project area is routinely subject to the elevated noise and activity of workers and equipment associated with common industrial practices. Bird perches on the existing pier would be lost. However, this is not expected to create a significant impact to migratory birds as there are several other structures in San Diego Bay that could be used for this purpose and because migratory birds are expected to recolonize the replacement pier once constructed.

In conclusion, implementation of this alternative would not have a significant effect on migratory bird populations or their habitats under the MBTA or a significant impact under NEPA. Potential effects on California least tern are discussed below (see page 3-44).

Marine Mammals

The MMPA defines ‘‘harassment’’ as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) 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 [Level B harassment] (50 CFR, Part 216, Subpart A, section 216.3-Definitions).

As discussed in Section 3.3.2, the only marine mammal species that is anticipated to occur south of the Coronado Bridge is the California sea lion. This analysis assumes that four California sea lions would be present in the project vicinity every day of the 250-workday construction and demolition period.

The proposed activities are not anticipated to result in any Level A harassment due to anticipated small zones of influence (ZOIs) generated from pile-extraction and pile-driving activities and implementation of marine mammal monitoring and a Level A exclusion zone. Under Section 101 (a)(5)(D) of the MMPA, the Navy requested an Incidental Harassment Authorization (IHA) for the anticipated take, by Level B behavioral harassment only, of California sea lions (Appendix B).

The NOAA Fisheries has developed acoustic threshold levels for determining the onset of permanent threshold shift (PTS) in marine mammals in response to underwater impulsive and non-impulsive sound sources (Table 3.2-2).

Table 3.2-2 Injury and Disturbance Threshold Criteria for Underwater and Airborne Noise

Marine Mammals	***Underwater Vibratory Pile-Driving Noise (non-impulsive sounds) (re 1 µPa)***		***Underwater Impact Pile-Driving Noise (impulsive sounds) (re 1 µPa)***	
	PTS Onset (Level A) Threshold	***Level B Disturbance Threshold***	***PTS Onset (Level A) Threshold[1]***	***Level B Disturbance Threshold***
Otariidae (sea lions)	219 dB SEL_{CUM}[4]	120 dB RMS	232 dB Peak[2] 203 dB SEL_{CUM}[3]	160 dB RMS

Notes:

[1] Dual metric acoustic thresholds for impulsive sounds; whichever results in the largest isopleth for calculating PTS onset is used in the analysis.

[2] Flat weighted or unweighted peak sound pressure within the generalized hearing range.

[3] Cumulative sound exposure level over 24 hours.

Abbreviations:

µPa = microPascal
dB = decibel
PTS = permanent threshold shift
RMS = root mean square
SEL = sound exposure level

The criteria use cumulative sound exposure level (SEL) metrics (dB SEL_{CUM}) and peak pressure (dB PEAK) rather than the previously used dB root mean square (RMS) metric. The NOAA Fisheries equates the onset of PTS, which is a form of auditory injury, with Level A harassment under the MMPA, and with “harm” under the ESA. Level B harassment occurs when marine mammals are exposed to impulsive underwater sounds above 160 dB RMS re 1 µPa, such as from impact pile driving, and to non-impulsive underwater sounds above 120 dB RMS re 1 µPa, such as from vibratory pile driving (NOAA Fisheries 2005, 2018) (see Table 3.2-2). Acoustic data collected at NBSD record an average ambient noise level within San Diego Bay of 126 dB re 1 µPa (Dahl and Dall’Osto 2019). The onset of TTS is a form of Level B harassment under the MMPA and a form of “harassment” under the ESA. All forms of harassment, either auditory or behavioral, constitute “incidental take” under these statutes.

Southall et al. (2007) reviewed studies conducted to document the behavioral responses of harbor seals and northern elephant seals to non-impulsive sounds under various conditions. They concluded that those limited studies suggest that exposures between 90 dB and 140 dB RMS re 1 µPa generally do not appear to induce strong behavioral responses.

Impact pile-driving is expected to be the greatest generator of underwater noise associated with this project and may be expected to generate noise levels described below in Table 3.2-3. The intensity of pile driving sound is greatly influenced by factors such as the type of pile, type of driver, and physical environment in which the activity takes place. To determine reasonable sound pressure levels (SPLs) from pile driving, studies with similar properties to the proposed project were evaluated. Table 3.2-3 presents received SPL at a distance of 33 feet (10 meters) from the pile, with RMS and Peak levels relative to 1 µPa and cumulative SELs relative to 1 microPascal squared second (re 1 μPa^2•s).

Table 3.2-3 Single-Strike Underwater Noise Source Levels Modeled for Impact Pile Driving

Pile Type and Size Measured	*Used as Proxy Source Level for Pier 6 Piles*	*Peak SPL (dB re 1 µPa)*	*RMS SPL (dB re 1 µPa)*	*SEL (dB re 1 µPa²s)*
Octagonal-concrete, 24-inch	20- and 24-inch concrete piles	188	176	166
Square concrete, 16-inch	16-inch fiberglass piles	163	153	144

Source: Caltrans 2015

Notes:

All SPLs are unattenuated; single strike SEL are the proxy source levels presented for impact pile driving and were used to calculate distances to PTS.

Abbreviations:

dB re 1 µPa = decibels referenced to a pressure of 1 microPascal (measures underwater SPL)

dB re 1 µPa²s= decibels referenced to a pressure of 1 microPascal squared per second (measures underwater SEL)

RMS = root mean square

SEL = sound exposure level

SPL = sound pressure level

Source levels associated with non-impulsive sources, including use of a vibratory driver/extractor to loosen 20-inch (51-centimeter [cm]) square concrete and 12-inch (30-cm) timber-plastic piles, high-pressure water jetting to install or remove concrete piles, use of an underwater chainsaw, and the use of small and large pile clippers for the removal of 12-inch (30-cm) timber-plastic piles and 20-inch (51-cm) square concrete piles, respectively, are shown in Table 3.2-4. Data from the most similar activities reported in the Acoustic Compendium for San Diego Bay (NAVFAC SW 2018) or by Caltrans (2015) have been used as proxies for the proposed activities at Pier 6 (Dahl and Dall'Osto 2019). For these purposes, the maximum RMS SPL is the only relevant criterion; peak SPLs and SELs for these types of sources would only exceed thresholds less than a meter from the source.

Table 3.2-4 Underwater Noise Source Levels Modeled for Non-Impulsive Sources

Method	***Pile Type and Size Measured***	***Used as Proxy Source Level for Pier 6 Piles***	***RMS SPL[1] (dB re 1 µPa)***
Vibratory extraction	Timber piles	12-inch timber-plastic piles	152[2]
	24-inch steel sheet	20-inch and 24-inch concrete piles	160[3]
		16-inch I-shape steel piles	
High-pressure water jetting	24x30-inch concrete	Removal of 20-inch square concrete piles	158[4]
Underwater hydraulic chainsaw	16-inch concrete square piles	Cutting all types of piles	150[4,5]
Small pile clipper	13-inch polycarbonate	Clipping 12-inch timber and plastic piles	154[4]
Large pile clipper	24-inch square concrete	Clipping 20- and 24-inch square concrete	161[4]
Two large pile clippers	24-inch square concrete	Simultaneously clipping 20- and 24-inch square concrete piles	164[4,6]

References: 1 = Caltrans 2015, 2 = NAVFAC SW 2018

Notes:

1 All SPLs are unattenuated

2 Proxy source level for vibratory timber pile extraction from Greenbusch 2018

3 Proxy source level from Caltrans 2015

1 Proxy source level from NAVFAC SW 2020

2 NAVFAC SW (2020) reports a value of 147 dB RMS at 17 m for hydraulic chainsaw. While NAVFAC SW (2020) shows a higher TL factor of 27.3 at the NBPL Fuel Pier in the northern portion of San Diego Bay, given the differing environments of the northern and southern portions of San Diego Bay, a TL value of 15 is used here to arrive at the 150 dB RMS source value for the hydraulic chainsaw.

3 Additive source level for simultaneous use of two large pile clippers (161 dB RMS + 3 dB addition)

Abbreviations:

dB re 1 µPa = decibels referenced to a pressure of 1 microPascal (measures underwater SPL)

RMS = root mean square

During the first year of the Fuel Pier Replacement Project at Naval Base Point Loma, the Navy recorded several piles being cut by two clipper sizes (24- and 30-inch blades) and reported the data in the SD Bay Noise Compendium (NAVFAC SW 2020). The data assessment revealed that the noise signature was more like a continuous noise source due to the relatively constant pressure of the blade against the pile. There were spikes in the readings when the blade cut through a section of rebar, and it tended to get louder as it got into the middle of the pile, and then tapered off as the pre-stressed concrete broke away on the other side of the pile.

For the analyses that follow, the expected noise propagation from pile driving and removal was modeled using the proxy source levels identified in Tables 3.2-3 and 3.2-4. Distances to Level A (onset PTS) and Level B (behavioral disturbance) thresholds have been calculated for impact and vibratory pile driving or extraction using acoustic models developed for south-central San Diego Bay (NOAA Fisheries 2018; Dall'Osto and Dahl 2019). The models consider local environmental conditions (bathymetry, sediment type, seasonal water temperature) and physiography of the Bay. Separate models were developed for concrete and plastic piles (applied to fiberglass, timber-plastic).

Impact pile driving is assumed to require 600 strikes per pile, whereas non-impulsive noise sources are assumed to operate for 20 minutes (water jetting) or 10 minutes (other sources). Based on the ambient average sound level of 126 dB near Pier 6 (Dall'Osto and Dahl 2019), the Level B threshold distance for non-impulsive sources is determined by the point at which sound from the project source diminishes to 126 dB.

ZOIs for impact and vibratory driving or extraction based on the South Bay acoustic models indicate that sound propagation is substantially influenced by local bathymetry, with the steep slope of the navigation channel limiting sound transmission across the Bay. Closer to land, adjacent piers are expected to influence sound transmission, but the rate of reduction is uncertain. Therefore, ZOIs were calculated separately for the open water and areas influenced by the piers.

The calculated radial distances to thresholds and corresponding areas within the ZOIs are summarized in Table 3.2-5. Figures 3-2, 3-3, and 3-4 show graphically the extent of the ZOIs associated with impact pile driving and the non-impulsive noise sources, respectively. Although Figures 3-2, 3-3, and 3-4 depict a 33 foot (10 meter) "Physical Interaction Shutdown ZOI," the Navy would apply a 66 foot (20 meter) buffered shutdown area to account for speed of marine mammals and be consistent with the green sea turtle shutdown area. ZOIs that extend less than the buffered shutdown distance (66 feet [20 meters]) from the source, including all of the Level A distances, are not shown because the shutdown procedure (when a marine mammal could approach within 66 feet [20 meters]) would prevent any exposures.

Monitors would work closely with construction workers to ensure that work would shut down within the exclusion zone to avoid the potential for Level A take. Based on all of these considerations, Level A takes are not anticipated. Figures 3-2, 3-3, and 3-4 depict the Navy's proposed locations for Protected Species Observers (PSOs).

Potential Level B takes would occur throughout pile driving and extraction activities if California sea lions are present within the ZOIs (Table 3.2-5, Figures 3-2, 3-3, 3-4, and 3-5). There are no known haulouts in the project area, although there are structures, such as buoys, that could be used as haulouts. California sea lions observed in the area would likely be swimming and/or foraging. As such, potential takes by disturbance would have a negligible short-term effect on individual California sea lions and would not have population-level impacts.

Table 3.2-5 Calculated Radial Distance(s) to Underwater Noise Thresholds and ZOIs within the Thresholds from Pile Driving and Removal

Activity Description/ Source Sound Levels at 10 meters	*Minor Injury (PTS Onset) Level A[3]*		*Behavioral Disturbance Level B[4, 5]*	
	Radial Distance (meters)	*ZOI Area (km^2)*	*ZOI Radial Distance (meters) or Length x Width*	*ZOI Area (km^2) (Open Water / Around Piers)*
Demolition Activities				
Vibratory extraction 20 and 24-inch concrete[1], 160 RMS	<10	<0.001	6,990 x 1,173	5.35 (4.06 / 1.29)
Vibratory extraction 12-inch timber-plastic[1], 152 RMS	<10	<0.001	2,167 x 1,055	2.11 (1.49 / 0.62)
Vibratory extraction 16-inch I-shape steel pile[1], 160 RMS	<10	<0.001	7,140 x 1,595	6.43 (5.15 / 1.28)
Water jetting installation/extraction[3], 158 RMS	<10	<0.001	1,359	3.6 (2.8 / 0.8)
Large hydraulic pile clipper, concrete[3], 161 RMS	<10	<0.001	2,154	7.7 (6.5 / 1.2)
Two large hydraulic pile clippers, concrete[3], 164 RMS	<10	<0.001	3,415	15.37 (13.85 / 1.52)
Small hydraulic pile clipper, timber-plastic[3], 154 RMS	<10	<0.001	736	1.4 (1.0 / 0.4)
Underwater hydraulic chain saw[3], 150 RMS	<10	<0.001	398	0.48 (0.4 / 0.08)
Installation Activities				
Impact driving 20 and 24-inch concrete[1,2], 188 Peak, 176 RMS, 166 SEL	<10	<0.001	192	0.10 (0.10 / NA)
Impact driving 16-inch fiberglass[1,2], 163 Peak, 153 RMS, 144 SEL	<10	<0.001	<10	<0.001

***Notes*:**

1 Distances to Level A and B thresholds were calculated for impact and vibratory pile driving or extraction using acoustic models developed for south-central San Diego Bay (Dall'Osto and Dahl 2019 and Caltrans 2015). The distances to the Level A SELcum threshold are adjusted for the representative frequency range of Otariid functional hearing group. Impact pile installation is based on the 160 dB threshold. SEL data taken from CALTRANS (2015).

2 Impact driving values as reported in Dall'Osto and Dahl 2019.

3 For pile installation/extraction activities using other equipment (water jetting, pile clippers, chain saw), the 2018 NOAA Fisheries User Spreadsheet was used to calculate distances to the Level A SELcum threshold and practical spreading loss model was used to calculate distances to Level B thresholds. Weighting Factor Adjustments of 2 kHz for impact pile driving and 2.5 kHz for non-impulsive sounds, and the representative frequency range for Otariid functional hearing group were used (NOAA Fisheries 2018).

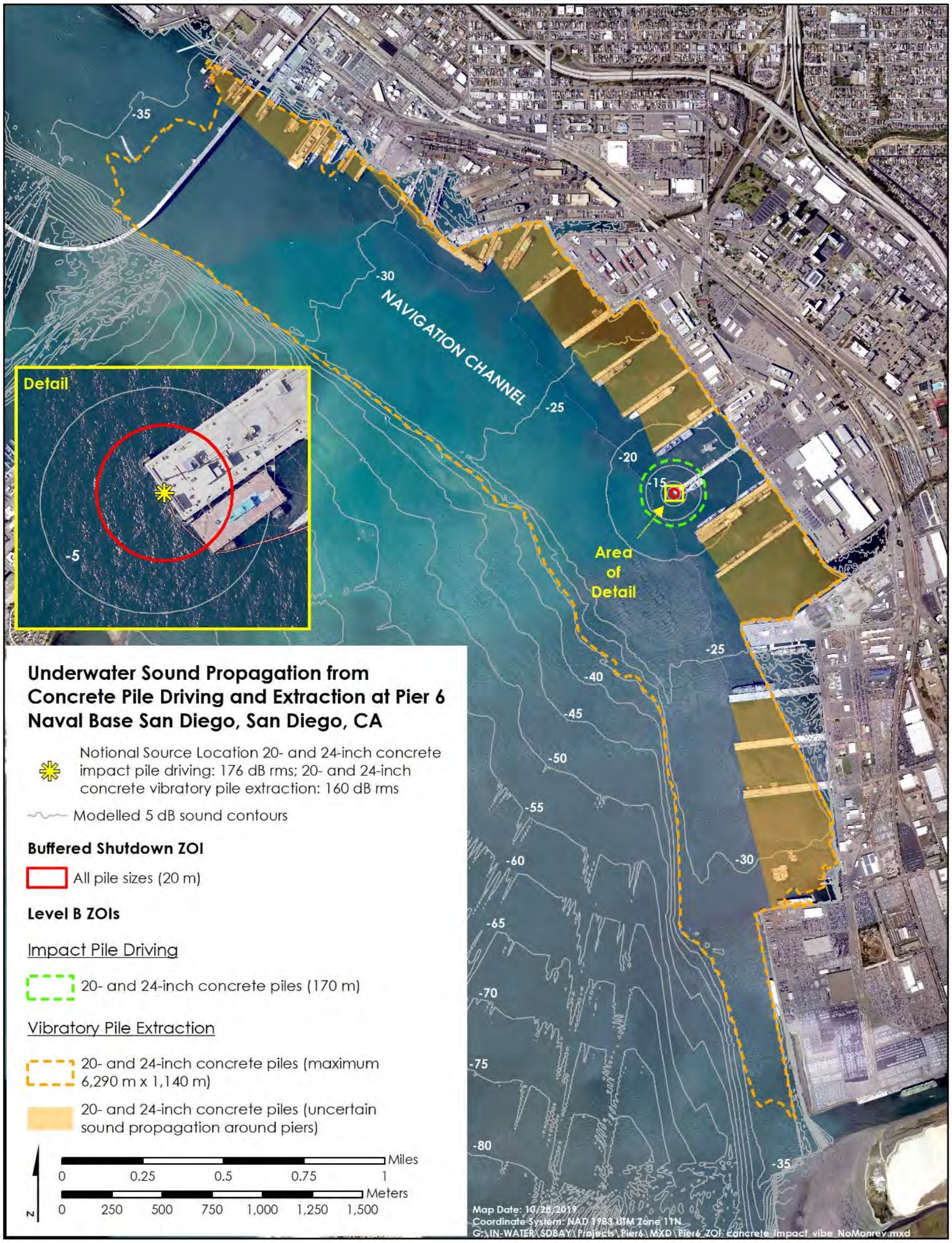
4 Assumes 600 strikes per pile, 10-minute duration for all non-impulsive sounds except for high-pressure water jetting (20-minute), and 7 piles installed and 8 piles removed per day.

5 The Level B ZOIs were calculated to the average ambient underwater noise value of 126 dB re 1 µPa within the project area (Dahl and Dall'Osto 2019).

6 Level B ZOI areas were calculated separately for open water versus areas around piers where the structure's influence on sound propagation is uncertain and then reported as the total ZOI area.

Abbreviations:

dB re 1 µPa = decibels referenced to a pressure of 1 microPascal,
km^2 = square kilometers, m = meters,
N/A = not applicable because the ZOI is contained within the buffered shutdown zone (less than 10 m from source),
PTS = permanent threshold shift, RMS = root mean square, SEL = sound exposure level,
ZOI = Zone of Influence (area encompassed within acoustic threshold boundary).



Note: Additional Representative PSO Location at Naval Amphibious Base Coronado (obscured by inset here)

Figure 3-2 Underwater Sound Propagation from Concrete Pile Driving and Extraction at Pier 6

Note: Impact Driving of Fiberglass Piles is not expected to result in Level A or B acoustic harassment due to limited generated sound, a 20-m (66-ft) buffered shutdown zone will be monitored to avoid injury related to physical interaction with operating in-water equipment.

Figure 3-3 Underwater Sound Propagation from Timber-Plastic and Fiberglass Pile Driving and Extraction at Pier 6

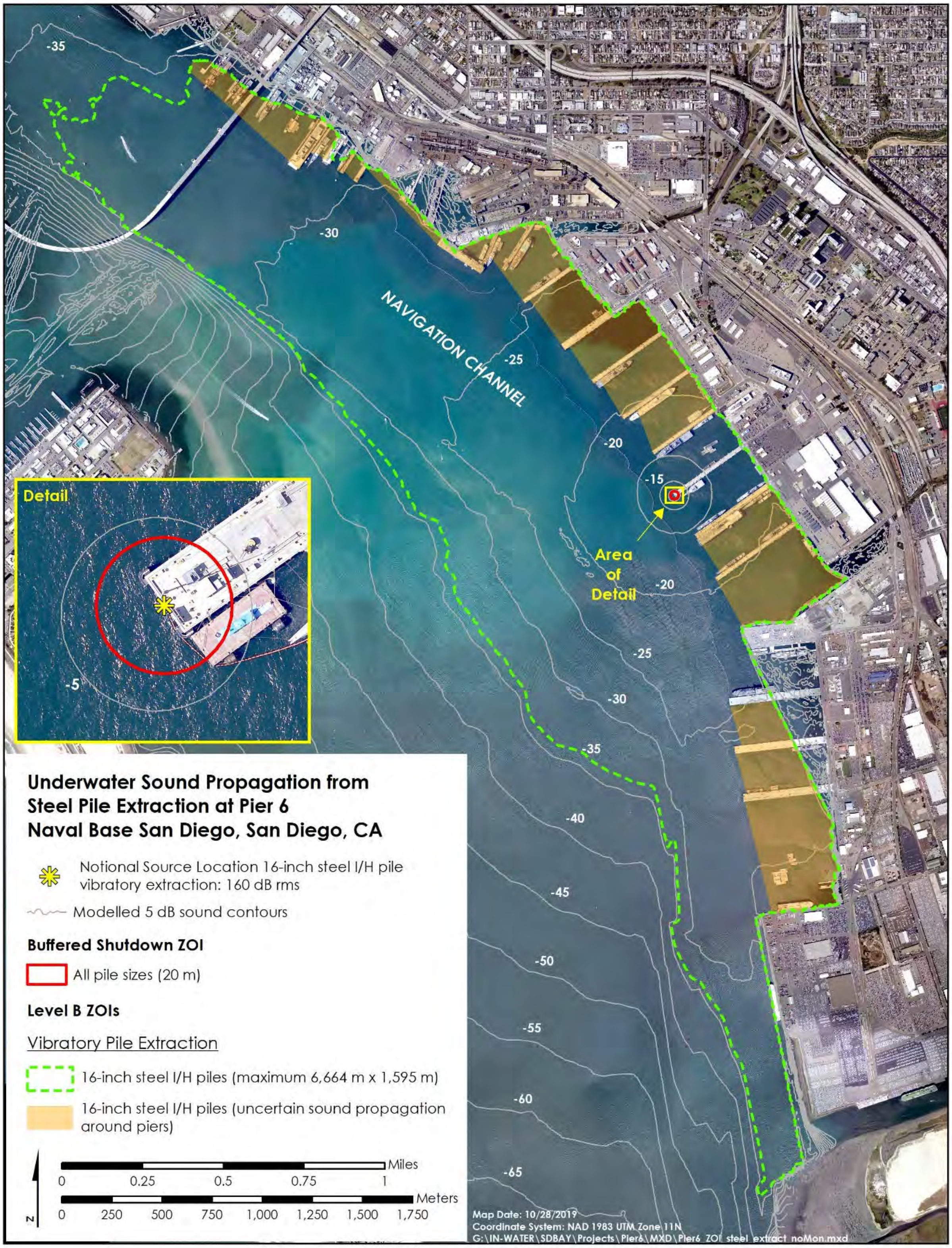


Figure 3-4 Underwater Sound Propagation from Steel Pile Extraction at Pier 6

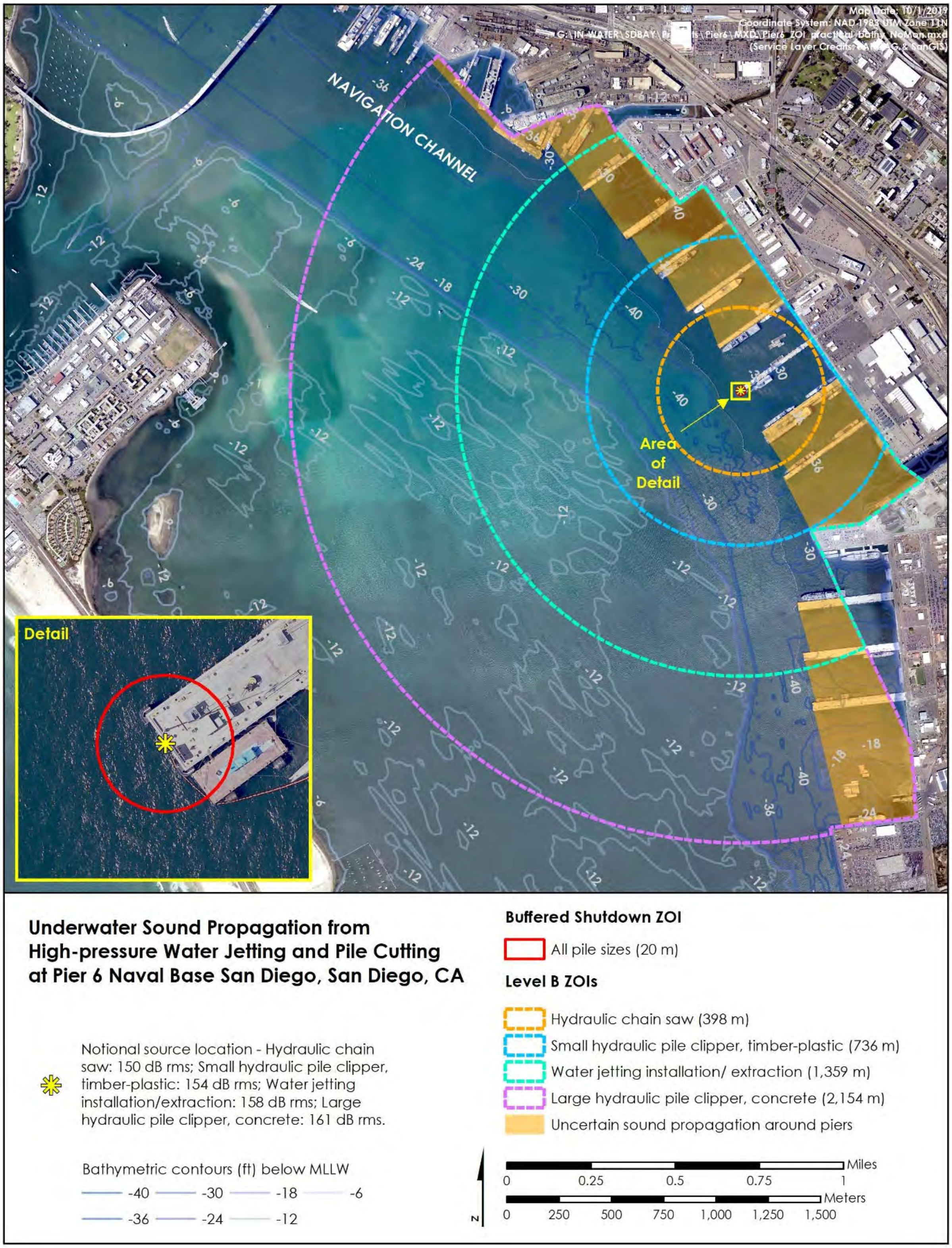


Figure 3-5 Underwater Sound Propagation from High-pressure Water Jetting and Pile Cutting at Pier 6

The following assumption was used to calculate potential exposures to impact and vibratory pile driving/extracting noise for each threshold:

- Four California sea lions have the potential to occur within the project ZOIs.
- Each animal can be "taken" via Level B harassment once every 24 hours.

Potential Level B harassment take of California sea lions during the 250-workday demolition period is estimated using the following equation:

Exposure Estimate = (250 days x 4 California sea lions)

= 1,000 California sea lions

Because each of the four California sea lions within the project area is assumed to be "taken" once per day over the projected 250-workday period, the maximum potential Level B harassment take of California sea lions is estimated at 1,000 individual incidents.

On 22 January 2021, NOAA Fisheries issued the Navy an Incidental Harassment Authorization for the Proposed Action (Alternative 1) to *"take, by Level B harassment only, small numbers of California sea lions incidental to the Naval Base San Diego Pier 6 Replacement Project in San Diego, CA for one year from October 1, 2021 through September 30, 2022"* (Appendix B).

Federally Listed Species

California Least Tern. As described above, the Pier 6 project area is not located within a nesting or foraging area described in the previous Tern MOU between the Navy and USFWS. In addition, the Pier 6 project area does not have any special characteristics such as: extraordinary size; eelgrass beds; unique fish habitat; or an abundance of California least tern prey species. Due to the distance to known nesting areas and high value foraging areas, California least terns are not expected to occur within the project area (see page 3-27). Given this and the localized nature of impacts associated with project activities, project activities would not affect individuals or have a persistent effect on numbers and distribution of the species.

Beyond nesting, California least terns forage on prey fish within San Diego Bay. As depicted above, the nearest California least tern foraging area is approximately 8,860 feet (2,700 meters) across the Bay to the west of the Project area. Caltrans (2015) has used a 150 dB threshold value for behavioral responses in fish, including prey fish, where exceedances may cause fish to temporarily leave an area until sound generation ceases. Over the 8,300 feet (2,530 meters) separating the project area from the nearest California least tern foraging area, transmission loss of sound pressure levels is anticipated to be approximately 48 dB. Given this anticipated value, project demolition or construction activities would need to generate sound at 198 dB or greater to cause behavioral disturbance of prey fish in the foraging area. None of the Project-related demolition or construction activities are anticipated to generate sound levels at or in exceedance of this threshold (refer to Tables 3.2-3 and 3.2-4). Therefore, the demolition and construction would not result in behavioral disruption of California least tern prey fish that would have secondary impacts on these birds. Therefore, implementation of this alternative would not affect California least terns and there would be no significant impact to the species under NEPA.

Green Sea Turtle. Green sea turtles in San Diego Bay are more common in the South Bay where larger areas of eelgrass are present, but transient turtles occur in the North Bay as they move in and out of San Diego Bay, foraging in eelgrass beds. Demolition, and pile driving activities have the potential to disturb sea turtles in the immediate vicinity because of vessel movement, construction-related noise, and water quality degradation.

No green sea turtle habitat would be directly impacted by project activities and there is nothing that would attract sea turtles to the project area. Potential impacts to green sea turtles from implementation of the proposed action would primarily be from impact pile driving. The threshold levels for injury to green sea turtles from impact pile driving are 1) a peak SPL of 232 dB re 1 µPa, or 2) a cumulative SEL of 204 dB re 1 μPa^2-sec (Navy 2017). The peak SPL and cumulative SEL thresholds would only be exceeded less than 3.2 feet (1 meter) from the source during any activity; the imposition of a 66-feet (20-meter) safety shutdown zone for turtles would ensure the avoidance of acoustic injuries.

During impact pile driving, green sea turtles are expected to avoid exposure to an SPL of 175 dB re 1 µPa RMS or greater (Navy 2017). Behavioral reactions would not rise to the level of “take” under the ESA unless they result in a significant curtailment of feeding, movement and other activities affecting fitness. During impact driving of the 24-inch (61-cm) diameter concrete piles (the loudest sound source), this threshold value would be reached only within a distance of 39 feet (12 meters) from the source. Again, the safety shutdown zone would prevent the exposure of sea turtles to potentially disturbing underwater noise as well as the risk of injury from vessels, machinery, or debris.

Any water quality effects due to the project, including turbidity or contaminants from suspended sediments, would be relatively brief and localized to the immediate area of the activities, where turtles are unlikely to occur.

The Navy concluded that Alternative 1 may affect, but is not likely to adversely affect, the green sea turtle. The Navy conducted informal consultation with NOAA Fisheries. On 21 December 2020, NOAA Fisheries concurred that the Proposed Action (Alternative 1) may affect, but is not likely to adversely affect the Eastern Pacific Distinct Population Segment of green sea turtles (Appendix B). Therefore, there would be no significant impact on the green sea turtle under NEPA.

Other Special Status Species

The project area is not in proximity to important foraging, resting, or breeding areas for bird species, and similar habitats are abundant throughout San Diego Bay. Potential disturbance of shoreline and adjacent open water areas that may be used on a transient basis by sensitive water and shore bird species would be short-term and less than significant. Noise generated during demolition activities such as pile and concrete removal and pile driving would not substantially increase noise levels. In addition, these increases in noise and activity would not vary substantially from normal levels of activity, vehicular traffic, and marine vessels operating in the immediate area, and would cease upon completion of demolition and construction activities. Therefore, there would be no adverse effect on these species’ populations or habitats and no significant impact to the species under NEPA.

In conclusion, for the reasons discussed in the preceding paragraphs, implementation of Alternative 1 would not result in significant impacts to marine biological resources.

3.3 Summary of Potential Impacts to Resources and Impact Mitigation, Avoidance, and Minimization Measures

Table 3.3-1 presents a summary of the potential impacts associated with Alternative 1 and the No Action Alternative. Table 3.3-2 provides a comprehensive list of all impact avoidance and minimization measures.

Table 3.3-1 Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1: Replace Pier 6*
Resources Dismissed from Detailed Analysis *(Air Quality, Geological Resources, Cultural Resources, Terrestrial Biological Resources, Land Use, Visual Resources, Airspace, Noise, Transportation, Public Health and Safety, Hazardous Materials and Wastes, Socioeconomics and Environmental Justice, and Infrastructure and Utilities)*	No Impacts. There would be no change in existing conditions; therefore, no impacts would occur.	Air Quality: Temporary demolition and construction emissions would not exceed *de minimis* levels. Geological Resources: Minor surficial modifications would not result in impacts to geology and topography. Alternative 1 would incorporate industry standard seismic engineering measures to minimize any potential effects of seismically induced ground movement. Cultural Resources: No known cultural resources would be impacted because no historic properties are present within the project area. Terrestrial Biological Resources: No impact to terrestrial biological resources because no sensitive terrestrial plant species or terrestrial threatened or endangered animals or their habitat occur within or near the limited upland portion of the project area. Land Use: No impacts because there would be no change to land use designation or existing activities. Visual Resources: No change to existing views or the viewshed at NBSD. The resulting pier would remain consistent with the military and industrial aesthetics of the surrounding area. Airspace: No change to airspace or airspace operations. Noise: Temporary demolition and construction noise (especially from pile driving) would be audible in the immediate vicinity but not exceed existing noise levels at sensitive noise receptors. Transportation: Temporary increase in traffic during construction of approximately 250 peak daily trips. Public Health and Safety: Activities would take place within NBSD property boundaries and restricted navigation zones, where the Navy provides emergency response services; no impacts to public emergency services. Hazardous Materials and Wastes: Demolition and construction activities would occur in accordance with all applicable regulations. Socioeconomics: Short-term increase in temporary jobs and spending to the local economy; no long-term increase in population or jobs. Environmental Justice and Protection of Children: Alternative 1 would be consistent with existing activities and would occur on NBSD which has restricted access. Alternative 1 would not disproportionately affect minority or low-income populations or children and there would be no disproportionate impact to the health and safety of children from implementation of the alternatives. Infrastructure and Utilities: Existing utility supply and local infrastructure would accommodate proposed electrical upgrades.

Table 3.3-1 Summary of Potential Impacts to Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1: Replace Pier 6***
Water Resources	No Impact. There would be no change in existing conditions; therefore, no impacts would occur.	No Significant Impact. Removal and installation of pilings would result in minor and localized temporary variations in bathymetry around pilings; no impact to long-term bathymetry. Reduction in number of pilings would enhance circulation around Pier 6. Pile removal/installation activities would result in localized temporary resuspension of marine sediments; impacts would cease with the completion of pile driving. Potential for inadvertent releases of petroleum-products and debris during construction and demolition.
Marine Biological Resources	No Impact. There would be no change in existing conditions; therefore, no impacts would occur.	No Significant Impact. Temporary and minor impacts to nonvegetated soft bottom benthic communities resulting in potential loss or displacement of benthic organisms occurring in the immediate area during demolition and construction activities. No eelgrass or any other special aquatic sites are found in the project area, thus, no effects to special aquatic sites would occur. However, the increase in Bay shading of approximately 2.2 acres (0.9 hectare); impacts offset by through the Navy Eelgrass Mitigation Bank at a rate of (0.07%) for shading of areas less than -29 feet (-8.8 m) deep. Fish occurring in the immediate area may be lost or displaced during demolition or construction activities, either directly by pile removal or equipment and noise associated with these activities or indirectly by exposure to short-term changes in: suspended sediments; turbidity; dissolved oxygen; and light diffusion. Relatively minor but adverse temporary and permanent effects on essential fish habitat for Coastal Pelagic Species and Pacific Coast Groundfish; however, no effect on these habitats in terms of the Bay and Pacific fishery as a whole. Temporary reduction in the algal and invertebrate production associated with encrusting communities on the pilings. Impacts to breeding birds would be minimal because: (1) bird abundance in the project area is low; (2) the proposed project would only affect a relatively small area of San Diego Bay; and (3) impacts would cease upon construction completion. A small number of “Level B -harassment” takes of California sea lions related to behavioral alterations in response to demolition and installation noise would have a negligible short-term effect on individual California sea lions and no population-level impacts. No effect to California least tern. May affect, but is not likely to adversely affect green sea turtle.

Table 3.3-2 Impact Avoidance and Minimization Measures

Resource Area	*Measure*	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Section 3.0: Public Health and Safety	The construction contractor would develop a rescue plan for all water activities, with specifications for the retrieval and rescue of personnel. The construction contractor would ensure all workers receive information on all relevant safety plans.	Support the safety of project personnel	Project safety record	Prepare and brief before project and implement during project	Construction contractor	Completion of construction activities
	Naval Ordnance Safety and Security Activity and/or Department of Defense Explosives Safety Board approval of the Explosives Safety Submission (ESS) or Explosives Safety Submission Determination Request (ESS DR)	Support the safety of project personnel	Project safety record	Prepare and follow ESS or ESS DR	Construction contractor and Navy	Completion of construction activities
	The Navy would provide the NBSD Explosives Safety Officer with contractor points of contact for notification and evacuation during explosives handling at Piers 5 or 7.	Personnel safety during explosives handling	Project safety record	Regular communication/ notification	Navy and construction contractor	Completion of construction activities
	The Navy would inform the contractor of potential presence of unexploded ordnance (UXO). If workers encounter potential UXO, all work would stop pending Navy evaluation and notification to proceed.	Minimize potential for encountering UXO/personnel safety	Project safety record	In accordance with Naval Ordnance Safety and Security Activity Instruction 8020.15	Navy and construction contractor	Completion of in-water construction activities
	The Navy or the construction contractor would submit a Local Notice to Mariners (via U.S. Coast Guard District 11) at least 14 days prior to the start of the project.	Notify boaters of in-water activity	Publication of notice and project safety record	Submit to USCG District 11 at least 14 days prior to project start	Navy and construction contractor	Completion of construction activities
Section 3.0: Hazardous Materials and Wastes	Contractors would abide by the provisions of the Hazardous Waste Management Plan for the San Diego Metro Area (Commander NRSW 2007) to ensure management of hazardous waste in accordance with all applicable requirements.	Protection of marine resources	Project safety record	Prepare and brief before project and implement during project	Construction contractor	Completion of construction activities
	Contractors would not discharge oil, fuel, or chemicals to waters of the state.	Protection of marine resources	No discharges	Observe for spills, sheens, etc.	Construction contractor	Completion of construction activities
	The contractor would develop and abide by site-specific Storm Water Pollution Prevention Plan (SWPPP), to include implementation of appropriate best management practices (BMPs).	Protection of marine resources	BMPs perform as designed	Regularly inspect BMPs for performance	Construction contractor	Completion of construction activities
	Any hazardous materials or wastes generated will be subject to Emergency Planning and Community Right-to-Know Act reporting requirements.	Informational for action, as needed	Continued positive community relations	Understanding and following of reporting requirements	Construction contractor	Completion of construction activities
	Certified workers would remove and manage lead-based paint in compliance with all applicable federal, state, and local regulations.	Minimize risk of exposure	No exposures	Follow applicable regulations	Construction contractor	Completion of demolition activities

Resource Area	*Measure*	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Section 3.0: Hazardous Materials and Wastes	Certified workers would remove and manage asbestos containing materials in compliance with all applicable federal, state, and local regulations.	Minimize risk of exposure	No exposures	Follow applicable regulations	Construction contractor	Completion of demolition activities
	Develop a Solid Waste Management Plan to characterize demolition and construction waste for proper reuse, recycling, or disposal.	Maximize reuse/recycling and minimize solid waste disposal	Successful characterization and reduction in disposal	Monthly diversion summary reports and weight tickets	Construction contractor	Completion of construction activities
Section 3.1: Water Resources	Adhere to NBSD's existing National Pollutant Discharge Elimination System Permit and develop and implement a SWPPP and associated BMPs.	Protection of marine resources	No discharges	Draft and implement SWPPP; periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	Develop and implement a Construction and Demolition Plan (CDP).	Contain demolition debris	Containment of debris	Draft and implement CDP; periodic inspections for effectiveness	Construction contractor	Completion of demolition activities
	Develop and implement a Spill Prevention Plan (SPP).	Minimize potential for spills to marine waters	No spills	Draft and implement SPP; periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	Deploy a floating boom and cable net around the project area.	Protection of marine resources	Catch devices, ensnare debris	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	Keep spill containment equipment on-hand as specified in the NBSD Facility Response Plan.	Immediate response to inadvertent discharges/spills	Fast and effective response	Periodic inspections to confirm equipment is on-hand and in good working order	Construction contractor	Completion of construction activities
	Subject to the terms and conditions identified in the project-specific USACE Section 404 and Section 10 permit and San Diego Regional Water Quality Control Board Section 401 Permit, the Navy would deploy precautionary measures to alleviate turbidity associated with demolition and construction activities.	Minimize impacts to marine resources	Success in achieving permit conditions	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities

Resource Area	Measure	Anticipated Benefit	Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
Section 3.2 Biological Resources	The contractor would use only clean construction materials suitable for use in the oceanic environment. The contractor would ensure no: debris; soil; silt; sand; sawdust; rubbish; cement or concrete washings thereof; chemical; oil or petroleum products from construction would be allowed to enter into or place where it may be washed by rainfall or runoff into waters of the U.S. Upon completion of the project, any and all excess material or debris would be completely removed from the work area and disposed of in an appropriate upland site. Following the removal of all project-related materials and equipment, project lay-down areas would be thoroughly cleaned (no visible sediment or other contaminants) by the contractor.	Avoid/minimize impacts to marine resources	Containment of debris and no spills	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	A *Caulerpa* survey (Surveillance Level) would be conducted prior to in-water project activities, consistent with National Marine Fisheries Service and California Department of Fish and Wildlife requirements. If Caulerpa was found in the project area during this survey, eradication techniques would be used in accordance with approved Caulerpa Control Protocols.	Identify and eradicate invasive species	If detected, complete removal	Survey results and implementation	Navy	Prior to demolition activities
	Prior to demolition, the pier would be surveyed for active nests. If a nest is discovered, it would be avoided until it is no longer active.	Avoid/minimize impacts to birds protected under the MBTA	No impacts to active nests	Survey results and avoidance	Construction contractor	Prior to demolition activities

Resource Area	Measure	Anticipated Benefit	Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
Section 3.3: Biological Resources	The following avoidance and minimization measures would be followed during proposed pile driving activities. • During all pile driving and removal activities, regardless of predicted SPLs, a buffered shutdown area of 10 m (33 ft) will be added to the required 10-m (33 ft) Level A injury prevention Physical Interaction Shutdown Zone. Since California sea lions are fast-swimming, this is appropriate to reduce the likelihood of injury to marine mammal species due to physical interaction with construction equipment during in-water activities. If an animal enters the buffered shutdown zone, pile driving or extraction would be stopped until the individual(s) has left the zone of its own volition, or not been sighted for 15 min. • The Level A/B harassment ZOIs will be monitored throughout the time required to drive or extract a pile. If a marine mammal is observed entering the Level B ZOI, an exposure would be recorded, and behaviors documented. Work would continue without cessation, unless the animal approaches or enters the buffered shutdown zone, at which point pile driving or extraction shall be halted. • Visual Monitoring o Impact Installation and Vibratory Installation and Removal: Monitoring will be conducted for a 20 m (66 ft) buffered shutdown zone and within the Level B ZOI before, during, and after pile installation activities. The Level B ZOI may be adjusted based on acoustic monitoring results, subject to NOAA Fisheries concurrence. Monitoring will take place from 30 minutes prior to initiation through 30 minutes post-completion of installation or removal activities.					

Resource Area	Measure	Anticipated Benefit	Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
Section 3.3: Biological Resources	○ Monitoring will be conducted by qualified protected species observers (PSOs). All PSOs would be trained in marine mammal identification and behaviors, and have experience conducting marine mammal monitoring or surveys. Trained PSOs will be placed at the best vantage point(s) practicable (e.g., from a small boat, the pile driving barge, on shore, or any other suitable location) to monitor for marine mammals and implement shutdown/delay procedures, when applicable, by notifying the hammer operator of a need for a shutdown of construction. Up to three PSOs will be deployed on land or vessel with a clear view of the shutdown zone and ZOIs. ○ Prior to the start of pile installation activity, the buffered shutdown zones will be monitored for 30 minutes to ensure that they are clear of marine mammals. Pile driving will only commence once observers have declared the buffered shutdown zones clear of marine mammals; Animals will be allowed to remain in the Level B ZOI and their behavior will be monitored and documented. ○ If a marine mammal approaches/enters the buffered shutdown zone during the course of pile installation or extraction operations, pile driving will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone, or 15 minutes have passed without a re-detection of the animal(s) from the last observation time. ○ If a marine mammal species not covered in this IHA enters the Level B harassment zone, all pile driving or extraction activities shall be halted until the animal(s) has been observed to have left the Level B ZOI, or has not been observed for at least one hour. NOAA Fisheries will be notified immediately with the species, and precautions made during the encounter. Pile installation or extraction will be allowed to proceed if the above measures are fulfilled for non-IHA species.					

Resource Area	Measure	Anticipated Benefit	Evaluating Effectiveness	Implementing and Monitoring	Responsibility	Estimated Completion Date
Section 3.3: Biological Resources	○ In the unlikely event of conditions that prevent the visual detection of marine mammals, such as heavy fog, activities, prevent the visual detection of marine mammals within the buffered shutdown zone, in-water construction of demolition activities have been initiated, and conditions deteriorate so that the buffered shutdown zone is not completely visible, activities will be delayed until the full buffered shutdown zone is once again visible. ○ If the take of a marine mammal species approaches the take limits specified, NOAA Fisheries will be notified, and appropriate steps will be discussed. • Acoustic Measurements – Acoustic measurements will be used to empirically validate sound source levels and, if appropriate, adjust the dimensions of Level B ZOIs. • Soft Start - The use of impact pile-driving soft-start procedure is believed to provide additional protection to marine mammals by providing a warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. The Pier 6 Project will utilize soft-start techniques (ramp-up/dry fire) recommended by NOAA Fisheries for impact pile installation. These measures are as follows: ○ Soft start for impact pile driving must be conducted at beginning of day's activity and at any time pile driving has ceased for more than 30 minutes. If vibratory pile driving has been occurring but impact has not for more than 30 minutes, soft start for the impact hammer must occur. The soft-start requires contractors to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 30-second waiting period, then two subsequent 3-strike sets. ○ The 30-second waiting period is proposed based on the Navy's recent experience and consultation with NOAA Fisheries on a similar project at Naval Base Kitsap at Bangor. Soft start will only be required for impact pile driving. • Daylight Construction – In-water construction and demolition work will occur only during daylight hours that allow for sighting of protected marine species within all project areas and defined monitoring zones.	Avoidance/Minimization of impacts to marine biological resources	Minimal impact	Visual sweep and acoustic measurements as needed	Navy and construction contractor	End of construction activities

4 Cumulative Impacts

This chapter 1) defines cumulative impacts, 2) describes past, present, and reasonably foreseeable future actions relevant to cumulative impacts, 3) analyzes the incremental interaction the Proposed Action may have with other actions, and 4) evaluates cumulative impacts potentially resulting from these interactions.

4.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, and CEQ guidance. 40 Code of Federal Regulations (CFR) section 1508.7 defines *cumulative impacts*.

The impact on the environment that results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In addition, CEQ and United States (U.S.) Environmental Protection Agency (USEPA) have published guidance addressing implementation of cumulative impact analyses—*Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005) and *Consideration of Cumulative Impacts in USEPA Review of NEPA Documents* (USEPA 1999). CEQ guidance entitled *Considering Cumulative Impacts Under NEPA* (1997) states that cumulative impact analyses should:

"…determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions...identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Cumulative impacts are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the proposed action have more potential for a relationship than those more geographically separated. Similarly, relatively concurrent actions would tend to offer a higher potential for cumulative impacts. To identify cumulative impacts, the analysis needs to address the following three fundamental questions.

- Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
- If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
- If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

4.2 Scope of Cumulative Impacts Analysis

The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the time frame in which the effects could occur. For this EA, the study area delimits the geographic extent of the cumulative impacts analysis. In general, the study area includes those areas previously identified in Chapter 3 for the respective resource areas. The time frame for cumulative impacts centers on the timing of the proposed action.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section focuses on past, present, and reasonably foreseeable future projects at and near NBSD. Using the first fundamental question presented in Section 4.1, this analysis first determined if a relationship exists such that the affected resource areas (as addressed in this EA) might interact with the affected resource area of a past, present, or reasonably foreseeable action. If no such potential relationship exists, then the analysis did not carry the project forward into the cumulative impacts analysis. In accordance with CEQ guidance (CEQ 2005), this analysis does not catalogue these actions considered but excluded from further cumulative effects analysis as the intent is to focus the analysis on the meaningful actions relevant to inform decision-making. Table 4-1 presents those projects included in this cumulative impact analysis and the following subsections describe these projects.

Table 4-1 Cumulative Action Evaluation

Past Actions	
Action	**Level of NEPA Analysis Completed and Project Start Date (year)**
NBPL Fuel Pier Replacement and Dredging (P-151)	EA (2013)
NBPL Pier 5000 North Side Outer Berth Dredging	EA (2013)
NBPL Piers 5000, 5002 and Pier 5002 Approach Channel Dredging	EA (2014)
NBSD Pier 12 Replacement and Dredging (P-327)	EA (2016)
NBSD Maintenance Dredging Various Piers (Piers 2, 6, 7, 13 and 14) and in Chollas Creek	EA (2017)
U.S. Coast Guard Ballast Point Maintenance Dredging	EA (2016)
Present and Reasonably Foreseeable Future Actions	
Action	**Estimated Project Start Date**
NBPL Smuggler's Cove Fish - Eelgrass, Intertidal, Subtidal Habitat Reef and Enhancement Project	2019
South San Diego Harbor Maintenance Federal Channel Maintenance Dredging	2019-2020
Ballast Point to Approach Federal Channel Maintenance Dredging	2019-2020
NBSD Graving Dock Approach Maintenance Dredging	2019-2020
NBPL Floating Dry Dock (ARCO) Dredging	2019-2020
Fleet Logistics Center Fuel Pier Dredging	2019-2020
NBSD Pier 8 Replacement and Dredging (P-440)	2020
BAE Systems Waterfront Improvement Project	2020-2024
Energy Security and Resilience Project	2018
NBPL Pier 5000 North Side Outer Berth and Pier Approach Dredging	2019
Floating Dry Dock Replacement	2020
Pier 6 Maintenance Dredging	2022

4.3.1 Past Actions

A variety of in-water projects within the San Diego Bay are completed, are underway, or are estimated to start soon. These projects include maintenance dredging and pier repair/maintenance projects (Table 4-1). Descriptions of these projects follows.

4.3.1.1 Naval Base Point Loma Fuel Pier Replacement and Dredging (P-151)

This project involved the demolition and replacement of the existing fuel pier (Pier 180) in San Diego Bay at Naval Base Point Loma (NBPL), which included the removal and installation of piles. This project also involved sediment dredging with beneficial reuse of the dredge sediments at the Naval Base Coronado Silver Strand Training Complex. The Navy prepared an EA for this project in August 2013, and project implementation began the same year starting with dredging. The project is complete.

4.3.1.2 NBPL Pier 5000 North Side Outer Berth Dredging

This project dredged sediment from the NBPL Pier 5000 North Side Outer Berth to maximize installation waterfront usability and allow for deeper dredge submarine berthing. The Navy beneficially used the dredged sediment nearshore of Naval Air Station North Island. The Navy completed an EA for the project in 2013 and completed the dredging later the same year.

4.3.1.3 NBPL Piers 5000, 5002 and Pier 5002 Approach Channel Dredging

This project involved dredging of sediment at NBPL Pier 5000 and Pier 5002 sites and the approach area, off site aquatic sediment disposal, and fender relocation to increase depth to accommodate submarines. The Navy completed an EA for this project in 2014 and began dredging shortly thereafter.

4.3.1.4 NBSD Pier 12 Replacement and Dredging (P-327)

This project consisted of the demolition and replacement of Pier 12. This project also included dredging to meet the -37 feet (11 meters) mean lower low water (MLLW) requirement for deep draft vessels. The Navy completed this project in July 2016 (NAVFAC SW 2011a).

4.3.1.5 NBSD Maintenance Dredging Various Piers (Piers 2, 6, 7, 13 and 14) and in Chollas Creek

These maintenance dredging activities began in 2016.

4.3.1.6 U.S. Coast Guard Ballast Point Maintenance Dredging

This project involved dredging of the Coast Guard berths to restore navigational requirements. The dredged clean sand was provided for beneficial reuse as part of the neighboring Smugglers Cove Fish, Eelgrass, Intertidal, Subtidal Habitat Reef and Enhancement Project.

4.3.2 Present and Reasonably Foreseeable Actions

A variety of in-water projects within the San Diego Bay are anticipated to occur within the next 2 years and include pier replacement, maintenance dredging, pier repairs, construction of new static and floating docks, and habitat enhancement projects (Table 4-1). Descriptions of these projects follows.

4.3.2.1 NBPL Smuggler's Cove Fish - Eelgrass, Intertidal, Subtidal Habitat Reef and Enhancement Project

The goal of this proposed project is to restore intertidal and subtidal beach and habitat at Smugglers Cove at NBPL. The project would create an artificial reef using broken concrete and piles salvaged from the Fuel Pier Replacement project to create a berm to hold sand and create new shallow beach and eelgrass habitat. Clean sand dredged as part of the USCG Station Ballast Point Maintenance Dredge would provide sand material for this project.

4.3.2.2 South San Diego Harbor Federal Channel Maintenance Dredging

The Los Angeles District of the U.S. Army Corps of Engineers (USACE), as part of its Operations and Maintenance Program, is proposing to perform maintenance dredging in South San Diego Harbor Federal Channel to re-establish authorized channel depths (-35 feet [-10.7 meters] MLLW, with a 2 foot (0.6 meters) allowable overdepth to -37 feet (-11 meters) MLLW (USACE 2019).

4.3.2.3 Ballast Point to Approach Federal Channel Maintenance Dredging

The USACE, as part of its Operations and Maintenance Program, will perform maintenance dredging from the federal navigation channel seaward of Ballast Point to the approach. The USACE dredges at Ballast Point approximately every seven years (USACE 2019) and the last dredging was in 2012.

4.3.2.4 NBSD Graving Dock Approach Maintenance Dredging

Proposed maintenance dredging in the approach area of the NBSD Graving Dock would ensure appropriate operational depths in the project vicinity. This would support the continued use of the site by ensuring appropriate depths for transit and maneuvering of vessels at NBSD.

4.3.2.5 NBPL Floating Dry Dock (ARCO) Dredging

Dredging in the vicinity of the ARCO floating dry dock at NBPL would ensure appropriate operational depths for the dry dock and client vessels in the project vicinity. This would support the continued use of the site by ensuring appropriate depths for transit and maneuvering of vessels.

4.3.2.6 Fleet Logistics Center Fuel Pier Dredging

The goal of this proposed project is to maintain access to one of the Navy's busiest maritime fueling facilities in the Southwest Region by dredging within the fuel pier vicinity. This would support the continued use of the site by ensuring appropriate depths for fueling operations and client vessels.

4.3.2.7 NBSD Pier 8 Replacement and Dredging (P-440)

This project consists of the demolition and replacement of Pier 8. The Navy prepared an EA for this project in 2016 (NAVFAC SW 2016) and started the project in 2020.

4.3.2.8 BAE Systems Waterfront Improvement Project

This proposed project would replace aging structures, improve existing infrastructure, increase space utilization, and increase efficiency of operations at the existing BAE Systems San Diego Ship Repair Yard, located adjacent to NBSD. The proposed project includes 15 distinct project elements designed to improve efficiency and functionality of the existing BAE Systems San Diego Ship Repair Yard. Construction of various project elements would last through 2024.

4.3.2.9 Energy Security and Resilience Project

This Navy-led project would include the construction and operation of an energy security and resilience project that may include a natural gas peaker plant, installation of grid-integrated battery storage or other energy assets at NBSD.

4.3.2.10 NBPL Pier 5000 North Side Outer Berth and Pier Approach Dredging

This proposed project would dredge material at NBPL to meet new submarine water depth requirements for the navigation and berthing of large submarines to support continued Navy submarine fleet operations. The Navy prepared a Final EA and FONSI for this project in April 2019.

4.3.2.11 Floating Dry Dock Replacement

The Navy proposes dredging, demolition, and construction in support of the emplacement and operation of floating dry dock space at NBSD. The proposal also includes the disposal of dredged sediments at Nearshore Replenishment Sites, Offshore Disposal Sites, or Upland Disposal Sites. The Navy prepared and Final EA and FONSI for this project in May 2020.

4.3.2.12 Pier 6 Maintenance Dredging

Proposed maintenance dredging around Pier 6 would ensure appropriate operational depths in the vicinity of Pier 6. This would support the continued use of the pier by ensuring appropriate depths for transit and maneuvering of vessels. The Navy has not initiated a NEPA document for this action.

4.4 Cumulative Impact Analysis

Where feasible, this analysis assessed the cumulative impacts using quantifiable data; however, for many of the resources included for analysis, quantifiable data is not available and this analysis uses a qualitative approach. The following cumulative impact analysis uses the same analytical methodology as presented in Chapter 3.

4.4.1 Water Resources

4.4.1.1 Description of Geographic Study Area

The region of influence (ROI) for water resources is San Diego Bay.

4.4.1.2 Relevant Past, Present, and Future Actions

This cumulative impact analysis considers the potential for the identified past, present, or reasonably foreseeable projects in the vicinity of Pier 6 (refer to Table 4-1), when combined with the incremental effects of the Proposed Action, to cumulatively impact bathymetry and circulation, marine water quality, and marine sediments.

4.4.1.3 Cumulative Impact Analysis

Bathymetry and Circulation: Implementation of Alternative 1 would result in minor and localized variations in bottom bathymetry around the piles as workers remove and install the piles; however, these minor variations would be temporary as currents and deposition would fill in low areas. Once construction is complete, the proposed Pier 6 would have approximately 1,032 fewer piles distributed over an area twice as large as the existing Pier 6. This pile spacing would be wide enough so that the proposed Pier 6 would enhance local circulation. Implementation of the other in-water projects, especially those projects involving pilings, would result in similar short-term and localized impacts to bathymetry and circulation in San Diego Bay. The identified recurring maintenance dredging projects would increase water depth in specific areas, counteracting the natural long-term deposition that occurs in San Diego Bay. Therefore, implementation of Alternative 1 combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts on bathymetry or circulation within the ROI.

Marine Water Quality: Implementation of Alternative 1 would not exceed water quality standards or contribute to the Section 303(d) water quality status of San Diego Bay in the project area. Alternative 1 and all other Navy-led projects in San Diego Bay would comply with the CNRSW Storm Water Best Management Practices Policies and Procedures Manual (CNRSW 2017). In the event of an inadvertent hazardous materials release, workers would follow procedures in the NBSD Facility Response Plan to contain the release and properly dispose of any spilled materials in compliance with applicable regulations. Compliance with applicable federal regulations and requirements, and the implementation of similar types of protection measures identified for Alternative 1 would minimize the potential for long-term marine water quality impacts. In addition, adherence to NBSD's existing National Pollutant Discharge Elimination System Permit via the development and implementation of a SWPPP and associated BMPs would minimize the potential for construction-related cumulative effects on marine water quality. Therefore, implementation of Alternative 1 combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts on marine water quality within the ROI.

Marine Sediments: Implementation of Alternative 1 would have only short-term, localized effects on marine sediment. There is a low likelihood of inadvertent discharges from vessels; however, should they occur, workers would contain and clean up the discharge(s) in accordance with Navy policy. The removal and installation of piles would result in a temporary increase in localized turbidity in water near the piles. The turbidity would settle and dissipate in a short amount of time given the minimal amount of disturbance. Implementation of the other in-water projects, especially those projects involving pilings, would result in similar short-term and localized impacts to marine sediments in San Diego Bay. The recurring maintenance dredging projects would disturb and remove sediments in localized areas. Therefore, implementation of Alternative 1 combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts on marine sediments within the ROI.

4.4.2 Marine Biological Resources

4.4.2.1 Description of Geographic Study Area

The ROI for marine biological resources is San Diego Bay.

4.4.2.2 Relevant Past, Present, and Future Actions

This cumulative impact analysis considers the potential for the identified past, present, or reasonably foreseeable projects in the vicinity of Pier 6 (refer to Table 4-1), when combined with the incremental effects of the Proposed Action, to cumulatively impact marine biological resources.

4.4.2.3 Cumulative Impact Analysis

Implementation of Alternative 1 would have no adverse effect to threatened or endangered species, no long-term adverse effect to EFH and associated Fishery Management Plan species, and only short-term, localized, and less than significant impacts to marine habitats, invertebrates, fish, marine mammals, and marine birds that occur in the project vicinity. For EFH, implementation of Alternative 1 would result in minor impacts to bay bottom and water column habitats and fishes from increased suspended sediments and turbidity, shading, and increased underwater noise levels from pier demolition and construction activities. Implementation of Alternative 1 and the identified reasonably foreseeable projects would not likely occur at the same time and location, so the potential project impacts would be spread out over space or time.

The NBSD Integrated Natural Resources Management Plan (INRMP) (NBSD 2014) and the San Diego Bay INRMP (NRSW and Unified Port of San Diego 2013) provide an implementable and cooperative framework for managing natural resources in San Diego Bay. The INRMPs provide goals and objectives for the use and conservation of marine biological resources in San Diego Bay which integrate regional ecosystem, military, social (i.e., community), and economic concerns.

The Navy is committed to avoiding or minimizing environmental effects to the greatest extent possible. As part of this commitment, conservation measures in the NBSD INRMP help to ensure that the Navy avoids or minimizes potential adverse impacts. The San Diego Bay INRMP recognizes the regular and sustained implementation of maintenance dredging and pile driving activities within San Diego Bay and provides associated measures for marine biological resource management. Therefore, implementation of Alternative 1 under such a cooperative framework and when combined with past present, and reasonably foreseeable future projects, would not result in significant impacts on marine biological resources within the ROI.

5 Other Considerations Required by the National Environmental Policy Act

5.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

In accordance with 40 Code of Federal Regulations (CFR) section 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state and local land use plans, policies, and controls. Table 5-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action and describes briefly how the Proposed action would comply with these laws and regulations.

Table 5-1 Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	***Status of Compliance***
National Environmental Policy Act (NEPA) (42 United States [U.S.] Code [U.S.C.] section 4321 et seq.); Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR parts 1500-1508); Navy procedures for Implementing NEPA (32 CFR part 775) and Chief of Naval Operations Instruction 5090.1E, Environmental Readiness Program	This Environment Assessment (EA) has been prepared in accordance with NEPA, CEQ regulations implementing NEPA, and Navy NEPA procedures.
Clean Air Act (42 U.S.C. section 7401 et seq.)	Under Alternative 1, no significant impacts to air quality would occur. As such, the Navy has prepared a Record of Non-Applicability demonstrating Clean Air Act conformity (Appendix A).
Clean Water Act (33 U.S.C. section 1251 et seq.)	The Navy would implement Alternative 1 in compliance with NBSD's National Pollutant Discharge Elimination System Permit. Proposed construction activities would follow best management practices to limit potential water quality impacts. The Navy would follow the permit conditions to comply with Sections 401 and 404 of the Clean Water Act (Appendix D).
Rivers and Harbors Appropriation Act of 1899 (33 U.S.C. 403; chapter 425, 3 March 1899)	The Navy would follow the permit conditions stipulated in the U.S. Army Corps of Engineers permit to comply with Section 10 of the Rivers and Harbors Act.
Coastal Zone Management Act (16 U.S.C. section 1451 et seq.)	On 24 August 2020, the California Coastal Commission concurred with the Navy's Coastal Consistency Negative Determination (Appendix C).
National Historic Preservation Act (NHPA) (section 6, 54 U.S.C. section 3001 et seq.)	The Navy has a Programmatic Agreement (PA) (CNRSW 2014) with the California State Historic Preservation Office. Consistent with the Stipulation 8.A of the PA, Alternative 1 meets the standard determination of "no historic properties affected" in accordance with 36 CFR 800.4(d)(l), and no further review of compliance under Section 106 is required.

Table 5-1 Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
Endangered Species Act (16 U.S.C. section 1531 et seq.)	Alternative 1 is not likely to adversely affect any federally listed endangered or threatened species or critical habitat and thus formal consultation with the U.S. Fish and Wildlife Service was not required. In conjunction with the NEPA process, the Navy informally consulted with National Oceanic and Atmospheric Administration (NOAA) Fisheries. On 21 December 2020, NOAA Fisheries concurred that the Proposed Action may affect, but is not likely to adversely affect the Eastern Pacific Distinct Population Segment of green sea turtles (Appendix B).
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 U.S.C. section 1801 et seq.)	Alternative 1 would have relatively minor but adverse temporary and permanent effects on essential fish habitat (EFH) for federally managed fish species within the Coastal Pelagic Species and Pacific Coast Groundfish FMPs. The addition of 2.2 acres (0.9 ha) of pier surface area would have a negligible effect on benthic primary production because the project area does not support eelgrass beds. The Navy consulted with NOAA Fisheries in compliance with the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act. On 20 November 2020, NOAA Fisheries concurred with the Navy’s EFH Assessment (Appendix B).
Marine Mammal Protection Act (16 U.S.C. section 1361 et seq.)	Alternative 1 would result in Level B harassment of California sea lions. The Navy consulted with NOAA Fisheries in compliance with the Marine Mammal Protection Act. On 22 January 2021, NOAA Fisheries issued the Navy an Incidental Harassment Authorization for the Proposed Action (Alternative 1) (Appendix B).
Migratory Bird Treaty Act (16 U.S.C. Sections 703-712)	Alternative 1 would comply with the Migratory Bird Treaty Act.
Executive Order (EO) 11988, Floodplain Management	No impacts to floodplains would occur.
EO 12088, Federal Compliance with Pollution Control Standards	The Navy would implement Alternative 1 in compliance with EO 12088.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations	Alternative 1 would not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	Alternative 1 would not result in environmental health risks and safety risks that may disproportionately affect children.
EO 13175, Consultation and Coordination with Indian Tribal Governments	The Navy has complied with this policy via the Naval Base San Diego Programmatic Agreement (CNRSW 2014).

5.2 Coastal Zone Management

The federal Coastal Zone Management Act (CZMA) of 1972 establishes a federal-state partnership to provide for the comprehensive management of coastal resources. Coastal states and territories develop site-specific coastal management programs based on enforceable policies and mechanisms to balance resource protection and coastal development needs.

The California Coastal Commission lays out the policy to guide the use, protection, and development of land and ocean resources within the state’s coastal zone. Under the Act, federal activity in, or affecting, a coastal zone requires preparation of a Coastal Zone Consistency Determination or a Negative Determination. In other words, any federal agency proposing to conduct or support an activity within or outside the coastal zone that would affect any land or water use or natural resource of the coastal zone must do so in a manner consistent with the CZMA or applicable state coastal zone program to the maximum extent practicable. However, Federal lands, which are “lands the use of which is by law subject solely to the discretion of…the Federal Government, its officers, or agents,” are statutorily excluded from the State’s “coastal zone.” If, however, the proposed federal activity affects coastal resources or uses beyond the boundaries of the federal property (i.e., has spillover effects), the CZMA Section 307 federal consistency requirement applies.

As a federal agency, the Navy must determine whether its proposed activities would affect the coastal zone. This takes the form of either a Negative Determination or a Consistency Determination.

As defined in Section 304 of the CZMA, the term "coastal zone" does not include "lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government." The federal government (Navy) owns and operates NBSD; therefore, NBSD is not part of the coastal zone. The Navy recognizes that actions outside the coastal zone that affect land or water uses or natural resources of the coastal zone via "spillover" are subject to the provisions of CZMA.

The Navy analyzed the impacts of Alternative 1 on the coastal zone by looking at reasonably foreseeable direct and indirect effects on the coastal use or resources and reviewing relevant management program enforceable policies (15 CFR 930.33[a][1]) and the Coastal Resources Planning and Management Policies.

The Proposed Action is relatively comparable to previous Navy Coastal Consistency Negative Determinations prepared for similar pier replacement projects in San Diego Bay, namely Pier 8 and Pier 12. The Navy determined that Alternative 1 would have no effects to coastal uses or resources of the coastal zone, and as such prepared and submitted a Coastal Consistency Negative Determination to the California Coastal Commission requesting concurrence with the Navy's determination of effects. On 24 August 2020, the California Coastal Commission concurred with the Navy’s Coastal Consistency Negative Determination (Appendix C).

5.3 Climate Change

The USEPA developed a “State of Knowledge” website following the 2007 Intergovernmental Panel on Climate Change report. The USEPA affirms that while the contribution is uncertain, human activities are substantially increasing greenhouse gas (GHG) emissions, which, in turn, are contributing to a global warming trend (USEPA 2015). The U.S. Global Change Research Program (USGCRP) is a working group coordinating the efforts of 13 different federal agencies, including the U.S. Department of Agriculture, the Department of the Interior, the Department of Defense, and the Department of Energy. The USGCRP releases regular reports presenting the most current scientific consensus of predicted changes associated with global climate change. The 2018 National Climate Assessment report is the most recent complete report (USGCRP 2018). This report summarizes the science of climate change and the impacts of climate change on the U.S., now and in the future.

5.3.1 Predicted Future Conditions

Relevant to the location of the Proposed Action, the "Southwest" section of the 2018 National Climate Assessment report describes how many coastal resources in the Southwest have been affected by sea level rise, ocean warming, and reduced ocean oxygen—all impacts of human-caused climate change—and ocean acidification resulting from human emissions of carbon dioxide. Homes and other coastal infrastructure, marine flora and fauna, and people who depend on coastal resources face increased risks under continued climate change. Between 1906 and 2016, the sea level in San Diego rose 9.5 inches (24 cm) (USGCRP 2018).

Under the highest modeled scenario, continued climate change could raise sea level near San Francisco by 30 inches (76 cm) by 2100, with a range of 19-41 inches (49-104 cm). Storm surges and high tides on top of sea level rise would exacerbate flooding. Major seaports in Long Beach and Oakland and the international airports of San Francisco, Oakland, and San Diego are vulnerable (USGCRP 2018).

Projected changes in long-term climate predict more frequent extreme events such as heat waves and droughts. Current simulations predict decreasing precipitation, snowpack, runoff, and soil moisture for the region into the future. While simulations predict that total precipitation would decrease, they also predict the frequency of extreme rain events with a high potential for flooding would increase. At the same time, the scenarios predict that extreme heat events are expected to increase in frequency and magnitude, resulting in increased heat-associated deaths and illnesses, vulnerabilities to chronic disease, and other health risks to people in the Southwest (USGCRP 2018).

5.3.2 Impact of the Proposed Action on Climate Change

As shown in Appendix A, estimated emissions from implementation of Alternative 1 (5,733 metric tons of carbon dioxide equivalents) would be well below 25,000 metric tons of carbon dioxide equivalents, which is considered as a viable threshold warranting a more substantial evaluation of—but not necessarily a determination of—significance of climate change impact. Furthermore, even though Alternative 1 would represent a fractional percentage of US baseline carbon dioxide equivalent emissions (estimated to be 5,742,600,000 metric tons in 2017), the Navy would continue to make attempts to minimize contributions to GHG emissions. Thus, the implementation of Alternative 1 would not contribute significantly to global climate change.

5.3.3 Impact of Climate Change on the Proposed Action

Climate change has the potential to impact the Proposed Action, primarily via sea level rise. As sea levels rise, coastal and underwater infrastructure may experience stress of increased water weight and changing physical stress.

To account for future sea level rise anticipated in the 75 year lifespan of the new pier, the final pier design would reflect a final elevation based on sea level rise predictions and the Unified Facilities Criteria (UFC) requirements (specifically, UFC 4-152-01 Design of Piers and Wharves [UFC 2017]). The proposed Pier 6 would be able to adapt to a potential sea level rise of 3 feet (1 meter).

5.4 Irreversible or Irretrievable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irreversibly or irretrievably committed in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Alternative 1 would require construction materials and energy. The total amount of construction materials (e.g., concrete and steel) required for Alternative 1 would be relatively small when compared to the resources available in the region. The construction materials and energy required for construction are not in short supply. Moreover, the use of construction materials and energy would not have an adverse impact on the continued availability of these resources. The commitment of energy resources to implement Alternative 1 would not be excessive in terms of region-wide usage. Implementation of Alternative 1 would not result in significant irreversible or irretrievable commitment of resources.

5.5 Unavoidable Adverse Impacts

This EA has determined that the alternatives considered would not result in any significant impacts. No resource area would be subject to significant adverse impacts that would require mitigation. Table 3.3-2 presents the resource area impact avoidance and minimization measures.

5.6 Relationship between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

As discussed in Chapter 3, Alternative 1 would result in both short- and long-term environmental effects. However, no element of Alternative 1 is expected to result in the types of impacts that would reduce environmental productivity, have long-term impacts on sustainability, affect biodiversity, or narrow the range of long-term beneficial uses of the environment. In summary, implementation of Alternative 1 would not result in any impacts that would significantly reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

6 References

Allen, L.G., A.M. Findlay, and C.M. Phalen. (2002). Structure and Standing Stock of the Fish Assemblages of San Diego Bay, California from 1994-1999. Bulletin of the Southern California Academy of Sciences 101: 49-85.

AMEC Earth & Environmental, Inc. (2008). Water Quality Monitoring Report P-440 Pier 8 Reconstruction and Pier 14 Demolition Project, Naval Base San Diego. AMEC Earth & Environment, Inc. March.

California Air Resources Board (CARB). (2014). EMFAC Web Database. https://www.arb.ca.gov/emfac/2014/. Accessed on 19 June 2019.

Caltrans. (2015). Final Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. February.

CARB. (2016). Ambient Air Quality Standards. https://ww3.arb.ca.gov/research/aaqs/aaqs2.pdf?_ga=2.80113745.757457248.1562881014-127567563.1558669873. 4 May. Accessed on 17 May 2019.

CARB. (2017). Mobile Source Emissions Inventory – Off-Road Diesel Vehicles 2017 Off-road Diesel Emission Factors. https://ww3.arb.ca.gov/msei/ordiesel.htm. Accessed on 17 June 2019.

Chollas Creek Quaywall Repairs. (2020). 2019/2020 Reported observations of California sea lions in San Diego Bay. Unpublished data.

City of San Diego. (2019). San Diego Municipal Code, Chapter 5: Public Safety, Morals and Welfare, Article 9.5: Noise Abatement and Control, Division 4: Limits. https://docs.sandiego.gov/municode/MuniCodeChapter05/Ch05Art9.5Division04.pdf. Accessed on 10 July 2019.

Commander, Navy Installations Command. (2019). About Naval Base San Diego (NBSD). https://www.cnic.navy.mil/regions/cnrsw/installations/navbase_san_diego/about.html. Accessed on 2 April 2019.

Commander Navy Region Southwest (CNRSW). (2010). Port Operations Shore Infrastructure Plan. Final Document April 2009, Revised September 2010.

CNRSW. (2014). Programmatic Agreement between the Commander NBSD and the California State Historic Preservation Officer regarding NBSD Undertakings, San Diego County, CA.

CNRSW. (2017). Storm Water Best Management Practices Policies and Procedures Manual.

Council on Environmental Quality (CEQ). (1997). Considering Cumulative Impacts Under NEPA.

CEQ. (2005). Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Washington, DC. June.

Crear, D.P., D.D. Lawson, J.A. Seminoff, T. Eguchi, R.A. LeRoux and C.G. Lowe. (2016). Seasonal Shifts in the Movement and Distribution of Green Sea Turtles Chelonia mydas in Response to Anthropogenically Altered Water Temperatures. Marine Ecology Progress Series, 548: 219–232.

Crear, D.P., D.D. Lawson, J.A. Seminoff, T. Eguchi, R.A. LeRoux, C.G. Lowe. (2017). Habitat Use and Behavior of the East Pacific Green Turtle, Chelonia mydas in an Urbanized System. Bulletin of Southern California Academy of Sciences, 116(1), 17-32.

Dahl. P.H. and D.R. Dall'Osto. (2019). Ambient Underwater Sound at NBSD, San Diego Bay, California. Prepared for NAVFAC SW under contract to Tierra Data, Inc.

Dall'Osto, D.R. and P.H. Dahl. (2019). Hydroacoustic Modeling of Pile Driving for the South-Central Region of San Diego Bay. Prepared for Naval Facilities Engineering Command Southwest under contract to Tierra Data, Inc.

Department of Defense. (2008). DoD Ammunition and Explosives Safety Standards. Change 2, 18 December 2017.

Department of Defense. (2017). Unified Facilities Criteria. Design: Piers and Wharves. 4-152-01. 24 January.

Earth Mechanics, Inc. (2019). Draft Geotechnical Investigation Report. FY21 MCON Project P-443, NBSD, Pier 6. 21 June.

Eaton, S. (2000). Workers' Compensation Board of BC. Engineering Section Report: Construction Noise. Project Number 7.11-99284. February.

Eguchi, T. (2017). Abundance of green turtles in San Diego Bay 2017. Report to Naval Facilities Engineering Command Southwest.

Fairey, R., C. Bretz, S. Lamerdin, J. Hunt, B. Anderson, S. Tudor, C. Wilson, F. LaCaro, M. Stephenson, M. Puckette, and E. Long. (1996). Chemistry, toxicity, and benthic community conditions in sediments of the San Diego Bay Region. Final Report prepared by California State Water Resources Control Board, NOAA, California Department of Fish and Game, Moss Landing Marine Laboratories, and University of California Santa Cruz. September.

Fairey, R., J. Downing, C. Roberts, E. Landrau, J. Hunt, B. Anderson, C. Wilson. G. Kapthi, F. LaCaro, P. Michael, M. Stephenson, and M. Puckett. (1998). Chemistry, toxicity, and benthic community conditions in sediments of the San Diego Bay region. Final Report prepared by California State Water Resources Control Board, NOAA, California Department of Fish and Game, Moss Landing Marine Laboratories, and University of California, Santa Cruz. September.

Frost, N. (2017). California Least Tern Breeding Survey, 2016 season. California Department of Fish and Wildlife, Wildlife Branch, Nongame Wildlife Program Report, 2017-03. Sacramento, CA. 20 pp + Appendices.

Graham, S.E. and Saunders, B.P. (2014). Occurrence, Distribution, and Population Estimates of Marine Mammals near Silver Strand Training Complex and San Diego Bay, CA. Prepared for Commander, Pacific Fleet. Submitted to Naval Facilities Engineering Command Southwest. February 2015.

Harris. (1991). Handbook of Acoustical Measurements and Noise Control.

Hill, T. (2011). Demolition of South Bay Power Plant Moves Forward. The Log. Available at: http://www.thelog.com/local/demolition-of-south-bay-power-plant-moves-forward/.

Lemons, G., R.L. Lewison, L. Komoroske, A. Gaos, C-T. Lai, P. Dutton, T. Eguchi, R. Leroux, J.A. Seminoff. (2011). Trophic Ecology of Green Sea Turtles in a Highly Urbanized Bay: Insights from Stable Isotopes and Mixing Models. Journal of Experimental Marine Biology and Ecology. 405:25-32.

Macdonald, K.B., R.F. Ford, E.B. Copper, P. Unitt, and J.P. Haltiner. (1990). South San Diego Bay Enhancement Plan, vol. 1, Bay History, Physical Environment and Marine Ecological Characterization, vol. 2, Resources Atlas: Birds of San Diego Bay, vol. 3, Enhancement Plan, vol. 4, Data Summaries. Published by San Diego Unified Port District, San Diego, CA. and California State Coastal Conservancy.

MacDonald and Dutton. (1992). Status of Sea Turtles in San Diego Bay: 1992 Report. Prepared for the San Diego Fish and Wildlife Advisory Commission. San Diego, CA.

MacDonald, B.D., R.L. Lewison, S.V. Madrak, J.A. Seminoff, and T. Eguchi. (2012). Home Ranges of East Pacific Green Turtles Chelonia mydas in a highly urbanized temperate foraging ground. Marine Ecology Progress Series, 461:211-221.

Massey, B.W. and J.L. Atwood. (1985). Application of Ecological Information to Habitat Management for the California Least Tern. Report No. 7-1985. Prepared for the U.S. Department of the Interior, Fish and Wildlife Service, Laguna Niguel, California.

Madrak S.V., R.L. Lewison, J.A. Seminoff, T. Eguchi. (2016). Characterizing response of East Pacific Green Turtles to Changing Temperatures: Using Acoustic Telemetry in a Highly Urbanized Environment. Animal Biotelemetry. 4:22.

Marine Taxonomic Services. (2020). Bay Habitat Mitigation Planning for Commercial Out Lease of Floating Dry Dock at the MGBW Maintenance Piers in San Diego Bay, California. 6 February.

Martinez-Takeshita, N. S.E. Graham, and J.J. Bredvik. (2015). San Diego Bay Fisheries Inventory and Utilization for April and July 2014. Prepared for Commander, Naval Installation Command. Submitted to NAVFAC SW, California. October.

Melin, S. R., F. Trillmich, and D. Aurioles-Gamboa. (2018). California, Galapagos, and Japanese Sea Lions: Zalophus californianus, Z. wollebaeki, and Z. japonicus. Encyclopedia of Marine Mammals (Third Edition). Bernd Würsig, J.G.M. Thewissen and Kit M. Kovacs (Ed.)

Merkel & Associates. (2008). Marine Mammal Surveys in the Vicinity of the Point Loma Naval Complex, San Diego, California. Final Report. Prepared for NAVFAC SW. September.

Merkel & Associates. (2009). 2008 San Diego Bay Eelgrass Inventory and Bathymetry Update. January.

Merkel & Associates. (2014). Draft Wharf Shading Study for the Pier 8 Replacement and Demolition Project, Naval Base San Diego. Prepared for NAVFAC SW. Prepared November 2013, revised March 2014.

Merkel & Associates. (2018). 2017 San Diego Bay Eelgrass Inventory Update. Prepared for NAVFAC SW and San Diego Unified Port District. March.

Moffatt and Nichol. (2019). Personal communication with Mr. Morales via email on 20 June 2019.

National City. (2019). National City Noise Ordinance, Title 12: Noise Control. https://library.municode.com/ca/national_city/codes/code_of_ordinances?nodeId=CD_ORD_TIT12NOCO_CH12.06EXNOLI_12.06.040COEXNOLELI. February. Accessed on 10 July.

National Oceanic and Atmospheric Administration (NOAA). (2019). Tides and Currents. Datums for 9410170, San Diego, San Diego Bay, CA. https://tidesandcurrents.noaa.gov/datums.html?id=9410170. Accessed on 21 April 2019.

NOAA. (2019). Ocean Explorer – Understanding Ocean Acoustics. Accessible at: oceanexplorer.noaa.gov/explorations/sound01/background/acoustics/acoustics.html. Accessed on 29 October 2019.

NOAA Fisheries. (2005). Endangered Fish and Wildlife; Notice of intent to prepare an Environmental Impact Statement. 70 FR 1871.

NOAA Fisheries. (2008). Caulerpa Control Protocol Version 4. 25 February 2008. https://www.westcoast.fisheries.noaa.gov/publications/habitat/caulerpa_taxifolia/caulerpa_control_protocol_4_.pdf. Accessed on 16 July 2019.

NOAA Fisheries. (2013). Essential Fish Habitat Programmatic Consultation for Overwater Structures between the National Oceanic and Atmospheric Administration's National Marine Fisheries Service and the United States Army Corps of Engineers, South Coast Branch, Los Angeles District.

NOAA Fisheries. (2018). Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) – Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. NOAA Technical Memorandum NMFS-OPR-59. April.

NOAA Fisheries and USFWS. (1998). Recovery Plan for the U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*). NOAA Fisheries, Silver Spring, MD.

Naval Base San Diego. (2014). Final Integrated Natural Resources Management Plan for NBSD. June.

Naval Facilities Engineering Systems Command Northwest. (2015). Proxy Source Sound Levels and Potential Bubble Curtain Attenuation for Acoustic Modeling of Nearshore Marine Pile Driving at Navy Installations in Puget Sound. January.

Naval Facilities Engineering Command Southwest (NAVFAC SW). (2002). Naval Base San Diego Integrated Natural Resources Management Plan. Naval Facilities Engineering Command, San Diego, California. August.

NAVFAC SW. (2010). Characterization of Essential Fish Habitat in San Diego Bay. PHASE 2: Qualitative Habitat Characterization and Mapping Report. Coastal IPT. Prepared by Merkel & Associates. September.

NAVFAC SW. (2011a). Final Environmental Assessment for Pier 12 Replacement. NBSD, CA. July.

NAVFAC SW. (2011b). Silver Strand Training Complex Environmental Impact Statement. United States Pacific Fleet. January.

NAVFAC SW. (2012). Final Dredged Material Characterization Study. Maintenance Dredging. Pier 6 Summary Report. NBSD, San Diego, CA. August.

NAVFAC SW. (2015). Pier 6 Load Capacity Analysis. NBSD. Project #N62473-13-D-3004 PTO# X0012. November.

NAVFAC SW. (2016). Final Environmental Assessment for Pier 8 Replacement. NBSD, CA. June.

NAVFAC SW. (2018). Compendium of Underwater and Airborne Sound Data from Pile Driving and Removal in San Diego Bay. Prepared by Tierra Data, Inc. August.

NAVFAC SW. (2019a). DD1391 for Pier 6, San Diego, CA, NBSD. Project Number P443. 1 March.

NAVFAC SW. (2019b). Personal communication via email with Mr. Alberto Sanchez regarding the number of existing piles. 22 October.

NAVFAC SW. (2019c). FY20 MILCON Project P-443. DD1391 Cost Estimate. Prepared by Pacific Cost Engineering, LLC. 17 February 2019.

NAVFAC SW. (2019d). Personal communication via email with Mr. Alberto Sanchez regarding the length of the new piles. 8 July.

NAVFAC SW. (2019e). FY20 P443 MILCON Planning Validation Pier 6 Replacement. 1391 Figures. 1 March.

NAVFAC SW. (2019f). Personal communication via email with Mr. David Sproul regarding cultural resources analysis. 13 September.

NAVFAC SW. (2020). Compendium of Underwater and Airborne Sound During Pile Installation and In-Water Demolition Activities in San Diego Bay, California. October.

Navy. (2017). Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III). Technical Report, prepared by SSC Pacific. June.

Navy. (2019). Personal communication during the Pier 6 kickoff meeting. 4 April.

NRSW. (2008). Executive Summary Memorandum from Christopher Stathos, Commander Navy Region SW N40, to RADM Hering, Regional Commander Navy Region Southwest. 24 July.

NRSW and Unified Port of San Diego. (2013). San Diego Bay Integrated Natural Resources Management Plan.

NRSW and Unified Port of San Diego. (2018). Green Sea Turtle Update to San Diego Bay Integrated Natural Resources Management Plan.

Nightingale, B. and C.A. Simenstad. (2001). Overwater Structures: Marine Issues. White Paper Research Project T1803, Task 35. WSDOT.

Office of the Chief of Naval Operations. (2013). Instruction 3111.17: Strategic Laydown and Dispersal Plan for the Operating Forces of the U.S. Navy. 22 November.

Pacific Fishery Management Council (PFMC) (2016a). Pacific Coast Groundfish Management Plan for the California, Oregon, and Washington Groundfish Fishery. PFMC, Portland, OR. August.

PFMC (2016b). Coastal Pelagic Species Fishery Management Plan as Amended Through Amendment 15. PFMC, Portland, OR. February.

Post M. L., Ibarguchi G., Aguiar, A., Vilchis I., Swaisgood R. (2018). Naval Base Coronado California Least Tern and Western Snowy Plover Monitoring, 2017. Unpublished report prepared for Naval Base Coronado under Cooperative Agreement with Army Corps of Engineers, Fort Worth District, Fort Worth, TX. Agreement Number W9126G-17-2-0003. Prepared by San Diego Zoo Institute for Conservation Research.

Ruiz, G.M. and Geller, J. (2015). Spatial and temporal analysis of marine invasions in California: morphological and molecular comparisons across habitats. Final Report Submitted to: Office of Spill Prevention and Response, Marine Invasive Species Program, California Department of Fish and Wildlife.

San Diego Air Pollution Control District. (2016). Air Quality Planning. https://www.sdapcd.org/content/sdc/apcd/en/air-quality-planning.html. Accessed on 20 June 2019.

Saunders, J. and R. Dooling. (1974). Noise-Induced Threshold Shift in the Parakeet (*Melopsittacus undulates*). Proceedings of the National Academy of Science, 71(5) 1962-1965.

Sorensen, K. and Swope, B. (2010). San Diego Bay Marine Mammal Survey Project. Report to NRSW, San Diego, CA. Third Survey Report.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran. (2007). Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals Volume 33, Number 4.

Stinson, M.L. (1984). Biology of Sea Turtles in San Diego Bay, California, and in the Northeastern Pacific Ocean. Master of Science Thesis, San Diego State University, California. 578 p.

Tierra Data, Inc. (2011). San Diego Bay Avian Species Surveys, 2009-2010. Final, May. Prepared for Naval Base Coronado and San Diego Unified Port District.

Tierra Data, Inc. (2016). North San Diego Bay Marine Mammal Report for Acoustics Monitoring and GIS Surveys in Support of Fuel Pier Replacement at Naval Base Point Loma, California. December 2016. 23 pp.

Unified Facilities Code. (2017). UFC 4-152-01, “Design: Piers and Wharves.” 24 January.

U.S. Army Corps of Engineers. (2019). Draft EA for South San Diego Harbor Maintenance Dredging Project. July.

U.S. Department of Transportation. (2006). Roadway Construction Noise Model Users Guide; Federal Highway Administration. U.S. Department of Transportation; Research and Innovative Technology Administration; John A. Volpe National Transportation Systems Center, Acoustics Facility, Cambridge, MA. January.

U.S. Federal Highway Administration. (2003). Living with Noise. Issue No: Vol 67 No. 1. July/August.

U.S. Global Change Research Program (USGCRP). (2018). Climate Change Impacts in the United States: The Fourth National Climate Assessment. Retrieved from https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf

U.S. Environmental Protection Agency (USEPA). (1999). Consideration of Cumulative Impacts in USEPA Review of NEPA Documents. Office of Federal Activities.

USEPA. (2000). Analysis of Commercial Marine Vessel Emissions and Fuel Consumption Data. USEPA A420-R-00-002, Chapter 5. February.

USEPA. (2015). Nonattainment Areas for Criteria Pollutants (Green Book). https://www.epa.gov/green-book/green-book-data-download. Accessed on 17 June 2019.

USEPA. (2019a). 2016 Waterbody Quality Assessment Report for San Diego Bay. https://ofmpub.epa.gov/waters10/attains_state.control?p_state=CA. Accessed on 6 July 2019.

USEPA. (2019b). 2016 Waterbody Quality Assessment Report for San Diego Bay Shoreline, 32nd St San Diego Naval Station. https://ofmpub.epa.gov/waters10/attains_state.control?p_state=CA. Accessed on 6 July 2019.

USEPA. (2019c). 2016 Waterbody Report for Paleta Creek. https://ofmpub.epa.gov/waters10/attains_state.control?p_state=CA. Accessed on 6 July 2019.

University of Washington. (2019). Analysis of Ambient Noise Data taken in support of the Mole Pier project. Applied Physics Laboratory, University of Washington, 7 June 2019.

U.S. Fish and Wildlife Service and Navy. (2004). Memorandum of Understanding Between USFWS and the U.S. Navy Concerning Conservation of the Endangered California Least Tern in San Diego Bay, California. 2004.

Williams, J.P., D.J. Pondella, C.M. Williams, and S. Schwab. (2015). Fisheries Inventory and Utilization of San Diego Bay, San Diego, California For Surveys Conducted in April and July 2015.

Williams, J.P., D.J. Pondella, C.M. Williams, and M.J. Robart. (2016). Fisheries Inventory and Utilization of San Diego Bay, San Diego, California For Surveys Conducted in April and July 2016.

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Appendix A
Air Quality Calculations and Record of Non-Applicability

RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT CONFORMITY

ENVIRONMENTAL ASSESSMENT FOR PIER 6 REPLACEMENT PROJECT
NAVAL BASE SAN DIEGO

SAN DIEGO AIR BASIN

INTRODUCTION

The U.S. Environmental Protection Agency (USEPA) published *Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule* in the 30 November 1993, Federal Register (40 Code of Federal Regulations [CFR] Parts 6, 51, and 93). The U.S. Department of the Navy (Navy) published *Clean Air Act (CAA) General Conformity Guidance* in OPNAVINST 5090.1E, dated 3 September 2019 and the Navy guidance for compliance with the CAA General Conformity Rule, dated 30 July 2013. These publications provide implementing guidance to document CAA Conformity Determination requirements.

Federal regulations state that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the Federal agency to determine whether a Federal action conforms to the applicable implementation plan, before the action is taken (40 CFR Part 1, Section 51.850[a]).

The General Conformity rule applies to federal actions proposed within areas which are designated as either nonattainment or maintenance areas for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Emissions of pollutants for which an area is in attainment are exempt from conformity analyses.

The project would occur within the San Diego Air Basin (SDAB) portion of Naval Base San Diego (NBSD). This portion of the SDAB is currently in serious nonattainment of the 2015 8-hour ozone (O_3) NAAQS and is a maintenance area for carbon monoxide (CO) NAAQS. The SDAB attains the NAAQS for all other criteria pollutants. Therefore, only project emissions of CO and O_3 (or its precursors, volatile organic compounds [VOCs] and oxides of nitrogen [NOx]) are analyzed for conformity rule applicability.

The annual *de minimis* levels for this region are 50 tons of VOC, NOx, and 100 tons of CO, as listed in Table 1. Federal actions may be exempt from conformity determinations if they do not exceed designated *de minimis* levels (40 CFR Part 1, Section 51.853[b]) and are not regionally significant (totals less than 10 percent of projected regional emissions for that pollutant) (40 CFR Part 1, Section 93.153[b]).

Table 1. Conformity *de minimum* Levels for Criteria Pollutants in the San Diego Air Basin

Criteria Pollutant	*de minimis* Level (tons/year)
Carbon Monoxide (CO)	100
Volatile Organic Compounds (VOC)	50
Oxides of Nitrogen (NO_x)	50

PROPOSED ACTION

Action Proponent: U.S. Navy

Location: Naval Base San Diego, Pier 6.

Proposed Action Name: Pier 6 Replacement, Naval Base San Diego.

Proposed Action & Emissions Summary: The Proposed Action involves the demolition of the existing Pier 6 and the construction of a new Pier 6 and associated pier utilities. The new Pier 6 would consist of a single-deck, concrete berthing pier and would be 120 feet wide by 1,500 feet long.

Project Emissions:

While the majority of work would occur within a one-year period, the total project duration is anticipated to be approximately 1.5 years; however, this air quality analysis assumes that all emissions would occur within one year.

Table 2 presents the estimated demolition and construction emissions due to implementation of the Proposed Action. Maximum estimated emissions would be below conformity *de minimis* levels. If the project emissions are considered over a two-year period, the emissions would be even further below the applicable *de minimis* levels.

Table 2. Estimated Emissions Resulting from Implementation of the Proposed Action

Component	Emissions (tons/year)		
	CO[1]	VOC	NOx
Pier 6 Demolition Emissions			
Piling Removal	1.55	0.40	4.60
Deck Removal	3.36	0.85	10.07
Debris Removal	2.99	0.81	8.22
Truck Trips - Demolition	0.39	0.12	0.74
Worker Trips - Demolition	0.99	0.04	0.08
Support Vessels	14.23	5.69	5.69
Subtotal Demolition	*23.51*	*7.91*	*29.40*
Conventional Concrete Single-Deck Pier Construction Emissions			
Piling Installation	0.92	0.23	2.79
Deck Installation	1.76	0.49	4.60
Shoreline Excavation	0.62	0.16	1.84
Truck Trips - Construction	1.19	0.36	2.25
Worker Trips - Construction	0.55	0.02	0.05
Support Vessels	7.94	3.18	3.18
Subtotal Construction	*12.98*	*4.44*	*14.71*
Project Total	**36.49**	**12.35**	**44.11**
de minimis Threshold for GCR (tons/year)	100	50	50

Notes: 1 SDAB is considered a maintenance area for the federal CO standard and is in attainment of the federal SO_2, NO_2, Lead, PM_{10}, and $PM_{2.5}$ standards.
2 SDAB is a serious nonattainment area for the 8-hour federal Ozone (O_3) standard as of September 23, 2019 (84 FR 44238); VOCs and NO_x are precursors to the formation of ozone.
3 Numbers in table may not add precisely as shown due to rounding and decimal places not visible.

PROPOSED ACTION EXEMPTION(S)

The Proposed Action is located within a nonattainment and maintenance area; therefore, the Proposed Action is **not** exempt from General Conformity Rule Requirements.

ATTAINMENT AREA STATUS AND EMISSIONS EVALUATION CONCLUSION

The SDAB is a serious nonattainment area for the 8-hour federal O_3 standard; VOCs and NO_x are precursors to the formation of O_3. The SDAB is considered a maintenance area for the federal CO standard.

Emissions associated with the Conventional Pier Alternative were calculated using data presented in Chapter 2 of the EA, general air quality assumptions, and emission factors compiled from the following sources: *OFFROAD Emission Factors; CARB EMFAC2007 Model*; 40 CFR 1042.104 Category 3 engine emission limits for Marine Compression-Ignition Engines, and Emission Factors from Analysis of *Commercial Marine Vessel Emissions and Fuel Consumption Data*.

The U.S. Navy concludes that *de minimis* thresholds for applicable criteria pollutants would not be exceeded nor would the project be regionally significant (i.e., greater than 10 percent of the air basins' emission budgets) as a result of implementation of the Proposed Action. Therefore, the Navy concludes that further Conformity Determination procedures are not required, resulting in this Record of Non-Applicability.

RONA APPROVAL

To the best of my knowledge, the information presented in this RONA is correct and accurate, and I concur in the finding that implementation of the Conventional Pier Alternative does not require a formal CAA Conformity Determination.

HABECK.JACKSON.RUSSELL.1243214021 Digitally signed by HABECK.JACKSON.RUSSELL.1243214021 Date: 2021.01.19 12:39:20 -08'00'

Signature: ______________________________ **Date:** ________________

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 μg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 μg/m^3)		0.070 ppm (137 μg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 μg/m^3	Gravimetric or Beta Attenuation	150 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m^3	Gravimetric or Beta Attenuation	12.0 μg/m^3	15 μg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 μg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 μg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 μg/m^3)		0.053 ppm (100 μg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 μg/m^3)	Ultraviolet Fluorescence	75 ppb (196 μg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 μg/m^3)	
	24 Hour	0.04 ppm (105 μg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 μg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 μg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 μg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 μg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 μg/m^3)	Gas Chromatography			

See footnotes on next page …

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24- hour PM2.5 standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Emissions Summary Criteria Pollutants
Pier 6 Replacement EA

Alternative 1: Demolition of Pier 6 and Construction of a Conventional Concrete Single-Deck Replacement Pier 6	Emissions (tons/year)					
	CO	VOC	NOx	SOx	PM10	PM2.5
Pier 6 Demolition Emissions						
Piling Removal	1.55	0.40	4.60	0.00	0.23	0.21
Deck Removal	3.36	0.85	10.07	0.01	0.48	0.44
Debris Removal	2.99	0.81	8.22	0.00	0.39	0.36
Truck Trips - Demolition	0.39	0.12	0.74	0.00	0.01	0.01
Worker Trips - Demolition	0.99	0.04	0.08	0.00	0.01	0.01
Support Vessels	14.23	5.69	5.69	1.50	0.71	0.64
Subtotal Demo	*23.51*	*7.91*	*29.40*	*1.52*	*1.83*	*1.65*
Conventional Concrete Single-Deck Pier Construction						
Piling Installation	0.92	0.23	2.79	0.00	0.13	0.12
Deck Installation	1.76	0.49	4.60	0.00	0.23	0.21
Shoreline Excavation	0.62	0.16	1.84	0.00	0.09	0.08
Truck Trips - Construction	1.19	0.36	2.25	0.00	0.02	0.02
Worker Trips - Construction	0.55	0.02	0.05	0.00	0.00	0.00
Support Vessels	7.94	3.18	3.18	0.84	0.40	0.36
Subtotal Construction	*12.98*	*4.44*	*14.71*	*0.85*	*0.87*	*0.78*
Total (One Year)	36.49	12.35	44.11	2.37	2.70	2.43
de minimis Threshold for GCR	100	50	50	--	--	--

Note to reviewers: The No Action Alternative would not result in any change in air quality impacts from baseline. Numbers may not add precisely by hand if calculated from this table due to rounding and decimal values not shown. Values are shown in the table rounded to the nearest 100th. The actual calculation result may include values in the 1000th place, and may summarize to a value with a result in the 100th place.
All demo and construction would occur within one year.

Emissions Summary Heavy Equipment Demolition
Pier 6 Replacement

Equipment				Emission Factors (lb/bhp-hr)						Operations			Emissions (lbs/day)						Emissions (tons/year)					
Equipment	Fuel Type	Horsepower (hp)	Load Factor	CO	VOC	NOx	SOx	PM10	PM2.5	Pieces of Equipment	Hours per day	Days in Service	CO	VOC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx	PM10	PM2.5
Piling Removal																								
Air Compressor	Diesel	50	48	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	2	4	250	1.48	0.42	3.71	0.00	0.29	0.26	0.18	0.05	0.46	0.00	0.04	0.03
Barge Crane - 250 ton	Diesel	314	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	6.13	1.54	18.54	0.01	0.86	0.78	0.77	0.19	2.32	0.00	0.11	0.10
Wharf Crane - 150 Ton	Diesel	247	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	4.82	1.22	14.58	0.01	0.68	0.61	0.60	0.15	1.82	0.00	0.08	0.08
												Total Piling Removal	12.42	3.18	36.83	0.02	1.83	1.65	**1.55**	**0.40**	**4.60**	**0.00**	**0.23**	**0.21**
Deck Removal																								
Air Compressor	Diesel	50	48	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	2	4	250	1.48	0.42	3.71	0.00	0.29	0.26	0.18	0.05	0.46	0.00	0.04	0.03
Loader	Diesel	147	54	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	3.78	0.95	11.43	0.01	0.53	0.48	0.47	0.12	1.43	0.00	0.07	0.06
Barge Crane - 150 Ton	Diesel	314	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	2	250	3.06	0.77	9.27	0.01	0.43	0.39	0.38	0.10	1.16	0.00	0.05	0.05
Dump Truck	Diesel	489	59	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	13.73	3.46	41.55	0.02	1.93	1.74	1.72	0.43	5.19	0.00	0.24	0.22
Wharf Crane	Diesel	247	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	4.82	1.22	14.58	0.01	0.68	0.61	0.60	0.15	1.82	0.00	0.08	0.08
												Total Deck Removal	26.87	6.82	80.53	0.05	3.87	3.48	**3.36**	**0.85**	**10.07**	**0.01**	**0.48**	**0.44**
Debris Removal																								
Air Compressor	Diesel	50	48	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	2	4	250	1.48	0.42	3.71	0.00	0.29	0.26	0.18	0.05	0.46	0.00	0.04	0.03
Dump Truck	Diesel	489	59	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	13.73	3.46	41.55	0.02	1.93	1.74	1.72	0.43	5.19	0.00	0.24	0.22
Excavator	Diesel	56	58	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	2	4	250	2.00	0.57	5.01	0.00	0.39	0.36	0.25	0.07	0.63	0.00	0.05	0.04
Generator	Diesel	45	74	1.10E-02	3.97E-03	1.52E-02	1.08E-05	1.68E-05	--	2	4	250	2.93	1.06	4.05	0.00	0.00	0.00	0.37	0.13	0.51	0.00	0.00	0.00
Loader	Diesel	147	54	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	2	4	250	3.78	0.95	11.43	0.01	0.53	0.48	0.47	0.12	1.43	0.00	0.07	0.06
												Total Debris Removal	23.92	6.46	65.75	0.04	3.16	2.84	**2.99**	**0.81**	**8.22**	**0.00**	**0.39**	**0.36**
												Total	63.21	16.46	183.11	0.11	8.86	7.97	**7.90**	**2.06**	**22.89**	**0.01**	**1.11**	**1.00**

Assumptions:
- Emissions calculated based on methodology and data published in U.S. Environmental Protection Agency's (EPA) Motor Vehicle Emission Simulator, 2017, CALEE MOD, an emissions modeling software published by the California Air Resources Board and San Diego County Air Pollution Control District, and the International Council on Clean Transportation's Working Paper 16-4, Non-road emission inventory model methodology.
- Assumed Pier removal would occur over 12 months.

- Assumed a conservative approach where all emissions occur within the same calendar year (2021). Actual emissions may occur in a twelve-month period from as early as October 2020 to October 2021 or as late as October 2021 to October 2022 or later depending on funding and contracting
- Pier Removal assumes 12 months of work (250 days without weekends or holidays).
- Deck Removal assumes 12 months of work (250 days without weekends or holidays).
- Debris Removal assumes 12 months of work (250 days without weekends or holidays). The actual work overlaps with pier removal and deck removal to maintain safe and efficient working operations at the site.
- The combination of equipment is based on the 2016 Environmental Assessment for Pier 8 Replacement, Naval Base San Diego.
- Assumed all vehicles are licensed to operate in California and follow all rules and regulations pertaining to registration, placarding, and idling.

Emissions Summary Construction of Conventional Pier
Pier 6 Replacement

Equipment				Emission Factors (lb/bhp-hr)						Operations			Emissions (lbs/day)						Emissions (tons/year)					
Equipment	Fuel Type	Horsepower (hp)	Load Factor	CO	VOC	NOx	SOx	PM10	PM2.5	Pieces of Equipment	Hours per day	Days in Service	CO	VOC	NOx	SOx	PM10	PM2.5	CO	VOC	NOx	SOx	PM10	PM2.5
Piling Installation																								
Barge Crane - 150 ton	Diesel	314	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	139	6.13	1.54	18.54	0.01	0.86	0.78	0.43	0.11	1.29	0.00	0.06	0.05
Impact Hammer	Diesel	300	50	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	139	7.14	1.80	21.60	0.01	1.01	0.91	0.50	0.13	1.50	0.00	0.07	0.06
												Total Piling Installation	13.27	3.34	40.14	0.02	1.87	1.68	**0.92**	**0.23**	**2.79**	**0.00**	**0.13**	**0.12**
Deck Installation																								
Air Compressor	Diesel	50	48	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	2	8	139	2.95	0.84	7.41	0.00	0.58	0.53	0.21	0.06	0.52	0.00	0.04	0.04
Barge Crane - 150 Ton	Diesel	314	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	139	6.13	1.54	18.54	0.01	0.86	0.78	0.43	0.11	1.29	0.00	0.06	0.05
Concrete Truck	Diesel	210	20	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	139	2.00	0.50	6.05	0.00	0.28	0.25	0.14	0.04	0.42	0.00	0.02	0.02
Concrete Pump Truck	Diesel	210	20	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	139	2.00	0.50	6.05	0.00	0.28	0.25	0.14	0.04	0.42	0.00	0.02	0.02
Fork Lift	Diesel	83	30	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	2	8	139	3.06	0.87	7.69	0.00	0.61	0.55	0.21	0.06	0.53	0.00	0.04	0.04
Generator	Diesel	33	74	1.10E-02	3.97E-03	1.52E-02	1.08E-05	1.68E-05	--	2	8	139	4.30	1.55	5.94	0.00	0.01	0.01	0.30	0.11	0.41	0.00	0.00	0.00
Wharf Crane - 150 ton	Diesel	247	41	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	139	4.82	1.22	14.58	0.01	0.68	0.61	0.34	0.08	1.01	0.00	0.05	0.04
												Total Deck Installation	25.26	7.02	66.26	0.04	3.30	2.97	**1.76**	**0.49**	**4.60**	**0.00**	**0.23**	**0.21**
Shoreline Excavation																								
Air Compressor	Diesel	50	48	7.69E-03	2.18E-03	1.93E-02	1.08E-05	1.52E-03	--	1	8	20	1.48	0.42	3.71	0.00	0.29	0.26	0.01	0.00	0.04	0.00	0.00	0.00
Dump Trucks	Diesel	489	59	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	4	8	20	54.93	13.85	166.18	0.10	7.74	6.96	0.55	0.14	1.66	0.00	0.08	0.07
Excavator	Diesel	250	58	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	8	6.90	1.74	20.88	0.01	0.97	0.87	0.03	0.01	0.08	0.00	0.00	0.00
Generator	Diesel	45	74	1.10E-02	3.97E-03	1.52E-02	1.08E-05	1.68E-05	--	1	8	8	2.93	1.06	4.05	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00
Loader	Diesel	147	54	5.95E-03	1.50E-03	1.80E-02	1.08E-05	8.38E-04	--	1	8	8	3.78	0.95	11.43	0.01	0.53	0.48	0.02	0.00	0.05	0.00	0.00	0.00
												Total Shoreline Excavation	70.02	18.02	206.25	0.12	9.54	8.58	**0.62**	**0.16**	**1.84**	**0.00**	**0.09**	**0.08**
												Total	108.55	28.39	312.64	0.19	14.71	13.24	**3.30**	**0.88**	**9.24**	**0.01**	**0.45**	**0.40**

Assumptions:
- Emissions calculated based on methodology and data published in U.S. Environmental Protection Agency's (EPA) Motor Vehicle Emission Simulator, 2017, CALEE MOD, an emissions modeling software published by the California Air Resources Board and San Diego County Air Pollution Control District, and the International Council on Clean Transportation's Working Paper 16-4, Non-road emission inventory model methodology.
- Assumes Pier construction would occur over 6 months (139 working days).
- Piling Installation assumes 6 months of work (139 days without weekends or holidays).
- Deck installation assumes 6 months of work (139 days without weekends or holidays) and occurs simultaneously with piling installation.
- Shoreline excavation assumes 1 months of work (20 days without weekends or holidays). The work precedes completion of the shore portion of the pier.
- The combination of equipment is based on the 2016 Environmental Assessment for Pier 8 Replacement, Naval Base San Diego.

Emissions Summary Onroad Vehicles Trips Demolition and Construction
Pier 6 Replacement

Phase	Vehicle Class	No. of Vehicles Trips (per day)	Speed (mph)	VMT (mi/vehicle-day)	CO		VOCs						NOx		SOx		PM10				Emissions (lbs/day)						Days of Work	Emissions (tons/year)					
					Running Exhaust (g/mi)	Start-up (g/start)	Running Exhaust (g/mi)	Start-up (g/start)	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evaporative (g/mi)	Diurnal Evaporative (g/hr)	Running Exhaust (g/mi)	Start-up (g/start)	Running Exhaust (g/mi)	Start-up (g/start)	Running Exhaust (g/mi)	Start-up (g/start)	Tire Wear (g/mi)	Brake Wear (g/mi)	CO	VOC	NOx	SOx	PM10	PM2.5		CO	VOC	NOx	SOx	PM10	PM2.5
Demolition (YEAR 1)																																	
Transport Trucks	Heavy-duty truck, diesel	4	25	31	11.383		3.438						21.608		0.025		0.141		0.036	0.028	3.11	0.94	5.91	0.01	0.06	0.05	250	0.3890	0.1175	0.7384	0.0009	0.0070	0.0063
Worker Vehicle Trips	Light-duty truck with catalyst	25	35	40	3.019	11.792	0.056	0.867	0.177	0.026	0.047	0.061	0.27	0.586	0.004	0.002	0.01	0.015	0.008	0.013	7.96	0.33	0.66	0.01	0.07	0.06	250	0.9945	0.0416	0.0825	0.0011	0.0087	0.0079
Construction Conventional Pier (YEAR 2)																																	
Transport Trucks	Heavy-duty truck, diesel	17	25	40	11.383		3.438						21.608		0.025		0.141		0.036	0.028	17.06	5.15	32.39	0.04	0.31	0.28	139	1.1860	0.3582	2.2513	0.0026	0.0214	0.0192
Worker Vehicle Trips	Light-duty truck with catalyst	25	35	40	3.019	11.792	0.056	0.867	0.177	0.026	0.047	0.061	0.27	0.586	0.004	0.002	0.01	0.015	0.008	0.013	7.96	0.33	0.66	0.01	0.07	0.06	139	0.5529	0.0231	0.0459	0.0006	0.0049	0.0044

mph = miles per hour
VMT = Vehicle Miles Traveled
Conversion of grams to pounds (lb) 453.592

Demolition Assumptions:
- Assuming 31 miles round trip (based on distance to Miramar Landfill from Google Maps). Alternative recycling locations exist within a similar radius and may be used depending on contracting.
- Assume startup after 8 hours
- Assume 45 minutes run time per truck. Emissions are based on number of miles the truck completes.
- Emissions factors based on 2016 Environmental Assessment for Pier 8 Replacement at Naval Base San Diego (2008 Emission Factors from EMFAC2007, assuming average temperature of 60F)
- Assume 12 months for demolition debris disposal (250 working days, excluding weekends and holidays)

Debris Generation:

			Truck Trips, total	No. of Truck trips per day needed
Concrete	180000	cubic feet	334	2
Steel	720	tons	24	1
Asphalt	2700	cubic feet	5	1
			Total	4

Trucks assumed to be tandem (two beds) with a capacity of 10 cubic yards capacity per bed/20 cubic yards per truck or a total of 540 cubic feet per truck.
Trucks assumed to be able to haul 30 tons of steel at one time.

Construction Assumptions:
- Assuming 40 miles round trip to supplier(s)
- Assume startup after 8 hours
- Assume 45 minutes run time per truck. Emissions are based on number of miles the truck completes.
- Emissions factors based on 2016 Environmental Assessment for Pier 8 Replacement at Naval Base San Diego (2008 Emission Factors from EMFAC2007, assuming average temperature of 60F)
- Assume 6 months (139 working days) for deliveries
- Amount of construction materials delivered are described below.

Construction Materials	Quantity	Truck Capacity	Capacity Units	Truck Trips, Total
Concrete Structural Piles (each)	532	2	Piles	266
Fender Piles (each)	434	2	Piles	217
Concrete (cubic Yards)	14,000	8	cubic yards	1750
Total Trips				2233
Trips/Day				17

Emissions Summary Marine Vessel Support Conventional Pier Demolition and Construction
Pier 6 Replacement

Equipment Type	Power Rating (kW)	Load (%)	No. of Units	Hours per day	Days/Year	hrs/year	Fuel Consumption (g/kW-hr)	Emission Factors (g/kW-hr) CO	VOC	NOx	SOx	PM10	PM2.5	Emissions (lbs/day) CO	VOC	NOx	SOx	PM10	PM2.5	Emissions (tons/year) CO	VOC	NOx	SOx	PM10	PM2.5
Demolition (YEAR 1)																									
Tugboats	3,183	85	1	2	249	498	222.33	5.00	2.00	2.00	0.53	0.25	--	70.17	28.07	28.07	7.41	3.51	3.16	8.74	3.49	3.49	0.92	0.44	0.39
Support Boat	2,000	85	1	2	249	498	222.33	5.00	2.00	2.00	0.53	0.25	--	44.09	17.64	17.64	4.65	2.20	1.98	5.49	2.20	2.20	0.58	0.27	0.25
													Demolition Total	114.27	45.71	45.71	12.06	5.71	5.14	**14.23**	**5.69**	**5.69**	**1.50**	**0.71**	**0.64**
Construction (YEAR 1)																									
Tugboat	3,183	85	1	2	139	278	222.33	5.00	2.00	2.00	0.53	0.25	--	70.17	28.07	28.07	7.41	3.51	3.16	4.88	1.95	1.95	0.51	0.24	0.22
Support Boat	2,000	85	1	2	139	278	222.33	5.00	2.00	2.00	0.53	0.25	--	44.09	17.64	17.64	4.65	2.20	1.98	3.06	1.23	1.23	0.32	0.15	0.14
													Construction Total	114.27	45.71	45.71	12.06	5.71	5.14	**7.94**	**3.18**	**3.18**	**0.84**	**0.40**	**0.36**

Notes:
Conversion of grams to pounds (lb) 453.592

Assumptions:
- All vessels certified for use in California, and operate within 3 nautical miles of the San Diego Air Pollution Control District Boundaries
- Emission Factors further described in supplement tables in this Appendix
- The fractional sulfur content of the fuel is 0.10%
  - Sulfur content of fuel is based on maximum sulfur content of marine diesel fuel for oceangoing vessels promulgated by California Air Resources Board, effective January 2014. (ABS 2018)
- CO, VOC, NOx emissions factors from Category 3 engine limits, 40 CFR 1042 Control of Emissions from New and In-Use Marine Compression-Ignition Engines and Vessels. Specifically 40 CFR § 1042.104 - Exhaust emission standards for Category 3 engines.
- Assume model year 2016 and later engine, over 2000 RPM.

Emissions Summary: Emission Factor Support for Marine Vessels
Pier 6 Replacement

Marine Engine Emission Factor and Fuel Consumption Algorithms (in g/kW-hr, for all marine engines)
Taken from EPA420-R-00-002, U.S. Environmental Protection Agency Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data, Table 5-1

<table>
<tr><th>Pollutant</th><th>Exponent (x)</th><th>Intercept (b)</th><th>Coefficient (a)</th></tr>
<tr><td>PM</td><td>1.5</td><td>0.2551</td><td>0.0059</td></tr>
<tr><td>NOX</td><td colspan="3" rowspan="2">Use 40 CFR § 1042.104 Category 3 Engine limits (see note)</td></tr>
<tr><td>NO2</td></tr>
<tr><td>SO2</td><td>n/a</td><td>n/s</td><td>2.3735</td></tr>
<tr><td>CO</td><td colspan="3" rowspan="2">Use 40 CFR § 1042.104 Category 3 Engine limits (see note)</td></tr>
<tr><td>HC (VOC)</td></tr>
<tr><td>CO2</td><td>1</td><td>648.6</td><td>44.1</td></tr>
</table>

Notes:
- n/a is not applicable
- n/s is not statistically significant
- All emission factor (except for SO2) equations (regressions) are in the form of
  Emissions Rate (g/kW-hr) = a * (Fractional Load of Engine Power)-x + b
- SO2 regression equation is:
  Emissions Rate (g/kW-hr) = a * (Fuel Sulfur Flow in g/kW-hr) + b = a * (fuel consumption in g/kW-hr) * (% sulfur in fuel/100) + b (Requires an estimate of the % sulfur in the fuel.)
- Fuel Consumption Estimation Equation is
  Fuel Consumption (g/kW-hr) = 14.12/(Fractional Load) + 205.717
  Where Fractional Load is equal to actual engine output divided by rated engine output (provided in Table 5-2 of EPA420-R-00-002)
  - Non-ocean going vessels do not have separate auxiliary loads (non-engine power) of significance and auxiliary power for the tugs used to complete pier construction are not evaluated).
- CO, VOC, NOx emissions factors from Category 3 engine limits, 40 CFR 1042 Control of Emissions from New and In-Use Marine Compression-Ignition Engines and Vessels. Specifically 40 CFR § 1042.104 - Exhaust emission standards for Category 3 engines.

GHG Emissions Summary Criteria Pollutants
Pier 6 Replacement EA

Alternative 1: Demolition of Pier 6 and Construction of a Conventional Concrete Single-Deck Replacement Pier 6	Emissions (metric tons/year)			CO2e (metric tons/year)
	CO2	CH4	N2O	
Pier 6 Demolition Emissions				
Piling Removal	162.66	0.02	0.17	214.53
Deck Removal	511.02	0.06	0.46	655.97
Debris Removal	453.14	0.06	0.40	579.08
Truck Trips - Demolition	80.47	0.00	0.06	100.31
Worker Trips - Demolition	99.04	0.01	0.01	101.38
Support Vessels	1,808.04	0.00	0.00	1,808.04
Conventional Concrete Single-Deck Pier Construction				
Piling Installation	213.36	0.02	0.14	257.59
Deck Installation	409.06	0.06	0.41	536.25
Shoreline Excavation	86.54	0.01	0.07	108.82
Truck Trips - Construction	245.37	0.02	0.19	305.84
Worker Trips - Construction	55.06	0.00	0.00	56.37
Support Vessels	1,009.31	0.00	0.00	1,009.31
Total (year)	5,133.07	0.26	1.92	5,733.49
Draft NEPA Threshold				25,000
U.S. 2017 Baseline				5,742,600,000
Construction as a Percent of U.S. Emissions				0.000100%

Notes:
- Note to reviewers: The No Action Alternative would not result in any change in air quality impacts from baseline.
- Numbers may not add precisely by hand if calculated from this table due to rounding and decimal values not shown. Values are shown in the table rounded to the nearest 100th. The actual calculation result may include values in the 1000th place, and may summarize to a value with a result in the 100th place.
- Conversion to metric tons = 1 short ton (2000 lbs) = 0.90718474 metric tons
- CO2e = CO2 equivalents = (CO2 *1)+(CH4*21)+(N2O*310)
- 2017 U.S. Baseline CO2e emissions from EPA 2017. U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017 https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks
- Demolition and Construction completed in one year

GHG Emissions Summary Heavy Equipment Demolition
Pier 6 Replacement

Equipment				Emission Factors (lb/hr)			Operations			Emissions (lbs/day)			Emissions (metric tons/year)		
Equipment	Fuel Type	Horsepower (hp)	Load Factor	CO2	CH4	N2O	Pieces of Equipment	Hours per day	Days in Service	CO2	CH4	N2O	CO2	CH4	N2O
Piling Removal															
Air Compressor	Diesel	50	48	2.23E+01	1.05E-02	2.27E-02	2	4	250	178.40	0.08	0.18	20.23	0.01	0.02
Barge Crane - 250 ton	Diesel	314	41	1.80E+02	1.64E-02	1.68E-01	1	2	250	360.00	0.03	0.34	40.82	0.00	0.04
Wharf Crane - 150 Ton	Diesel	247	41	1.12E+02	1.12E-02	1.18E-01	2	4	250	896.00	0.09	0.94	101.60	0.01	0.11
									Total Piling Removal	1,434.40	0.21	1.46	**162.66**	**0.02**	**0.17**
Deck Removal															
Air Compressor	Diesel	50	48	2.23E+01	1.05E-02	2.27E-02	2	4	250	178.40	0.08	0.18	20.23	0.01	0.02
Loader	Diesel	147	54	1.01E+02	1.10E-02	9.16E-02	2	4	250	808.00	0.09	0.73	91.63	0.01	0.08
Barge Crane - 150 Ton	Diesel	314	41	1.12E+02	1.12E-02	1.18E-01	2	2	250	448.00	0.04	0.47	50.80	0.01	0.05
Dump Truck	Diesel	489	59	2.72E+02	2.25E-02	2.20E-01	2	4	250	2,176.00	0.18	1.76	246.75	0.02	0.20
Wharf Crane	Diesel	247	41	1.12E+02	1.12E-02	1.18E-01	2	4	250	896.00	0.09	0.94	101.60	0.01	0.11
									Total Deck Removal	4,506.40	0.49	4.09	**511.02**	**0.06**	**0.46**
Debris Removal															
Air Compressor	Diesel	50	48	2.23E+01	1.05E-02	2.27E-02	2	4	250	178.40	0.08	0.18	20.23	0.01	0.02
Dump Truck	Diesel	489	59	2.72E+02	2.25E-02	2.20E-01	2	4	250	2,176.00	0.18	1.76	246.75	0.02	0.20
Excavator	Diesel	56	58	7.36E+01	1.26E-02	7.98E-02	2	4	250	588.80	0.10	0.64	66.77	0.01	0.07
Generator	Diesel	45	74	3.06E+01	1.01E-02	2.92E-02	2	4	250	244.80	0.08	0.23	27.76	0.01	0.03
Loader	Diesel	147	54	1.01E+02	1.10E-02	9.16E-02	2	4	250	808.00	0.09	0.73	91.63	0.01	0.08
									Total Debris Removal	3,996.00	0.53	3.55	**453.14**	**0.06**	**0.40**
									Total	9,936.80	1.23	9.10	**1,126.81**	**0.14**	**1.03**

Assumptions:

See Emission Summary Heavy Equipment Demolition table for more information.
- Conversion to metric tons = 1 short ton (2000 lbs) = 0.9071847 metric tons

GHG Emissions Summary Construction of Conventional Pier
Pier 6 Replacement

Equipment				Emission Factors (lb/bhp-hr)			Operations			Emissions (lbs/day)			Emissions (metric tons/year)		
Equipment	Fuel Type	Horsepower (hp)	Load Factor	CO2	CH4	N2O	Pieces of Equipment	Hours per day	Days in Service	CO2	CH4	N2O	CO2	CH4	N2O
Piling Installation															
Barge Crane - 150 ton	Diesel	314	41	1.12E+02	1.12E-02	1.18E-01	1	8	139	896.00	0.09	0.94	56.49	0.01	0.06
Impact Hammer	Diesel	300	50	3.11E+02	3.14E-02	1.62E-01	1	8	139	2,488.00	0.25	1.30	156.87	0.02	0.08
Total Piling Installation										3,384.00	0.34	2.24	**213.36**	**0.02**	**0.14**
Deck Installation															
Air Compressor	Diesel	50	48	2.23E+01	1.05E-02	2.27E-02	2	8	139	356.80	0.17	0.36	22.50	0.01	0.02
Barge Crane - 150 Ton	Diesel	314	41	1.12E+02	1.12E-02	1.18E-01	1	8	139	896.00	0.09	0.94	56.49	0.01	0.06
Concrete Truck	Diesel	210	20	1.67E+02	1.48E-02	1.53E-01	1	8	139	1,336.00	0.12	1.22	84.23	0.01	0.08
Concrete Pump Truck	Diesel	210	20	1.67E+02	1.48E-02	1.53E-01	1	8	139	1,336.00	0.12	1.22	84.23	0.01	0.08
Fork Lift	Diesel	83	30	7.36E+01	1.26E-02	7.98E-02	2	8	139	1,177.60	0.20	1.28	74.25	0.01	0.08
Generator	Diesel	33	74	3.06E+01	1.01E-02	2.92E-02	2	8	139	489.60	0.16	0.47	30.87	0.01	0.03
Wharf Crane - 150 ton	Diesel	247	41	1.12E+02	1.12E-02	1.18E-01	1	8	139	896.00	0.09	0.94	56.49	0.01	0.06
Total Deck Installation										6,488.00	0.95	6.44	**409.06**	**0.06**	**0.41**
Shoreline Excavation															
Air Compressor	Diesel	50	48	2.23E+01	1.05E-02	2.27E-02	1	8	20	178.40	0.08	0.18	1.62	0.00	0.00
Dump Trucks	Diesel	489	59	2.72E+02	2.25E-02	2.20E-01	4	8	20	8,704.00	0.72	7.04	78.96	0.01	0.06
Excavator	Diesel	250	58	7.36E+01	1.26E-02	7.98E-02	1	8	8	588.80	0.10	0.64	2.14	0.00	0.00
Generator	Diesel	45	74	3.06E+01	1.01E-02	2.92E-02	1	8	8	244.80	0.08	0.23	0.89	0.00	0.00
Loader	Diesel	147	54	1.01E+02	1.10E-02	9.16E-02	1	8	8	808.00	0.09	0.73	2.93	0.00	0.00
Total Shoreline Excavation										10,524.00	1.07	8.83	**86.54**	**0.01**	**0.07**
Total										20,396.00	2.36	17.51	**708.96**	**0.09**	**0.62**

Assumptions:

See Emission Summary Construction of Conventional Pier table for more information.

- Conversion to metric tons = 1 short ton (2000 lbs) = 0.90718474 metric tons

Emissions Summary Onroad Vehicles Trips Demolition and Construction
Pier 6 Replacement

Phase	Vehicle Class	No. of Vehicles Trips (per day)	Speed (mph)	VMT (mi/vehicle-day)	CO2		CH4		N2O		Emissions (lbs/day)			Days of Work	Emissions (metric tons/year)		
					Running Exhaust (g/mi)	Start-up (g/start)	Running Exhaust (g/mi)	Start-up (g/start)	Running Exhaust (g/mi)	Start-up (g/start)	CO2	CH4	N2O		CO2	CH4	N2O
Demolition (YEAR 1)																	
Transport Trucks	Heavy-duty truck, diesel	4	25	31	2,595.96		0.16		2.05		709.67	0.04	0.56	250	80.47	0.00	0.06
Worker Vehicle Trips	Light-duty truck with catalyst	25	35	40	385.95	203.87	0.03	0.05	0.03	0.06	873.35	0.06	0.06	250	99.04	0.01	0.01
Construction Conventional Pier (YEAR 2)																	
Transport Trucks	Heavy-duty truck, diesel	17	25	40	2,595.96		0.16		2.05		3,891.72	0.24	3.08	139	245.37	0.02	0.19
Worker Vehicle Trips	Light-duty truck with catalyst	25	35	40	385.95	203.87	0.03	0.05	0.03	0.06	873.35	0.06	0.06	139	55.06	0.00	0.00

mph = miles per hour
VMT = Vehicle Miles Traveled
Conversion of grams to pounds (lb) 453.592

Demolition Assumptions:
- See Emissions Summary Onroad Vehicles Trips Demolition and Construction table for more information.
- Conversion to metric tons = 1 short ton (2000 lbs) = 0.907185 metric tons

Emissions Summary Marine Vessel Support Conventional Pier Demolition and Construction
Pier 6 Replacement

Equipment Type	Power Rating (kW)	Load (%)	No. of Units	Hours per day	Days/Year	hrs/year	Fuel Consumption (g/kW-hr)	Emission Factors (g/kW-hr)	Emissions (lbs/day)	Emissions (metric tons/year)
								CO	CO	CO
Demolition (YEAR 1)										
Tugboats	3,183	85	1	2	249	498	222.33	700.48	9,831.02	1,110.36
Support Boat	2,000	85	1	2	249	498	222.33	700.48	6,177.20	697.68
								Demolition (YEAR 1) Total	16,008.22	**1,808.04**
Construction (YEAR 2)										
Tugboat	3,183	85	1	2	139	278	222.33	700.48	9,831.02	619.84
Support Boat	2,000	85	1	2	139	278	222.33	700.48	6,177.20	389.47
								Construction (YEAR 2) Total	16,008.22	**1,009.31**

Notes:
Conversion of grams to pounds (lb) 453.592

Assumptions:
- See Emissions Summary Marine Vessel Support Conventional Pier Demolition and Construction table for more information.
- Conversion to metric tons = 1 short ton (2000 lbs) = 0.907185 metric tons

Appendix B

NOAA Fisheries Consultation

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL BASE SAN DIEGO
3455 SENN ROAD
SAN DIEGO, CALIFORNIA 92136-5084

IN REPLY REFER TO:
5090
Ser U759
27 Oct 20

National Marine Fisheries Service
Attn: Mr. Barry Thom
Regional Administrator
501 West Ocean Boulevard
Long Beach, CA 90802-4213

Subj: INITIATION OF ENDANGERED SPECIES ACT SECTION 7 CONSULTATION FOR THE PIER 6 REPLACEMENT PROJECT AT NAVAL BASE SAN DIEGO, CA

Encl: (1) Green Sea Turtle Assessment Pier 6 Replacement Project at NBSD, OCT 2020
(2) Essential Fish Habitat Assessment Pier 6 Replacement Project at NBSD, OCT 2020
(3) NBSD Pier 6 Replacement Ecological Functional Loss Analysis, OCT 2020

1. The Department of the Navy is preparing an Environmental Assessment to evaluate the potential environmental effects of the Pier 6 Replacement Project on Naval Base San Diego (NBSD).

2. This letter serves as our request to initiate informal consultation in accordance with Section 7 of the Endangered Species Act for our proposed action at NBSD. Enclosure (1) provides the assessment for this action. We request written acknowledgement of our consultation request, including a point of contact from your office to facilitate and expedite the consultation process. This letter also serves to transmit the enclosures (2) and (3) for review and comment.

3. We appreciate your continued support of Navy operations and our efforts to minimize impacts to endangered species around Naval Base San Diego. The point of contact in this matter is Sean Suk, Biologist, at (619)532-4149 (seung.suk@navy.mil) or Lisa Seneca, NEPA Planner, at (619)556-3700 (lisa.seneca@navy.mil).

J. R. HABECK
By direction

Green Sea Turtle Assessment for the Pier 6 Replacement Project at Naval Base San Diego

The purpose of the Proposed Action is to address deteriorating pier infrastructure at NBSD through demolition and construction activities necessary to replace Pier 6. Enclosure 1 shows the location of the project, as well as eelgrass beds in the general vicinity. Additional details of the proposed in-water activities are provided in the accompanying EFH Assessment. This assessment addresses the effects of implementing the project at a single location, existing Pier 6 at NBSD.

The Navy is requesting Section 7 consultation regarding the project's potential to affect the threatened green sea turtle (GST) (*Chelonia mydas*). No other threatened or endangered species under National Oceanic and Atmospheric Administration (NOAA) purview are known or likely to occur in the project action area.

The Navy has been in informal consultation with NOAA since initiating a GST study (NOAA, Scripps, Port of San Diego [POSD] and Navy Partners) in December of 2007. Since the beginning of the GST study, there have been no GST sightings in the project area, which is a heavily used maritime industrial area and lacks eelgrass or other habitat features that might attract GST. The nearest eelgrass beds are: 1) a small bed recently documented 0.6 mile south (Merkel & Associates, Inc. 2017); and 2) extensive beds 1-2 miles south and west, across the Bay.

The San Diego Bay GST population is part of the East Pacific distinct population segment (DPS), which is listed as threatened under the Endangered Species Act. The Bay represents one of GST's northernmost foraging habitats (MacDonald et al. 2012); the nearest other regularly inhabited location is in the highly urbanized San Gabriel River mouth (Crear et al. 2016, 2017). As this species is considered rare along the California coast, the resident turtles in San Diego Bay are considered both "noteworthy" and "extremely interesting" by members of the scientific community (Macdonald et al. 1990). The number of GSTs using the Bay is estimated to range between 40 and 60 animals during most months of the year, increasing to 100 animals during peak migratory periods (Eguchi 2017).

Between 2009 and 2011, the Navy, POSD, National Marine Fisheries Service (NMFS), and San Diego State University (SDSU) initiated tracking efforts to determine the movement patterns of GST in San Diego Bay. Using a combination of manual and automated acoustic telemetry, GST home ranges and movements throughout the Bay were recorded and analyzed. Results from this study suggest that the South Bay serves as important GST habitat. The study also found individual home range areas tend to be 2.09 to 8.70 square kilometers in size, and that each turtle primarily uses one or two areas (MacDonald et al. 2012). The home ranges of all turtles in the study were found to be exclusively located in the South Bay, near abundant eelgrass pastures and the South Bay Power Plant's warm water effluent, more than 4 miles south of Pier 6 (MacDonald et al. 2012).

In 2009, the South Bay Power Plant decreased operations by 50 percent, shutting down two of four units, and was fully decommissioned by December 31, 2010 (Hill 2011). This resulted in cooler temperatures and a lesser concentration of turtles in areas formerly warmed by effluent (Turner-Tomaszewicz and Seminoff 2012). In an effort to evaluate how turtle behavior may have changed as a result of the power plant closure, the Navy and NMFS Southwest Fisheries Science Center initiated a satellite tagging effort in order to detect fine-scale movements of turtles in the Bay. The data collected since the inception of the post-closure program in 2011 indicates that turtles' movements in the Bay are changing. GST home ranges increased in size by 12 percent when comparing pre-closure tags (2007-2010) with post-closure tags (2011-2016). The 50 percent Utilization Distribution, which generally shows the most utilized areas or core home range, increased in size by 0.2 square kilometers and shifted to the northern side of outflow jetty. Overall, there was a trend of northern movement of home ranges following power plant closure (Navy and POSD 2018).

Additionally, it was determined that turtles in the Bay may associate with or seek out thermal refugia, when possible, to avoid low water temperatures. The cold water temperature inactivity threshold for East Pacific green turtles may be lower than previously thought. In a recent study, there was a significant negative relationship between turtle size and water temperature after power plant closure, which led researchers to conclude that East Pacific GST exhibit clear responses in habitat use to changes in water temperature (Madrak et al. 2016).

During the day, GST in San Diego Bay reside in the deeper portion of the now-defunct South Bay Power Plant discharge channel. At night, they feed in the South Bay eelgrass beds, including those near Coronado Cays greater than 3 miles south of Pier 6 (Stinson 1984). GSTs are carnivorous from hatching until they reach juvenile size, at which point they gradually transition to a primarily herbivorous diet; they have also been described as opportunistic feeders, feeding on jellyfish, ctenophores, bivalves, and gastropods, if such prey items are readily available (Lemons et al. 2011). Adult GST around the world are primarily herbivorous grazers of marine algae and grasses. Recent stable isotope diet analysis suggests that the San Diego Bay population also consumes various invertebrates, making this population predominantly omnivorous (Lemons et al. 2011). Stomach content analysis has revealed that San Diego Bay green turtles also consume red algae (***Polysiphonia*** sp.), sea lettuce (***Ulva*** sp.), and various species of invertebrates found in the South Bay (MacDonald and Dutton 1992; Lemons et al. 2011). A study by Seminoff et al. (2006) has broadened our understanding of GST foraging in San Diego Bay, indicating that adult GSTs in this population are likely more omnivorous than previously thought.

In the aforementioned telemetry study (Navy and POSD 2018), GST home ranges were found to extend from the south end of San Diego Bay northward to the Sweetwater River, approximately 2 miles south of Pier 6. Given the lack of eelgrass and limited food resources at NBSD, occurrence in the project area would likely be limited to migratory or wandering individuals.

A federal recovery plan for the species lists the following threats as pertinent to the San Diego Bay population (NMFS and USFWS 1998):

- Limited information concerning turtles' home range and foraging patterns impedes habitat delineation and subsequent protection.
- Persistent marine debris, including plastic and other anthropogenic waste, remains a concern with respect to potential mortalities through entanglement or blockage of turtles' digestive tracts.
- Reduction and/or fragmentation of foraging habitat caused by dredging and shoreline development.
- Disturbance and/or behavior modification as a result of various anthropogenic activities, most notably dredging and construction involving pile driving. Little information is available on defined thresholds or potential population-level impacts.
- Mortalities caused by collisions with motorized vessels transiting the Bay.

Demolition and pile-driving activities associated with the Proposed Action have the potential to disturb GST in the immediate vicinity because of vessel movement, construction-related noise, and water quality degradation. Vessel movement is associated with the transportation of water-based construction equipment, in-water construction and demolition, and removal of demolition and construction debris from the site as needed. Collision with vessels is a known cause of injury and mortality to sea turtles. However, given the slow speed of water-based construction equipment and transports, this collision is unlikely. Further, other support vessels (such as barges) are limited in number, will be required to maintain established speeds, and are consistent with baseline conditions. The risk of injury by demolition and construction equipment is considered negligible (discountable) as sea turtles are not known or likely to be present at those sites given that no eelgrass or other forage habitat discussed above is present in the vicinity of the Proposed Action Area.

Potential impacts to GST from implementation of the Proposed Action would primarily be from impact pile driving and the use of pile clippers during demolition activities. The threshold value for injury to sea turtles from impact pile driving is a cumulative sound exposure level (SEL) of 204 dB re 1 μPa^2-sec or a peak sound pressure level (SPL) of 232 dB re 1 µ Pa (Navy 2017). Sound source levels associated with pile driving and extraction have been estimated from CALTRANS (2015). The greatest potential exposure to underwater sound would occur during impact driving of 24-inch octagonal, concrete piles during installation and the use of a hydraulic pile clipper during demolition. Based on the estimated single-strike SEL source level (10 m from the pile) of 166 dB re 1 μPa^2-sec, 600 strikes per pile, and an average of 7 piles installed per day, the cumulative SEL at the source level distance (10 m) would be 202 dB re 1 μPa^2-sec, which is below the injury threshold. The estimated peak SPL of 188 dB at 10 m would also be below the injury threshold. Further, the maximum root mean square SPL for the large hydraulic pile clipper is expected to be 161 dB re 1 μPa^2, less than the injury threshold for GST. In addition, all demolition and construction activities would be monitored and subject to a 20-m shutdown zone, wherein activities must cease if and when a GST is within 20 m of the activity. This is also consistent with the 2017 NMFS/Navy Programmatic Consultation for waterfront structure maintenance. Therefore, no injury to GST would occur during pile driving.

Behavioral reactions would not rise to the level of "take" under the ESA unless they result in a significant curtailment of feeding, movement, and other activities affecting fitness. During impact driving of 24-inch octagonal, concrete piles and pile removal using a large hydraulic pile clipper (the loudest sound sources during installation and removal), this threshold value would be reached within a distance of 117 m from the source, conservatively assuming a source SPL of 176 dB root mean square. Given the lack of feeding areas (eelgrass) in the project area, ample space for sea turtles to move through the area at far away from construction, and the 20-m shutdown zone mentioned above, behavioral avoidance is unlikely to occur. In addition, prior to the start of impact pile driving each day, or after each break of more than 30 minutes, a "soft-start" procedure will be used (i.e., three unfueled hammer blows separated by 30 seconds). The procedure allows any animals in the area to voluntarily depart after brief exposures to project-related noise. This analysis indicates minor, inconsequential effects, if any, on sea turtles that would not rise to a level of "take" under the ESA. All sea turtle monitoring will be consistent with the 2017 NMFS/Navy Programmatic Consultation for waterfront structure maintenance.

As a result, the Navy believes impact driving the 24-inch octagonal concrete piles or removal of existing concrete piles, may affect, but is not likely to adversely affect sea turtles. Accordingly, the Navy requests written concurrence from NOAA on the finding of "may affect, not likely to adversely affect" as to the GST for proposed Navy project, Pier 6 Replacement at Naval Base San Diego. Project specific information is included as Enclosure 1 to this letter. Please respond via email or letter within 30 days.

References

Caltrans. 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. November. Available online at http://www.dot.ca.gov/hq/env/bio/fisheries bioacoustics.htm.

Crear, D.P., D.D. Lawson, J.A. Seminoff, T. Eguchi, R.A. LeRoux and C.G. Lowe. 2016. Seasonal Shifts in the Movement and Distribution of Green Sea Turtles ***Chelonia mydas*** in Response to Anthropogenically Altered Water Temperatures. Marine Ecology Progress Series, 548: 219–232.

Crear, D.P., D.D. Lawson, J.A. Seminoff, T. Eguchi, R.A. LeRoux, C.G. Lowe. 2017. Habitat Use and Behavior of the East Pacific Green Turtle, ***Chelonia mydas*** in an Urbanized System. Bulletin of Southern California Academy of Sciences, 116(1): 17-32.

Dickerson, C., K.J. Reine, and D.G. Clarke. 2001. "Characterization of Underwater Sounds Produced by Bucket Dredging Operations," DOER Technical Notes Collection (ERDC TN-DOER-E14), U.S. Army Engineer Research and Development Center, Vicksburg, MS. Available online at http://www.wes.army.mil/el/ dots/doer

Eguchi, T. 2017. Abundance of Green Turtles in San Diego Bay 2017. Report to Naval Facilities Engineering Command Southwest.

Hill, T. 2011. Demolition of South Bay Power Plant Moves Forward. The Log. Available at: http://www.thelog.com/local/demolition-of-south-bay-power-plant-moves-forward/.

Lemons, G., R. Lewison, L. Komoroske, A. Goas, C.T. Lai, P. Dutton, T. Eguchi, R. LeRoux, and J. Seminoff. 2011. Trophic Ecology of Green Sea Turtles in a Highly Urbanized Bay: Insights from Stable Isotopes and Mixing Models. Journal of Experimental Marine Biology and Ecology, 405:25-32.

MacDonald, B.D., R.L. Lewison, S.V. Madrak, J.A. Seminoff, and T. Eguchi. 2012. Home Ranges of East Pacific Green Turtles ***Chelonia mydas*** in a Highly Urbanized Temperate Foraging Ground. Marine Ecology Progress Series, 461:211-221.

Macdonald, K.B., R.F. Ford, E.B. Copper, P. Unitt, and J.P. Haltiner. 1990. South San Diego Bay Enhancement Plan, Vol. 1, Bay History, Physical Environment and Marine Ecological Characterization, Vol. 2, Resources Atlas: Birds of San Diego Bay, Vol. 3, Enhancement Plan, Vol. 4, Data Summaries. Published by San Diego Unified Port District, San Diego, CA. and California State Coastal Conservancy.

Madrak S.V., R.L. Lewison, J.A. Seminoff, T. Eguchi. 2016. Characterizing response of East Pacific green Turtles to Changing Temperatures: Using Acoustic Telemetry in a Highly Urbanized Environment. Animal Biotelemetry, 4:22.

Merkel & Associates, Inc. 2017. San Diego Bay Eelgrass Inventory Update. Prepared for NAVFAC SW and San Diego Port District.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 2014. Naval Base Point Loma Fleet Logistics Center Fuel Pier Replacement Project: Acoustic, Marine Mammal, Green Sea Turtle, and California Least Tern Monitoring Report.

NAVFAC SW. 2015. Monitoring Report for Fuel Pier Replacement Project (P-151) at Naval Base Point Loma, San Diego, CA 8 October 2014 to 30 April 2015.

NAVFAC SW. 2016. Monitoring Report for Fuel Pier Replacement Project (P-151) at Naval Base Point Loma, San Diego, CA 8 October 2015 to 30 April 2016.

Navy. 2017. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III). Technical Report, prepared by SSC Pacific. June.

Navy and Port of San Diego (POSD). 2018. San Diego Bay Integrated Natural Resources Management Plan, FY 18 Updates: Green Sea Turtle.

Seminoff, J.A., Jones, T.T., Eguchi, T., Jones, D.R., and Dutton, P.H. 2006. Stable Isotope Discrimination (δ13C and δ15N) between Soft Tissues of the Green Sea Turtle *Chelonia mydas* and its Diet. Marine Ecology Progress Series, 308:271-278.

Stinson, M.L. 1984. Biology of Sea Turtles in San Diego Bay, California, and in the Northeastern Pacific Ocean. Master of Science Thesis, San Diego State University, California. 578 p.

Turner-Tomaszewicz, C., and Seminoff, J.A. 2012. Turning Off the Heat: Impacts of Power Plant Decommissioning on Green Turtle Research in San Diego Bay, Coastal Management, 40:1, 73-87.

University of Washington. 2019. Analysis of Ambient Noise Data Taken in Support of the Mole Pier Project. Applied Physics Laboratory, University of Washington, June 7, 2019.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

December 21, 2020

Refer to NMFS No: WCRO-2020-03146

J.R. Habeck
U.S. Department of the Navy
Naval Base San Diego
3455 Senn Rd.
San Diego, California 92136-5084

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter for the Pier 6 Replacement Project at Naval Base San Diego, CA

Dear Mr. Habeck:

On October 30, 2020, NOAA's National Marine Fisheries Service (NMFS) received your request for a written concurrence with the U.S. Department of the Navy's determination that the Pier 6 Replacement Project at Naval Base San Diego, CA may affect, but is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA and implementing regulations at 50 CFR 402.

Thank you also for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1855(b)) for this action. We acknowledge that the EFH consultation was addressed via an email from Eric Chavez to Sean Suk on November 20, 2020, and no further consideration of impacts to EFH will be provided in this response.

In addition, during consultation, the Navy has applied for an Incidental Harassment Authorization under the Marine Mammal Protection Act (MMPA) and on December 11, 2020, the Federal Register published the notice of action (2020-27255) and the related request for public comment. As a result, the Navy will be implementing monitoring in concert with that authorization and we do not provide any further comments regarding compliance with the MMPA in this response.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the Environmental Consultation Organizer [https://eco.fisheries.noaa.gov]. A complete record of this consultation is on file at the NMFS West Coast Region Long Beach Office.

Pier 6 Replacement Project at Naval Base San Diego

Consultation History

On October 30, 2020, NMFS Protected Resources Division, received from the Navy, an ESA request for concurrence from Naval Base San Diego (NBSD) via email. The request for concurrence also included a biological assessment (BA) for the threatened green sea turtle (GST) (*Chelonia mydas*).

NMFS reviewed the ESA concurrence request and determined that more information was needed to initiate consultation. Information was requested of the Navy on November 16, 2020, via email regarding: project timeline/duration, marine mammal shut down procedures, green sea turtle monitoring procedures and shut down zone clarification, and a description of the pile clipper equipment noise signature. On a November 20, 2020, a phone call from the Navy informed NMFS West Coast Region that a marine mammal IHA permit was in progress with NMFS Office of Protected Resources and that an email response from the Navy with the information requested will follow. On November 24, 2020, the information requested by NMFS was provided via email by the Navy including the project timeline, photos of pile clipper equipment, description of pile clipper operations, and its noise signature from previous construction projects. As a result, we consider November 24, 2020, to be the date that complete information was received from the Navy and the informal consultation was initiated. On December 17, 2020, NMFS contacted the Navy via email to request more specifics on what distance the sound measurements from equipment drop to both 160dB and 126 dB (ambient sound for the South San Diego Bay). The Navy promptly replied December 18, 2020 with this information.

Proposed Action and Action Area

The action area includes the construction area located at and around the perimeter of Pier 6 in the Central San Diego Bay at NBSD (Figure 1). There are 12 piers in the NBSD pier complex, of which seven piers, including Pier 6, are intended to serve deep-draft ships (Figure 1). Constructed by the Navy in 1945, Pier 6 is 18 m (60 ft) wide and 420 m (1,377 ft) long and begins at the intersection of West Vesta and Brinser Streets.

Figure 1. Project area in San Diego Bay and Pier 6 (red bar) in relation to eelgrass beds (green areas) in (p1-5 EFHA Final NAVFAC, October 2020).

The Navy has described the proposed action as addressing the deteriorating pier infrastructure at NBSD through the demolition and construction activities necessary to replace and enlarge the footprint of Pier 6 by 2.2 acres.

The Navy has identified Pier 6 as functionally obsolete, structurally deficient, and operationally constrained due to its 60 ft width. Pier 6 replacement would include seismic standards to date and accommodate a 140-metric ton crane (154-US ton). Also it would provide NBSD with four berths to support the Pacific Fleet with the requisite utilities, deck space, and berthing capacity for modern Navy ships and rectify deteriorating infrastructure. The Navy asserts that under the proposed action there would be no change to existing operations at Pier 6 or in adjacent upland areas. While Pier 6 is being demolished and replaced, existing berthing operations would be temporarily re-distributed to the other NBSD piers.

Proposed construction activities include two phases: the demolition of existing Pier 6 and the construction of the new Pier 6 in the proposed larger foot print with the dimensions 37 m (120 ft) wide by 457 m (1,500 ft) long (NAVFAC 2020) (see Figure 3).

First, the demolition phase would include removal of approximately 2,000 existing assorted piles including: 24-inch and 20-inch concrete, 12-inch composite, and 16-inch I-shaped steel with in-water construction equipment including: large hydraulic pile clippers, vibratory extraction, high-pressure water jetting, and hydraulic chainsaw. The hydraulic pile clipper would create the greatest sound exposure underwater in the action area during the demolition phase.

Second, the construction phase would include impact pile driving and high-pressure water jetting of approximately 1,000 piles of various size and type. Pile types including: structural test piles, fender system test piles, corner fender piles, 24-inch octagonal concrete, 24-inch and 20-inch square concrete, and16-inch fiberglass. While multiple methods of installation would be used the impact pile driver would generate the greatest sound exposure underwater in the action area. Additional support vessels (including barges) will be used to move demolition and construction debris from the action area and out of the surrounding water throughout both phases as needed.

Figure 2. Naval Base San Diego Pier 6 project location showing the increased area footprint from 82,620 to 180,000 sq. ft. (p2-5 EFHA Final, NAVFAC, 2020).

The action area includes Pier 6, its footprint and perimeter, including within 3,415-m of the pier which may experience acoustic impacts greater than South Bay ambient sounds levels as a result from the two types of equipment with the greatest sound signature: large pile clippers and impact pile driving (Figure 3). The Navy has determined that due to the lack of eelgrass beds in the immediate action area, additional alternate areas for green turtle to travel away from the immediate construction zone, the monitoring plan including a 20-m shutdown procedure, and the equipment "soft start" procedure that the project may affect, but is not likely to adversely affect East Pacific Distinct Population Segment of GST in San Diego Bay.

Figure 6-4 Underwater Sound Propagation from High-Pressure Water Jetting and Pile Cutting and Proposed Monitor Locations at Pier 6

Figure 3. Overview of Pier 6 action area highlighting the multiple spheres of influence of sound exposure to marine mammals per equipment type and the shutdown zone (Figure 6-4 Navy 2020).

NMFS considered, under the ESA whether or not the proposed action would cause any other activities and determined that it would not.

Background and Action Agency's Effects Determination

The Navy has determined that the proposed project may affect, but is not likely to adversely affect the GST (*Chelonia mydas*) Eastern Pacific DPS population which are currently listed as threatened under the Endangered Species Act (81 FR 20057), and no other threatened or endangered species under NOAA's purview are known to occur within the action area.

San Diego Bay has been identified as an important area on the U.S. west coast to the Eastern Pacific DPS green sea turtle for the shallow water foraging habitat it provides, including marine algae and seagrass. Eguchi et al. (2020) reported that the Bay may support as many as 60 green turtles with continuous recruitment of both juveniles and adults. Results from an ongoing study (NOAA, Scripps, Port of San Diego [POSD] and Navy Partners) since December of 2007 indicate no sightings of GST in the project area, likely due to the lack of eelgrass in the project area as well the heavily used maritime industrial nature of the area. The nearest eelgrass beds to the action area are one small bed recently documented 0.6 mile south (Merkel & Associates, Inc. 2017); and extensive beds 1-2 miles south and west, across the Bay.

The total surface area of Pier 6 would increase from approximately 1.9 acres to approximately 4.1 acres, an increase in overwater coverage of approximately 2.2 acres. No dredging is required for this pier replacement project. Construction is expected to begin in fiscal year 22 and would require approximately 250 days of in-water work.

The proposed action for the demolition and replacement of NBSD Pier 6 in San Diego Bay and the effects of that action include: both the removal of piles, including the use of hydraulic pile clippers for demolition; and the installation of piles (24-inch octagonal, concrete), by impact pile driving, for the construction of the new pier overwater structure. The greatest potential exposure to underwater sound would occur from these equipment. The Navy determined that the resulting sound exposure was below the estimated injury threshold for GST from these activities, yet these are estimated sound thresholds for GST injury that are not currently known. In the absence of a green turtle sound threshold, NMFS uses marine mammal sound thresholds as a conservative proxy for assessing impacts to sea turtles as marine mammals are more sensitive to sound than sea turtles.

The noise exposure to GST were evaluated by the Navy using sound source levels estimated from pile driving and removal (Caltrans 2015) along with threshold value estimates for injury to sea turtles from impact pile driving is a cumulative sound exposure level (SEL) of 204 dB re 1 μPa2-sec or a peak sound pressure level (SPL) of 232 dB re 1 μ Pa (Navy 2017). Based on the estimated single-strike SEL source level (10 m from the pile) of 166 dB re 1 μPa2-sec, 600 strikes per pile, and an average of 7 piles installed per day, the cumulative SEL at the source level distance (10 m) would be 202 dB re 1 μPa2-sec, which is below the estimated injury threshold. The estimated peak SPL of 188 dB at 10 m would also be below the estimated injury threshold. Further, the maximum root mean square SPL for the large hydraulic pile clipper is expected to be 161 dB re 1 μPa2, less than the estimated injury threshold for GST.

During impact driving of 24-inch octagonal, concrete piles and pile removal using a large hydraulic pile clipper (the loudest sound sources during installation and removal), the estimated behavioral effect threshold value of 160 dB re 1 μ Pa2 would be reached within a distance of 117 m from the source, conservatively assuming a source SPL of 176 dB root mean square.

The Navy has identified that the construction and demolition activities described have the potential to affect green turtles in the vicinity of the action area as the result of the project related noise. The Navy has recognized the risks of injury from direct contact with construction equipment or vessel interactions. In order to avoid potential impacts to green turtles during the proposed action, the Navy has provided and proposed monitoring and mitigation measures for the proposed action as follows:

- All demolition and construction activities would be monitored and subject to a 20-m shutdown zone, wherein activities must cease if and when a GST is within 20 m of the activity. This is also consistent with the 2017 NMFS/Navy Programmatic Consultation for waterfront structure maintenance.
- Prior to the start of impact pile driving each day, or after each break of more than 30 minutes, a “soft-start” procedure will be used (i.e., three unfueled hammer blows separated by 30 seconds). The procedure allows time for any animals in the area to voluntarily depart after brief exposures to project-related noise to reduce the likelihood of injury or behavioral disturbance to GST in the action area.

The Navy concluded that if a green sea turtle (or a marine mammal) came within the action area, the minimization and avoidance measures that have been proposed were designed to avoid the potential adverse effects that have been identified, and the proposed action effects would likely be limited to temporary behavioral impacts (i.e. avoidance) associated with underwater noise generated by pile driving and hydraulic pile clippers in the project area. As a result, the Navy concluded that the proposed project may affect, but is not likely to adversely affect, green sea turtles.

Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b). When evaluating whether the proposed action is not likely to adversely affect listed species or critical habitat, NMFS considers whether the effects are expected to be completely beneficial, insignificant, or discountable. Completely beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Effects are considered discountable if they are extremely unlikely to occur.

The Navy acknowledges in their biological assessment of GST that there is a potential for collisions with: vessels, construction and demolition debris, and in-water construction or demolition equipment all of which are associated with the proposed action. Due to the slow moving speed of said equipment, the risk of injury by vessels, and demolition and/or construction equipment is considered discountable as sea turtles are not known or likely to be present at those sites given that no eelgrass or other forage habitat discussed above is present in the vicinity of the proposed action area.

Overall, we concur with the assessment provided by the Navy. Although it is possible that green turtles may occasionally be in the immediate construction area while transiting through San Diego Bay, the project area does not appear to be a typical, preferred, or hospitable location for green turtle presence in San Diego Bay. Any disturbance or disruption of green sea turtle presence in this area is unlikely to significantly impact the foraging and movement activities of green sea turtles which are typically concentrated in other areas of San Diego Bay and outside of the areas ensonified above threshold levels for green sea turtles.

Conclusion

Based on this analysis, NMFS concurs with the Navy that the proposed action may affect, but is not likely to adversely affect the Eastern Pacific DPS of green sea turtles.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the Navy or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) the proposed action causes take; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA consultation.

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. The Navy also has the same responsibilities, and informal consultation offers action agencies an opportunity to address their conservation responsibilities under section 7(a)(1).

Please direct questions regarding this letter to Laura Casali at laura.casali@noaa.gov or (562) 522-9098.

Sincerely,

Penny Ruvelas

Long Beach Office Branch Chief
Protected Resources Division

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References

CalTrans. 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. California Department of Transportation prepared by ICF Jones & Stokes. Sacramento, CA. 2009 Compendium of Pile Driving Sound Data, updated in 2015.

Department of Commerce. 2020. National Oceanic and Atmospheric Administration. [RTID 0648- XA687] Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Naval Base San Diego Pier 6 Replacement Project, San Diego, California. 2020-27225.

Eguchi, T., J. Bredvik, S. Graham, R. LeRoux, B. Saunderss, J.A. Seminoff. 2020. Effects of a power plant closure on home ranges of green turtles in an urban foraging area. Endangered Species Research 41:265-77.

National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce; United States Fish and Wildlife Service (USFWS), Interior. May 06, 2016 (81 FR 20057). Endangered and Threatened Wildlife and Plants; Final Rule To List Eleven Distinct Population Segments of the Green Sea Turtle (Chelonia mydas) as Endangered or Threatened and Revision of Current Listings Under the Endangered Species Act. https://www.federalregister.gov/documents/2016/04/06/2016-07587/endangered-and-threatened-wildlife-and-plants-final-rule-to-list-eleven-distinct-population-segments

National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce; United States Fish and Wildlife Service (USFWS), Interior. May 22, 1998 (63 FR 28359). Endangered and Threatened Wildlife; Recovery Plans for Listed Sea Turtles. https://www.federalregister.gov/documents/1998/05/22/98-13763/endangered-and-threatened-wildlife-recovery-plans-for-listed-sea-turtles

National Marine Fisheries Service/Navy (NMFS/NAVY). 2017. San Diego Programmatic Final Consultation.

Naval Facilities Engineering Command (NAVFAC). October 2020. Final Essential Fish Habitat Assessment Pier 6 Replacement Project Naval Base San Diego, CA.

Navy. 2017. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III). Technical Report, prepared by SSC Pacific. June.

Navy. 2020. Incidental Harassment Authorization Application for the Pier 6 Replacement Project at Naval Base San Diego. November 2020.

Navy and Port of San Diego (POSD). 2018. San Diego Bay Integrated Natural Resources Management Plan, FY 18 Updates: Green Sea Turtle.

NMFS/Navy San Diego Programmatic Final Consultation 2017.

Naval Facilities Engineering Command Southwest
San Diego, CA

FINAL

ESSENTIAL FISH HABITAT ASSESSMENT

Pier 6 Replacement Project

NAVAL BASE SAN DIEGO, SAN DIEGO, CALIFORNIA

October 2020

Submitted to:

NOAA National Marine Fisheries Service

West Coast Region

Protected Resources Division

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Essential Fish Habitat Assessment

Pier 6 Replacement Project

Naval Base San Diego, California

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Abbreviations and Acronyms

Acronym	Definition
°C	degrees Celsius
BMP	best management practice
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
cm	centimeters
CPS	Coastal Pelagic Species
CWA	Clean Water Act
cy	cubic yards
dB	decibels
DoD	Department of Defense
EA	Environmental Assessment
EFH	essential fish habitat
FT	Feet
FMP	Fishery Management Plan
FY	Fiscal year
GPS	Global Positioning System
HAPC	Habitat Area of Particular Concern
km	kilometers
MHHW	mean higher high water
MLLW	mean lower low water
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAVFAC SW	Naval Facilities Engineering Command, Southwest
Navy	Department of the Navy
NEPA	National Environmental Policy Act
NBSD	Naval Base San Diego
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PFMC	Pacific Fishery Management Council
POSD	Unified Port of San Diego
RHA	Rivers and Harbors Act
RMS	root mean square
SAV	submerged aquatic vegetation
SCEMP	Southern California Eelgrass Mitigation Policy
SEL	sound exposure level
SPL	sound pressure level
TTS	temporary threshold shift
U.S.	United States
USC	United States Code
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

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1 Introduction

1.1 Introduction

Naval Base San Diego (NBSD) is a major port for Navy ships assigned to the Pacific Fleet and is the major West Coast logistics base for surface forces of the United States Department of the Navy (Navy), dependent activities, and other commands. NBSD contains 12 piers (including a mole pier), two channels, and various quay walls[1] that extend along approximately 5.6 miles of shoreline (Figure 1-1). Surface ships, support vessels, and barges receive various ship support services, such as resupply and minor repair or maintenance, when berthed at NBSD.

Pier 6 is functionally obsolete and operationally constrained given its inadequate deck size (at only 18 meters [m] [60 feet (ft)] wide), utilities capacity, and load restrictions render it insufficient to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. A 2015 Load Capacity Analysis Report (NAVFAC SW 2015) cited Pier 6's overall condition as poor and in need of replacement. Due to Pier 6's limited width, utilities deficiencies, and other infrastructure support limitations, only dock landing ships, guided-missile frigates, and older amphibious transfer dock ships can berth at Pier 6.

Pier 6's deficiencies include the following:

- Width:
  - The limited width of Pier 6 restricts the amount and type of ship maintenance and large-load ship storing that can occur.
  - There is inadequate space for trash containers; when a container is on the pier, no traffic can pass.
  - Trucks and mobile truck cranes must travel on the center 5 m (17 ft) of the pier only.
  - There is no adequate fire lane on Pier 6.
- Structural:
  - Pier 6 is not compliant with current structural or seismic criteria (i.e., Department of Defense [DoD] Unified Facilities Criteria [DoD 2017]).
  - Concrete is spalling in many locations above and below deck, at pile caps, and at the top of concrete bearing piles.
  - There are cracked and broken concrete curbs on the deck edges in many areas; exposed sections of corroded steel reinforcement create unsafe working conditions to personnel, especially during berthing operations.
  - Maximum load limits restrict 35-ton crane and forklift use to limited areas.
  - By 2023, the Navy will prohibit all crane operations on Pier 6 due to the concrete deck's projected inability to structurally support the load of a crane.

[1] A quay wall is an earth-retaining structure which is used to dock floating vessels and transfer goods.

- Utility Services:
    - Electrical, potable water, sanitary sewer, compressed air, and steam utilities on the pier are all in poor condition and/or inadequate to meet demands.
    - There is no oily waste system on Pier 6 due to the narrowness of Pier 6 and its load restrictions.

The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern Navy ships and ultimately, Fleet readiness as part of the Navy’s overall mission to maintain, train, and equip combat-ready Naval forces. Unless the Navy replaces structurally deteriorating and operationally constrained piers such as Pier 6, NBSD will not be able to properly support berthing of homeported ships. Unless replaced, Pier 6’s structural integrity will continue to deteriorate and pose unsafe working conditions, especially during berthing operations.

No new ship homeporting actions are specifically planned as a part of the Proposed Action. Port loading at NBSD is coordinated between the Commander Navy Region Southwest Port Operations Shore Infrastructure Plan (Commander Navy Region Southwest 2010) and the Chief of Naval Operations Notional Strategic Laydown Plan. Ship berthing and pier operations (including pier maintenance) are included in these two plans and any potential operational impacts at Pier 6, both in water and on land, were analyzed as a part of the plan adoption process. Therefore, ship berthing operations associated with the Proposed Action are not addressed in this IHA. While Pier 6 is being demolished and replaced, existing berthing operations would be temporarily re-distributed to the other NBSD piers.

Figure 1-1. Regional Location of Naval Base San Diego

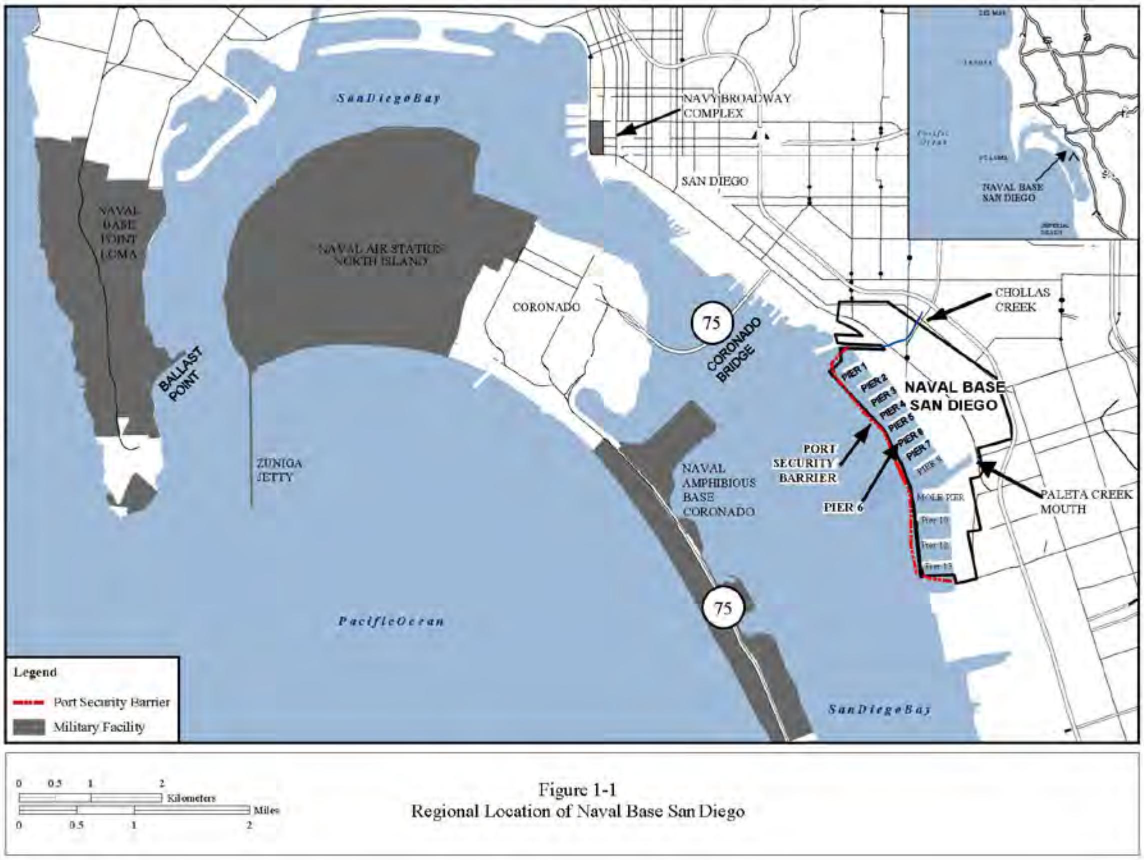

Figure 1-1
Regional Location of Naval Base San Diego

1.2 Project Location

Pier 6 is located in San Diego Bay at NBSD. NBSD is a major installation for Navy ships assigned to the Pacific Fleet and the major West Coast logistics base for surface forces of the Navy, dependent activities, and other commands. The mission of NBSD is to deliver support and quality of life services to the Pacific Fleet, warfighter and family. NBSD proper covers over 1,600 land acres and 326 acres of water (Commander, Navy Installations Command [CNIC] 2019).

The Navy has 12 piers in the NBSD pier complex (Figure 1-2). There are seven piers of which (including Pier 6) are intended to serve deep-draft ships. Constructed by the Navy in 1945, Pier 6 is 18 m (60 ft) wide and 420 m (1,377 ft) long and begins at the intersection of West Vesta and Brinser Streets.

Figure 1-2. Pier 6 at Naval Base San Diego

Figure 1-2
Pier 6 Location at Naval Base San Diego

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2 Proposed Action

2.1 Proposed Action

Under the Proposed Action, the Navy would demolish the existing Pier 6 and replace it with a new larger general purpose berthing pier. The new Pier 6 dimensions would be 37 m (120 ft) wide by 457 m (1,500 ft) long (NAVFAC SW 2019a). The Pier 6 replacement would provide NBSD with four berths to support the Pacific Fleet with the requisite utilities, deck space, and berthing capacity for modern Navy ships and rectify deteriorating infrastructure that – if not addressed – would severely limit the overall utility of the pier.

Under the Proposed Action there would be no change to existing operations at Pier 6 or in adjacent upland areas. Should the Navy proceed with demolishing and replacing Pier 6, the Navy would redistribute existing Pier 6 operations to other NBSD piers. The Proposed Action does not include dredging at Pier 6 or homeporting of ships at NBSD.

No new ship homeporting actions are specifically planned as a part of the Proposed Action. Port loading at NBSD is coordinated between the Commander Navy Region Southwest Port Operations Shore Infrastructure Plan (Commander Navy Region Southwest 2010) and the Chief of Naval Operations Notional Strategic Laydown Plan. Ship berthing and pier operations (including pier maintenance) are included in these two plans and any potential operational impacts at Pier 6, both in water and on land, were analyzed as a part of the plan adoption process. Therefore, ship berthing operations associated with the Proposed Action are not addressed here. While Pier 6 is being demolished and replaced, existing berthing operations would be temporarily re-distributed to the other NBSD piers.

The evaluation of potential project alternatives is described in the *Draft Environmental Assessment*. This Environmental Fish Habitat (EFH) Assessment is for implementation of the preferred alternative described in Section 2.3.2 of the Environmental Assessment.

2.1.1 Preferred Alternative

As described in Section 2.3.2 of the Environmental Assessment, the Proposed Action includes demolition and replacement of the existing Pier 6 with a conventional concrete single-deck pier. Demolition and construction of Pier 6 would begin in fiscal year (FY) 22 and last approximately 250 days of in-water work.

Demolition of Pier 6 (Phase I)

The Navy would demolish Pier 6 in less than 12 months. The project would comply with the Navy-approved Programmatic Explosives Safety Submittal to ensure the protection of personnel and Navy assets in the event of encountering historical ammunition that may be present within the project footprint.

Following an initial hazardous materials survey and any necessary abatement, workers would disconnect, clean, and safe-out all utilities and then remove all electrical and mechanical equipment from the pier.

Pier demolition would take place bayward to landward and from the top down. First, the fender piles and exterior appurtenances (such as utilities and the fuel piping systems) would be demolished above and below the pier deck. Then the deck would be demolished using concrete saws and a barge-mounted excavator. Next, structural and fender piles would be demolished.

Workers would initially attempt to extract the piles out by securing the piles above the waterline and applying upwards pressure to the pile (dead-pull). Workers may also use the dead-pull method with pile jetting (where an external high-pressure water jet is used to loosen the sediment around the pile). A vibratory hammer may also be used to loosen the piles prior to removal. If the piles could not be pulled out by these methods, workers would place a hydraulic cutter over each pile and lower it to the mudline. Diver assistance may or may not be required during this specific pile removal activity. An underwater hydraulic saw operated by a diver may also be used to remove piles. Once the piles are cut, a crane would remove the pile and set it onto a barge for transport to a concrete processing yard (at NBSD or offsite). Ultimately, the contractor will use one of the above described methods depending on which method proves to be most efficient method to remove the pile. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

The pier deck would be saw cut and removed in large sections using a floating derrick crane before the crane would place the sections on a barge. Workers would also demolish the quaywall to allow for new utility extensions. Support craft would tow the barges loaded with concrete deck sections and piles to a concrete processing yard (at NBSD or offsite) to process the material. Trucks would haul concrete to an off-site recycler for processing in compliance with recycling facility requirements. Workers would separate steel from concrete for recycling. Trucks would then transport non-recyclable materials to a permitted landfill. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

As detailed in Table 2-1, all existing piles (totaling approximately 2,000 structural, fender, and other piles) would be removed (NAVFAC SW 2019d). While Table 2-1 presents a total of 1,998 piles, the actual number could be slightly higher, so this analysis uses an estimate of 2,000 piles (NAVFAC SW 2019d).

Table 2-1. Estimated Number and Types of Existing Piles to be Removed under Alternative 1

Method	*Pile Type*	*Number of Piles*	*Piles / Day*	*Total Estimated Days*
Vibratory Extraction High-pressure Water Jetting Hydraulic Pile Clipper Hydraulic Chainsaw	24-inch square pre-cast concrete 20-inch square pre-stressed / pre-cast concrete piles	1,833	8	229
	12-inch composite (timber-plastic) piles	149	8	19
Vibratory Extraction	16-inch I-shaped steel piles	16	8	2
	Total	**1,998**		**250**

Based on similar work completed at other Navy piers, workers would remove on average approximately 8 piles per day, one pile at a time. Demolition and construction of Pier 6 would begin in fiscal year (FY) 22. All in-water work (piling removal and installation) is anticipated to occur within a one-year (250 working day) period (NAVFAC SW 2019c).

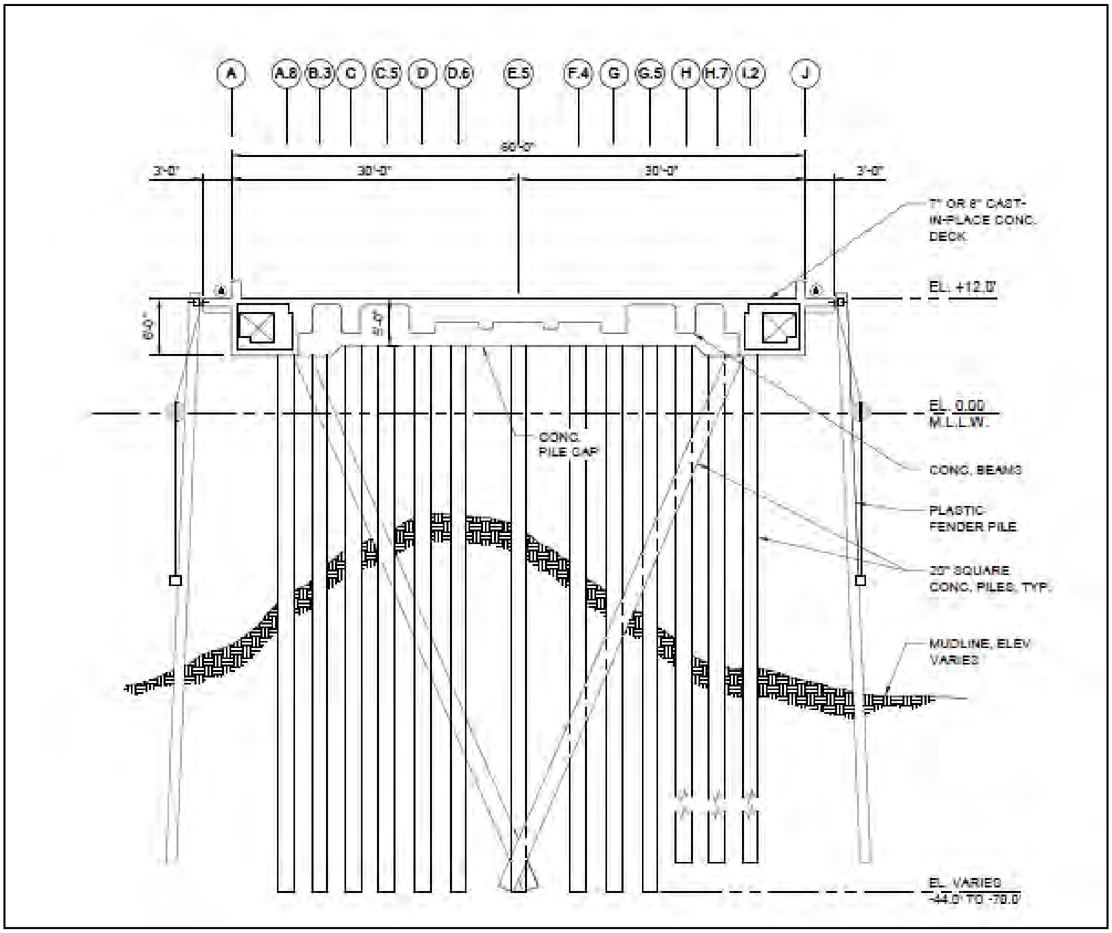

Figure 2-1. Existing Cross-Section of Pier 6 (typical)

Construction of a Conventional Concrete Single-Deck Replacement Pier 6

The Navy would construct a conventional concrete single-deck berthing pier measuring 37 m (120 ft) wide by 457 m (1,500 ft) long (NAVFAC SW 2019a) (Figure 2-4). The total surface area of Pier 6 would increase from approximately 0.8 hectare (ha; 1.9 acres) to approximately 1.6 ha (4.1 acres), an increase of approximately 0.9 ha (2.2 acres). Figure 2-3 presents a schematic drawing of a typical cross-section of the proposed replacement Pier 6.

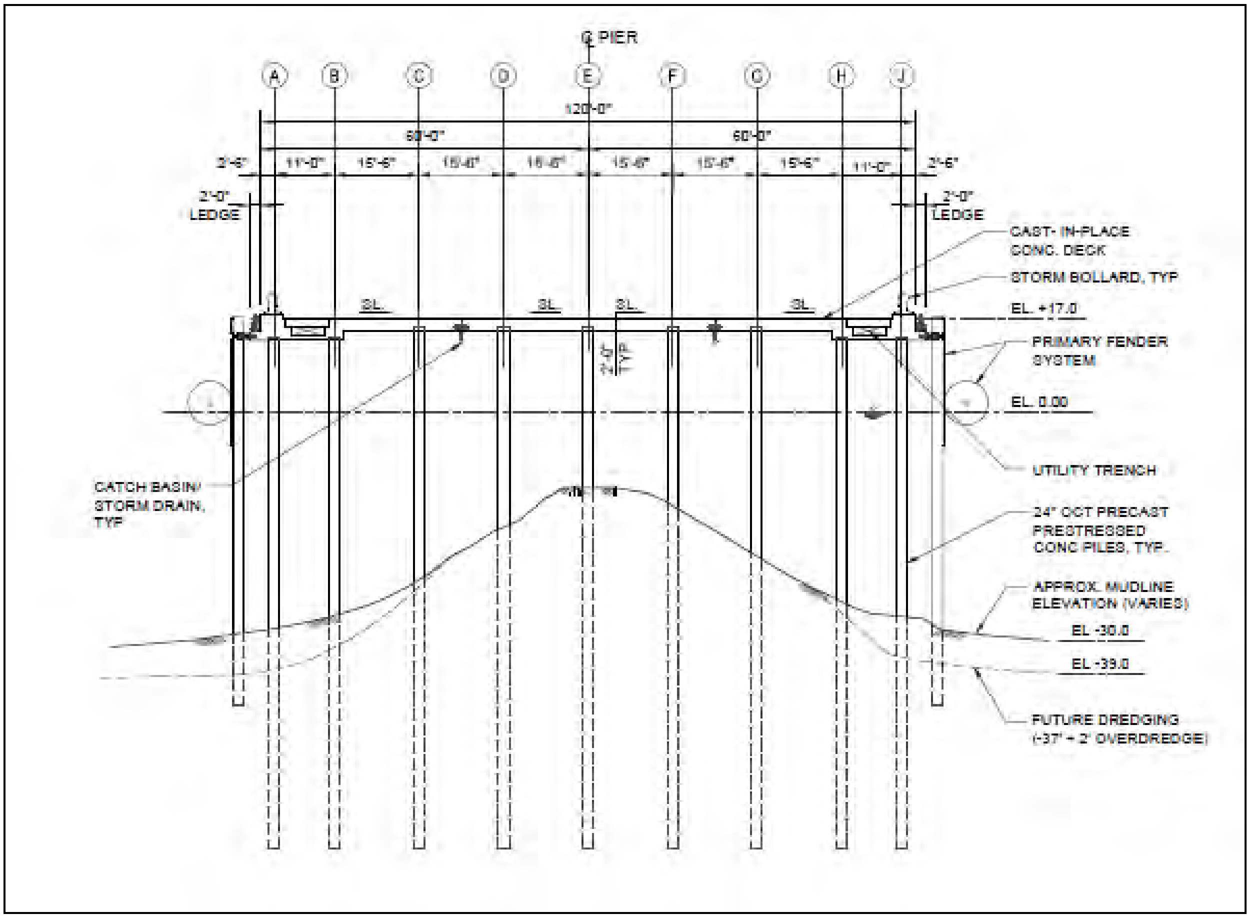

Figure 2-2. Cross-Section of Proposed Pier 6 (typical)

Figure 2-3. Pier Replacement Alternative 1

Figure 2-3
Pier 6 Replacement: Alternative 1

Table 2-2 summarizes the types and number of piles that construction workers would install using a floating crane and diesel hammer (pile driver) under the preferred alternative. Workers could potentially begin installing the new piles as demolition of the existing pier is wrapping up (Phase I), or, depending on timing and space, the installation of the new pier (Phase II) may begin after all demolition is completed. However, based on other similar pier replacement projects, it is likely there will be an overlap between demolition and installation activities. As such, the following impact analysis assumes there would be an overlap.

On average, workers would install approximately 5-9 piles each day, one pile at a time. At an average daily rate of 7 piles per day, it would take workers approximately 138 working days to install all of the piles. It is anticipated that some overlap would occur between demolition and installation with the 138 installation days occurring concurrently with 250 working days for demolition, for a total of 250 working days. In addition, approximately 15 additional test piles would be installed at the beginning of construction. Some or all of the structural test piles would likely be left in place as a permanent part of the project or be removed.

Table 2-2. Estimated Piles Types and Numbers to be Installed Under Alternative 1

Method	***Pile Type***	***Number of Piles***	***Piles / Day***	***Total Estimated Days***
Impact Pile Driving	Structural test piles	15	7	2
	24-inch octagonal concrete structural piles	513		73
	Fender system test piles	4		0.5
	24-inch square concrete primary fender piles	204		29
	20-inch square concrete pile for load-out ramp cradle	4		0.5
	16-inch fiberglass secondary and corner fender piles	226		33
High-pressure Water Jetting	20- and 24-inch concrete piles	Within Above Counts		
	Total	**966**		138

The total length of the piles would range from approximately 26 m (85 ft) (fender piles) to 34 m (110 ft) (structural piles); the length of the portion of the piles in the water column would range from approximately 3 to 9 m (10 to 30 ft), depending on pile type, location, and tide (NAVFAC SW 2019e). The use of concrete and fiberglass rather than creosote-treated wood pilings would be consistent with Navy policy and would be preferable because, unlike creosote-treated wood pilings, the new piles would not be a potential source of polycyclic aromatic hydrocarbons to the bay.

Workers would construct the pier deck on-site with rebar-reinforced concrete. Pre-stressed concrete (structural) piles with cast-in-place concrete pile caps would support the concrete deck structure. All pile and deck construction for Pier 6 would follow current seismic standards and would be strong enough to support a 140-metric ton (154-US ton crane) (NAVFAC SW 2019a). The pier deck would be positioned above the predicted high tides and tidal surges to ensure that sea water would not damage the deck or pier utilities network. All construction material deliveries would be via truck.

New utilities would include electrical, potable water, sanitary sewer, steam, oily waste, and compensating ballast water collection system. Compressed air is not currently identified as a project component. The electrical utilities would include a switching station, primary and secondary distribution systems, telephone, coaxial and fiber optic communications, supervisory control and data acquisitions systems for energy monitoring and control, a fire alarm system, and storm water treatment system (NAVFAC SW 2019c).

2.2 Best Management Practices, Avoidance, and Minimization Measures Included in Proposed Action

This section presents an overview of the best management practices (BMPs), avoidance, and minimization measures that are incorporated into the Proposed Action. BMPs are existing policies, practices, and measures that the Navy would apply to reduce environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing, or reducing/eliminating impacts, BMPs are distinguished from potential mitigation measures because BMPs are (1) existing requirements for the Proposed Action; (2) ongoing, regularly occurring practices; or (3) not unique to this Proposed Action. In other words, the BMPs identified in this document are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the National Environmental Policy Act (NEPA) environmental review process for the Proposed Action. Table 2-3 includes a list of these measures.

Table 2-3. Best Management Practices and Avoidance and Minimization Measures

Measure	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Best Management Practices					
The contractor would use only clean construction materials suitable for use in the oceanic environment. The contractor would ensure no: debris; soil; silt; sand; sawdust; rubbish; cement or concrete washings thereof; chemical; oil or petroleum products from construction would be allowed to enter into or place where it may be washed by rainfall or runoff into waters of the U.S. Upon completion of the project authorized, any and all excess material or debris would be completely removed from the work area and disposed of in an appropriate upland site.	Avoid/minimize impacts to marine resources	Containment of debris and no spills	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities
A *Caulerpa* survey (Surveillance Level) would be conducted prior to in-water project activities, consistent with National Marine Fisheries Service and California Department of Fish and Wildlife requirements. If Caulerpa was found in the project area during this survey, eradication techniques would be used in accordance with approved Caulerpa Control Protocols.	Identify and eradicate invasive species	If detected, complete removal	Survey results and implementation	Navy	Prior to demolition activities.

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3 ESSENTIAL FISH HABITAT

3.1 EFH and Habitat Areas of Particular Concern Designations

EFH is described as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (50 CFR [Code of Federal Regulations] § 600.10). Regional Fishery Management Councils are required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) to identify EFH in Fishery Management Plans (FMPs) [16 United States Code [USC] §180l-189ld].

The Pacific Fishery Management Council (PFMC) is responsible for designating EFH for all federally managed species occurring in the coastal and marine waters off the coasts of Washington, Oregon, and California, including Puget Sound. The PFMC has designated EFH for species within the FMPs for each of the four primary fisheries that they manage: Pacific Coast Groundfish (PFMC 2016a), Coastal Pelagic Species (PFMC 2019a), Pacific Coast Salmon (PFMC 2016b), and West Coast Fisheries for Highly Migratory Species (PFMC 2018).

In addition to designating EFH, the PMFC is also responsible for identifying Habitat Areas of Potential Concern (HAPC) for federally managed species. EFH that is considered to be particularly important to the long-term productivity of populations of one or more managed species, or to be particularly vulnerable to degradation, also may be identified by the National Marine Fisheries Service (NMFS) as HAPCs. For types or areas of EFH to be considered HAPCs, at least one of the following must be demonstrated:

- The importance of the ecological function provided by the habitat
- The extent to which the habitat is sensitive to human-induced environmental degradation
- Whether, and to what extent, development activities are, or would be, negatively impacting the habitat type
- The rarity of the habitat.

The PFMC has designated HAPC for groundfish only. The HAPCs are seagrass, canopy kelp, rocky reef, and estuarine habitats along the Pacific coast (PFMC 2016a). Two HAPCs, estuarine habitats and eelgrass (*Zostera marina*), a species of seagrass, are in San Diego Bay (Bay) (NAVFAC SW 2010). No HAPC occurs within the project area.

Estuarine habitat is associated with the Sweetwater Marsh (south of NBSD) and, to a very limited extent, in the Paleta Creek channel (south of Pier 6) (Navy 2014a; Navy and POSD 2013). NBSD is in a part of San Diego Bay characterized as seasonally hypersaline due to evaporation and reduced tidal flushing (Navy and POSD 2013). The project area does not provide estuarine habitat as usually recognized because freshwater inflows are limited to temporary runoff from the developed surroundings, and salinities average about 30 parts per thousand (Navy 2016). It is recognized, however, that Southern California bays, including San Diego Bay, are classified as estuarine HAPC by NMFS due to their importance as nursery habitat.

Eelgrass habitat is extensive in San Diego Bay. This shallow water habitat supports a unique assemblage of juvenile and adult fishes (Pondella and Williams 2009a and 2009b). It provides important nursery areas for fish and invertebrates that are food for the California least tern and other marine birds. Furthermore, these sites are noted for overall higher diversity compared with the unvegetated bottom habitat that characterizes the project area. Results of recent eelgrass habitat mapping of San Diego Bay showed that approximately 11 percent of the Bay (about 685 of 4897 ha [1,693 of 12,100 acres]) is vegetated with eelgrass (Merkel & Associates, Inc. 2017). Eelgrass beds in particular are recognized as highly productive and important nursery habitat for a number of fish species in San Diego Bay, but they do not occur in the project area (Navy and POSD 2013; Merkel & Associates, Inc. 2014).

Approximately 109 species of bottom-living and open-water fishes occur in San Diego Bay. There is a greater variety of fish species in the North Bay area than in the South Bay, and the greatest fish diversity can be found at artificial reefs. Increased levels of flushing found in the North Bay also increase food availability, supply of larval recruits, and water quality (Navy 2010). While there is no commercial fishing within San Diego Bay, seven fish species inhabiting the bay support commercial fisheries elsewhere in southern California waters. Examples of notable fishery populations found in San Diego Bay include California halibut (*Paralichthys californicus*) and white seabass (*Atractoscion nobilis*). At least 58 species are caught in the recreational fishery (Navy and POSD 2013).

While no surveys have been conducted at Pier 6, Merkel & Associates, Inc. (2014) have provided lists of San Diego Bay fish species that are associated with deep subtidal versus manmade structural habitats, based on the surveys of the neighboring Pier 2 and Pier 8 (north and south of Pier 6, respectively; Figure 1-1). A large number of species have been documented around piers and other artificial structures, including most of the common species found in San Diego Bay. When comparably sampled, piers have been found to support a greater abundance and species diversity of fish than adjacent open water areas (Merkel & Associates 2014).

Fish species observed in transects along the edges of and/or underneath Pier 2 and Pier 8 include spotted sand bass (*Paralabrax maculatofasciatus*); barred sand bass (*Paralabrax nebulifer*); kelp bass (*Paralabrax clathratus*); black croaker (*Cheilotrema saturnum*); round stingray (*Urobatis halleri*); yellowfin croaker (*Umbrina roncador*); white sea bass (*Atractoscion nobilis*); midshipman (*Porichthys* sp.); sargo (*Anisotremus davidsonii*); slough anchovy (*Anchoa delicatissima*); giant kelpfish (*Heterostichus rostratus*); and bay blenny (*Hypsoblennius gentilis*) (Merkel & Associates 2014). The same species would be expected to occur at Pier 6. In contrast, in deep subtidal habitat away from the piers, only one fish species, black croaker, was observed (next to a tire on the bottom), although other species considered likely to use this habitat include spotted sand bass, round stingray, barred sand bass, midshipman, and gobies (family Gobiidae). California spiny lobsters were also observed under Pier 2, but were not observed and are not likely to occur in the open deep subtidal habitat.

Figure 3-1. Surveyed Eelgrass Locations at Pier 6

3.2 Descriptions of Managed Species

Of the 109 species of fish previously identified in San Diego Bay, 10 are managed by the NMFS. Four are managed under the Coastal Pelagic Species FMP (PFMC 2019a): northern anchovy (*Engraulis mordax*); Pacific sardine (*Sardinops sagax*); Pacific [chub] mackerel (*Scomber japonicus*); and jack mackerel (*Trachurus symmetricus*). Six species are covered under the Pacific Groundfish FMP (PFMC 2016a) and occur, although not in abundance, in San Diego Bay: California scorpionfish (*Scorpaena guttata*); grass rockfish (*Sebastes rastrelliger*); English sole (*Parophrys vetulus*); curlfin sole (*Pleuronichthys decurrens*); leopard shark (*Triakis semifasciatus*); and soupfin shark (*Galeorhinus galeus*) (Navy 2010; Navy and POSD 2013). These species are discussed briefly below.

3.1.1 Coastal Pelagic Species

Coastal pelagic species (CPS) are those fish that live in the water column, in contrast to groundfish species, which live near the sea floor. The CPS fishery includes four finfish (Pacific sardine, Pacific [chub] mackerel, northern anchovy, and jack mackerel) and the invertebrate, market squid (PFMC 2019a). Pelagic species can generally be found anywhere from the surface to a depth of 1,005 m (3,300 ft). San Diego Bay is entirely within the boundary of EFH for CPS finfish. All, except for market squid, are likely to occur in the Bay. Finfish are highly transient and two types, northern anchovy and Pacific sardine, can be found throughout the Bay. Jack mackerel and Pacific mackerel are typically found in the North, North-Central, and South-Central Ecoregions of the Bay (Allen et al. 2002).

EFH for the CPS finfish is defined both through geographic boundaries and by sea surface temperature ranges (PFMC 2019a). The east-west geographic boundary of EFH for each individual CPS finfish and market squid is defined to be all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the exclusive economic zone (322 kilometers [km; 200 miles]) and above the thermocline where sea surface temperatures range between 10 degrees Celsius (°C) and 26°C. The southern extent of EFH for CPS finfish is the U.S.-Mexico maritime boundary. The northern boundary of the range of CPS finfish is more dynamic and variable because of the seasonal cooling of the sea surface temperature. The northern EFH boundary is, therefore, the position of the 10°C isotherm (which varies both seasonally and annually). San Diego Bay is entirely within the boundary of EFH for CPS finfish.

In addition to their value to commercial Pacific fisheries, CPS finfish species are also recognized for their importance as food for other fish, marine mammals, and birds (63 CFR 13833). CPS finfish are considered sensitive to overfishing, loss of habitat, reduction in water and sediment quality, and changes in marine hydrology (PFMC 2019a).

Following are descriptions of CPS finfish that occur in San Diego Bay. All the CPS finfish have been documented to occur in deep subtidal habitat, and all but the jack mackerel—which is less common and hence less likely to have been detected in the few surveys conducted—have been documented around manmade structures (Merkel & Associates, Inc. 2014).

Northern anchovies are small, short-lived fish that are typically found in schools near the water's surface. They are found from British Columbia to Baja California and have recently appeared in the Gulf of California. Northern anchovies are divided into northern, central, and southern subpopulations. The central subpopulation is located in the Southern California Bight, between Point Conception, California, and Point Descanso, Mexico. They grow to approximately 18 centimeters (cm; 7 inches) and rarely live beyond 4 years. Northern anchovies spawn during every month of the year, but spawning increases in late winter and early spring (peaking from February to April).

In San Diego Bay, highly mobile schools of northern anchovies spend most of their time and feed in the water column in all the natural and manmade habitats, primarily in the North Bay. The Bay serves as a nursery area for this species; 100 percent of northern anchovies collected in quarterly surveys throughout the bay over a course of 5 years (1994–1999) were juveniles (Allen et al. 2002).

Spawning primarily occurs outside of the Bay, and the pelagic eggs and larvae are advected into the Bay. Young-of-year northern anchovies recruit to the midwater of nearshore habitats and the channel, and abundances peak in late spring and early summer (Allen et al. 2002; Allen 1999 referenced by Robbins 2006). During this time, northern anchovies can numerically dominate the fish assemblage in the northern quadrant of the Bay (Allen et al 2002; Pondella and Williams 2009a and 2009b).

Northern anchovies eat phytoplankton and zooplankton. Northern anchovies are subject to natural predation throughout all life stages and are important forage for other species. Eggs and larvae fall prey to an assortment of invertebrate and vertebrate planktivores. As juveniles, anchovies are vulnerable to a wide variety of predators, including many recreationally and commercially important species of fish. Adult anchovies are fed upon by numerous fishes (some of which have recreational and commercial value), marine mammals, and birds (PFMC 2016b; NAVFAC SW 2010).

Pacific sardines are also small schooling fish. At times, they have been the most abundant fish species in the California current, a highly productive current that extends up to 1,000 km (600 miles) offshore from Oregon to Baja California. When the population of Pacific sardines is large, they are abundant from the tip of Baja California to southeastern Alaska, and throughout the Gulf of California. Sardines typically grow to approximately 30 cm (12 inches) in length and may live as long as 13 years, but they are usually younger than 5 years old.

Pacific sardines are typically distributed more offshore than northern anchovies. Pacific sardines occur in estuaries, but the fish are most common in the nearshore and offshore domains along the coast (PFMC 2019a). Spawning occurs year-round, peaking from April through August. Eggs and larvae occur nearly everywhere adults are found and eggs are most abundant between 14°C and 15°C. Sardines spawn in loosely aggregated schools in the upper 50 m (164 ft) of the water column. The main spawning area for the historical population off the U.S. was between Point Conception and San Diego, out to approximately 160 km (100 miles).

Pacific sardines, like northern anchovies, occur in highly mobile schools and feed in the water column in all natural and manmade habitats. The species is among the numerically dominant taxa during the summer and fall in the Bay (Allen et al 2002; Pondella and Williams 2009a and 2009b). The Bay serves as a nursery area for this species; 96 percent of Pacific sardines collected in quarterly surveys throughout the Bay over a course of 5 years (1994–1999) were juveniles (Allen et al. 2002).

Pacific sardines feed on phytoplankton and zooplankton. The fish are heavily preyed upon at all life stages. Sardine eggs and larvae are consumed by an assortment of invertebrate and vertebrate planktivores, including northern anchovies. Juvenile and adult sardines are consumed by a variety of predators, including commercially important fish (e.g., yellowtail, barracuda, bonito, tuna, marlin, mackerel, hake, salmon, and sharks), seabirds (pelicans, gulls, and cormorants) and marine mammals (sea lions, seals, porpoises, and whales). In all probability, sardines are forage for the same predators that prey on northern anchovies (PFMC 2019a).

Pacific mackerels, or chub mackerels, are schooling fish that typically range from Mexico to southeastern Alaska. Pacific mackerel can grow to 65 cm (25 inches) and reach 11 years old; however, commercially fished Pacific mackerel rarely exceed 16 inches and are under four years old. These fish are most abundant south of Point Conception and usually appear within 32 km (20 miles) offshore. The "northeastern Pacific" stock of Pacific mackerel is harvested by fishers in the United States and Mexico and spawns from Eureka, California, south to Cabo San Lucas in Baja California between 3.2 and 3,217 km (2 and 1,999 miles) from shore.

Pacific mackerels are schooling fish and may school with other pelagic species such as jack mackerel and sardines. They are also heavily preyed upon by a variety of fish, mammals, and sea birds.

Jack mackerels are schooling fish that range widely throughout the northeastern Pacific. They grow to about 60 cm (24 inches) and can live 35 years or longer. Much of their range lies far offshore outside the 200-mile U.S. Exclusive Economic Zone. Jack mackerels in southern California are more likely to appear on offshore banks in late spring, summer, and early fall. The spawning season for jack mackerels off California extends from February to October, with peak activity from March to July. Little is known about the maturity cycle of large fish offshore, but peak spawning appears to occur later in more northerly waters. Small jack mackerels (up to 6 years of age) are most abundant in the Southern California Bight, where they are often found near the mainland coast and islands and over shallow rocky banks.

Young juvenile fish sometimes form small schools beneath floating kelp and debris in the open sea. In southern California waters, jack mackerel schools are often found over rocky banks, artificial reefs, and shallow rocky coastal areas including kelp beds. They remain near the bottom or under kelp canopies during daylight and venture into deeper surrounding areas at night.

Jack mackerel is the least common species among the managed pelagic finfish species in the bay (Allen et al. 2002). Jack mackerels have been observed over bare sand, bare mud, and eelgrass, in marinas, and under wharves in northern San Diego Bay (Table 3-1). Jack mackerels have been observed over eelgrass only in an experimental transplanted bed located across the channel from the proposed project area (Pondella et al. 2006). The species could occur in the proposed project area, although it has not been observed in the southern half of the bay.

Small jack mackerels taken off southern California and northern Baja California eat large zooplankton, juvenile squid, and juvenile northern anchovies. Larvae feed almost entirely on plankton. They provide forage for a variety of fish, mammals, and sea birds.

3.1.2 Pacific Groundfish Species

The Pacific Coast Groundfish FMP manages 91 species over a large ecologically diverse area covering the entire West Coast of the continental United States (PFMC 2016a). Although groundfish are those fish considered demersal (fish that live on or near the seabed), they occupy diverse habitats at all stages in their life histories. EFH areas may be large because the pelagic eggs and larvae of a species are widely dispersed, for example, or comparatively small, as is the case with the adults of many nearshore rockfishes, which show strong affinities to a particular location or type of substrate. However, the species rarity in all or parts of San Diego Bay makes it unlikely that any will occur the project area (Merkel &

Associates, Inc. 2014). These species include curlfin sole, English sole, California scorpionfish, grass rockfish, leopard shark, and soupfin shark.

Curlfin sole are found along the Pacific Coast of North America from the Bering Sea south to San Quintin, Baja California (Eschmeyer et al. 1983). Adults are demersal (bottom dwellers) flatfish and are associated with soft bottoms, occurring all along the west coast at depths from 38 to 350 meters (125 to 1,150 feet). This species spawns from April to August and grows to a maximum size of 37 cm (15 inches). Curlfin sole feed primarily on polychaete worms, crustacean eggs, and brittle star fragments.

Curlfin sole are documented to occur in bare sand and bare mud habitat in northern San Diego Bay (Table 3-1, NAVFAC SW 2010). However, the species is very uncommon in San Diego Bay; no specimens were collected during quarterly surveys from 1994–1999 or surveys in 2008 (Allen et al. 2002; Pondella and Williams 2009a and 2009b). Kramer (1991) conducted extensive trawl and seine surveys in San Diego County and found that curlfin sole were very uncommon nearshore along the open coast and were absent from catches in San Diego Bay. This flatfish has not been found in eelgrass beds of San Diego Bay. Thus, curlfin sole is unlikely to occur in the proposed project area.

English sole are found in water less than 1,000 feet (300 meters) from Baja California to the Gulf of Alaska (PMFC 2016a). Spawning occurs offshore in waters shallower than 100 m (330 ft), primarily during the autumn and winter, depending on the stock. English sole use nearshore coastal and estuarine waters as nursery areas. Adults and juveniles prefer soft bottoms composed of fine sands and mud, but also occur in eelgrass habitats. This species may reach ages in excess of 20 years. Females generally reach maturity after 4 years. Juveniles and adults are carnivorous, feeding on polychaetes, small bivalves, clam (*Tagelus californianus*) siphons, and other benthic invertebrates. English sole is uncommon in the San Diego Bay, and few individuals have been collected infrequently over bare mud and sand habitat in the northern quadrant of the bay (Allen et al. 2002; NAVFAC SW 2010; Merkel & Associates, Inc. 2014). English sole is unlikely to occur in the proposed project area.

California scorpionfish is a benthic species found from central California to the Gulf of California in depths between the intertidal and 170 m (555 ft). Although it generally inhabits rocky reefs, it also aggregates over sandy or muddy substrate, depending on the area or season (PFMC 2006). California scorpionfish migrate to deeper water to spawn from May to September (peaking in July). This species feeds on a wide variety of prey, including crabs, fishes, octopi, isopods, and shrimp. California scorpionfish utilize eelgrass beds as juvenile nursery habitat and a resource for prey.

California scorpionfish occur somewhat frequently in very low numbers in San Diego Bay. From 1994-1999, 37 California scorpionfish were collected in quarterly surveys in the North Bay (comprising less than 0.01 percent of the total catch throughout the bay), and only 2 individuals were collected in the southern half of the bay (Allen et al. 2002). NAVFAC SW (2010) indicates that California scorpionfish occur in all manmade habitats composed of hard structure. Juvenile and adult California scorpionfish have been collected in eelgrass (a designated HAPC) and channel habitats of north and north-central San Diego Bay (Allen et al. 2002; Pondella and Williams 2009a and 2009b). Pondella et al. (2006) report observations of the species in an established natural eelgrass bed near Shelter Island and in experimental artificial reefs set in the North Bay across the channel from the proposed project area. Merkel & Associates, Inc. (2014) report additional observations of California scorpionfish within structured habitats, including the seawall of the Tenth Avenue Marine Terminal, on the Coronado Bridge piles, and on the pendant wall at the J. Street Marina. Thus, California scorpionfish may occur, although in small numbers in NBSD.

Grass rockfish is a common, shallow-water rockfish found from Playa Maria Bay, Baja California, to Yaquina Bay, Oregon, although they are most common south of southern Oregon. Among rockfishes, they have one of the shallowest and narrowest depth ranges. They are found from the intertidal zone to 56 m (184 ft), frequently less than 15 m (49 ft), and are commonly found from the intertidal to 6 m (20 ft). The species is common in nearshore rocky areas, along jetties, and in kelp. Around reef structures, adults may be found hiding in crevices (PFMC 2019b). Grass rockfish have become an important component of the live-fish fishery. Both sexes of grass rockfish begin to mature at 23 cm (9 inches) and are fully mature at 28 cm (11 inches); these lengths correspond to ages 2 to 5 years for males and 3 to 5 years for females. Larvae are released from January to March (PFMC 2019b). Grass rockfish habitat generally is restricted to rocky areas (Leet et al. 2001).

Grass rockfish are documented to occur in eelgrass beds, a designated HAPC, but not in any other habitat in the San Diego Bay. Juveniles of shallow dwelling rockfish species will inhabit eelgrass habitat as shelter and resource for prey for months; however, no life history stage of this or other rockfish species is dependent on eelgrass beds. Grass rockfish are very uncommon in San Diego Bay; no specimens of this species or other rockfishes (*Sebastes* spp.) were collected in more than 5 years of fish surveys in eelgrass or unvegetated nearshore and channel habitats in the bay (Allen et al. 2002; Pondella et al. 2006; Pondella and Williams 2009a and 2009b). Thus, grass rockfish are unlikely to occur in the project area.

Leopard sharks are found from southern Oregon to Baja California, Mexico, including the Gulf of California. They are most common at depths ranging from 0 to 5 m (0 to 15 ft) in muddy bays, and reside in estuaries, bays, and kelp beds over soft and hard bottoms, as well as along open coast sandy beaches (PFMC 2006). Leopard sharks are most common on or near the bottom in waters less than 4 m (13 ft) deep, but have been caught as deep as 91 m (300 ft).

Leopard sharks spawn and give birth to live young ("pup") in shallow water. Seasonally, pups occur along sandy beaches and in protected bays. Leopard sharks will utilize eelgrass beds as juvenile nursery habitat and as a resource for prey. The maximum recorded length of a leopard shark is 180 cm (6 ft), but most do not exceed 150 cm (5 ft) in length. Females may take 10 to 15 years to reach maturity, while males may only take 7 to 13 years. Maximum age is reported to be 30 years. This species feeds on a variety of prey, including crabs, clams, fish, and octopus.

Leopard sharks have been documented to use intertidal sandy beach and subtidal soft bottom sediments (mud, sand, and silty sand), two habitat components of San Diego Bay (Hoffmann 1986 referenced by Robbins 2006). These habitats can be influenced by seasonal freshwater input, and thus are designated estuarine HAPC for this managed groundfish species. In Humboldt Bay and San Francisco Bay, females have been observed releasing their young in beds of eelgrass, while in southern California females are thought to release their pups along more open coastal areas (Carlisle and Smith 2009). No specimens were collected over 6 years of surveys by Allen et al. (2002) and Pondella and Williams (2009a and 2009b). Thus, leopard shark is expected to be very uncommon in San Diego Bay and the project area.

Soupfin sharks range from northern British Columbia to Abreojos Point, Baja California, and the Gulf of California. This shark is an abundant coastal-pelagic species of temperate continental and insular waters. They are often associated with the bottom, inhabiting bays and muddy shallows. Males and females apparently segregate by gender; adult males occur in deeper water and adult females occur closer inshore. Females and young tend to be more common in southern California waters. Primary nursery grounds are in southern California inshore areas south of Point Conception, with females moving in to bays to bear live young (PFMC 2005). Soupfin sharks are opportunistic carnivores, preying upon moderate-sized bony fishes, echinoderms, shrimp, invertebrates, and squid. This species is one of many caught by recreational fishermen in the San Diego Bay (NAVFAC SW 2000). Although the whereabouts of this species in the bay is unknown, its rarity makes it unlikely to occur in the project area.

3.1.3 Description of Habitats in the Proposed Project Area

The project area consists of the developed shorelines and piers on NBSD in the immediate vicinity of Pier 6, and the surrounding waters of the San Diego Bay (Figures 1-1, 1-2, and 2-3). The only undeveloped terrestrial habitat in the vicinity is along Paleta Creek (Navy 2014a), which is south of Pier 6 and would not be affected by the project. The South-Central portion of the Bay is recognized as a distinct hydrodynamic region of the Bay, with physical and biological characteristics that also differ from areas to the north and south within the bay (Navy and POSD 2013; Merkel & Associates, Inc. 2017; Tierra Data, Inc. 2010).

Habitats of San Diego Bay are differentiated by elevation or depth, substrate, and manmade or natural biological features. Habitats associated within the project area include the developed shoreline and artificial substrates such as pier pilings and marine benthic (bottom), water column, and surface water habitat. Depths in the project area vary from moderately deep (3.7 to 6 m [12 to 20 ft] MLLW) to deep (>6 m [20 ft] below MLLW) (Navy and POSD 2013). The associated habitats and communities are described below.

The shoreline of the affected environment consists of developed adjacent upland and artificial substrates. Artificial substrates comprise pier pilings, bulkheads, rock riprap, floating docks, seawalls, mooring systems, artificial reefs, and derelict ships and ship parts. These substrates form extensive artificial habitat along the NBSD shoreline. From the intertidal zone to deep subtidal habitat, the manmade structures support abundant invertebrates and seaweeds. California spiny lobsters (*Panulirus interruptus*), along with a variety of crabs, worms, oysters, mussels, barnacles, echinoderms, sponges, hydroids, sea anemones, bryozoans, and tunicates (sea squirts), all inhabit artificial substrates in San Diego Bay (Navy and POSD 2013; Merkel & Associates, Inc. 2014). These areas may also provide refuge and feeding areas for juvenile and predatory fishes. Riprap niches are often filled with invertebrate fauna. Small mobile invertebrates, including nemertean worms (ribbon worms), amphipods, shrimp, decorator crabs, and gastropods, are common on piles (Navy and POSD 2013). Approximately 74 percent (73 km [45.4 miles]) of the shoreline of San Diego Bay is armored by manmade structures that protect developed sites (Navy 2011).

Although a number of potential negative impacts have been attributed to overwater structures (Nightingale and Simenstad 2001; NMFS 2013), wharves, docks, and piers in San Diego Bay provide increased three-dimensional substrate and cover that locally increase the productivity of benthic organisms as well as the species richness and abundance of fish compared to more open waters (Merkel & Associates, Inc. 2014; Navy 2016). Note, however, that many of the species that inhabit artificial structures in San Diego Bay, e.g., the recently discovered bryozoan *Watersipora subovoidea*, are nonindigenous and may displace or have other detrimental effects on native species (Ruiz and Geller 2015).

A hardened shoreline typically produces a very steep shore profile that can provide elevated roosting sites for bay waterbirds, such as California brown pelicans (*Pelicanus occidentalis californicus*), cormorants, and gulls, which allow them to conserve energy and avoid harsh weather conditions (Navy and POSD 2013). The surface roughness and complexity of a structure can affect its ability to provide refuge niches and allow water retention at low tides.

Subtidal habitats in San Diego Bay are differentiated by depth as follows (Navy and POSD 2013):

- Shallow Subtidal (-0.7 to -3.7 m [-2.2 to -12 ft] MLLW)
- Moderately Deep Subtidal (-3.7 to -6 m [-12 to -20 ft] MLLW)
- Deep Subtidal (deeper than -6 m [-20 ft] MLLW)

The occurrence of each habitat with respect to the project area is discussed below.

Shallow subtidal habitats are highly productive and important in San Diego Bay, in part because of the presence of eelgrass beds and algal mats on shallow sandy to muddy substrates in many areas of the bay (Merkel & Associates, Inc. 2017; Navy 2011; Navy and POSD 2013). However, except to the extent that this depth range exists where shoreline and artificial substrates extend into deeper waters, shallow subtidal habitats do not occur in the project area, and there is no suitable substrate at the appropriate depths for eelgrass. The nearest eelgrass beds are approximately (1) 0.6 mile south (a small bed is present at the southern end of NBSD), and (2) 1.2 miles northwest (a bed is present on the opposite shore of San Diego Bay) (Merkel & Associates, Inc. 2017).

Moderately deep subtidal habitat in the project area is limited to the artificial substrates of the shoreline and piers, whereas all of the remaining habitat is deep subtidal. For both the moderately deep and deep subtidal habitats, primary production by phytoplankton occurs in the overlying water column, but benthic primary production is limited because of low light penetration; algal mats and eelgrass beds are lacking. The base of the food chain for the benthic community is provided instead by organic detritus that originates in shallower water and drifts/sinks into deeper water. Fauna residing in subtidal benthic habitats (across all depths) include the warty sea cucumber (*Apostichopus parvimensis*) and a diversity of infaunal species, including suspension feeders, burrowers, and tube builders. Feeding by nematode and polychaete worms, clams, gastropod mollusks, brittlestars, crabs, isopods, and a wide variety of smaller crustaceans transforms detritus and small invertebrates into usable food for larger invertebrates and fishes. The soft bottom benthos provides other functional roles besides serving as a prey base for fish and birds. The less conspicuous mollusks, polychaete worms, small crustaceans, and other invertebrates living at the bottom of the bay mineralize organic wastes as it accumulates, consume algae, and return essential chemicals and organic matter to the water column (Navy and POSD 2013).

Although a variety of organisms inhabit the waters of NBSD, the sediments in the area are historically known to be contaminated, and the associated biological communities have been considered degraded (Fairey et al. 1996 and 1998). Typical deep subtidal fish species include round stingray (*Urobatis halleri*), spotted sand bass (*Paralabrax maculatofasciatus*), California halibut, barred sand bass (*Paralabrax nebulifer*), and bat ray (*Myliobatis californica*) (Navy and POSD 2013).

The deep subtidal water column is home to phytoplankton and zooplankton, including species that spend their entire lives (holoplankton), or only a portion of their life cycle (e.g., as eggs, larvae, or juveniles [meroplankton]), in the plankton. For the meroplankton, which includes many fish and invertebrates, an important function of the deep subtidal environment is transport into and out of the relatively warm, sheltered waters of the bay, which provide nursery habitats.

Table 3-1 is a summary of the local-scale habitats that the 10 NMFS-managed fishes are expected to utilize in the northern and southern halves of San Diego Bay. The data are excerpted from NAVFAC SW (2010), which provides characterizations of the potential community of fishes, including the managed species, and other marine organisms at each habitat. One natural habitat, bare mud, is in the proposed project area. Six habitats are manmade: riprap, marina, wharf, artificial reef, bulkhead wall, and launch ramp. Mud, wharf, and bulkhead wall habitats are in the proposed project area.

Table 3-1. Summary of Federally Managed Fishes Observed in Habitats of the Northern (N) and Southern (S) Half of San Diego Bay

Species	Bare sand*	Bare mud*	Eelgrass*	Riprap*	Marina	Wharf*	Artificial Reef	Bulkhead Wall*	Launch Ramp
Coastal Pelagic Species									
Northern anchovy	N,S	N,S	N,S	N	N	N	N	N	N
Pacific sardine	N,S	N,S	N,S	N,S	N,S	N	N	N	N
Pacific mackerel	N	N	N		N	N	N	N	N
Jack mackerel	N	N	N***		N	N			
Pacific Coast Groundfish									
Curlfin sole	N	N							
English sole	N	N							
California scorpionfish			N,S	N, S	N,S	N,S	N, S	N,S	
Grass rockfish			N						
Leopard shark			N **						
Soupfin shark#									

* Habitat present in the proposed project area based on maps from NAVFAC SW 2010.
** Leopard shark observed by Hoffman 1986 referenced by Robbins 2006.
***May occur in bar sand and eelgrass habitat; observed in an eelgrass transplantation bed (Pondella et al. 2006).
caught by recreational anglers in the San Diego Bay (Pondella et al. 2009a and 2009b), whereabouts unknown.
Source: NAVFAC SW 2010; Merkel & Associates 2014

Numerous surveys have been conducted over the last few decades in San Diego Bay to quantify fish diversity and abundance. The most comprehensive surveys of the bay have been conducted by the Vantuna Research Group (Allen et al. 2002; Williams et al. 2015 and 2016) and Martinez-Takeshita et al. (2015). These surveys have generally found much lower abundance, biomass, and diversity of fishes in the South-Central Bay than in other parts of San Diego Bay.

Note that the South-Central Bay sites sampled in these studies were across San Diego Bay from NBSD at Glorietta Bay and the Naval Amphibious Base, and probably are not representative of the fish community associated with the NBSD piers. These and other works related to fish and EFH were characterized by Merkel & Associates, Inc. (2014) and the Navy (2010).

4 ASSESSMENT OF IMPACTS AND CONSERVATION MEASURES

An adverse effect to EFH is "any impact that reduces the quality and/or quantity of EFH" (see 50 CFR § 600.910 (a) for further clarification). Potential impacts to EFH associated with the Proposed Action would occur during demolition and construction activities. Project activities may impact EFH as a result of increased noise, turbidity, shading, and other direct disturbances. A detailed description as it relates to potential impacts to species is provided below.

4.1 Noise

Pile-driving activities and use of large pile clippers (i.e., installation and removal during demolition) would generate the loudest noise levels during project implementation. In-water work associated with pile installation and removal is anticipated to occur over 250 total working days. It is anticipated that overlap between demolition and installation activities would occur over the 250-day project period (Table 4-1). Pile removal would begin on day 1 and progress at a rate of 8 piles per day, for an expected 250 days of pile removal. Pile installation is anticipated to begin after removal of one third of the piles, or approximately 83 days of pile removal, at a rate of 7 piles per day for an expected 138 days of pile installation. Pile installation is expected to periodically occur alongside ongoing pile removal activities over 138 days of the remaining 167 project days of pile removal. Because pile installation cannot continue where demolition activities are incomplete, there would be 29 days (167 days – 138 days of pile installation) where only pile removal would occur after pile installation has started. Demolition and installation activities would end on day 250. In summary, the 250-day project period would include 112 days of pile removal-only activities and 138 days of concurrent pile removal and installation activities.

For the types of piles to be driven, no sound source data from previous projects in San Diego are available, so suitable proxy sound source levels, based on the same pile sizes, types, and similar water conditions, were determined by reference to the California Department of Transportation (Caltrans) Compendium (Caltrans 2015). Table 4-2 provides these sound source levels at the standardized reference distance of 10 meters. Piles are assumed to require 600 strikes per pile, and to be installed at the rate of 7 piles per day.

Table 4-1. Activity Summary, Pile Driving and Demolition, Pier 6 Replacement Project.

Method	Pile Type	Number of Piles	Piles/ Day	Total Estimated Days
Demolition Old Pier				
Vibratory Extraction High-pressure Water Jetting Hydraulic Pile Clipper Hydraulic Chainsaw	24-inch square pre-cast concrete, 20-inch square pre-stressed/pre-cast concrete piles	1,833	**8**	**250**
	12-inch composite (timber-plastic) piles	149		
Vibratory Extraction	16-inch I-shaped steel piles	16		
	Total	**1,998**		
Construction New Pier				
Impact Pile Driving	Structural test piles	15		
	24-inch octagonal concrete structural piles	513	**7**	**138**
	Fender system test piles	4		
	24-inch square concrete primary fender piles	204		
	20-inch square concrete pile for load-out ramp cradle	4		
	16-inch fiberglass secondary and corner fender piles	226		
High-pressure Water Jetting	20- and 24-inch concrete piles	Within Above Counts		
	Total	**966**		

Note: high-pressure water jetting may be used to assist pile installation/extraction and a hydraulic cutter may be used to clip piles at the mudline.

Table 4-2. Single-Strike Underwater Noise Source Levels Modeled for Impact Pile Driving

Pile Type	*Pile Diameter*	*Peak SPL (dB re 1 µPa)*	*RMS SPL (dB re 1 µPa)*	*SEL (dB re 1 µPa²s)*
Concrete	20- and 24-inch	188	176	166
Fiberglass	16-inch	163	153	144

Source: Caltrans 2015

Notes:

All SPLs are unattenuated; single strike SEL are the proxy sources levels presented for impact pile driving and were used to calculate distances to PTS.

Abbreviations:

dB re 1 µPa = decibels referenced to a pressure of 1 microPascal (measures underwater SPL)

dB re 1 µPa²s= decibels referenced to a pressure of 1 microPascal squared per second (measures underwater SEL)

RMS = root mean square

SEL = sound exposure level

SPL = sound pressure level

Table 4-3. Single-Strike Underwater Noise Source Levels Modeled for non-Impulsive Sources

Method	*Pile Type and Size Measured*	*Used as Proxy Source Level for Pier 6 Piles*	*RMS SPL (dB re 1 μPa)*
Vibratory extraction	12-inch steel pipe	12-inch timber-plastic piles	140
	24-inch steel sheet	20-inch and 24-inch concrete piles	160
		16-inch I-shaped steel piles	
High-pressure water jetting	24x30-inch concrete	Removal of 20-inch square concrete piles	158
Underwater hydraulic chainsaw	16-inch concrete square piles	Cutting all types of piles	150
Small pile clipper	13-inch polycarbonate	Clipping 12-inch timber and plastic piles	154
Large pile clipper	24-inch square concrete	Clipping 20-inch square concrete	161

***Sources*:** 1 = Caltrans 2015, 2 = NAVFAC SW 2018
***Notes*:**
All SPLs are unattenuated
***Abbreviations*:**
dB re 1 μPa = decibels referenced to a pressure of 1 microPascal (measures underwater SPL)
RMS = root mean square

Source levels associated with non-impulsive sources, including use of a vibratory driver/extractor to loosen 24-inch and 20-inch square concrete piles, 12-inch timber-plastic piles, 16-inch I-shaped steel piles, high-pressure water jetting to loosen concrete piles, diver use of a hydraulic chainsaw to cut piles at the mudline, and the use of small and large pile clippers for the removal of piles, respectively, at 10 meters from the source are shown in Table 4-3. Data from the most similar activities reported in the Acoustic Compendium for San Diego Bay (NAVFAC SW 2018) or by Caltrans (2015) have been used as proxies for the proposed activities at Pier 6. For these purposes, the maximum RMS SPL is the only relevant criterion; peak SPLs and SELs for these types of sources would not exceed fish injury or mortality thresholds.

Thresholds for fish mortality, injury, and temporary threshold shift (TTS = temporary hearing impairment) from pile driving are shown in Table 4-4. These are the thresholds used in the *Hawaii-Southern California Training and Testing Final EIS/OEIS* (Navy 2018) and represent best available science (Popper et al. 2014). The likelihood of behavioral responses is qualitatively considered to be high within tens of meters, intermediate within hundreds of meters, and low at thousands of meters (Popper et al. 2014).

Table 4-4. Sound Exposure Criteria for Mortality, Injury, and TTS from Impact Pile Driving

Fish Hearing Group	*Onset of Mortality*		*Onset of Injury*		*TTS*	*Behavior*
	SEL_{cum}	*SPL_{peak}*	*SEL_{cum}*	*SPL_{peak}*	*SEL_{cum}*	*(150 dB RMS)*
Fishes without a swim bladder	> 219	> 213	> 216	> 213	NC	150
Fishes with a swim bladder not involved in hearing	210	> 207	203	203	> 186	150
Fishes with a swim bladder involved in hearing	207	>207	203	> 207	186	150
Fishes with a swim bladder and high-frequency hearing	207	> 207	203	> 203	186	150

Source: Navy 2018
Notes:

SEL_{cum} = Cumulative sound exposure level (decibel referenced to 1 micropascal squared seconds [dB re 1 μPa^2-s]),
SPL_{peak} = Peak sound pressure level (decibel referenced to 1 micropascal [dB re 1 μPa]), “>” indicates that the given effect would occur above the reported threshold.
TTS = Temporary Threshold Shift,
NC = effects from exposure to sound produced by impact pile driving is considered to be unlikely, therefore no criteria are reported,
> indicates that the given effect would occur above the reported threshold.

In all that follows, the base 10 logarithm is abbreviated as log. SEL_{cum} at the 10-meter source distance is calculated for impact pile driving as follows:

SEL_{cum} = Single-strike SEL + 10 log (number of strikes per day)

For each pile, 600 pile strikes per pile at 7 piles per day for a total of 4,200 strikes per day are assumed.

For non-impulsive sources, SEL_{cum} at the 10-meter source distance is calculated as:

SEL_{cum} = One-second RMS SPL + 10 log (number of seconds of operation per day)

For non-impulsive sources, up to 10 minutes (600 seconds) operation of the given piece of equipment is assumed at 8 piles per day for a total of 4,800 seconds per day per equipment piece. Table 4-5 presents the calculated SEL_{cum} values for each demolition and construction activity as well as details regarding exceedance of mortality, injury, TTS, or behavior values.

Table 4-5. SEL_{cum} Values (10 meter source distance) for Demolition and Installation Activities and Threshold Exceedances

	SEL (dB re 1 $\mu Pa^2 s$)	*RMS SPL (dB re 1 μPa)*	*SEL_{cum}*	*Onset of Mortality Exceedance*	*Onset of Injury Exceedance*	*TTS*	*Behavior*
Demolition							
12-inch timber-plastic piles		140	177	No	No	Yes	Yes
20-inch and 24-inch concrete piles		160	197	No	No	Yes	Yes
16-inch I-shaped steel piles		160	197	No	No	Yes	Yes
High-pressure water jetting		158	195	No	No	Yes	Yes
Underwater hydraulic chainsaw		150	187	No	No	Yes	Yes
Small pile clipper		154	191	No	No	Yes	Yes
Large pile clipper		161	198	No	No	Yes	Yes
Installation							
Concrete piles	166		202	No	No	Yes	Yes
Fiberglass piles	144		180	No	No	Yes	Yes

As the foregoing indicates, relatively small portions of the project area would be affected, and the effects on EFH would be temporary, limited to the duration of sound-generating activities and would not exceed any mortality or injury thresholds.

4.2 Turbidity

Turbidity is expected to increase short-term during pile installation and removal. The size and shape of the turbidity plume from pile driving and removal are difficult to quantify because of variability in naturally occurring conditions, such as wind and currents. Consequently, it is difficult to predict the specific areas that may be influenced by the plume.

Pile driving and removal activities are likely to increase turbidity in the immediate vicinity, for example when high-pressure water jetting is used. Turbidity monitoring during jetting to remove caissons for the Fuel Pier Replacement Project revealed relatively minor if any changes, with only localized decreases in water clarity that dissipated within 11 minutes or less (NAVFAC SW 2017). Pile removal and installation at the project site when jetting is employed would likely have similar effects, resulting relatively minor (local to the pile being worked on) and temporary negative effects on the quality of EFH.

4.3 Alteration of Marine Habitats and Communities

The replacement Pier 6 would shade 1.7 ha (4.1 acres) of deep subtidal habitat, an increase of 0.9 ha (2.2 acres) shaded by the existing Pier 6 and representing less than 0.1 percent of the 1,793 ha (4,431 acres) of deep subtidal habitat in San Diego Bay (Navy and POSD 2013). The deep subtidal area is muddy, lacking eelgrass or attached algae, so any effects on productivity would be negligible. To offset for the increase in shading of this deep unvegetated subtidal habitat, the Navy is will offset by using credits from the Navy Eelgrass Mitigation Bank. Enclosure 3, Pier 6 Replacement Ecological Functional Loss Analysis provides the scientific basis of the habitat conversion offset. This builds upon the methodology adopted from the NBSD Floating Dry Dock Project (MTS 2020, Merkel 2020). The total eelgrass offset for the habitat conversion is 0.014 acre from an already established Navy Eelgrass Mitigation Site.

Demolition and pile-driving activities would cause minor and short-term impacts to existing unvegetated soft-bottom benthic communities within the project area. Organisms occurring in the immediate area would be lost or displaced during demolition and construction activities, either directly by equipment and noise associated with these activities or indirectly by exposure to short-term changes in suspended sediments, turbidity, dissolved oxygen, or light diffusion. Elevated turbidity levels and associated resuspended sediments would decrease to background levels within a period of 1 hour after activities cease. Potential impacts to plankton communities could include a localized decrease in primary productivity due to reduced photosynthesis. However, sediment resuspension, increased turbidity, or chemical changes would be limited to the areas of bottom disturbance and would persist for the duration of activities. Turbidity would vary spatially based on currents and sediment grain size. Turbidity plumes from demolition pile driving are expected to persist for less than 1 hour following disturbance. Therefore, the increased turbidity would not significantly impact benthic or water column habitats in the project area.

The project area would remain as deep subtidal habitat at depths greater than -6 m (-20 ft) MLLW. As such, no permanent change in habitat would result from proposed demolition and construction. Any fish in the area would be capable of avoiding project equipment. Any impacts to marine algae and meioflora are expected to be localized, minimal, and not significant. Therefore, demolition and pile driving activities may have some adverse, but less than significant, impacts to marine life.

A survey for *Caulerpa* consistent with NMFS and California Department of Fish and Wildlife (CDFW) requirements would be conducted before initiating in-water project activities (NMFS 2008). If *Caulerpa* is found in the project area during this survey, NMFS-approved *Caulerpa* Control Protocols would be followed. Therefore, implementation of the Proposed Action would not result in significant impacts to special aquatic sites associated with the spread of *Caulerpa*.

Impacts to fish communities in the project area would be primarily associated with noise and with disturbance of bottom sediments and unvegetated soft bottom habitat during demolition and pile-driving activities. Sediment resuspension and increased turbidity would be limited to the areas of bottom disturbance and would persist for less than 1 hour following the disturbance. Fish present during project activities are capable of avoiding project equipment and areas affected by increased turbidity and increased noise from project activities. Subject to the terms and conditions identified in the project-specific Clean Water Act (CWA) Section 404 and Rivers and Harbors Act (RHA) Section 10 permits issued by the U.S. Army Corps of Engineers (USACE), precautionary measures would be implemented to minimize turbidity associated with demolition and construction activities. A turbidity threshold may be adopted or alternative measures identified during the project-specific USACE permitting process would be implemented. Impacts to fish species would be temporary and limited in nature because of the focused duration of activities. Therefore, implementation of the Proposed Action would not result in significant impacts to fish communities.

Fish species occurring in the immediate area would be displaced during project activities, either directly by equipment and noise associated with these activities or indirectly by short-term changes in suspended sediments, turbidity, dissolved oxygen, and light diffusion. Noise levels, therefore, are far below the effects thresholds discussed above. Thus, impacts to fish from underwater noise would not be significant under NEPA because of their limited geographic and temporal scale, and fish species would return to the project area following completion of project activities. Impacts to EFH under the MSFCMA are discussed below.

Four managed coastal pelagic fish species (jack mackerel, northern anchovy, Pacific mackerel, and Pacific sardine) and six managed groundfish species (curlfin sole, California scorpionfish, English sole, grass rockfish, leopard shark, and soupfin shark) have the potential to occur in the project area (Navy 2000; Allen et al. 2002; Pondella and Williams 2009a and 2009b; Williams et at. 2016). Northern anchovies and Pacific sardines can be found throughout San Diego Bay. Jack mackerels were found only on the North Bay survey area and Pacific mackerels were found at all locations except South Bay (Allen et al. 2002). All of these species are highly transient, are not tied to artificial substrates, and routinely experience turbid and noisy conditions from natural processes and ship traffic within San Diego Bay. Impacts from demolition and pile-driving activities of the Proposed Action would be the same as those described for other fish communities in the fisheries discussion above. Namely, noise associated with these activities would temporarily displace EFH species within a limited scope, although no fish would be injured. Other effects would occur from increased suspended sediments and turbidity and increased underwater noise levels from demolition and pile-driving activities. These impacts would result in minimal adverse effects per the MSFCMA and are not considered significant under NEPA.

As discussed previously, turbidity plumes would be expected to persist for less than 1 hour following disturbance. Subject to the terms and conditions in the project-specific USACE CWA Section 404 and RHA Section 10 permits, avoidance and minimization measures would be implemented to alleviate turbidity associated with project activities. Avoidance and minimization measures may include turbidity monitoring or other alternative measures developed during the USACE permitting process. A turbidity threshold would be adopted, or alternative measures identified during the project-specific USACE permitting process would be implemented.

Although the outer edges of piers support increased fish biomass, abundance, and species richness, EFH species expected to occur in the project area are highly mobile are not closely tied to artificial substrates. If present, such species would likely leave the immediate project area during demolition and pile driving, and would return when completed.

An indirect effect of the temporary reduction in invertebrate populations would be a reduction in forage base for fish and other organisms feeding on invertebrates. Nevertheless, colonization of the sands would begin almost immediately, and development of the invertebrate prey base would proceed naturally. Therefore, because of the relatively rapid recovery rates of sandy subtidal invertebrates, direct and indirect impacts to marine organisms within the replenishment site are expected to be less than significant. Further, nearshore replenishment provides beneficial beach nourishment, which is ultimately positive for marine organisms and coastal ecology. Hence, there would be minimal, short-term adverse effects on EFH from demolition and pile driving per the MSFCMA, which would not be significant under NEPA.

4.4 Consideration of Additional Conservation Measures

4.4.1 Consideration of NMFS (2013) Programmatic EFH Conservation Recommendations

Although the Programmatic EFH Consultation developed by NMFS for the USACE permitting of overwater structures in southern California waters (NMFS 2013) does not procedurally apply to the Navy, the discussion of adverse effects and proposed conservation measures have been used to serve as points of discussion and analysis to this Proposed Action:

1. Because the project area does not contain estuarine, seagrass, kelp canopy, rocky reef HAPC, or other areas of interest, there would be no negative effects to groundfish HAPC.
2. The Proposed Action would result in an additional 2.2 acres, in addition to existing shading of 1.9 acre, of shading over deep subtidal habitat. The fish community of this habitat in the south part of San Diego Bay is relatively poor in terms of the diversity and abundance of species with designated EFH (Merkel & Associates 2014).

As recommended by NMFS during the previous EFH consultation for Pier 8 replacement, the following provides the Navy's detailed consideration of the conservation recommendations developed in the Programmatic EFH Consultation for Overwater Structures (NMFS 2013). For the sake of completeness, the NMFS measures are reproduced in their entirety, followed by Navy responses in **bold**.

General Recommendations

1. All overwater structure construction (including in-kind replacement) should be required to follow eelgrass monitoring requirements put forth in the California Eelgrass Mitigation Policy (CEMP). Exceptions may be granted for areas that USACE and NMFS believe are highly unlikely to support eelgrass habitat. **Not applicable because the project area does not support eelgrass**.
2. Given the significant alteration of existing shoreline and shallow water habitats in southern California, all overwater structures should be water dependent. Proposed projects should clearly explain their water dependency and why the project is in the public's best interest. **The project is water dependent because it is not feasible to move Navy ships out of the water onto land for maintenance. The project is in the public's best interest under Title 10 of the United States Code, which requires the Navy to maintain its ships pursuant to the national defense.**
3. As part of the project application, the proponent should describe how their proposal addresses the specific conservation recommendations identified below. NMFS recognizes that not all conservation recommendations will be relevant in all situations. Therefore, the proponent should clearly articulate when a particular recommendation is not applicable to the proposed project. Based upon the project application, USACE should determine whether the project implements appropriate conservation recommendations and, therefore, can be covered by this programmatic consultation. **See measures and discussion below**.

Mooring Anchors and Persistently Moored Vessels

For all projects, the project proponent should strive to implement avoidance measures to the extent feasible. When avoidance measures are not feasible, minimization measures should be implemented:

Avoidance

1. Mooring anchors placed within suitable submerged aquatic vegetation (SAV) habitat should use midline floats to prevent chain scour to the substrate. This action will prevent adverse impacts to SAV and other benthic habitat. **Not applicable because SAV does not occur.**
2. Persistently moored vessels that are moored over SAV or rocky reef habitats with less than 18 inches between the bottom of the vessel and the substrate at low tides should utilize float stops. This action will prevent adverse grounding impacts to benthic habitat. **Not applicable because SAV and rocky reef habitats do not occur.**

Minimization

1. Mooring anchors placed within suitable SAV habitat should use midline floats to prevent chain scour to the substrate. This action will prevent adverse impacts to SAV and other benthic habitat. **Not applicable because SAV does not occur.**
2. Persistently moored vessels that are moored over SAV or rocky reef habitats with less than 18 inches between the bottom of the vessel and the substrate at low tides should utilize float stops. This action will prevent adverse grounding impacts to benthic habitat. **Not applicable because SAV and rocky reef habitats do not occur.**

Pile Removal and Installation

Minimization

1. When feasible, remove piles with a vibratory hammer rather than a direct pull or clamshell method. **The piles would be removed using a vibratory hammer, appropriately sized hydraulic pile clipper, or underwater chainsaw.**
2. Slowly remove pile to allow sediment to slough off at or near the mudline. **This action would be completed.**
3. Hit or vibrate the pile first to break the bond between the sediment and the pile to minimize the likelihood of the pile breaking and to reduce the amount of sediment sloughed. **This action would be completed.**
4. Encircle the pile with a silt curtain that extends from the surface of the water to the substrate, where appropriate and feasible. **This action is not proposed because currents are weak in the Pier 6 area: speeds range from 5 cm per second near the quay wall to 10 to 15 cm per second between the piers. Sediments resuspended by pier removal/installation and construction vessel movements would settle out around the nearby Navy piers, where sediment and marine water quality conditions are similar to those at Pier 6 (i.e., industrial marine facilities where water and sediments are not pristine).**
5. If contaminated sediment occurs in the footprint of the proposed project, cap all holes left by the piles with clean native sediments. **This action is not proposed because the holes would fill rapidly as a result of (1) inward collapse of the unconsolidated sediments as pile is removed; and (2) filling of the residual volume by sediment dispersed through the project area by the continuing project activities as well as tidal currents.**
6. Drive piles during low tide periods when substrates are exposed in intertidal areas. This action minimizes the direct impacts to fish from sound waves and minimizes the amount of sediments resuspended in the water column. **Not applicable because all of the piles are in deep water.**
7. Use a vibratory hammer to install piles, when possible. Under those conditions where impact hammer are required (i.e., substrate type and seismic stability) the pile should be driven as deep as possible with a vibratory hammer prior to the use of the impact hammer. This action will minimize noise impacts. **A vibratory hammer or high pressure water jetting would be used whenever dictated by the engineering analysis and considerations of time and cost, taking into account the substrate, drivability of the pile type by impact versus vibratory, and capacity requirements. The contractor would have discretion on when to switch to impact hammering. In particular, piles installed by vibratory driver generally need to be "proofed" by impact driving to ensure bearing capacity requirements are met. It is appropriate for the contractor to determine what is the appropriate depth for vibratory driving, allowing the pile to be finished by impact driver.**

Pile Supported Over-Water Structures

For all projects, the project proponent should strive to implement avoidance measures to the extent feasible. When avoidance measures are not feasible, minimization measures should be implemented:

Avoidance

1. To the maximum extent practicable, site overwater structures in areas not occupied by or determined to be suitable for sensitive habitat (e.g., SAV, salt marsh, intertidal flats). **Sensitive habitats are not present in the project area.**
2. Any cross or transverse bracing should be placed above the mean higher high water (MHHW) to avoid impacts to water flow and circulation. **Does not apply.**

Minimization:

1. Minimize, to the maximum extent practicable, the footprint of the overwater structure. The overwater structure should be the minimum size necessary to meet the water-dependent purpose of the project. **The proposed new pier design is the minimum design required to meet the purpose and need.**
2. Design structures in a north-south orientation, to the maximum extent practicable, to minimize persistent shading over the course of a diurnal cycle. **Not feasible.**
3. For residential dock and pier structures, the height of the structure above water should be a minimum of 5 feet above MHHW. **Not applicable.**
4. For residential dock and pier structures, the width of the structure should be limited to a maximum of 4 feet wide. Exceptions may be provided to comply with the Americans with Disabilities Act. **Not applicable.**
5. For residential dock and pier structures, one turnaround is permitted not exceeding 10 feet long and 6 feet wide, or 60 square feet. The turnaround is intended to accommodate efficient unloading/loading of boating equipment and is not intended to be used for non-water-dependent uses. **Not applicable.**
6. For residential dock and pier structures, a terminal platform should not exceed 5 feet long by 20 feet wide, or 100 square feet. **Not applicable.**
7. Extend the structure's terminal platform into nearest adjacent deep water to minimize the need for dredging and to minimize the likelihood of boat grounding, propeller scar/scour in shallow water habitat. **The project is in deep water that is already maintained by dredging; no dredging is proposed as part of the project.**
8. Use the fewest number of piles practicable for necessary support of the structure to minimize pile shading, substrate impacts, and impacts to water circulation. Pilings should be spaced a minimum of 10 feet apart on center. **The project design is dictated by engineering and safety requirements for a pier of this size and use.**
9. Gaps between deck boards should be a minimum of 1/2 inch. If the overwater structure is placed over SAV or salt marsh habitat, 1-inch deck board spacing or use of light transmitting material with a minimum of 40 percent transmittance should be used. Exceptions may be provided to comply with the Americans with Disabilities Act. **Not applicable.**

10. The use of floating dock structures should be minimized to the extent practicable and should be restricted to terminal platforms placed in the deepest water available at the project site. **The project site is in deep water maintained by dredging.**
11. Incorporate materials into the overwater structure design to maximize light transmittance. When suitable SAV habitat is within the project vicinity, appropriate grating should be used to permit sufficient light for SAV production. **Not applicable because of the depth of water under the pier, and not practicable because a solid concrete deck is needed to support loads on the pier deck.**

4.4.2 Additional Proposed Measures Adapted From Pier 8

To reduce and avoid the potential impacts to FMP species, the following measures would be implemented to minimize impacts:

- A cable net and floating boom would be used to capture debris that falls into the water during pier demolition. Such debris would be collected and disposed of onshore.
- Spill kits and cleanup materials would be present during construction should there be a leak into the surrounding water.
- The contractor would use only clean construction materials suitable for use in the oceanic environment. The contractor would ensure that no debris, soil, silt, sand, sawdust, rubbish, cement or concrete washings thereof, chemicals, oil, or petroleum products from construction would be allowed to enter into or placed where it may be washed by rainfall or runoff into waters of the U.S. Upon completion of the project authorized, any and all excess material or debris would be completely removed from the work area and disposed of in an appropriate upland site.
- All debris would be transported to, and disposed of, at an appropriate upland disposal site, or recycled, if appropriate.
- During project implementation, the Navy would regularly monitor construction activities to ensure that no deviations from the project as described herein are occurring. The Navy would report any violation of authorized impacts to NMFS within 24 hours of occurrence.

4.5 Conclusion

As described in the effects analysis above, the Navy has determined that the project may have relatively minor but adverse temporary and permanent effects on EFH for federally managed fish species within the Coastal Pelagic Species and Pacific Coast Groundfish FMPs. Habitat conversion offset in the form of eelgrass credit from an established Navy Eelgrass Mitigation Site will be used to account for the functional loss of unvegetated deep subtidal.

5 References

Allen, L.G., A.M. Findlay, and C.M. Phalen. 2002. Structure and Standing Stock of the Fish Assemblages of San Diego Bay, California from 1994-1999. Bulletin of the Southern California Academy of Sciences 101:49-85.

California Department of Transportation (Caltrans). 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. November.

Carlisle, A. & Smith, S.E. 2009. Triakis semifasciata. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.1 <www.iucnredlist.org>. Downloaded on 13 June 2014.

Dickerson, C., K.J. Reine, and D.G. Clarke. 2001. Characterization of Underwater Sounds Produced by Bucket Dredging Operations. DOER Technical Notes Collection (ERDC TN-DOER-E14). U.S. Army Engineer Research and Development Center, Vicksburg, MS. Available at: www.wes.army.mil/el/dots/doer.

Eschmeyer, W.N., E.S. Herald ,and H. Hammann. 1983. A field guide to Pacific coast fishes of North America. Boston (MA, USA): Houghton Mifflin Company. xii+336 pp.

Fairey, R., C. Bretz, S. Lamerdin, J. Hunt, B. Anderson, S. Tudor, C. Wilson, F. LaCaro, M. Stephenson, M. Puckett, and E. Long. 1996. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay region. Final Report Prepared by California State Water Resources Control Board, NOAA, California Department of Fish and Game, Moss Landing Marine Laboratories, and University of California, Santa Cruz. September.

Fairey, R., J. Downing, C. Roberts, E. Landrau, J. Hunt, B. Anderson, C. Wilson, G. Kapahi, F. LaCaro, P. Michael, M. Stephenson, and M. Puckett. 1998. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. Final Report Prepared by California State Water Resources Control Board, NOAA, California Department of Fish and Game, Moss Landing Marine Laboratories, and University of California, Santa Cruz. September.

Jones, D., Marten, K. and Harris, K. 2015. Underwater Sound from Dredging Activities: Establishing Source Levels and Modeling the Propagation of Underwater Sound. CEDA Dredging Days 2015: Innovative Dredging Solutions for Ports, Rotterdam, The Netherlands.

Kramer, S. H. 1991. The shallow-water flatfishes of San Diego County. CalCOFI Reports 32:128-142.

Leet, W., C. Dewees, R. Klingbeil, and E. Larson (Eds.) 2001. California's Living Marine Resources: A Status Report. California Department of Fish and Game Publication SG01-11, Sacramento, California.

Marine Taxonomic Services, LTD. 2020. Bay Habitat Mitigation Planning for Commercial Out Lease of a Floating Dry Dock at the MGVW Maintenance Piers in San Diego Bay, California.

Martinez-Takeshita, N., Graham, S.E., and Bredvik, J.J. 2015. San Diego Bay Fisheries Inventory and Utilization for April and July 2014. Prepared for Commander, Naval Installation Command. Submitted to Naval Facilities Engineering Command Southwest, California, October 2015.

Merkel & Associates, Inc. 2014. Draft Wharf Shading Study for the Pier 8 Replacement and Demolition Project, Naval Base San Diego. Prepared for NAVFAC SW. Prepared November 2013, revised March 2014.

Merkel & Associates, Inc. 2017. San Diego Bay Eelgrass Inventory.

National Marine Fisheries Service (NMFS). 2008. Caulerpa Control Protocol Version 4 - February 25, 2008. Available at: https://www.westcoast.fisheries.noaa.gov/publications/habitat/caulerpa_taxifolia/caulerpa_control_protocol_4.pdf.

NMFS. 2013. Essential Fish Habitat Programmatic Consultation for Overwater Structures between the National Oceanic and Atmospheric Administration's National Marine Fisheries Service and the United States Army Corps of Engineers, South Coast Branch, Los Angeles District.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 2000. San Diego Bay Integrated Natural Resources Management Plan. And San Diego Unified Port District. San Diego, CA. September.

NAVFAC SW. 2010. Characterization of Essential Fish Habitat in San Diego Bay. PHASE 2: Qualitative Habitat Characterization and Mapping Report. Coastal IPT. Prepared by Merkel & Associates, Inc. September.

NAVFAC SW. 2017. Monitoring Report for the Fuel Pier Replacement Project (P-151), Naval Base Point Loma, San Diego, CA. Appendix A: Turbidity Monitoring.

NAVFAC SW. 2018. Compendium of Underwater and Airborne Sound Data from Pile Driving and Demolition Activities in San Diego Bay. August.

NAVFAC SW. 2019a. DD1391 for Pier 6, San Diego, CA, NBSD. Project P443.1. 1 March.

NAVFAC SW. 2019b. FY20 MILCON Project P-443. DD1391 Cost Estimate. Prepared by Pacific Cost Engineering, LLC. 17 February.

NAVFAC SW. 2019c. FY2020 P443 MILCON Planning Validation Pier 6 Replacement. 1391 Figures. 1 March.

NAVFAC SW. 2019d. Personal communication via email with Mr. Alberto Sanchez regarding the number of existing piles. 8 July.

NAVFAC SW. 2019e. Personal communication via email with Mr. Alberto Sanchez regarding the length of the new piles. 8 July.

NAVFAC SW and Unified Port of San Diego (POSD). 2013. San Diego Bay Integrated Natural Resources Management Plan, Draft. San Diego, California. Prepared by Tierra Data Inc., Escondido, California. March.

Nightingale, B. and C.A. Simenstad. 2001. Overwater structures: marine issues. White Paper Research Project T1803, Task 35. WSDOT.

Pacific Fishery Management Council (PFMC). 2005. Essential Fish Habitat West Coastal Groundfish Appendix B. PFMC, Portland, OR. November.

PFMC. 2006. Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2007-2008 Pacific Coast Groundfish Fishery and Amendment 16-4 Rebuilding Plans. Final Environmental Impact Statement. [http://www.pcouncil.org/groundfish/gfspex/gfspex07-08.html]. Pacific Management Fishery Council. 2130 SW Fifth Avenue, Suite 224, Portland, Oregon.

PFMC. 2016a. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. PFMC, Portland, OR. August.

PFMC. 2016b. Pacific Coast Salmon Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California as Revised Through Amendment 19. PFMC, Portland, OR. March.

PFMC. 2018. Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species as Amended Through Amendment 5. PFMC, Portland, OR. April.

PFMC. 2019a. Coastal Pelagic Species Fishery Management Plan as Amended Through Amendment 15. PFMC, Portland, OR. June.

PFMC. 2019b. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. Appendix B Part 2. Groundfish Essential Fish Habitat and Life History Descriptions, Habitat Use Database Description, and Habitat Suitability Probability Information. PFMC, Portland, OR. June.

Pondella, D. J., II, J. Froeschke and B. Young. 2006. Fisheries Inventory and Utilization of San Diego Bay, San Diego California for surveys conducted in April and July 2005. 103 pp.

Pondella, D.J. and J.P. Williams. 2009a. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in April and July 2008. Vantuna Research Group - Moore Laboratory of Zoology, Occidental College. February.

Pondella, D.J. and J.P. Williams. 2009b. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in June 2009. Vantuna Research Group - Moore Laboratory of Zoology, Occidental College. June.

Popper, A. N., A. D. Hawkins, R. R. Fay, D. A. Mann, S. M. Bartol, T. J. Carlson, S. Coombs, W. T. Ellison, R.L. Gentry, M. B. Halvorsen, S. Løkkeborg, P. H. Rogers, B. L. Southall, D. G. Zeddies, and W. N. Tavolga. 2014. *ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI*. New York, NY and London, United Kingdom: Acoustical Society of America Press and Springer Briefs in Oceanography.

Robbins, E.A. 2006. Essential Fish Habitat in Santa Monica Bay, San Pedro Bay, and San Diego Bay: A Reference Guide for Managers. Masters project submitted in partial fulfillment of the requirements for the Master of Environmental Management degree in the Nicholas School of the Environment and Earth Sciences of Duke University.

Ruiz, G.M. and Geller, J. 2015. Spatial and temporal analysis of marine invasions in California: morphological and molecular comparisons across habitats. Final Report Submitted to: Office of Spill Prevention and Response, Marine Invasive Species Program, California Department of Fish and Wildlife.

Tierra Data, Inc. 2010. Characterizing the Spatial and Temporal Variation in Turbidity and Physical Water Quality Characteristics in San Diego Bay – A Study to Determine a Cost-Efficient Strategy for Long-term Monitoring. A Project for: Environmental Project to Benefit San Diego Bay San Diego Unified Port District Environmental Services Department. Final Report. Available at; http://www.portofsandiego.org/environment/projects-a-progress-reports.html

United States Department of the Navy (Navy). 2010. Characterization of Essential Fish Habitat in San Diego Bay.

Navy. 2011. Silver Strand Training Complex Environmental Impact Statement.

Navy. 2014a. Final Naval Base San Diego Integrated Natural Resources Management Plan. June.

Navy. 2014b. Final Environmental Assessment of Piers 5000, 5002 and Pier 5002 Approach Channel Dredge, Naval Base Point Loma, San Diego, California. September.

Navy. 2016. Final Environmental Assessment Pier 8 Replacement Naval Base San Diego. June.

Navy. 2018. Final Environmental Impact Statement/Overseas Environmental Impact Statement for Hawaii-Southern California Training and Testing.

Navy and Port of San Diego (POSD). 2000. San Diego Bay Integrated Natural Resources Management Plan. San Diego, CA. September.

Navy and POSD. 2013. San Diego Bay Integrated Natural Resources Management Plan.

Williams, J.P., D.J. Pondella, C.M. Williams, S. Schwab. 2015. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California For Surveys Conducted in April and July 2015.

Williams, J.P., D.J. Pondella, C.M. Williams, and M.J. Robart. 2016. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California For Surveys Conducted in April and July 2016.

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October 8, 2020
M&A #14-075-38

Mr. Sean Suk
Natural Resources Specialist
Naval Facilities Engineering Command Southwest
937 N Harbor Dr., Building 1, 3rd Floor
San Diego, CA 92132

RE: NBSD Pier 6 Replacement Project Ecological Functional Loss Analysis and Potential for Offsetting Mitigation Employing the NEMS Bank, or New Eelgrass Restoration

Dear Sean,

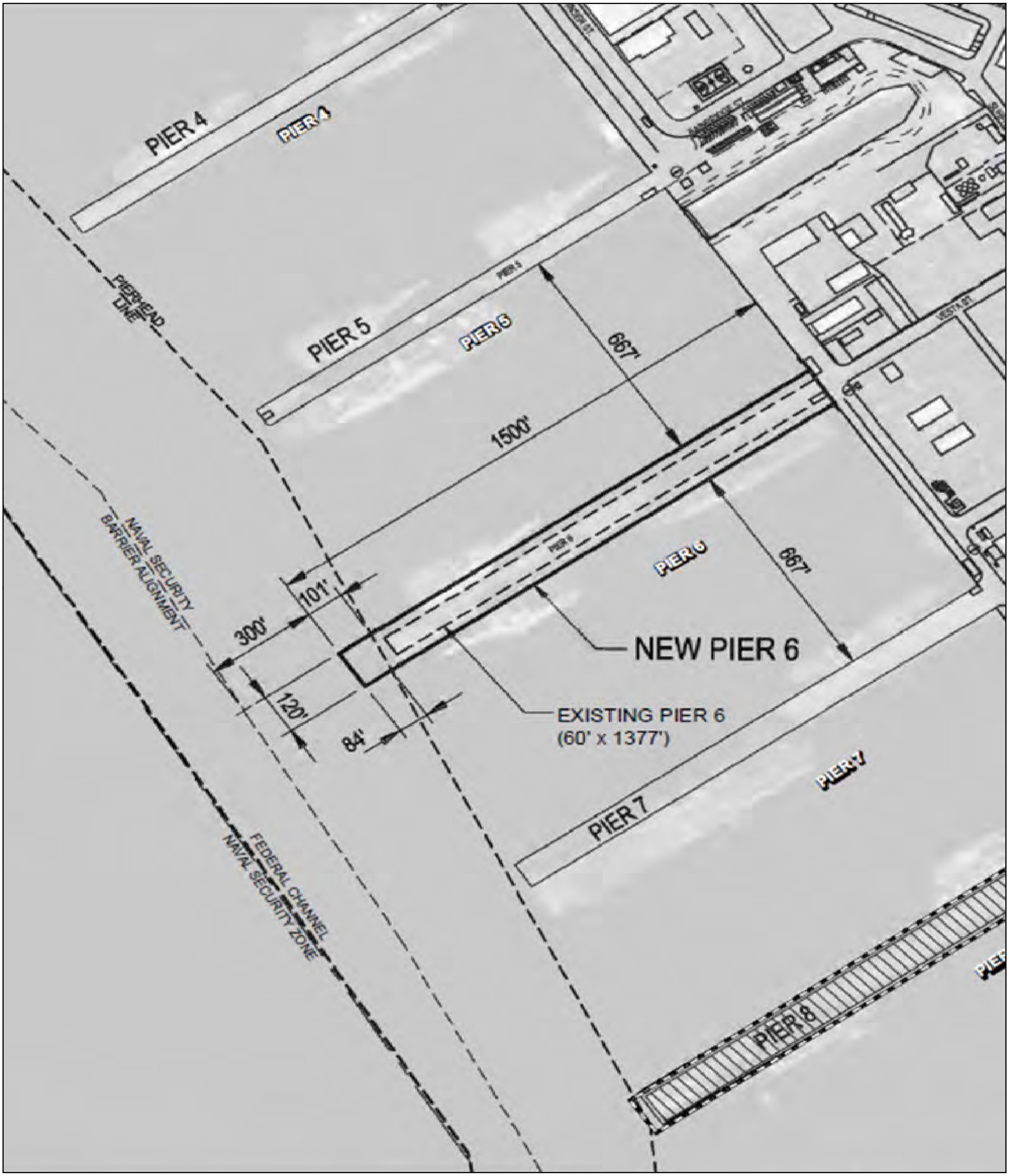
This letter is to transmit information regarding the quantification of anticipated functional loss associated with the proposed Navy Base San Diego (NBSD) Pier 6 Replacement Project (Project), and to identify the means of offsetting ecological impacts through eelgrass habitat development.

Background

Naval Base San Diego (NBSD) is planning the replacement of Pier 6, a functionally obsolete and operationally constrained pier that is limited by utilities capacity, load restrictions, and inadequate deck size to support current and projected ship berthing operations. The Navy proposes to replace Pier 6 with a new conventional concrete single deck pier that is expanded from the existing 60 foot pier width to a new 120 foot width. In addition, the pier would be increased in length to 1,500 feet from the present 1,377 foot present length (Figure 1). The pier surface area of Pier 6 would be increased from approximately 1.9 acres to approximately 4.1 acres, adding 2.2 acres of new deep harbor coverage via the pier structure. With pier fendering systems the existing pier is estimated to be just over 2.2 acres and the new proposed expanded pier would be just less than 4.7 acres.

The Project would be positioned along much the same alignment as the present Pier 6 and would cover waters ranging in depth from 0 feet MLLW at the quay wall under the existing pier down to a depth of -40 feet at deeper points within the existing berths (Figure 2). No new dredging is proposed in association with the Pier 6 replacement.

The proposed project would include demolition of the existing Pier 6 and construction of the new pier over an estimated 745 days of work. Construction period impacts have been separately addressed through identification of Best Management Practices and avoidance/minimization measures to be implemented during construction. These measures are not addressed within this analysis that focuses only on the expansion of bay coverage. The project area supports no eelgrass (Merkel & Associates 2018) or other sensitive biological resources and as such this analysis is restricted to consideration only of the function habitat value reduction in unvegetated soft bottom habitat and water column conditions under the expanded footprint of Pier 6.



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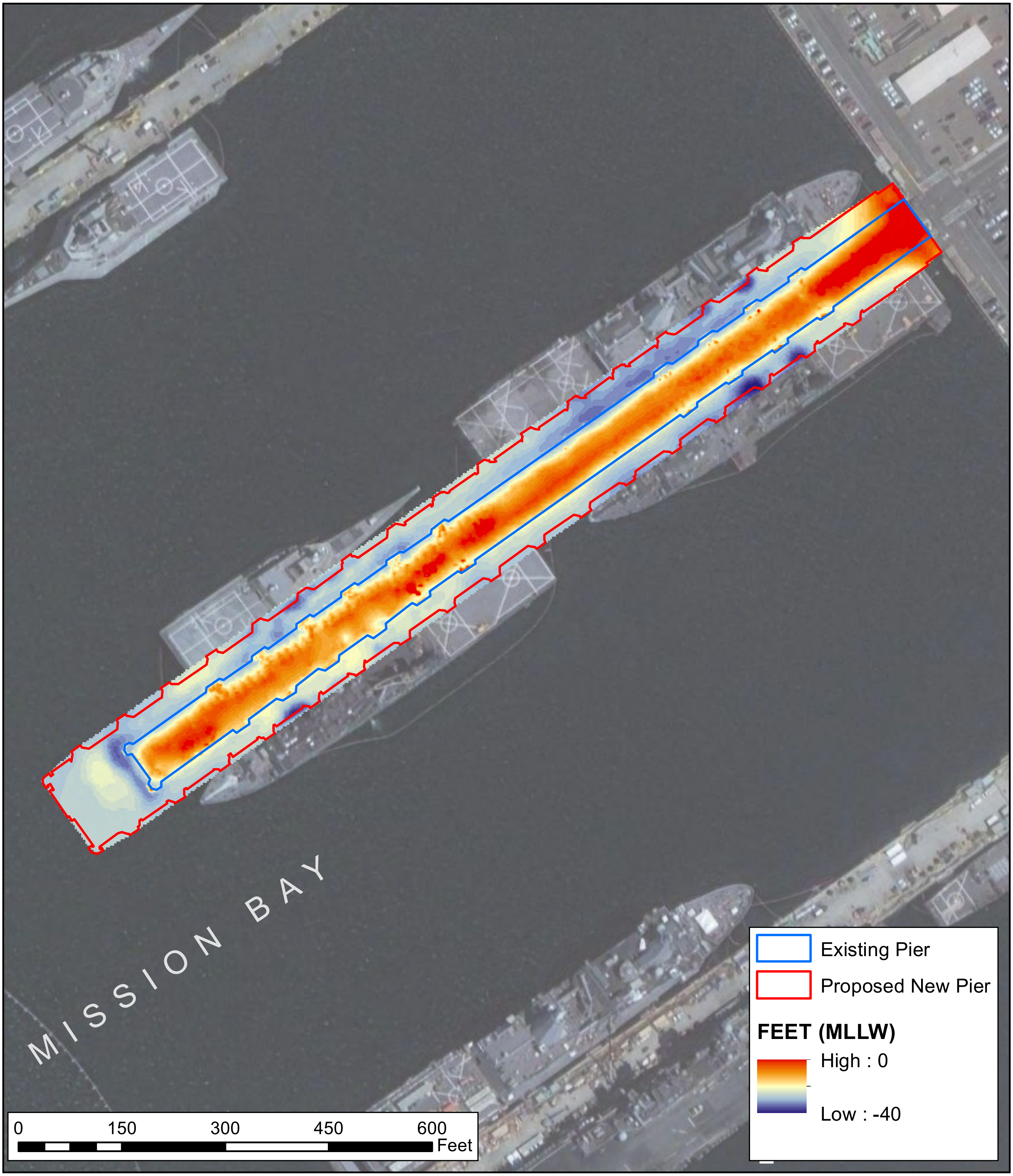
Schematic Footprint Changes Associated with the Proposed NBSD Pier 6 Replacement

Naval Base San Diego Pier 6 Replacement Project
San Diego Bay, California

Figure 1

Merkel & Associates, Inc.



Proposed Changes in Bay Coverage Over Bathymetric Range

Naval Base San Diego Pier 6 Replacement Project
San Diego Bay, California

Figure 2

Assessment Methods and Results

The analysis method follows that applied to the Navy Base San Diego (NBSD) Mole Pier Floating Dry Dock and the Marine Group Boat Works (MGBW) Maintenance Piers Floating Dry Dock projects (Merkel & Associates 2020a and 2020b, MTS 2020). This document provides the analyses of the impacts of bay coverage associated with the Pier 6 replacement project and recommends mitigation through eelgrass habitat restoration or credit debiting from an existing Navy Eelgrass Mitigation Site (NEMS) from the Navy's Eelgrass Mitigation Bank.

The loss of ecological value with increasing depth has been noted in prior impact assessments and mitigation programs within developed bays. Differing value of habitat by depth range is also recognized in the San Diego Bay Integrated Natural Resource Plan (INRMP; U.S. Navy and Port of San Diego 2013). In most instances, the difference in value by depth is reflected as functional lift being generated by increasingly shallow submergence in subtidal environments. Thus, shallow water is considered to be of greater ecological value than deep water. This is principally related to increasing benthic primary productivity at shallow depths, increasing circulation due to wave and swell surge influence, and increasing temperature in shallow waters. For the change in ecological value with depth, a relationship was drawn from an ecological investigation conducted in at the Port of Los Angeles Cabrillo Shallow Water Habitat (CSWH) to explore the likely ecological lift garnered through raising the bay floor from -51 feet to an elevation of -15 feet MLLW (Merkel & Associates 2019) and then contemplating the reciprocal loss of ecological value with increasing depth (MTS 2020). While the analysis is not perfect, in that it omits the value garnered through changing the nature of the substrate from mud to sand, this shortcoming is offset by applying a highly conservative simple linear relationship for value change over depth rather than a more likely exponential or power function that would be expected to show more pronounced loss of function with increasing depth in shallow waters and asymptotically diminished difference in values expressed at the deeper harbor elevations. By applying the relationship found in Merkel & Associates (2019), the ecological value was calculated to be diminished by 2.56 percent for every foot of depth increase (Merkel & Associates 2000a and MTS 2020).

Ecological Function Loss/Gain Associated with Habitat Type Conversion

The proposed project would not result in any habitat type conversions. The site is dominated by soft bottom habitat with an armored shoreline. There is no eelgrass habitat within the project area (Merkel & Associates 2018). The area supports no other sensitive or unique habitat types.

Ecological Function Loss/Gain Associated with Change in Depth

All change analysis has been based on the bathymetry derived from the 2014 condition survey (M&A and CLE Engineering 2015). While the bay floor in this location is subject to recurrent maintenance dredging, the proposed Project would not include any new deepening. As such, the pre-project and post-project depth distribution within the Project footprint would remain unchanged and the depth change would be zero. As a result, the project would not experience any gains or losses associated with changing bay floor elevations (Table 1).

Table 1. Pier 6 Replacement Change in Elevation and Benthic Shading Functional Loss Analysis

Project Area Change Over Depth					Change in Depth Based Lift/Loss				Benthic Shading Adjusted Lift/Loss		Subtotal
Elevation (Ft MLLW)	Existing Area Shaded (sf)	Proposed Area Shaded (sf)	Proposed Depth Change (sf)	Shading Increase (sf)	Depth Relative Lift	Area Adjusted Lift (proposed)	Area Adjusted Lift (existing)	Area Adjusted Lift Change	Shading Depth Correction (ft)	Area Adjusted Benthic Shading Loss/Lift	Change in Depth + Benthic Shading Loss/Lift
0	27	27	0	0	2.306	0.000	0.000	0.000%	-17	0.000%	**0.000%**
-1	9	9	0	0	2.280	0.000	0.000	0.000%	-17	0.000%	**0.000%**
-2	54	54	0	0	2.254	0.001	0.001	0.000%	-17	0.000%	**0.000%**
-3	81	81	0	0	2.229	0.001	0.001	0.000%	-17	0.000%	**0.000%**
-4	81	81	0	0	2.203	0.001	0.001	0.000%	-17	0.000%	**0.000%**
-5	180	180	0	0	2.178	0.002	0.002	0.000%	-17	0.000%	**0.000%**
-6	261	261	0	0	2.152	0.003	0.003	0.000%	-17	0.000%	**0.000%**
-7	396	396	0	0	2.126	0.004	0.004	0.000%	-17	0.000%	**0.000%**
-8	963	999	0	36	2.101	0.010	0.010	0.000%	-17	-0.008%	**-0.008%**
-9	1278	1278	0	0	2.075	0.013	0.013	0.000%	-17	0.000%	**0.000%**
-10	1161	1170	0	9	2.050	0.012	0.012	0.000%	-17	-0.002%	**-0.002%**
-11	1431	1485	0	54	2.024	0.015	0.015	0.000%	-17	-0.012%	**-0.012%**
-12	1917	1989	0	72	1.998	0.020	0.020	0.000%	-17	-0.015%	**-0.015%**
-13	1782	1971	0	189	1.973	0.019	0.019	0.000%	-16	-0.038%	**-0.038%**
-14	2601	2997	0	396	1.947	0.029	0.029	0.000%	-15	-0.075%	**-0.075%**
-15	5346	6021	0	675	1.922	0.057	0.057	0.000%	-14	-0.119%	**-0.119%**
-16	8253	8658	0	405	1.896	0.081	0.081	0.000%	-13	-0.066%	**-0.066%**
-17	8982	9243	0	261	1.870	0.085	0.085	0.000%	-12	-0.039%	**-0.039%**
-18	7713	8001	0	288	1.845	0.073	0.073	0.000%	-11	-0.040%	**-0.040%**
-19	7191	7461	0	270	1.819	0.067	0.067	0.000%	-10	-0.034%	**-0.034%**
-20	6570	6840	0	270	1.794	0.060	0.060	0.000%	-9	-0.031%	**-0.031%**
-21	5571	5814	0	243	1.768	0.051	0.051	0.000%	-8	-0.025%	**-0.025%**
-22	5418	5832	0	414	1.742	0.050	0.050	0.000%	-7	-0.037%	**-0.037%**
-23	4833	5508	0	675	1.717	0.047	0.047	0.000%	-6	-0.051%	**-0.051%**
-24	4887	5562	0	675	1.691	0.046	0.046	0.000%	-5	-0.043%	**-0.043%**
-25	4437	5850	0	1413	1.666	0.048	0.048	0.000%	-4	-0.071%	**-0.071%**
-26	3564	6579	0	3015	1.640	0.053	0.053	0.000%	-3	-0.114%	**-0.114%**
-27	2709	8604	0	5895	1.614	0.068	0.068	0.000%	-2	-0.149%	**-0.149%**
-28	2358	12159	0	9801	1.589	0.095	0.095	0.000%	-1	-0.124%	**-0.124%**
-29	2358	18099	0	15741	1.563	0.139	0.139	0.000%	0	0.000%	**0.000%**
-30	1881	23967	0	22086	1.538	0.181	0.181	0.000%	0	0.000%	**0.000%**
-31	1179	16731	0	15552	1.512	0.125	0.125	0.000%	0	0.000%	**0.000%**
-32	576	11142	0	10566	1.486	0.082	0.082	0.000%	0	0.000%	**0.000%**
-33	135	8847	0	8712	1.461	0.064	0.064	0.000%	0	0.000%	**0.000%**
-34	9	5787	0	5778	1.435	0.041	0.041	0.000%	0	0.000%	**0.000%**
-35	0	2034	0	2034	1.410	0.014	0.014	0.000%	0	0.000%	**0.000%**
-36	0	567	0	567	1.384	0.004	0.004	0.000%	0	0.000%	**0.000%**
-37	0	333	0	333	1.358	0.002	0.002	0.000%	0	0.000%	**0.000%**
-38	0	252	0	252	1.333	0.002	0.002	0.000%	0	0.000%	**0.000%**
-39	0	117	0	117	1.307	0.001	0.001	0.000%	0	0.000%	**0.000%**
-40	0	90	0	90	1.282	0.001	0.001	0.000%		0.000%	**0.000%**
Totals	**96192**	**203076**	**0**	106884	NA	1.66	1.66	**0.000%**	**NA**	**-1.091%**	**-1.091%**

Existing Pier 6 Bay Coverage	**2.208**	**acres**
Proposed Pier 6 Coverage	**4.662**	**acres**
Net Increase in Bay Coverage	**2.454**	**acres**

Change in Depth Area	0.000	acres
Depth Based Change in Function	0.000%	
Habitat Loss Equivalency	0.000	acres
New Pier Benthic Shading Area	2.454	acres
Shading Based Change In Function	-1.091%	
Habitat Loss Equivalency	-0.027	acres
Total Habitat Loss Equivalency	**-0.027**	**acres**

Ecological Function Loss/Gain in Benthic Habitat Associated with Pier Shading

Concurrent with the reduction in value associated with increasing site depth, bay coverage diminishes light levels and would be expected to reduce productivity of a covered site where photosynthesis supports primary productivity. However, as light extinction occurs with increasing depth, eventually the photo-compensation point is reached where photosynthesis just balances respiration. Below this depth, the ambient light environment is too low to support photosynthetically derived primary productivity and increasing shading is no longer a factor relative to changing habitat function. MTS (2020) explored this relationship from photosynthetically active radiation (PAR) data collected in San Diego Bay by Merkel & Associates in 2004 and determined that light diminished along an exponential attenuation curve such that by 29 feet of depth in the central bay, light levels were less than 1 percent of surface light as measured at channel marker 28 approximately 0.3 miles off the tip of Pier 6 (Merkel & Associates, unpublished data). This is typically considered to be the approximate photo-compensation point below which photosynthesis would not be a factor to ecological function as it just balances respiration.

To evaluate the effects of bay coverage by the Pier 6 replacement project, we only considered new bay coverage and omitted coverage of the new pier that would be coincident with the existing pier. The footprint of the proposed new pier was overlain over the existing bathymetry to determine the impact of light reduction by shading that would occur. Shading impacts were determined by assuming functional equivalency of shaded areas with those at depth that would have comparable light levels absent water surface covering as derived at channel marker 28. The analysis methodology is described in MTS (2020). Notably, however, nearly all of the new shading is anticipated to occur in waters already dredged for berthing and which are thus typically deeper than -29 feet (Figure 2 and Table 1). As a result, the shading of the bottom as a result of pier expansion is expected to have limited effect on benthic environment functions with the majority of the most substantive effects on benthic productivity occurring within the narrow shallow slope below the quay wall. Because the majority of the expansion area is in waters below the photo-compensation depth, the percent reduction in benthic productivity is extremely small (Table 1).

Ecological Function Loss/Gain in the Water Column Associated with Pier Shading

The original analyses completed for the dry dock projects focused on benthic habitat functional impact (MTS 2020, Merkel & Associates 2020a). However, following coordination with the Navy and National Marine Fisheries Service, a supplemental analyses was prepared that addressed water column shading elements not captured in the original analyses. As with the benthic effects discussion above, the methodology for assessment of water column functional loss associated with shading relies on the methodology of this prior analysis as articulated in the supplemental document for the dry dock projects (Merkel & Associates 2020b).

This element of the productivity loss calculation considers the loss of primary productivity within the water mass due to shading of the pier. Phytoplankton, which forms the lowest trophic level in the water column, would be affected by shading of an over water structure. While most plankton passing beneath the structure would not be killed by reduction of photosynthesis for the period they are beneath the pier, the net productivity can be considered as photosynthesis foregone. The integration of this reduction in productivity over time would be expected to be equal to the productivity of plankton within a volume of water equal to that under the pier and which is reduced in productivity with depth as photosynthetically active radiation attenuates (Table 2).

Table 2. Pier 6 Replacement Change in Water Column Shading Functional Loss Analysis

Project Area Change Over Depth					Water Column Shading Lift/Loss					
Elevation (Ft MLLW)	Existing Area Shaded (sf)	Proposed Area Shaded (sf)	Proposed Depth Change (sf)	Shading Increase (sf)	New Water Column Volume Shaded (ft^3)	Depth Corrected Volume Shaded (ft^3)	Light Decay	Plankton Stock (g C ft^3)	Plankton Loss (g C)	Equivalent Z. marina (ft^2)
0	27	27	0	0	0	89302	1.0000	0.0042	-379.312	-84.010
-1	9	9	0	0	0	89302	1.0000	0.0042	-379.312	-84.010
-2	54	54	0	0	0	89302	1.0000	0.0042	-379.312	-84.010
-3	81	81	0	0	0	89015	0.8513	0.0036	-321.868	-71.287
-4	81	81	0	0	0	88701	0.7247	0.0031	-273.037	-60.472
-5	180	180	0	0	0	88327	0.6169	0.0026	-231.454	-51.262
-6	261	261	0	0	0	87806	0.5252	0.0022	-195.873	-43.382
-7	396	396	0	0	0	87209	0.4471	0.0019	-165.611	-36.680
-8	963	999	0	36	252	85830	0.3806	0.0016	-138.754	-30.731
-9	1278	1278	0	0	0	82313	0.3240	0.0014	-113.280	-25.089
-10	1161	1170	0	9	81	73812	0.2758	0.0012	-86.475	-19.152
-11	1431	1485	0	54	540	69579	0.2348	0.0010	-69.394	-15.369
-12	1917	1989	0	72	792	64215	0.1999	0.0008	-54.520	-12.075
-13	1782	1971	0	189	2268	48435	0.1702	0.0007	-35.007	-7.753
-14	2601	2997	0	396	5148	6009	0.1449	0.0006	-3.697	-0.819
-15	5346	6021	0	675	9450	0	0.1233	0.0005	0.000	0.000
-16	8253	8658	0	405	6075	0	0.1050	0.0004	0.000	0.000
-17	8982	9243	0	261	4176	0	0.0894	0.0004	0.000	0.000
-18	7713	8001	0	288	4896	0	0.0761	0.0003	0.000	0.000
-19	7191	7461	0	270	4860	0	0.0648	0.0003	0.000	0.000
-20	6570	6840	0	270	5130	0	0.0551	0.0002	0.000	0.000
-21	5571	5814	0	243	4860	0	0.0469	0.0002	0.000	0.000
-22	5418	5832	0	414	8694	0	0.0400	0.0002	0.000	0.000
-23	4833	5508	0	675	14850	0	0.0340	0.0001	0.000	0.000
-24	4887	5562	0	675	15525	0	0.0290	0.0001	0.000	0.000
-25	4437	5850	0	1413	33912	0	0.0246	0.0001	0.000	0.000
-26	3564	6579	0	3015	75375	0	0.0210	0.0001	0.000	0.000
-27	2709	8604	0	5895	153270	0	0.0179	0.0001	0.000	0.000
-28	2358	12159	0	9801	264627	0	0.0152	0.0001	0.000	0.000
-29	2358	18099	0	15741	440748	0	0.0129	0.0001	0.000	0.000
-30	1881	23967	0	22086	640494	0	0.0110	0.0000	0.000	0.000
-31	1179	16731	0	15552	466560	0	0.0000	0.0000	0.000	0.000
-32	576	11142	0	10566	327546	0	0.0000	0.0000	0.000	0.000
-33	135	8847	0	8712	278784	0	0.0000	0.0000	0.000	0.000
-34	9	5787	0	5778	190674	0	0.0000	0.0000	0.000	0.000
-35	0	2034	0	2034	69156	0	0.0000	0.0000	0.000	0.000
-36	0	567	0	567	19845	0	0.0000	0.0000	0.000	0.000
-37	0	333	0	333	11988	0	0.0000	0.0000	0.000	0.000
-38	0	252	0	252	9324	0	0.0000	0.0000	0.000	0.000
-39	0	117	0	117	4446	0	0.0000	0.0000	0	0
-40	0	90	0	90	3510	0	0.0000	0.0000	0	0
Totals	**96192**	**203076**	**0**	**106884**	**3077856**	**960553**	**NA**	**0.03679**	**-2068**	**-458**

Existing Pier 6 Bay Coverage	**2.21**	**acres**
Proposed Pier 6 Coverage	**4.66**	**acres**
Net Increase in Bay Coverage	**2.45**	**acres**

Plankton Loss Equivalency	-2068	g C
Offsetting Eelgrass Equivalency	458	ft^2
Eelgrass Acreage Equivalency	**0.011**	**acres**

For the analysis it was assumed that the effects to standing stock at lower trophic levels would translate upward in a similarly scalable manner to higher trophic levels across habitat types. Most specifically, it was assumed that the influence of the projects on the biomass of phytoplankton would have similarly translatable effects to the rest of the system as biomass of eelgrass. As such, the functional loss in productivity associated with shading of the water column and reduction in biomass was balanced against the area of eelgrass beds required to achieve equal biomass. This assumption grossly oversimplifies ecosystem dynamics in that the biomass of eelgrass, in addition to supporting a detrital based food web, also provides multiple habitat structural benefits that feed multiple trophic sub-complexes that are not found within the water column. Further, the trophic complexity of eelgrass cannot be fully decoupled from the water column contributions to a bed. In any case, this assumption was necessary for the analysis completed to provide an estimator of ecological functional equivalency between the water column shading and eelgrass habitat.

Based on the substantial expansion in covered area associated with Pier 6 replacement, the water column productivity impacts are the most substantive of the component functional losses associated with the project. However, even these impacts are fairly minor given the limited plankton productivity of central San Diego Bay waters.

Cumulative Impacts and Mitigation of Impacts

The approach taken to evaluate the project impacts has been to sum the impacts over principal components of the ecosystem. This would normally include consideration of changes in habitat type (e.g., eelgrass to non-vegetated soft bottom), changes in depth, changes in benthic shading, and changes in water column productivity (in this case driven by shading, but may be driven by changes in circulation, etc.). Notably, by dissecting the project environment and evaluating changes by element, it is theoretically possible to derive impacts greater than the sum of the parts. This would occur in shallow water areas where habitat type changes were contemplated, and severe changes in conditions were proposed. However, this is not the case with the present project. For Pier 6, the pier replacement would result replacement of the pier within an existing deep harbor environment with a comparable but larger structure to that existing such that much of the new pier shading would occur over areas presently shaded. Further, the work would not result in deepening the bay floor and the site lacks sensitive habitat areas. As a result, the accumulation of functional losses from the project is limited in scale.

Table 3 summarizes the functional equivalency losses by impact location and element. It then translates the losses to an equivalent area of eelgrass habitat necessary to offset this loss. In the case of water column calculations the initial calculation already converted grams carbon loss to an eelgrass equivalency so no additional calculation to convert to eelgrass area was required. The mitigation for anticipated ecological function impacts is proposed to be addressed based on providing offsetting ecological lift equivalent to the quantified loss through replacement with eelgrass habitat either derived through the Navy Eelgrass Mitigation Bank (NEMS), or through new eelgrass habitat development. As discussed in MTS (2020), eelgrass habitat is considered to provide 1020 percent of the ecological function of similar unvegetated soft bottom habitat (i.e., 10.2 acres of unvegetated soft bottom equals 1 acre of eelgrass habitat). This is based on the median value of studies documenting faunal organism density for *Zostera marina*. The logic to accepting the median value of studies over the mean value derived from the multiple studies evaluated is discussed in MTS (2020). To calculate the equivalent eelgrass habitat needed to offset project impacts, the area equivalency of impacted soft bottom has been divided by the difference in functional value between eelgrass and unvegetated soft bottom. The results of this analysis are summarized in Table 3.

Table 3. Eelgrass Habitat Equivalency to Functional Loss of Unvegetated Soft Bottom Habitat

Impact Location (Element)	Impact Functional Equivalency Loss (acres)	Eelgrass Habitat Equivalency (acres)
Benthic Habitat (Change in habitat type)	0.000 acre (unveg)	0.000 acre
Benthic Habitat (Change in elevation)	0.000 acre (unveg)	0.000 acre
Benthic Habitat (Change in shading)	-0.027 acre (unveg)	0.003 acre
Water Column (Shading loss of productivity)	-0.011 acre (eelgrass)	0.011 acre
Total		**0.014 acre**

Because of the significant difference in ecological value associated with submerged aquatic vegetation and particularly eelgrass, the functional equivalency of ecological value loss as calculated in acres of unvegetated soft bottom habitat is off-set with relatively minor amounts of eelgrass habitat development. It is anticipated for the purposes of this analysis that mitigation would be derived through use of the NEMS mitigation bank. Adequate eelgrass exists in many of the individual sites to meet this mitigation need (U.S. Navy 2019).

Should it be deemed desirable to develop a new standalone eelgrass mitigation area, the time delay to habitat development would need to be factored in in accordance with the standards of the California Eelgrass Mitigation Policy (CEMP, NMFS 2014). This would increase the total mitigation required to be developed by a factor of 1.2. In other words the mitigation required would rise to 0.017 acre.

Please let me know if you need any additional information to support this effort. We appreciate the opportunity to assist you.

Sincerely,

Keith W. Merkel
Principal Consultant

References

Merkel & Associates. 2018. 2017 San Diego Eelgrass Inventory. Prepared for U.S. Navy Region Southwest Naval Facilities Engineering Command and San Diego Unified Port District. March 2018.

Merkel & Associates. 2020a. NBSD Mole Pier Floating Dry Dock Ecological Functional Loss Analysis and Potential for Offsetting Mitigation Employing the NEMS Bank, or New Eelgrass Restoration. Prepared for U.S. Navy Region Naval Facilities Engineering Command Southwest. February 8, 2020.

Merkel & Associates. 2020b. Supplemental Analysis for Ecological Functional Loss Associated with Water Column Shading by the NBSD Mole Pier and MGBW Floating Dry Docks. Prepared for U.S. Navy Region Naval Facilities Engineering Command Southwest and Mission Environmental, LLC. April 3, 2020.

Merkel & Associates and CLE Engineering. 2015. Naval Base San Diego 2014 Hydrographic Survey, San Diego, CA, Field Data Collection Procedures and Results. February 2015

Merkel & Associates, Inc. [M&A]. unpub. data. Vertical Profiles of Photosynthetically Active Radiation (PAR) in San Diego Bay and the Port of Los Angeles Collected in 2004. Prepared for the Southern California *Caulerpa* Action Team.

Merkel & Associates, Inc. [M&A]. 2019. Phase 4 Cabrillo Shallow Water Habitat Biological Monitoring Program: Year 5 Data Report. Prepared for Port of Los Angeles. April 2019.

Marine Taxonomic Services Ltd. 2020. Bay Habitat Mitigation Planning for Commercial Out Lease of a Floating Dry Dock at the MGBW Maintenance Piers in San Diego Bay, California. Prepared for Mission Environmental, LLC. February 2020.

National Marine Fisheries Services. 2014, California Eelgrass Mitigation Policy and Guidance. October 2014.

U.S. Navy, 2019. Eelgrass Mitigation Bank Ledger and Asset Report 2019 Eelgrass Surveys NEMS 1, 2, 4, 5 & 6 San Diego Bay, California. Prepared by Merkel & Associates, Inc. for U.S. Navy NAVFACSW NAVFACENGCOM.

U.S. Department of the Navy, Naval Facilities Engineering Command Southwest [U.S. Navy] and Port of San Diego. 2013. San Diego Bay Integrated Natural Resources Management Plan, Final March 2013. San Diego, California. Prepared by Tierra Data Inc., Escondido, California.

Ryan Pingree

To: Ryan Pingree
Subject: FW: NBSD Pier 6 Replacement Project EFH Consultation Request

From: Eric Chavez - NOAA Federal <eric.chavez@noaa.gov>
Sent: Friday, November 20, 2020 7:56 AM
To: Suk, S H (Sean) CIV USN NAVFAC SW SAN CA (USA) <seung.suk@navy.mil>
Cc: Seneca, Lisa A CIV USN NAVFAC SW SAN CA (USA) <lisa.seneca@navy.mil>; Basinet, Richard J CIV USN NAVFAC SW SAN CA (USA) <richard.basinet@navy.mil>
Subject: [Non-DoD Source] Re: NBSD Pier 6 Replacement Project EFH Consultation Request

Sean,

NOAA's National Marine Fisheries Service (NMFS) has reviewed the U.S. Department of the Navy (Navy) Essential Fish Habitat (EFH) Assessment for the Pier 6 Replacement Project at Naval Base San Diego (NBSD), located in south-central San Diego Bay, California (proposed project). NMFS has also reviewed other relevant information, including the "*NBSD Pier 6 Replacement Project Ecological Functional Loss Analysis and Potential for Offsetting Mitigation Employing the NEMS Bank, or New Eelgrass Restoration*" (Pier 6 Functional Loss Analysis and Mitigation). The Pier 6 Functional Loss Analysis and Mitigation is based on and/or references documents related to a previous overwater structure project, including the "*Bay Habitat Mitigation Planning for Commercial Out Lease of a Floating Dry Dock at the MGBW Maintenance Piers in San Diego Bay, California*" prepared by Marine Taxonomic Services, Ltd., the "*NBSD Mole Pier Floating Dry Dock Ecological Functional Loss Analysis and Potential for Offsetting Mitigation Employing the NEMS Bank or New Eelgrass Restoration*," and the "*Supplemental Analysis for Ecological Functional Loss Associated with Water Column Shading by the NBSD Mole Pier and MGBW Floating Dry Docks*," both prepared by Merkel & Associates, Inc. (hereafter referenced collectively as the Floating Dry Dock Mitigation Plans).

The proposed project would demolish the existing Pier 6 and replace it with a larger general purpose berthing pier, also known as Pier 6. After an initial hazardous materials survey and any necessary abatement, demolition would take place bayward to landward and from the top down. Demolition will include the removal of approximately 2,000 piles potentially using a variety of methods, with cutting the pile at the mudline reserved as the last option. For the new Pier 6, approximately 1,000 piles, ranging from 16-inch fiberglass fender piles to 24-inch concrete structural piles, would be installed using a floating crane and diesel hammer pile driver. The total surface area of Pier 6 would increase from approximately 1.9 acres to approximately 4.1 acres, an increase in overwater coverage of approximately 2.2 acres. No dredging is required for this pier replacement project. Construction is expected to begin in fiscal year 22 and would require approximately 250 days of in-water work.

The proposed project occurs in EFH for various federally managed fish species within the Pacific Coast Groundfish and Coastal Pelagic Species Fishery Management Plans (FMPs). In addition, the project occurs within an estuary, which has been designated as a habitat area of particular concern (HAPC) for various federally managed fish species within the Pacific Coast Groundfish FMP. Designated HAPC are not afforded any additional regulatory protection under the Magnuson-Stevens Fishery Conservation and Management Act; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. The nearest eelgrass beds, another designated HAPC under the Pacific Coast Groundfish FMP that occurs in San Diego Bay, are approximately 0.6 mile south and 1.2 miles northwest of the project area.

Adverse effects to EFH would result from demolition and construction activities, including pile removal and installation, due to noise, turbidity, and sedimentation impacts, as well as from increased shading impacts due to the expanded overwater coverage. Increased shading from the addition of a large overwater structure would decrease productivity and have adverse impacts to the physical and biological elements of EFH. However, the proposed project includes conservation measures to avoid, minimize, or offset those impacts. Specifically, the aforementioned Pier 6 Functional

Loss Analysis and Mitigation proposes to use .014 acre of credits from the Navy's San Diego Bay Eelgrass Mitigation Bank to offset the increased shading impacts from the new, larger dock structure. NMFS has reviewed the Pier 6 Functional Loss Analysis and Mitigation, which again, is based largely on the Floating Dry Dock Mitigation Plans. Although we would like to reiterate concerns we have expressed previously with elements of the Floating Dry Dock Mitigation Plans (see attached email dated April 13, 2020), we do not object to the proposed compensatory mitigation. Therefore, as long as the proposed conservation measures are implemented, including the compensatory mitigation, we have no additional EFH Conservation Recommendations to provide at this time. Thank you for consulting with NMFS.

Regards,

Eric

On Fri, Oct 30, 2020 at 12:02 PM Suk, S H (Sean) CIV USN NAVFAC SW SAN CA (USA) <seung.suk@navy.mil> wrote:

> Hello Eric,
>
> Hope you are doing well. Please see the attached EFHA for the NBSD Pier 6 Replacement Project. There is one supporting attachment for habitat mitigation.
>
> The ESA informal consultation request letter and Sea Turtle assessment are also attached for reference and have also been sent separately to Penny Ruvelas for assignment.
>
> Our office remains on full telework status. Please let me know if you need additional information.
>
> v/r,
>
> Sean Suk
>
> NAVFAC SW
>
> Environmental
>
> (619) 705-5590

--
Eric Chavez
NOAA Fisheries West Coast Region
U.S. Department of Commerce

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ACOUSTIC and MARINE PROTECTED SPECIES MONITORING PLAN FOR THE NAVY'S PIER 6 REPLACEMENT PROJECT AT NAVAL BASE SAN DIEGO, CALIFORNIA

Submitted to:

Office of Protected Resources,
National Marine Fisheries Service,
National Oceanic and Atmospheric Administration

Prepared by:
Naval Facilities Engineering Systems Command Southwest

For:
Naval Base San Diego

Final November 2020

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ACRONYMS AND ABBREVIATIONS

μPa	microPascal
AT	Acoustic Technician
dB	decibel(s)
ESA	Endangered Species Act
ft	foot/feet
GPS	Global Positioning System
IHA	Incidental Harassment Authorization
kHz	kilohertz
m	meter(s)
MMPA	Marine Mammal Protection Act
NAVFAC SW	Naval Facilities Engineering Systems Command (SW – Southwest)
Navy	U.S. Department of the Navy
NBSD	Naval Base San Diego
NOAA	National Oceanic and Atmospheric Administration
PAM	Passive Acoustic Monitoring
Plan	Marine Mammal and Acoustic Monitoring Plan
Project	Pier 6 Replacement Project
PSO	Protected Species Observer
PTS	Permanent Threshold Shift
re 1 μPa	referenced to one microPascal
RMS	root mean square
SEL	sound exposure level
SPL	sound pressure level
ZOI	zone of influence

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1.0 INTRODUCTION

1.1 Purpose of the Monitoring Plan

The purpose of this Acoustic and Marine Protected Species Monitoring Plan (Plan) is to provide protocols for marine mammal and acoustic monitoring during pile driving and removal activities in accordance with the Incidental Harassment Authorization (IHA) issued on **Date TBD**, by the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) for the incidental take of California sea lions (*Zalophus californianus*). Incidental take is expected as a result of the U.S. Department of the Navy's (Navy's) Pier 6 Replacement (hereafter referred to as "Project") associated with the Naval Base San Diego (NBSD), California. No other marine mammal species are expected to occur in the Project area.

The Project will include replacement of Pier 6 at NBSD (Figure 1-1). Constructed by the Navy in 1945, Pier 6 is 18 meters (m; 60 feet [ft]) wide and 420 m (1,377 ft) long and begins at the intersection of West Vesta and Brinser Streets. Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and inadequate deck size (at only 20 m [66 ft] wide) to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel.

Demolition and construction activities will include removal and driving of piles using multiple methods and equipment including, impact and vibratory hammers and possibly high-pressure water jetting, hydraulic pile cutters, and underwater chain saw. The actual equipment used to install and remove piles would be determined by the construction contractor. Pile installation and removal activities that have the potential to result in Marine Mammal Protection Act (MMPA) take by acoustic harassment will be monitored. See the IHA for a definition of MMPA take relative to this Project.

There are no known pinniped haulout locations in the vicinity of the Project; therefore, airborne noise is not expected to result in incidental take and will not be monitored. These activities are not discussed further in this Plan. The purpose of monitoring described herein is threefold:

1) To minimize the potential for Level A (injury) harassment of marine mammals by implementing a shutdown of activities when a marine mammal is observed within a designated buffered shutdown zone of influence (ZOI). With this mitigation measure in place, the proposed activities are not anticipated to result in any Level A harassment; therefore, no Level A take is being requested for this project.
2) To enumerate the numbers and species of marine mammals that occur within established Level A (injury) and Level B (behavioral disturbance) ZOIs, and to document any differences in species, numbers, or behavioral effects associated with Project-related in-water activities.
3) To empirically measure sound source levels and distances to acoustic harassment thresholds under specific conditions defined in the IHA. If appropriate, and based on concurrence from NOAA Fisheries, ZOIs and/or monitoring protocols may be adjusted.

The Plan is a requirement of the IHA issued under the MMPA. Once approved by NOAA Fisheries, the Plan cannot be modified without NOAA Fisheries approval. The IHA and this corresponding Plan is valid for take incidental to the specified waterfront demolition and construction activities at NBSD during the IHA time period.

While no Level A harassment is anticipated, and only Level B harassment is authorized under the IHA, the mitigation measures and monitoring protocols described herein will serve to protect sea lions in the Project area, provide for practical implementation of this Plan, reduce the risk of unauthorized take, and allow maintenance of construction and demolition schedules.

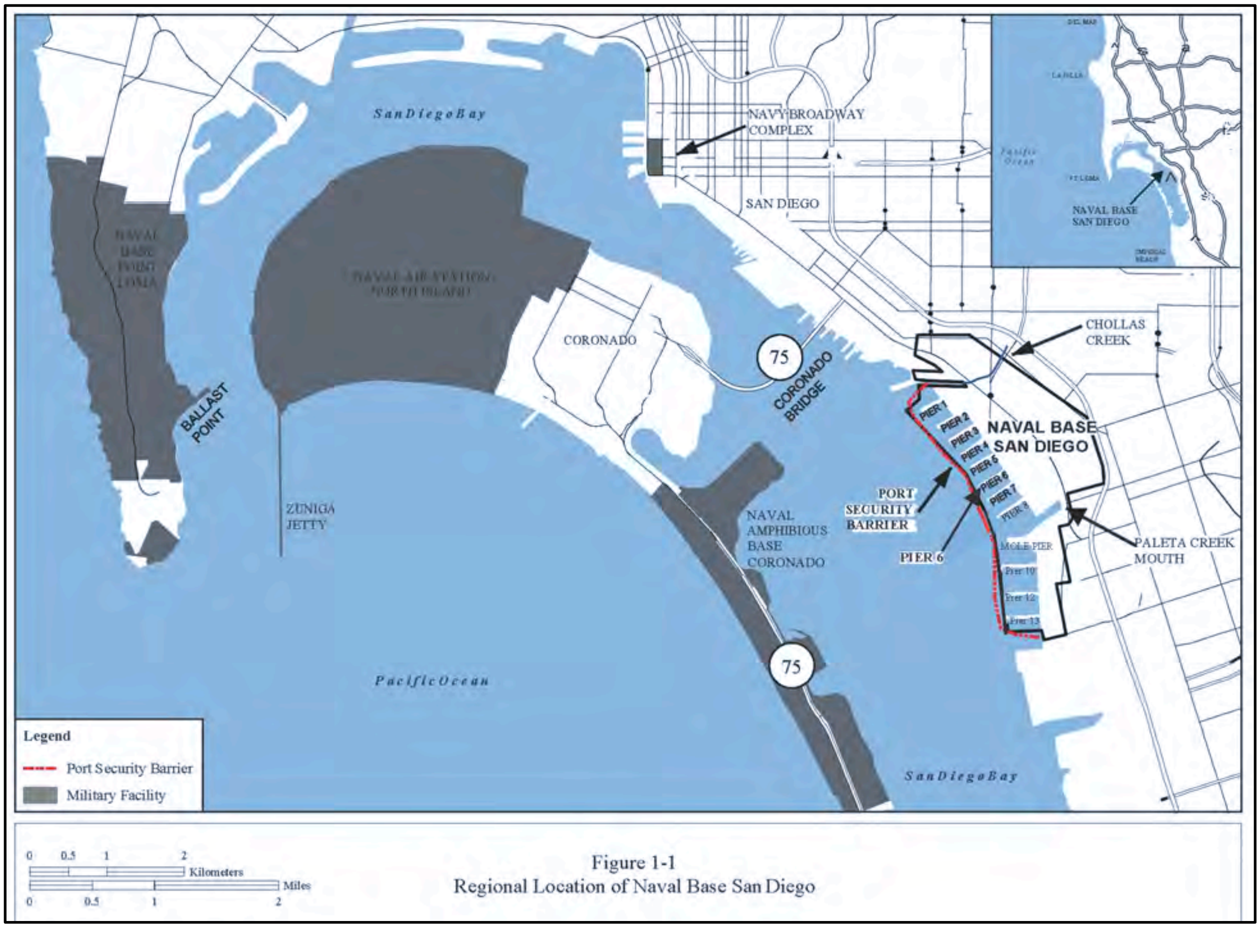

Figure 1-1. Regional Location of the Pier 6 Replacement Project, Naval Base San Diego.

1.2 Summary of Activities to be Monitored

All relevant in-water construction and demolition activities that have the potential to result in Level A or Level B harassment of marine mammals will be monitored, including installation of piles via vibratory and impact pile driving, vibratory extraction of piles, as well as use of high-pressure water jetting to assist pile installation/removal and/or clipping piles at the mudline using hydraulic pile cutters and/or underwater chain saw.

In-water construction and demolition activities under the IHA must comply with the following General Conditions of the IHA:

1) The IHA permit must be in the possession of the Navy, its designees, and work crew personnel operating under the authority of the IHA;
2) Only incidental take of marine mammals by Level B harassment, as specified in the IHA is authorized; and
3) Taking of species that exceeds the numbers and/or intensity indicated in the IHA, or any taking of other species of marine mammal is prohibited and may result in modification, suspension, or revocation of the IHA.

Marine mammal and other protected species monitoring will be conducted before, during, and after all pile driving and extraction activities within the acoustic ZOIs of those activities relative to the Level A and B acoustic thresholds. The proposed monitoring will document the number of marine mammal species exposed to underwater sound levels that would constitute "take" under the MMPA. All measures identified in the applicable ESA consultation documents for green sea turtles (*Chelonia mydas*) will also be incorporated into monitoring protocols.

The proposed construction and demolition activities at Pier 6 locations are summarized in Table 1-1.

Table 1-1. Activity Summary for Pile Driving and Demolition Activities.

Method	Pile Type	Number of Piles	Piles/ Day	Total Estimated Days
Demolition Activities				
Vibratory Extraction High-pressure Water Jetting Hydraulic Pile Clipper Hydraulic Chainsaw	24-inch square pre-cast concrete, 20-inch square pre-stressed/pre-cast concrete piles	1,833	**8**	**250**
	12-inch composite (timber-plastic) piles	149		
Vibratory Extraction	16-inch I-shaped steel piles	16		
	Total	**1,998**		
Construction Activities				
Impact Pile Driving	24-inch octagonal concrete structural test piles	15	**7**	**138**
	24-inch octagonal concrete structural piles	513		
	24-inch square concrete fender system test piles	4		
	24-inch square concrete primary fender piles	204		
	20-inch square concrete pile for load-out ramp cradle	4		
	16-inch fiberglass secondary and corner fender piles	226		
High-pressure Water Jetting	20- and 24-inch concrete piles	Within Above Counts		
	Total	**966**		

Note: high-pressure water jetting may be used to assist pile installation/extraction and a hydraulic cutter may be used to clip piles at the mudline.

It is anticipated that overlap between demolition and installation activities would occur over the 250-day project period (Table 1-1). Pile removal would begin on day 1 and progress at a rate of 8 piles per day, for an expected 250 days of pile removal. Pile installation is anticipated to begin after removal of one third of the piles, or approximately 83 days of pile removal, at a rate of 7 piles per day for an expected 138 days of pill installation. Pile installation is expected to periodically occur alongside ongoing pile removal activities over 138 days of the remaining 167 project days of pile removal. Because pile installation cannot continue where demolition activities are incomplete, there would be 29 days (167 days – 138 days of pile installation) where only pile removal would occur after pile installation has started. Demolition and installation activities would end on day 250. In summary, the 250-day project period would include 112 days of pile removal-only activities and 138 days of concurrent pile removal and installation activities.

Detailed analysis of ZOIs and estimated numbers of species takes are contained in the Navy's IHA application (Navy 2020). There would be no Level A takes. The number of requested Level B takes are summarized in Table 1-2.

Table 1-2. Number of Level B Takes of California Sea Lion Requested for the Pier 6 Replacement Project.

Species	Total Authorized Take
California sea lion (*Zalophus californianus*)	1,000

Note: If the number of takes may be exceeded in any year, NOAA Fisheries must be notified as early as possible of a potential need to modify the authorized takes.

1.3 Monitoring Zones

The Level A and Level B monitoring and shutdown zones as well as representative protected species observer (PSO) monitoring locations are described for the Pier 6 Replacement Project in the subsections below.

Anticipated sound propagation during impact and vibratory pile driving and extraction was assessed using acoustic models developed for the South-Central region of San Diego Bay (Dall'Osto and Dahl 2019). The models take into account local environmental conditions (bathymetry, sediment type, seasonal water temperatures) and the physiography of the bay. Separate models were developed for concrete, plastic piles (applied to fiberglass, timber-plastic), and steel piles, and in-water demolition activities using other equipment (underwater hydraulic pile clippers, underwater chainsaw, and high-pressure water jetting).

Sound propagation from in-water demolition activities using other equipment (underwater hydraulic pile clippers, underwater chain saw, water jetting) was evaluated using NOAA Fisheries Technical Guidance (NOAA Fisheries 2018), including the NOAA Fisheries User Spreadsheet and practical spreading loss model.

Following NOAA Fisheries Technical Guidance, acoustic thresholds and weighting factor adjustments applicable to the pinniped family Otariidae (sea lions) are used. Distances to the Otariid Level A acoustic threshold were calculated based on the cumulative sound exposure level (SEL_{cum}) (SEL x 10 Log[number of strikes or duration per 24 hours]), given that the anticipated peak values at 10 m (33 ft) during pile driving or removal are below injury thresholds. Construction assumptions include 600 strikes per pile, 10-minute duration for all non-impulsive sources except water jetting (20-minutes), and 7 piles driven or 8 piles removed per day. For the South-Central San Diego Bay acoustic models, decibel reductions of underwater noise levels at source (as measures 10 m [33 ft] from pile installation) were applied to the Otariid FHG weighting function for each pile type. Based on an analysis of the applicable noise data (California Department of Transportation [Caltrans] 2015, Naval Facilities Engineering Systems Command [NAVFAC] SW 2020), reduction of 14.1 dB (steel piles), 16.1 dB (plastic piles), and 23.6 dB (concrete piles) were applied to the unweighted SEL_{cum} to obtain an Otariid functional hearing group SEL_{cum} source datum at 10 m (33 ft; Dall'Osto and Dahl 2019). The Otariid FHG adjusted source datum is the input value (where transmission loss – 0 dB at 10 m [33 ft]) in Table 1-3 and Figures 1-2 through 1-4 which identify distances to Level A/B ZOIs. For those actions not covered in the modeling report (Dall'Osto and Dahl 2019), default Weighting Factor Adjustment (2.5 kilohertz [kHz] for non-impulsive sound) and representative frequency ranges were used for calculations using the NOAA Fisheries User Spreadsheets. For all in-water construction and demolition activities, the distances to PTS onset (Level A) are modeled to be less than 10 m (33 ft) from the source pile.

Calculated distances to in-water Otariid disturbance (Level B) for continuous noise sources and corresponding areas within the ZOIs are based on the average underwater noise level (126 dB) within the project area (Dahl and Dall'Osto 2019). ZOIs for impact and vibratory driving or extraction based on the South Bay acoustic models indicate that sound propagation is substantially influenced by local bathymetry, with the steep slope of the navigation channel limiting sound transmission across the bay (Section 1.3.1). Closer to land, adjacent piers are expected to influence sound transmission, but the rate of reduction is uncertain. Therefore, ZOIs were calculated separately for the open water and areas influenced by piers.

Marine protected species monitoring efforts will be adjusted, after NMFS concurrence, to account for any changes in the dimensions of the ZOIs based on results of the acoustic monitoring (see Section 3.0), as appropriate.

1.3.1 Level A and Level B Harassment Monitoring and Shutdown Zones

Maximum potential distances to Level A and Level B acoustic harassment associated with the proposed pile driving and removal activities at Pier 6 are provided in Table 1-3 and shown on Figure 1-2 for impact and vibratory driving/extraction of concrete piles, Figure 1-3 for impact driving of fiberglass and vibratory extraction of timber-plastic piles, Figure 1-4 for vibratory extraction of steel I/H piles, and Figure 1-5 for other in-water activities (water jetting, pile clipping, pile cutting with chainsaw). Because the Navy is not requesting Level A take for the Project, a "Physical Interaction Shutdown ZOI" (10 m [33 ft]) was used to reduce the likelihood of any animal being exposed to potentially project-related injurious sound (Figures 1-2, 1-3, 1-4, and 1-5). Although Figures 1-2, 1-3, 1-4, and 1-5 depict the 10 m (33 ft) "Physical Interaction Shutdown ZOI," the Navy would apply a 20 m (66 ft) buffered shutdown area to account for the speed of marine mammals and be consisted with other shutdown zones to be implemented for the Project (i.e., 20 m [66 ft] green sea turtle shutdown zone).

Considering that animal density in the Project area is unknown, with only two California sea lions observed during a survey in 2010 (Sorensen and Swope 2010), a conservative estimate of four California sea lions per day (n = 4) were multiplied by the total number of Project days (n = 250). This would equate to a Level B take estimate of 1,000 California sea lions.

1.3.2 Observer Monitoring Locations

In order to effectively monitor the Level A and Level B Harassment Zones, PSOs will be positioned at the best practicable vantage points, taking into consideration security, safety, and space limitations. Up to three PSO locations with four PSOs (including two on a captained vessel) will be required, depending on in-water activity and size of the monitoring zone. At a minimum, one PSO (in the "Command" position) will be located with clear view of the buffered shutdown zone or smaller Level B ZOIs and will be responsible for halting in-water activities, as required.

For all ZOIs larger than 400 m (1,312 ft) identified in Table 1-3, two (2) PSOs will be on a captained vessel that will conduct the pre-activity survey of the entire monitoring area prior to in-water construction. A PSO in the "Command" position will also be positioned close to the project site to coordinate with the PSOs on the vessel, and to monitor the shutdown zone. The vessel will start from south of the Project area (where potential marine mammal occurrence is lowest) and proceed to the north. Data will be collected on any marine protected species observed within the monitoring zones in accordance with monitoring and data collection procedures (Section 2.0). When the vessel arrives near the northern boundary of the ZOI, it will set up station so the two PSOs are best situated to detect any marine mammals that may approach from the north. The two PSOs aboard will split monitoring duties in order to monitor a 360 degree sweep around the vessel with each PSO responsible for 180 degrees of observable area. It assumed that while the monitoring vessel will be anchored, tides and wind will result in small movements of the vessel resulting in slight variations in the total area observed by the PSOs aboard. Prior studies have shown that marine mammal occurrence is rare in South-Central San Diego Bay, and the undetected presence of marine mammals to the south is very unlikely. The number of land-based PSOs may be increased for the larger ZOIs, if warranted based on actual marine mammal occurrence and with NOAA Fisheries concurrence; however, only one boat-based PSO location, crewed by two PSOs, is anticipated for this Project.

Table 1-3. Calculated Distance to Underwater Acoustic Thresholds and ZOIs within the Thresholds from Pile Driving and Removal.

Activity Description/ Source Sound Levels at 10 m (33 ft)	Minor Injury (PTS Onset) Level A[4]		Behavioral Disturbance Level B [5, 6]	
	Radial Distance (m)	ZOI Area (km^2)	Maximum Radial or Length x Width Distance (m)	Total ZOI Area (km^2) (Open Water / Around Piers)
Demolition Activities				
Vibratory extraction 20-inch and 24-inch concrete[1], 160 RMS	<10	<0.001	6,990 x 1,173	5.35 (4.06 / 1.29)
Vibratory extraction 12-inch timber- plastic[1], 152 RMS	<10	<0.001	2,167 x 1,055	2.11 (1.49 / 0.62)
Vibratory extraction 16-inch I-shaped steel pile[1], 160 RMS	<10	<0.001	7,140 x 1,595	6.43 (5.15 / 1.28)
Water jetting installation/ extraction[3], 158 RMS	<10	<0.001	1,359	3.6 (2.8 / 0.8)
Large hydraulic pile clipper, concrete[3], 161 RMS	<10	<0.001	2,154	7.7 (6.5 / 1.2)
Two large hydraulic pile clippers, concrete[3], 164 RMS	<10	<0.001	3,415	15.37 (13.85 / 1.52)
Small hydraulic pile clipper, timber- plastic[3], 154 RMS	<10	<0.001	736	1.4 (1.0 / 0.4)
Underwater hydraulic chain saw[3], 150 RMS	<10	<0.001	398	0.48 (0.4 / 0.08)
Construction Activities				
Impact driving 20 and 24-inch concrete[1,2], 188 Peak, 176 RMS, 166 SEL	<10	<0.001	192	0.10 (0.10 / NA)
Impact driving 16-inch fiberglass[1,2], 166 Peak, 153 RMS, 144 SEL	<10	<0.001	<10	<0.001

Notes:

1. Distances to Level A and B thresholds were calculated for impact and vibratory pile driving or extraction using acoustic models developed for South-Central San Diego Bay (Dall'Osto and Dahl 2019 and Caltrans 2015). The distances to the Level A SEL$_{cum}$ threshold are adjusted for the representative frequency range of Otariid functional hearing group. The Level B ZOIs for impact pile installation and vibratory pile extraction are based on the 160-dB threshold and distance to ambient levels (126 dB), respectively.
2. Impact driving values as reported in Dall'Osto and Dahl 2019.
3. For pile installation/extraction activities using other equipment (water jetting, pile clippers, chain saw), the 2020 NOAA Fisheries User Spreadsheet was used to calculate distances to the Level A SEL$_{cum}$ threshold and practical spreading loss model was used to calculate distances to Level B thresholds. Weighting Factor Adjustments of 2 kHz for impact pile driving and 2.5 kHz for non-impulsive sounds, and the representative frequency range for Otariid functional hearing group were used (NOAA Fisheries, 2020).
4. Assumes 600 strikes per pile, 10-minute duration for all non-impulsive sounds except for high-pressure water jetting (20-minute), and 7 piles installed and 8 piles removed per day.
5. The Level B ZOIs were calculated to the average ambient underwater noise value of 126 dB re 1 μPa within the project area (Dahl and Dall'Osto 2019).
6. Level B ZOI areas were calculated separately for open water versus areas around piers where the structure's influence on sound propagation is uncertain; slight variations between these estimated values and those presented in other documentation result from rounding at the hundredths level.

Abbreviations:

dB re 1 μPa = decibels referenced to a pressure of 1 microPascal,
km^2 = square kilometers, m = meters,
N/A = not applicable because the ZOI is contained within the shutdown zone (less than 10 m [33 ft] from source),
PTS = permanent threshold shift, RMS = root mean square, SEL = sound exposure level,
ZOI = Zone of Influence (area encompassed within acoustic threshold boundary).

Note: Additional Representative PSO Location at Naval Amphibious Base Coronado (obscured by inset here)

Figure 1-2. Monitoring / Shutdown Zones and Proposed Monitor Locations for Proposed Impact and Vibratory Driving/Extraction of Concrete Piles.

Note: Impact Driving of Fiberglass Piles is not expected to result in Level A or B acoustic harassment; a 20-m buffered (66-ft) shutdown zone will be monitored to avoid injury from physical interaction with operating in-water equipment.

Figure 1-3. Monitoring / Shutdown Zones and Proposed Monitor Locations for Proposed Impact Driving of Fiberglass Piles and Vibratory Extraction of Timber-Plastic Piles.

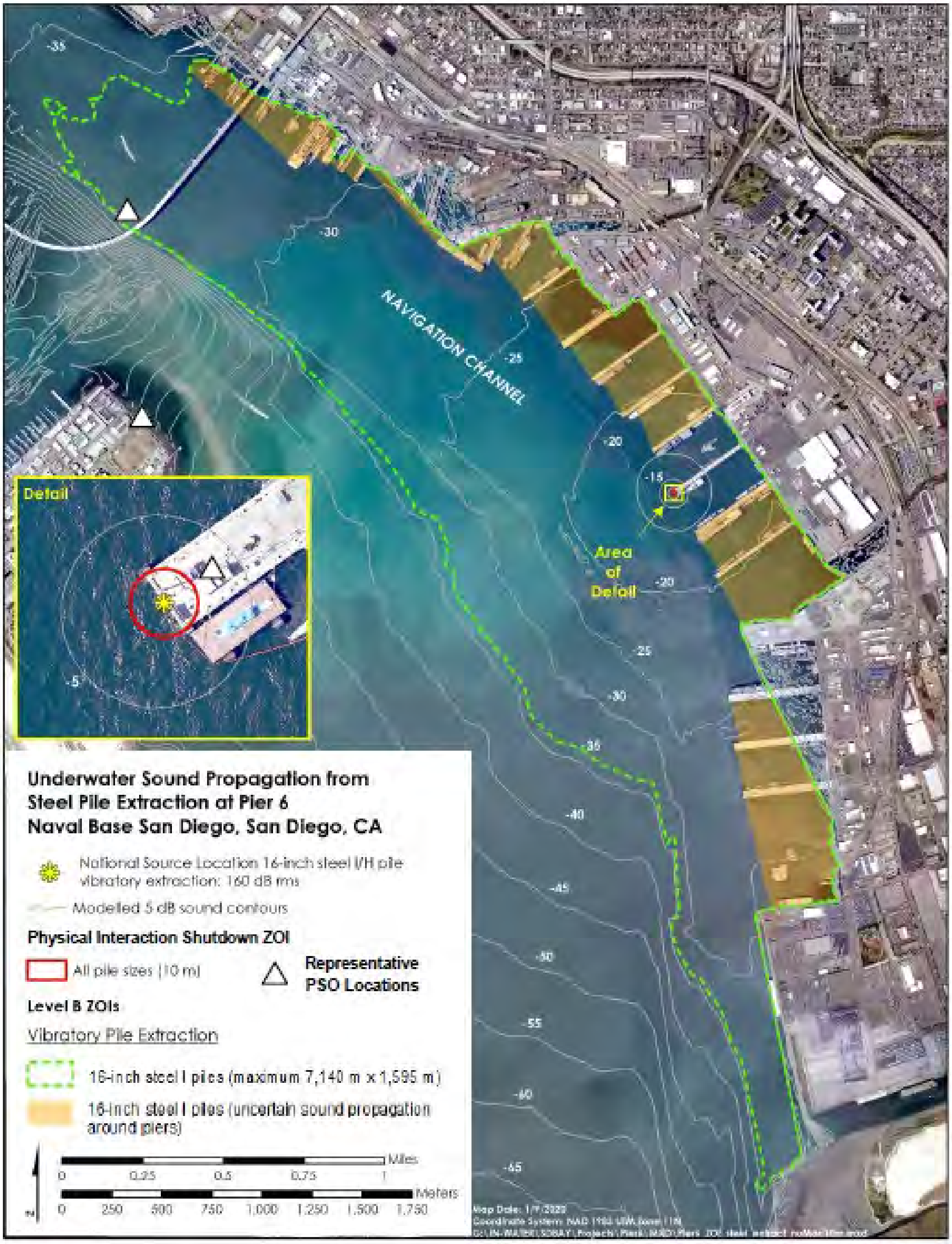

Figure 1-4. Monitoring / Shutdown Zones and Proposed Monitor Locations for Proposed Vibratory Extraction of Steel I Piles.

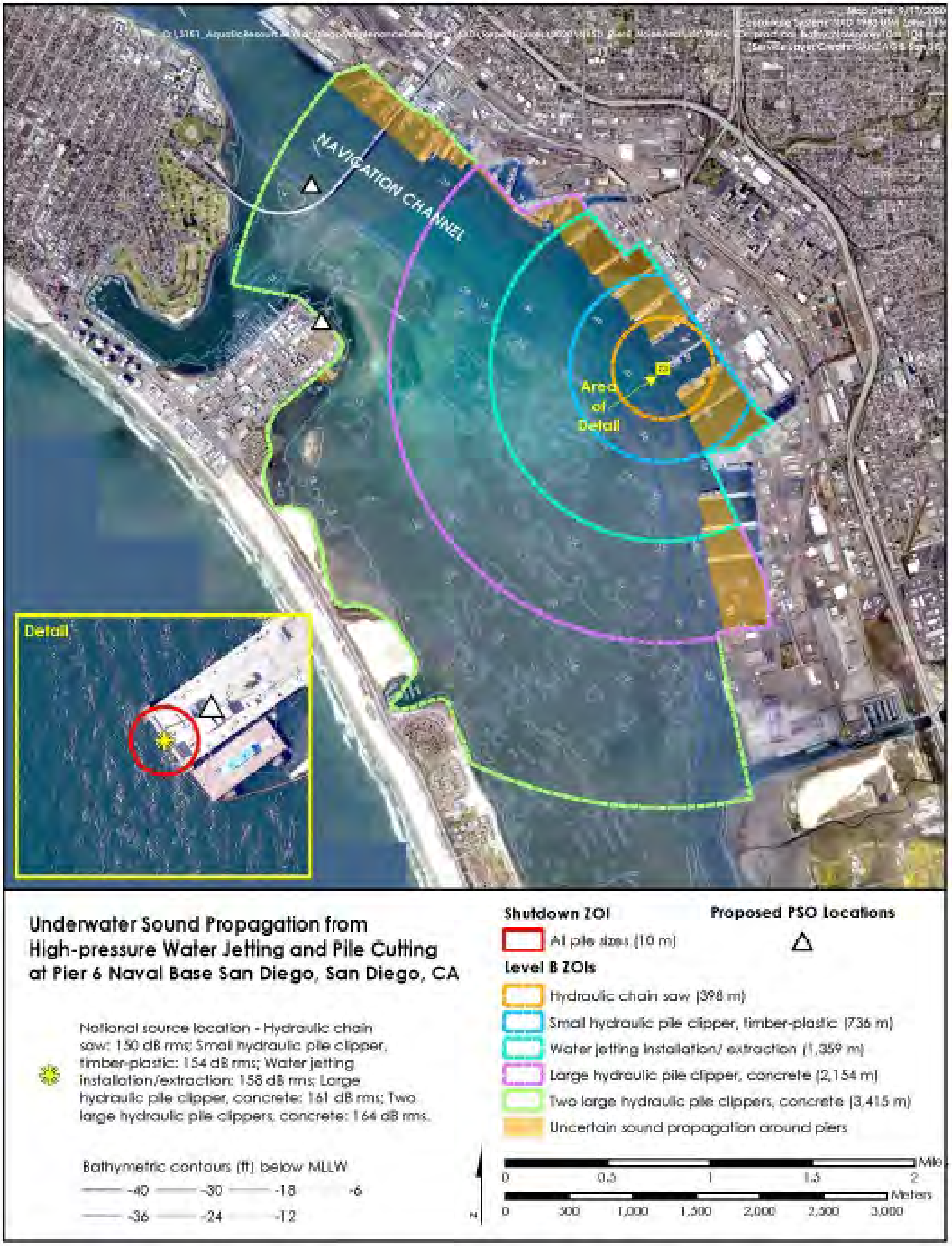

Figure 1-5. Monitoring / Shutdown Zones and Proposed Monitor Locations for Proposed Other In-Water Construction or Demolition Activities.

1.4 Mitigation Measures

The following mitigation measures, as specified in the NOAA Fisheries IHA, shall be implemented during pile driving/extraction activities to avoid and minimize marine mammal exposure to Level An injury and to reduce to the lowest extent practicable exposure to Level B noise levels. Any mitigation measures identified in the IHA, beyond those identified below, will also be adhered to. The contractor is responsible for complying with all the mitigation measures listed below, whereas onsite Navy representatives will monitor the contractor's performance and require corrective action or stop work, if necessary, to ensure the requirements are met.

1) **Time Restriction:**
   - In-water pile driving and removal activities will only be conducted when sufficient light is available for visual observations (generally 30 minutes after sunrise and up to 45 minutes before sunset).
2) **General Vessel & Machinery Stoppage**
   - For in-water construction, heavy machinery activities other than pile driving (e.g., use of barge-mounted excavators, or dredging), if a marine mammal comes within 10 m (33 ft), the activity must cease operations and reduce vessel speed to the minimum level required to maintain steerage and safe working conditions.
3) **Pre-Construction Briefing**
   - Prior to the start of all in-water pile installation or extraction activities, briefings will be conducted for construction supervisors and crews and the monitoring team and when new personnel join the work, in order to explain responsibilities, communication procedures, the marine mammal protocol, and operational procedures.
4) **Establishment of Level A and Level B Harassment ZOIs During Pile Driving and Removal**
   - During all pile driving and removal activities, a 10-m (33-ft) visual buffer will be added to a 10-m (33-ft) physical interaction shutdown zone to yield a 20-m (66-ft) buffered shutdown monitoring zone. The 20-m (66-ft) buffered shutdown zone also will avoid and minimize the potential for Level A acoustic harassment since the largest calculated Level A ZOI is less than 10 m (33 ft) (see Section 1.3). Due to swim speeds of marine mammals potentially in the project area, adding a 10-m (33-ft) visual buffer is considered appropriate to reduce the likelihood a Level A take associated with pile installation or removal. If an animal enters the 20-m (66-ft) buffered shutdown zone, pile driving would be stopped until the individual(s) has left the zone of its own volition, or not been sighted for 15 minutes.
   - If a marine mammal is observed entering the Level B ZOI, behaviors would be documented to assess for any potential behavioral changes due to exposure to project-related noise. Work would continue without cessation, unless the animal enters the buffered shutdown zone, at which point pile driving or extraction shall be halted.

5) Marine Protected Species Visual Monitoring

- Monitoring will be conducted for a 20 m (66-ft) buffered shutdown zone and within the Level B ZOIs before, during, and after pile driving and removal activities. The Leve B ZOI may be adjusted based on acoustic monitoring results, subject to NOAA Fisheries concurrence. Monitoring will take place from 30 minutes prior to initiation through 30 minutes post-completion of installation or removal activities.
- Monitoring will be conducted by qualified observers. All observers would be trained in marine mammal identification and behaviors, and have experience conducting marine mammal monitoring or surveys. Trained observers will be placed at the best vantage point(s) practicable (e.g., from a small boat, the pile driving barge, on shore, or any other suitable location) to monitor for marine mammals and implement shutdown/delay procedures, when applicable, by notifying the construction operator of a need for a shutdown.
- Up to four PSOs will be deployed at up to three locations with a clear view of the shutdown zone and ZOIs. The number of PSOs may vary depending on the pile installation or removal activity and applicable size of the ZOI(s).
- Prior to the start of pile driving activity, the buffered shutdown zone will be monitored for 30 minutes to ensure that it is clear of marine protected species. Pile driving will only commence once observers have declared the buffered shutdown zone clear of marine protected species. Animals will be allowed to remain in the Level B ZOI and their behavior will be monitored and documented.
- If a marine protected species enters the buffered shutdown zone during the course of pile driving operations, pile driving will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without a re-detection of the animal(s) from the last observation time. A determination that the shutdown zone is clear must be made during a period of good visibility (i.e., the entire shutdown zone and surrounding waters must be visible to the naked eye).
- In the unlikely event that environmental conditions, such as heavy fog, prevent the visual detection of marine mammals within the buffered shutdown zone, in-water construction or demolition activities will not be initiated. If in water construction or demolition activities have been initiated, and conditions deteriorate so that the buffered shutdown zone is not completely visible, then activities will be delayed until the full zone is visible.
- In the event that the Level B ZOI is not fully visible, an adjustment will be made for animals that were not actually observed during pile installation/removal but were assumed to have been inside of the Level B ZOI.

- If a marine mammal species not covered in the IHA enters the Level B harassment zone, all pile driving or removal activities shall be halted until the animal(s) has been observed to have left the Level B ZOI or has not been observed for at least one hour. NOAA Fisheries will be notified immediately with the species, and precautions made during the encounter. Pile installation/removal will be allowed to proceed if the above measures are fulfilled for non-IHA species.
- If the take of a marine mammal species approaches the take limits specified in the IHA, NOAA Fisheries will be notified and appropriate steps will be discussed.

6) Acoustic Monitoring

- Acoustic monitoring will be conducted for a representative number of piles and pile driving/extracting activity to empirically validate sound source levels and, if appropriate, adjust the distances to the Level B ZOIs after consultation and concurrence with NOAA Fisheries.

7) Soft Start

The use of impact pile driving soft-start procedures are believed to provide additional protection to marine mammals by providing a warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. The soft start procedure is described below:

Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.

8) Daylight Construction

In-water pile installation and removal work will occur only during daylight hours that allow for sighting of marine protected species within all project area and defined monitoring zones.

2.0 MARINE PROTECTED SPECIES MONITORING PROTOCOLS

2.1 Objectives

The primary objective of the visual monitoring is to detect and document impacts from Project-related activities on marine protected species. Monitoring will be conducted at all times during in-water demolition and/or construction to assess marine mammal use patterns and behavioral responses relative to Level A and Level B harassment ZOIs. Monitoring for green sea turtles will co-occur with the marine mammal monitoring.

2.2 Overview

The visual monitoring component of this Plan takes into consideration the logistical, environmental, and security requirements for working in the Project area. For the in-water construction and demolition activities, distances to regulatory thresholds (see Section 1.0, Table 1-3) were estimated based on acoustic data for similar pile types and sizes (California Department of Transportation 2015, NAVFAC SW 2020) using the latest acoustic threshold guidance from NOAA Fisheries (2018), as well as site-specific analysis presented in Dall'Osto and Dahl (2019). The estimated distances to the ZOI boundaries were used to determine monitoring locations identified in this Plan.

During all pile driving and removal activities, regardless of predicted sound pressure levels (SPLs), a visual buffer of 10 m (33 ft) will be added to a 10-m (33-ft) physical interaction shutdown zone to yield a 20-m (66-ft) buffered shutdown monitoring zone. The 20-m (66-ft) buffered shutdown zone also will avoid and minimize the potential for Level A acoustic harassment since all Level A ZOI distances are less than 10 m (33 ft) (see Section 1.3). Due to swim speeds of marine mammals potentially in the project area, adding a 10-m (33-ft) visual buffer is considered appropriate to reduce the risk of a Level A take associated with pile installation or removal. If an animal enters the 20-m (66-ft) buffered shutdown zone, pile driving would be stopped until the individual(s) has left the zone of its own volition, or not been sighted for 15 minutes after its last observed time.

The Level A/B harassment ZOIs will be monitored throughout the time required to drive or extract a pile. If a marine mammal is observed entering the Level B ZOI, an exposure would be recorded and behaviors documented. Work would continue without cessation, unless the animal approaches or enters the 20-m (66-ft) buffered shutdown zone, at which point pile driving or extraction will be halted.

If a marine mammal species not covered in the IHA approaches the Level B harassment zone, all pile driving or removal activities shall be halted until the animal(s) has been observed to have left the area, or has not been observed for at least one hour from its last observation time. NOAA Fisheries will be notified as soon as possible to discuss the occurrence of the non-covered species, pertinent observations of the behavior and condition of the animal, and precautions that were, and would be, taken to avoid unauthorized take. Pile installation/removal will be allowed to proceed if the above measures are fulfilled for non-IHA species.

If the take of a marine mammal species approaches the take limits specified in the IHA, NOAA Fisheries will be notified and appropriate steps will be discussed.

During any monitored activity, the PSO located closest to the construction activities ("Command" position) will initiate shutdown procedures, if warranted, by notifying the construction crew via either verbal or visual communication procedures (e.g., signal flag). Other PSOs can initiate shutdown procedures by calling the PSO/"Command," who will then stop construction by notifying the construction crew.

2.3 Observer Qualifications

The PSOs must be independent observers (i.e., not construction personnel), who are trained biologists with the ability to correctly identify the marine mammal species and accurately describe the relevant species-specific behaviors that may occur in proximity to in-water construction and demolition activities. The PSOs may either be biologists with prior training and experience to meet the qualifications in conducting marine mammal monitoring or must undergo applicable training to meet the qualifications. Additional qualifications and protocols of PSOs include the following:

- Will have the ability to conduct field observations and collect data according to the assigned protocol.
- Where a team of three or more observers are required, one observer will be designated as lead observer or monitoring coordinator and the lead observer will have had prior experience working as an observer.
- Will have experience or training in the field identification of marine mammals, including the identification of behaviors.
- Will have a minimum of a Bachelor's degree in biological science, wildlife management, mammalogy or related fields.
- Will have visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface, with the ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Will have sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
- Will have writing skills sufficient to prepare a report of observations including, but not limited to, dates and times when monitoring was conducted; the number and species of marine mammals observed; observed marine mammal behavior during monitoring relative to Project-related in-water activities; and dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound or physical interaction with operating equipment.
- Ability to communicate orally, by radio or in person, with Project personnel to provide real-time information on marine mammals observed in the area, as necessary.

- PSO resumes/curriculae vitae shall be submitted to NOAA Fisheries for approval prior to the onset of pile driving or extraction activities.

2.4 Marine Species Data Collection

NOAA Fisheries requires that at a minimum, the following information be collected by protected species observers (PSOs):

- Date and time that pile driving or removal begins or ends;
- Construction activities occurring during each observation period;
- Weather parameters (e.g., wind, temperature, percent cloud cover, and visibility);
- Tide stage and sea state (The Beaufort Sea State Scale will be used to determine sea-state);
- Species, numbers, and, if possible, sex and age class of marine mammals;
- Marine mammal behavior patterns observed, including bearing and direction of travel, and if possible, the correlation to SPLs;
- Distance from pile driving activities to marine mammals and distance from the marine mammal to the observation point;
- Locations of all PSOs; and
- Other human activity in the area.

The required fields will be incorporated into an electronic tablet form or hardcopy datasheets that will be used by the PSOs (example provided in Appendix A). Data collection forms shall be submitted to the Navy point of contact for review within a mutually agreeable timeframe prior to the start of construction.

To the extent practicable, the PSOs will also record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of Project activities over the course of a day.

In addition, the PSOs will document any occurrences of green sea turtles within the designated monitoring zones. Sighting information for green sea turtles will include all data that was collected for marine mammals (e.g., distance, bearing, and number of individuals). All measures identified in the applicable ESA consultation documents will be incorporated into monitoring protocols.

The PSOs will monitor the applicable ZOIs before, during, and after all pile driving and demolition activities, except for dead-pull pile removal, which will be monitored within the buffered shutdown zone only to avoid the potential for physical interaction with operating equipment.

2.5 Monitoring Equipment

PSOs will be stationed at land-based observation locations and may be on a survey boat, depending on size of monitoring zones.

2.5.1 Survey Vessel

The vessel will include the following equipment for the safety of the crew:

- A fixed marine radio for the vessel operator to monitor channels independent of observers communicating on a dedicated channel;
- Cellular phones (minimum one per boat), and the contact information for the other observers, and monitoring coordinator;
- Flags (one green, one red per boat) as back-up for radio communication;
- Daily tide tables for the Project area within San Diego Bay;
- A depth finder;
- Nautical chart;
- Navigational plotting equipment; and
- Both fixed and handheld Global Positioning System (GPS) units.

The vessel will comply with all U.S. Coast Guard regulations and be able to pass a U.S. Coast Guard safety inspection.

2.5.2 Marine Species Observation Equipment

The following equipment would be used to conduct marine species monitoring:

- Hearing protection for all personnel working near heavy construction equipment;
- Portable marine radios for the observers to communicate with the monitoring coordinator, construction contractor, and other observers;
- Cellular phones (one per observing location), and the contact information for the other observers, and monitoring coordinator;
- Flags (one green, one red per observing location) as back-up for radio communication;
- Daily tide tables for the Project area within San Diego Bay;
- Watch or Chronometer;
- Binoculars with built-in compass (quality of 7x50 or better);
- Laser rangefinder;
- Plan, IHA permit, and/or other relevant permit requirement specifications in sealed transparent plastic cover;

- Notebook and/or electronic tablets with pre-standardized Marine Mammal Observation Record forms to record field monitoring data electronically or on waterproof paper (e.g., Rite-in-the Rain);
- Marine mammal identification guides on waterproof paper;
- Clipboard; and
- Pen / Pencil

2.6 Monitoring Methods

The Navy will conduct briefings between construction supervisors and crews and the PSO team prior to the start of all pile driving/extraction activities, and when new personnel join the work. These briefings will explain responsibilities, communication procedures, visual monitoring protocols, and operational procedures. All personnel working in the project area will have watched the Navy's Marine Species Awareness Training Module.

The PSOs will collect marine mammal sightings data, including behaviors, for the pre-, during, and post-pile driving/extraction periods. All observations will be logged, regardless of proximity to the Level A or Level B ZOIs, to eliminate potential for bias. An assessment of take will occur only if the animal or group enters the ZOIs during project-related activities that may generate noise levels that meet or exceed the values identified in the application for the IHA (Navy 2020). The efficacy of visual detection depends on several factors including the PSOs ability to detect the animal, the environmental conditions (visibility and sea state), and monitoring platforms.

Based on NOAA Fisheries requirements, this Plan includes the following procedures:

- Monitoring will be conducted during daylight hours. If lighting conditions do not allow PSOs to observe the buffered Level A ZOI effectively, in-water construction or demolition activities will not be allowed to start (or continue) until conditions improve.
- For each type of construction with in-water activities (removal of existing piles, installation of new piles), PSOs will be placed at the best vantage point(s) practicable (e.g., from a small boat, construction barges, on shore).
- Up to four PSOs at up to three locations (including two PSOs on a captained vessel) will conduct the marine protected species monitoring depending on the activity and size of monitoring zones. When there are two or more PSOs, all will be in radio communication with each other to enhance tracking of marine mammals that may be moving through the area and to minimize duplicate observation records of the same animal by different PSOs (i.e., a re-sighting);
- One land-/barge-based PSO ("Command" position) will be stationed with clear view of the buffered shutdown and physical interaction shutdown zone(s) and will be responsible for the collection of pile driving/extraction start and stop times, identification of all marine protected species in the vicinity of the pile being installed or removed, and notifying the

contractor if construction or demolition must be delayed or stopped due to the presence of a marine protected species within the shutdown zones.

- For activities with monitoring zones beyond the visual range of the PSO/Command position, additional monitoring locations or the use of a vessel with captain and up to two PSOs (depending on width of the monitoring zones) will conduct monitoring. During pre-activity monitoring, the vessel will start from south of the Project area (where potential marine mammal occurrence is lowest) and proceed to the north. Data will be collected on any marine protected species observed within the monitoring zones in accordance with monitoring and data collection procedures. When the vessel arrives near the northern boundary of the ZOI, it will set up station so the PSO(s) are best situated to detect any marine mammals that may approach from the north.
- Monitoring will be conducted before, during, and after pile driving/removal activities. Pile driving activities include the time to remove a single pile or series of piles, as long as the time elapsed between use of the pile driving equipment is no more than 30 minutes.
- During all observation periods, the PSOs will use binoculars and/or the naked eye to search continuously for marine protected;
- A 20-m (66-ft) buffered shutdown zone will be established around all in-water construction and demolition activities to avoid the potential for physical or Level A acoustic injury of marine protected species.
- If a marine protected species enters the buffered shutdown zone, all pile driving or removal activities at that location must be halted. The animal(s) must be allowed to remain in the shutdown zone (i.e., must leave of their own volition) and their behavior must be monitored and documented. Work will be allowed to restart once the animal has been observed either leaving the shutdown area, or 15 minutes has elapsed since the last observation without re-detection of the animal.
- Results of all marine protected species observations during pre-activity, during activity, and post-activity monitoring will be recorded on electronic tablet or hardcopy datasheets.
- If an injured, sick, or dead marine mammal is observed, procedures outlined in Section 4.0 will be followed.

Pre-, during, and post-pile driving/extraction visual survey protocols are further described below.

2.6.1 Pre-Activity Monitoring

The following survey protocols will be implemented prior to the start of in-water pile driving and removal activities:

- Visual surveys will occur for at least 30 minutes prior to the start of construction.
- If a marine mammal is present within the 20-m (66-ft) buffered shutdown zone, in-water activities will be delayed until either the animal has voluntarily left and been visually

confirmed beyond the shutdown zone, or 15 minutes has elapsed since the last observation time without a re-detection of the animal.

- The buffered shutdown zone(s) may only be declared clear, and pile driving or demolition started, when the entire buffered shutdown zone is visible (i.e., when not obscured by a poor light, rain, fog, etc.). If the buffered shutdown zone is obscured by fog or poor lighting conditions, activity at the location will not be initiated until the buffered shutdown zone is visible.
- If marine mammals are present within the Level B Behavioral Harassment Monitoring Zone, in-water construction or demolition will not need to be delayed.

2.6.2 During Activity Monitoring

The Monitoring Zones will be monitored throughout pile driving and removal. Distances and activity monitoring protocols for these zones are described below:

- If a marine protected species approaches, or appears to be approaching, the 20-m (66-ft) buffered shutdown zone, the PSO who first observed the animal will alert the PSO/"Command," who will notify the construction crew of the animal's current status; in-water activities will be allowed to continue while the animal remains outside the buffered shutdown zone.
- If the marine protected species enters the 20-m (66-ft) buffered shutdown zone, a shutdown will be called by the PSO/"Command." As the animal enters the shutdown zone, all pile operations will be stopped and the animal(s) will be continually tracked. Once a shutdown has been initiated, all in-water activities that generate potentially impactful noise will be delayed until the animal has voluntarily left the shutdown zone and has been visually confirmed beyond the shutdown zone, or 15 minutes have passed without re-detection of the animal (i.e., the zone is deemed clear of marine protected species). The PSO/"Command" will inform the construction contractor that activities can re-commence.
- If shutdown and/or clearance procedures would result in an imminent concern for human safety, then the activity will be allowed to continue until the safety concern is addressed. During that timeframe the animal will be continuously monitored, and the Navy point of contact will be notified and consulted prior to re-initiation of project-related activities.
- Shutdown shall occur if a species, for which authorization has not been granted, or for which the authorized numbers of takes have been met, approaches or is observed within the Level B ZOI. The monitoring coordinator or lead PSO shall notify the Navy point of contact, who will then contact NOAA Fisheries immediately. For non-IHA species, pile installation/removal will be allowed to proceed if the animal(s) is observed to leave the Level B ZOI, or if one hour has lapsed since the last observation.
- The number, species, and locations of all marine mammals observed will be documented using an electronic tablet or hardcopy datasheets in compliance with NMFS reporting requirements.

- If a marine mammal is observed entering the Level B monitoring zones (see Table 1-3, Figure 1-2, Figure 1-4, and Figure 1-5), the pile segment being worked on will be completed without cessation, unless the animal enters or approaches the buffered shutdown zone. Regardless of location within the Level B monitoring zone, an initial behavior and the location of the animal(s) will be logged. Behaviors will be continually logged until the animal is either passed off to another PSO, the animal is no longer visible, or it has left the Level B monitoring zone.
- Due to the size of the larger Level B ZOIs (see Table 1-3 and Figures 1-2, 1-4, and 1-5), some animals may enter the ZOIs unseen by the PSOs. For these cases, the number of California sea lions observed during active pile driving or extraction by the PSOs inside of the Level B ZOI will also be counted as unobserved animals inside of the ZOI, effectively doubling take on any given day. These unobserved animals will be considered as "estimated" takes, as opposed to "observed" takes reported by the PSOs. For any regular or final reporting, the "estimated" and "observed" take will be added together to genera a total take for the reporting period.

2.6.3 Post-Activity Monitoring

Monitoring of all zones will continue for 30 minutes following completion of pile driving/extraction and drilling activities. These surveys will record all marine mammal observations following the same procedures as identified for the pre-construction monitoring time period, and will focus on observing and reporting unusual or abnormal behaviors.

2.6.4 Concurrent Action

There is a possibility that an overlap of in-water construction or construction and demolition activities could occur. If construction and/or demolition activities were to occur simultaneously, then two PSO/"Command" positions would be in place. These positions would act independently and would have the ability to shutdown proximate construction or demolition if a marine protected species entered the buffered shutdown zone under their observation. Sightings of marine protected species at one location that are moving towards the other location will be communicated among the PSOs, to increase the awareness of an incoming potential sighting.

In the event that water jetting and pile driving or extraction occur at the same time or simultaneous use of multiple pile clippers, the action will be monitored as one sound source. The buffered shutdown or the Level B ZOI associated with the louder of the two actions or additive Level B ZOI will be monitored for species presence as appropriate.

3.0 ACOUSTIC MONITORING

3.1 Objectives

The purpose of acoustic monitoring is to empirically verify Level A and Level B ZOIs for specific underwater sound-generating activities by using in-situ acoustic data collection on sound source levels, number of pile strikes, and duration of activity; received levels at a range of distances, from which actual rates of transmission loss can be determined; and determining the distances at which the applicable NOAA Fisheries Level A and Level B thresholds for sea lions are reached. Depending on the results and concurrence from NOAA Fisheries, this information may be used to adjust the estimated Level A and B monitoring zones (see Section 1.0).

3.2 Equipment

Sound data acquisition during pile installation and/or removal will utilize a combination of equipment, including survey vessel and specific acoustic data logging equipment. The equipment will be deployed to verify source levels at 10 m (33 ft) and received SPLs across a range of distances to confirm Level A and B ZOIs.

3.2.1 Survey Vessel

The vessel will include the following equipment for the safety of the crew:

- A fixed marine radio for the vessel operator to monitor channels independent of observers communicating on a dedicated channel;
- Cellular phones (minimum one per boat);
- A depth finder;
- Nautical chart and plotting tools;
- GPS unit.

The vessel will comply with all U.S. Coast Guard regulations and be able to pass a U.S. Coast Guard safety inspection.

3.2.2 Acoustic Measurement Equipment

Acoustic technicians (ATs) will conduct *in-situ* hydroacoustic monitoring of in-water construction and demolition activities. The following types of equipment will be used:

- A passive acoustic monitoring (PAM) system, with cabled underwater microphone (hydrophone) and specialized equipment and software for recording and processing received SPLs (e.g., digital audio recorder, data logger sound level meter, data processing hardware, sound analysis software, display hardware and software). The PAM system should allow the AT to determine dB RMS and PEAK (referenced to 1 μPa), and sound exposure level (SEL) (referenced to 1 μPa^2). The SEL_{cum} (SEL+10log(# pile strikes or pile driving/extraction duration)) metric will be calculated from collected data.

- The PAM system receiving sensitivity should be sufficient to measure very high acoustic pressures (e.g., 220 dB re: 1 μPa) within 10 m (33 ft) of pile driving activities without distortion.
- Pistonphone for calibration of hydrophones.

3.3 Methods

3.3.1 Overview

ATs will record SPLs during pile driving and extraction for each pile type and size. Data will be collected for a representative number of piles (three to five) at the start of each unique type of in-water activity (e.g., impact driving, vibratory driving/extraction, water jetting alone or in combination with pile driving or removal, pile clipping or chainsaw cutting). Data will be collected near the source (at, or as close as possible to, 10 m [33 ft] of the pile) and at various distances away to confirm SPLs, Level A and B ZOI monitoring zones, and rates of transmission loss for each separate in-water construction activity. While acoustic data will be recorded for a minimum number of piles according to each pile size and type and activity, collected acoustic data will be considered “sufficient” when the unique obtained values are demonstrated to be consistent and as expected over multiple recorded activities. Given that, there is the possibility that more acoustic data may need to be collected for some activities or pile sizes to be considered sufficient.

ATs may be co-located with the land-based PSO responsible for monitoring within 10 m (33 ft) of in-water construction and demolition activities. Acoustic surveys will be conducted using a vessel to confirm Level B ZOIs. This vessel will be free to move to any location needed to record acoustic data and will not interfere with the visual monitoring.

Hydroacoustic equipment and methods will follow NOAA (2012) guidance for hydroacoustic data collection equipment considerations and methods during impact and vibratory pile driving.

3.3.2 Equipment Calibration

- All hydrophones and recording systems will be checked prior to deployment each day to ensure proper operation.
- Pistonphone calibration will be performed at least once per week to maintain consistent measurements.
- The PAM system should be calibrated by the manufacturer to National Institute of Standards and Technology standards at least annually.

3.3.3 Hydrophone Deployment and Data Collection

- Hydroacoustic monitoring stations will be located at source and at appropriate distances away from the in-water construction activities to confirm monitoring zone Level A and B ZOI distances and sound transmission loss.

- All underwater sound monitoring systems will deploy hydrophones at mid-water depth (as determined by direct measurement or vessel-based depth finder).
- The hydrophone will be deployed so as to maximize its distance from flat surfaces or structures that may produce excessive reflections.
- During all vessel-based recordings, the vessel will be anchored and the engine off.
- GPS coordinates will be recorded for all acoustic monitoring locations.
- Sound level meter will be set to applicable source sound type, impulsive or non-impulsive, depending on pile driving or extraction method. Recordings will be made for the duration of each individual pile driving or extraction activity.
- Data will be reported on electronic tablet or hardcopy data sheets.
    - Field data collection will include, but not be limited to: date, AT initials, general weather information (wind, waves, temperature), boat/ship traffic in area, pile number, hydrophone location, hydrophone depth, water depth, start/end time of activity, type of activity, and field-collected acoustic metrics.
    - The monitoring coordinator will supply the AT with the start and stop times for the activity, hammer model and size, hammer energy settings, blow counts, and any changes to those settings during the piles being monitored.

3.3.4 Sound Source Verification

- Conduct pile driving sound source verification for the following types and sizes of piles.
    - At least five piles each during impact installation of the following pile sizes and types: 24-inch concrete octagonal piles, 16-inch fiberglass piles.
    - At least five piles each during vibratory extraction of 20-inch concrete piles and 12-inch timber-plastic piles.
    - At least three piles each during water jetting assisted pile installation and pile extraction.
    - At least three piles each during pile clipping and pile cutting with a chainsaw, as applicable.
- For impact pile driving source level measurements, reports will include: pulse duration and mean, median, and maximum sound levels (dB re: 1 μPa); cumulative sound exposure level (SEL_{cum});peak sound pressure level (SPL_{peak}), and single-strike sound exposure level ($SEL_{s\text{-}s}$).
- For vibratory pile driving/removal, water jetting, clipping and chainsaw cutting, source level measurements, reports will include: mean, median, and maximum source levels (dB re: 1 μPa); root mean square sound pressure level (SPL_{rms}); and cumulative sound exposure level (SEL_{cum}).
- Number of strikes (impact) or duration (vibratory or other non-impulsive sources) per pile measures, one-third octave band spectrum and power spectral density plot.

3.3.5 Monitoring Zone Confirmation

1) Initial hydro-acoustic monitoring will occur near the predicted ZOIs for Level A/B harassment ZOIs sufficient to document ZOI distances.
    - Empirically determine the Level B harassment distance by extrapolating from in-situ measurements of received SPLs at several points between 10 m and 500 m (33 ft and 1,640 ft) from the source. It is recommended that, at a minimum, measurements be taken at 10, 50, 250 and 500 m (33, 164, 820, and 1,640 ft) from the source, and that the best fit regression equation be used to estimate the Level B harassment distance. Alternatively, the Level B harassment distance can be determined by direct measurements to locate the distance where the received levels reach the ambient noise level (126 dB) (Dahl and Dall'Osto 2019).

- With NOAA Fisheries' concurrence, these metrics will, if needed, be used to recalculate the distances to the Level A and Level B isopleths, and to make corresponding adjustments in marine mammal monitoring of these zones.

4.0 INTERAGENCY NOTIFICATION FOR INJURED OR DEAD MARINE MAMMALS

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder shall report the incident to the Navy POC[1], Office of Protected Resources, NOAA Fisheries, and the Regional Stranding Coordinator as soon as feasible. If the death or injury was clearly caused by the specified activity, the IHA-holder must immediately cease the specified activities until NOAA Fisheries is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NOAA Fisheries.

- NBSD Base Biologist (Michelle Maley): 619-532-2868.
- NMFS Office of Protected Resources (OPR): 301-427-8401.
- West Coast Region Marine Mammal Stranding Network(s);
    - Live animals – Sea World of California: 800-541-7325
    - Dead animals – NMFS Southwest Fisheries Science Center: 858-546-7162.

The report will include the following information:

- Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behavior of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and,
- General circumstances under which the animal was discovered.

In the event that an injured or dead marine mammal is discovered, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), the PSO will report to the Navy POC. Within 24 hours, the Navy POC will report the incident to the NBSD Base Biologist, the NMFS OPR, and the appropriate West Coast Region Marine Mammal Network Stranding Coordinators as noted above. The report will include the same information identified above. Pursuant to NOAA Fisheries instruction and approval, activities may continue while the circumstances of the incident are under review. NOAA Fisheries will work with the Navy to determine whether modification in the activities are appropriate.

[1] The Navy POC will be determined prior the start of the Project and contact information will be provided to the monitoring crew.

In the event that an injured or dead marine mammal is discovered, and the lead PSO determines that the injury or death is not associated with, or related to, Project-related activities authorized in the IHA (i.e., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the lead PSO will report the incident to the Navy POC, who will report the animal(s) to the NBSD base biologist. The appropriate West Coast Region Marine Mammal Network Stranding Coordinators, as noted above, will be notified within 24 hours of the discovery. The Navy POC will not be required to contact the NMFS OPR for these cases. The PSOs will provide photographs or video footage (if available) or other documentation of the stranded animal sighting to the Navy POC under such a case. At no time should the PSO handle, or attempt to handle, a dead marine mammal.

5.0 REPORTING

A draft report would be submitted to NOAA Fisheries within 90 calendar days of the completion of marine mammal and acoustic monitoring or 60 days prior to the issuance of any subsequent IHA for this project. A final report would be prepared and submitted to the NOAA Fisheries within 30 days following resolution of comments on the draft report from NOAA Fisheries.

The marine mammal report shall contain informational elements including, but not limited to:

- Dates and times (begin and end of all marine mammal monitoring.
- Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method (i.e., impact or vibratory).
- Weather parameters and water conditions during each monitoring period (e.g., wind speed, percent cover, visibility, sea state).
- The number of marine mammals observed, by species, relative to the pile location and if pile driving or removal was occurring at time of sighting.
- Age and sex class, if possible, of all marine mammals observed.
- PSO locations during marine mammal monitoring.
- Distances and bearings of each marine mammal observed to the pile being driven or removed for each sighting (if pile driving or removal as occurring at time of sighting).
- Description of any marine mammal behavior patterns during observation, including direction of travel and estimated speed time spent within the Level A and Leve B harassment zones while the source was active.
- Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone, and estimates of number of marine mammals taken, by species (a correction factor may be applied to total take numbers, as appropriate).
- Detailed information about any implementation of any mitigation triggered (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any.
- Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals.
- Submit all PSO datasheets and/or raw sighting data (in a separate file from the Final Report referenced immediately above).

The acoustic monitoring report must, at minimum, include the following:

- Hydrophone equipment and methods: recording device, sampling rate, distance (m) from the pile where recordings were made; depth of recording device(s).
- Type of pile being driven, substrate type, method of driving during recordings, and if a sound attenuation device was used.

- For impact pile driving and/or down the hole drilling: Pulse duration and mean, median, and maximum sound levels (dB re 1 μPa): cumulative sound exposure level (SEL_{cum}), peak sound pressure level (SPL_{peak}); and single strike sound exposure levels (SELs-s).
- For vibratory driving/removal: Mean, median, and maximum sound levels (dB re 1 μPa); RMS sound pressure levels (SPLRMS); cumulative sound exposure level (SEL_{cum}).
- Number of strikes (impact) or duration (vibratory) per pile measures; one-third octave band spectrum and power spectral density plot.

6.0 REFERENCES

California Department of Transportation. 2015. Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Prepared by David Buehler, P.E., Rick Oestman, James Reyff, Keith Pommerenck, and Bill Mitchell.

Dahl, P.H. and D.R. Dall'Osto. 2019. Ambient Underwater Sound at Naval Base San Diego, San Diego Bay, California. Prepared for Naval Facilities Engineering Command Southwest under contract to Tierra Data, Inc.

Dall'Osto, D.R. and P.H. Dahl. 2019. Hydroacoustic Modeling of Pile Driving for the South-Central Region of San Diego Bay. Prepared for Naval Facilities Engineering Command Southwest under contract to Tierra Data, Inc.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries). 2012. Guidance Document: Data Collection Methods to Characterize Impact and Vibratory Pile Driving Source Levels Relevant to Marine Mammals. Prepared by NMFS Northwest Region and Northwest Fisheries Science Center.

_____. 2018. Revision to Technical Guidance for Assessing the Effects of Anthropogenic 32 Sound on Marine Mammal Hearing (Version 2.0) – Underwater Thresholds for Onset of 33 Permanent and Temporary Threshold Shifts. NOAA Technical Memorandum NMFS-OPR-59. 34 April.

Naval Facilities Engineering Command Southwest. 2020. Compendium of Underwater and Airborne Sound Data during Pile Installation and In-water Demolition Activities in San Diego Bay. September 2018.

U.S. Department of the Navy (Navy). 2020. Incidental Harassment Authorization Application for the Navy's Pier 6 Replacement Project at Naval Base San Diego. Submitted to Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration.

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APPENDIX A:

EXAMPLE MARINE SPECIES OBSERVATION RECORD FORM

Marine Species Monitoring Log (Page 1)

Date:__________ Observer(s):______________________________

Geneal Weather: AM____________________ Daily Start Time:__________

PM____________________ Daily End Time:__________

	Time	Species	# Indiv Water	# Indiv HO	Dist (m)	Bear (deg)	Sex	Age Class	Dir of Travel	1° Beh	2° Beh	2° Beh Time	Activity Type	Resight (Y/N)	Notes/Other Human Activity
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Species Abbreviations:

CSL	CA sea lion	CSL DD	Dead CSL	OTH	Other Species	ULWH	Unknown Large Whale
CBD	Coastal Bottlenose Dolphin	PGW	Pacific Grey Whale	Mixed	Multiple Species	GST	Green Sea Turtle
PHS	Harbor Seal	CLT	CA Least Tern	UPIN	Unknown Pinniped		
PWS	Pacific White-sided Dolphin	CMD	Common Dolphin	UDOL	Unknown Dolphin		

Marine Species Monitoring Log (Page 2)

	Station	Buoy #	Obs Lat	Obs Long	Sky Cover	Vis.	BSS	Photo (Y/N)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Activity Type

IPD	Impact	Post	Post-con Monitoring
VPD	Vibratory	OTH	Other
Pre	Pre-con Monitoring		
ND	Non Driving Monitoring		

Sex

F	Female	Mixed	Mixed Group
M	Male	U	Unknown

Age Class

P	Pup	A	Adult
C	Calf	U	Unknown
J	Juvenile	M	Mixed
SA	Subadult	N/A	N/A

Primary Behavior

DV	Dive	PP	Porpoising
O	Other	SW	Swimming
SF	Suc Forage	JH	Jug Handling
UF	Unsuc Forage	RF	Rafting
LG	Logging	EN	Enter Water
BR	Bow Riding	EX	Exit Water
TS	Tail Slap	HO	Hauled Out
SH	Spyhop	LO	Look
ML	Milling		

Secondary Behavior

AD	Ab Change Dir	BC	Breach
IB	Inc Breath Rate	FL	Flush
IS	Inc Swim Rate		

Sky Cover

C	Clear	F	Fog
PC	Partly Cloudy	HZ	Hazy
CD	Cloudy	LR	Light Rain
O	Overcast	HR	Heavy Rain

Visibility

BD	bad (<0.5 km)	GD	good (10-20 km)
PR	poor (0.5-1.5 km)	EX	excellent (>20 km)
MD	moderate (1.5-10 km)		

INCIDENTAL HARASSMENT AUTHORIZATION APPLICATION FOR THE NAVY'S PIER 6 REPLACEMENT PROJECT AT NAVAL BASE SAN DIEGO

October 1, 2021 THROUGH September 30, 2022

Submitted to:

Office of Protected Resources,
National Marine Fisheries Service,
National Oceanic and Atmospheric Administration

Prepared by:

Naval Facilities Engineering Systems Command

For:

Naval Base San Diego

November 2020

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ACRONYMS AND ABBREVIATIONS

°C	Celsius
Caltrans	California Department of Transportation
CFR	Code of Federal Regulations
CTR	California Toxic Rule
cy	cubic yards
dB	decibel
ESA	Endangered Species Act
ESTCP	Environmental Security Technology Certification Program
°F	Fahrenheit
ft	foot/feet
Hz	hertz
IHA	Incidental Harassment Authorization
in	inch(es)
kHz	kilohertz
km	kilometer(s)
l	liter
lbs	pounds
lf	linear ft
LMR	Living Marine Resources
m	meter(s)
min	minute(s)
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
NAVFAC	Naval Facilities Engineering Systems Command (SW = Southwest)
Navy	U.S. Department of the Navy
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Marine Fisheries Service
NRSW	Navy Region Southwest
ONR	Office of Naval Research
Pa	Pascal
POSD	Port of San Diego
ppm	parts per million
PSO	protected species observer
PTS	permanent threshold shift
R&D	research and development
RMS	root mean square
s	second(s)
SEL	sound exposure level
SERDP	Strategic Environmental Research and Development Program
sf	square ft
SPAWAR	Space and Naval Warfare Systems Command
SPL	sound pressure level
TL	transmission loss
TTS	temporary threshold shift
re 1 µPa	referenced to 1 micropascal
U.S.	United States
USACE	U.S. Army Corps of Engineers
ZOI	Zone of Influence

EXECUTIVE SUMMARY

In accordance with the Marine Mammal Protection Act (MMPA) of 1972, as amended, the U.S. Navy (Navy) is applying for an Incidental Harassment Authorization (IHA) for activities associated with the Pier 6 Replacement Project in the south-central part of San Diego Bay at Naval Base San Diego (NBSD). For this IHA application, the Navy determined that underwater noise from pile removal during demolition of the existing pier and pile installation during construction of the new pier have the potential to result in incidental harassment under the MMPA. This IHA application is intended to cover 12 months of pile removal and installation activity during fiscal year 2022. A subsequent Continuation IHA application will be submitted for any remaining in-water demolition and construction activities that are necessary to complete the project that extend beyond the planned 12-month construction period.

One species of marine mammal has a reasonable likelihood of occurrence during the project's timeline and could thereby be exposed to sound pressure levels (SPLs) and sound exposure levels (SELs) associated with vibratory and impulsive pile demolition and installation activities: the California sea lion (*Zalophus californianus*).

Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and inadequate deck size to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. The replacement of Pier 6 is needed to provide adequate ship berthing infrastructure to support modern Navy ships and ultimately, Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces. Unless replaced, Pier 6's structural integrity will continue to deteriorate and pose unsafe working conditions, especially during berthing operations.

The existing Pier is 18 meters (m; 60 feet [ft]) wide by 420 m (1,377 ft) long and would be demolished prior to the construction of the new pier. Following an initial hazardous materials survey and any necessary abatement, workers would disconnect, clean, and safe-out all utilities and then remove all electrical and mechanical equipment from the pier. All piles (totaling approximately 2,000 structural, fender, and other piles) would be removed, one pile at a time, at a rate of up to 8 piles per day; this analysis assumes the maximum rate of removal over 250 working days. The existing piles are predominantly 20-inch square concrete piles.

Workers would initially attempt to extract the piles out by securing the piles above the water line and applying upwards pressure to the pile (dead-pull). Workers may also use the dead-pull method with pile jetting (where an external high-pressure water jet is used to loosen the sediment around the pile). A vibratory hammer may also be used to loosen the piles prior to removal. If the piles could not be pulled out by these methods, workers would place a hydraulic cutter over each pile and lower it to the mudline. Diver assistance may or may not be required during this specific pile removal activity. An underwater hydraulic saw operated by a diver may also be used to remove piles. Once the piles are cut, a crane would remove the pile and set it onto a barge for transport to a concrete processing yard (at NBSD or offsite). Ultimately, the contractor will use one of the above described methods depending on which method proves to be most efficient method to remove the pile. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

Following demolition of the existing pier, the Navy would construct a conventional concrete single-deck berthing pier measuring 37 m (120 ft) wide by 457 m (1,500-ft) long. The total surface area of Pier 6 would increase from approximately 0.8 hectare (ha; 1.9 acres) to approximately 1.7 ha (4.1 acres), an increase of approximately 0.9 ha (2.2 acres).

On average, workers would install approximately 5-9 piles each day, one pile at a time. At an average daily rate of 7 piles per day, it would take workers approximately 138 working days to install all of the piles. It is anticipated that some overlap would occur between demolition and installation with 138 installation days occurring concurrently with pile removal over a total of 250 working days.

In addition, approximately 15 additional structural test piles would be installed at the beginning of construction and are included. Some or all of the structural test piles would likely be left in place as a permanent part of the project or be removed.

The total length of the piles would range from approximately 26 m (85 ft) (fender piles) to 34 m (110 ft) (structural piles); the length of the portion of the piles in the water column would range from approximately 3 to 9 m (10 to 30 ft), depending on pile type, location, and tide. The use of concrete and fiberglass rather than creosote-treated wood pilings would be consistent with Navy policy and would be preferable because, unlike creosote-treated wood pilings, the new piles would not be a potential source of polycyclic aromatic hydrocarbons to the bay.

Workers would construct the pier deck on-site with rebar-reinforced concrete. Pre-stressed concrete (structural) piles with cast-in-place concrete pile caps would support the concrete deck structure. All pile and deck construction for Pier 6 would follow current seismic standards and would be strong enough to support a 140-metric ton (154-US ton) crane. The design would position the pier deck above the predicted high tides and tidal surges to ensure that sea water would not damage the deck or pier utilities network. All construction material deliveries would be via truck.

In this IHA application, the Navy has used site-specific acoustic models (Dall'Osto and Dahl 2019), the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) Technical Guidance, NOAA Fisheries User Spreadsheet, and simple practical spreading loss models (NOAA Fisheries 2018a, 2020a) to identify the Level A (injury) and Level B (behavior) zones of influence (ZOIs) that would result from pile removal and installation, as outlined in Section 6 (Table ES-1). Recently proposed changes to the criteria and thresholds (Southall et al. 2019) have not been formally adopted as of the date of this application and are not used here. Empirically measured source levels from similar pile removal events as reported in the literature (California Department of Transportation [Caltrans] 2015; Naval Facilities Engineering Command [NAVFAC] Atlantic 2017; NAVFAC SW 2020) were used to estimate sound source levels for this project. Source levels for pile driving are typically measured at 10 m (33 ft) from the pile in order to standardize sound measurement data. For pile driving and removal activities, underwater sound transmission loss is estimated using the site-specific model developed for the Navy by Dall'Osto and Dahl (2019). Transmission loss from other sound-generating activities has been modeled using “practical spreading loss,” which assumes a loss of 4.5 decibels (dB) with each doubling of distance. Ambient underwater sound levels for the project area (Dahl and Dall'Osto 2019) are used as appropriate in the analysis.

Transect surveys have very infrequently encountered marine mammals south of the Coronado Bridge, and very few surveys have extended as far south as the project area because of the scarcity of marine mammals in this part of the Bay. There are no known haulout locations in the project area, although there are structures, such as buoys, that could be used. A single survey in February 2010 (Sorensen and Swope 2010), however, recorded two California sea lions swimming off of NBSD. More recently, monitoring efforts for a quaywall repair project at the northern end of NBSD in late 2019 and early 2020 recorded California sea lions observations at an average of 0.69 animals per monitoring day (Chollas Creek Quaywall Repairs, unpublished data). Given that there is a lack of density data in the project area, an accepted observation protocol is to assume that for every California sea lion observed there is one more unseen because California sea lions tend to travel in groups of two or more (Melin et al 2018). This is the basis for a conservative estimate of four California sea lions per day within the potential acoustic ZOIs for the project.

Table ES-1. Noise Model Used to Calculate Level A and B ZOI by Extraction / Installation Method by Pile Type

Installation / Extraction Method	***Pile Type***
Dall'Osto and Dahl Model (2019)	
Vibratory extraction	12-inch timber-plastic piles
	20-inch and 24-inch concrete piles
	16-inch I-shaped steel piles
Pile Installation	20-inch and 24-inch concrete piles
NOAA Fisheries User Spreadsheet (2020)/Simple Practical Spreading Loss Model (15LOGR)	
High-pressure water jetting	Removal of 20-inch square concrete piles
Underwater hydraulic chainsaw	Cutting all types of piles
Small pile clipper	Clipping 12-inch timber and plastic piles
Large pile clipper	Clipping 20-inch square concrete

Potential exposures that would constitute takes under the MMPA are calculated in Section 6, and based on this analysis, no mortality or serious injuries are anticipated. A "Physical Interaction Shutdown Zone" of 10 m (33 ft) would be implemented to halt activities that could pose a risk of non-hearing injury when a marine mammal is within 10 m (33 ft) of the activity. No project related activities are expected to have a Level A acoustic ZOI beyond the 10-m (33-ft) "Physical Interaction Shutdown Zone." Further, a buffer of 10 m (33 ft) would be added to that required 10-m (33-ft) Level A injury prevention (shutdown) zone resulting in a 20-m (66 ft) monitored shutdown zone. This would further reduce the likelihood of Level A harassment (minor injury due to the onset of a permanent threshold shift [PTS]), which could only occur if an animal were to remain well inside of 10 m (33 ft) for a prolonged period. Previously established thresholds and the aforementioned site-specific modeling (Dall'Osto and Dahl 2019) and practical spreading loss model are used to determine the extent of the Level B ZOI for these activities.

The proposed action will include specific acoustic monitoring of pile removal activities not previously validated by repetitive field measurements and analysis, as well as continued observational monitoring of marine mammal occurrences within established ZOIs.

Pursuant to the MMPA Section 101(a)(5)(D)[1], the Navy submits this application to the NOAA Fisheries for an IHA for the incidental, but not intentional, taking of 1,000 California sea lions during pile removal and installation activities as part of the Pier 6 Replacement Project, for the 12-month period beginning October 1, 2021. The anticipated take of California sea lions would be in the form of non-lethal, temporary harassment behavioral disturbance and is expected to have a negligible impact on the species.

[1] 16 U.S.C. § 1371(a)(5); 50 CFR Part 216, Subpart I.

In addition, the taking would not have an unmitigable adverse impact on the availability of these species for subsistence use. If in-water activities do not occur within the year anticipated, a request for a Renewal will be submitted and received by NOAA Fisheries no later than 60 days prior to the expiration of this IHA. The Renewal request will include an explanation that the activities to be conducted under the requested Renewal are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take because only a subset of the initially analyzed activities remain to be completed under the Renewal). The Renewal request will also include a preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

Regulations governing the issuance of incidental take under certain circumstances are codified at 50 Code of Federal Regulations (CFR) Part 216, Subpart I (Sections 216.101 – 216.108). Section 216.104 sets out 14 specific items that must be addressed in requests for take pursuant to Section 101 (a) (5) (D) of the MMPA. These 14 items are addressed in Sections 1 through 14 of this IHA application.

1 DESCRIPTION OF ACTIVITIES

A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.

1.1 Introduction

Pursuant to the Marine Mammal Protection Act (MMPA) Section 101(a)(5)(D), the United States Navy (Navy) submits this application to National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) for an Incidental Harassment Authorization (IHA) for the incidental taking of marine mammal species during pile removal and installation activities associated with the proposed replacement of Pier 6 at Naval Base San Diego (NBSD) (Figure 1-1). This application is intended to cover the in-water demolition and installation activities that may result in takes of marine mammals between October 1, 2021 and September 30, 2022, inclusive. Code of Federal Regulations (CFR) 50 216.104 sets out 14 specific items that must be included in requests for take pursuant to Section 101(a)(5)(A) of the MMPA; Those 14 items are addressed in Sections 1 through 14 of this IHA. If in-water activities do not occur within the year anticipated, a request for renewal will be submitted and received by NOAA Fisheries no later than 60 days prior to the expiration of this IHA. The renewal request will include an explanation that the activities to be conducted under the requested Renewal are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take because only a subset of the initially analyzed activities remain to be completed under the Renewal). The renewal request will also include a preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

1.2 Proposed Action

NBSD is a major port for Navy ships assigned to the Pacific Fleet and is the major West Coast logistics base for surface forces of the Navy, dependent activities, and other commands. Activities at NBSD include Continuous Maintenance Availabilities and loading supplies for fleet vessels. NBSD contains 12 piers (including a mole pier), two channels, and various quay walls that extend along approximately 5.6 miles of shoreline (Figure 1-2). Surface ships, support vessels, and barges receive various ship support services, such as supplies and minor repair or maintenance, when berthed at NBSD.

Constructed by the Navy in 1945, Pier 6 is 18 meters (m; 60 feet [ft]) wide and 420 m (1,377 ft) long and begins at the intersection of West Vesta and Brinser Streets. Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and inadequate deck size (at only 18 m [60 ft] wide) to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. A 2015 Load Capacity Analysis Report (NAVFAC SW 2015) cited Pier 6's overall condition as poor and in need of replacement. Due to Pier 6's limited width, utilities deficiencies, and other infrastructure support limitations, only dock landing ships, guided-missile frigates, and older amphibious transfer dock ships can berth at Pier 6.

Pier 6's deficiencies include the following:

- Width:
  - The limited width of Pier 6 restricts the amount and type of ship maintenance and large-load ship storing that can occur.
  - There is inadequate space for trash containers; when a container is on the pier, no traffic can pass.
  - Trucks and mobile truck cranes must travel on the center 5 m (17 ft) of the pier only.
  - There is no adequate fire lane on Pier 6.
- Structural:
  - Pier 6 is not compliant with current structural or seismic criteria (i.e., Department of Defense [DoD] Unified Facilities Criteria [DoD 2017]).
  - Concrete is spalling in many locations above and below deck, at pile caps, and at the top of concrete bearing piles.
  - There are cracked and broken concrete curbs on the deck edges in many areas; exposed sections of corroded steel reinforcement create unsafe working conditions to personnel, especially during berthing operations.
  - Maximum load limits restrict 35-ton crane and forklift use to limited areas.
  - By 2023, the Navy will prohibit all crane operations on Pier 6 due to the concrete deck's projected inability to structurally support the load of a crane.
- Utility Services:
  - Electrical, potable water, sanitary sewer, compressed air, and steam utilities on the pier are all in poor condition and/or inadequate to meet demands.
  - There is no oily waste system on Pier 6 due to the narrowness of Pier 6 and its load restrictions.

The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern Navy ships and ultimately, Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces. Unless the Navy replaces structurally deteriorating and operationally constrained piers such as Pier 6, NBSD will not be able to properly support berthing of homeported ships. Unless replaced, Pier 6's structural integrity will continue to deteriorate and pose unsafe working conditions, especially during berthing operations.

No new ship homeporting actions are specifically planned as a part of the Proposed Action. Port loading at NBSD is coordinated between the Commander Navy Region Southwest Port Operations Shore Infrastructure Plan (Commander Navy Region Southwest 2010) and the Chief of Naval Operations Notional Strategic Laydown Plan. Ship berthing and pier operations (including pier maintenance) are included in these two plans and any potential operational impacts at Pier 6, both in water and on land, were analyzed as a part of the plan adoption process. Therefore, ship berthing operations associated with the Proposed Action are not addressed in this IHA. While Pier 6 is being demolished and replaced, existing berthing operations would be temporarily re-distributed to the other NBSD piers.

Figure 1-1 Regional Location of Naval Base San Diego

Figure 1-2
Pier 6 Location at Naval Base San Diego

1.3 Description of Activities

Figure 1-3 presents a typical cross-section of the existing pier. The Navy would demolish Pier 6 over a period of approximately 12 months generally in the following manner:

- Following an initial hazardous materials survey and any necessary abatement, workers would disconnect, clean, and safe-out all utilities and then remove all electrical and mechanical equipment from the pier.
- All piles (totaling approximately 2,000 structural, fender, and other piles) would be removed (NAVFAC SW 2019a). Workers would remove approximately 8 piles per day, one pile at a time (Moffatt and Nichol 2019). The existing piles are predominantly 20-inch square concrete piles (NAVFAC SW 2019b).

Workers would initially attempt to extract the piles out by securing the piles above the water line and applying upwards pressure to the pile (dead-pull). Workers may also use the dead-pull method with pile jetting (where an external high-pressure water jet is used to loosen the sediment around the pile). A vibratory hammer may also be used to loosen the piles prior to removal. If the piles could not be pulled out by these methods, workers would place a hydraulic cutter over each pile and lower it to the mudline. Diver assistance may or may not be required during this specific pile removal activity. An underwater hydraulic saw operated by a diver may also be used to remove piles. Once the piles are cut, a crane would remove the pile and set it onto a barge for transport to a concrete processing yard (at NBSD or offsite). Ultimately, the contractor will use one of the above described methods depending on which method proves to be most efficient method to remove the pile. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

The pier deck would be sawcut and removed in large sections using a floating derrick crane before the crane would place the sections on a barge. Workers would also remove portions of the quaywall pile cap to allow for extension of new utility services to the pier. Support craft would tow the barges loaded with concrete deck sections and piles to a concreate processing yard (at NBSD or offsite) to process the material. Trucks would haul concrete to an off-site recycler for processing in compliance with recycling facility requirements. Workers would separate steel from concrete for recycling. Trucks would then transport unrecyclable materials to a permitted landfill. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

The new Pier 6 would be a conventional concrete single-deck berthing pier measuring 37 m (120 ft) wide by 457 m (1,500 ft) long and would wholly replace the old Pier 6. The total surface area of Pier 6 would increase from approximately 0.8 hectare (ha; 1.9 acres) to approximately 1.6 ha (4.1 acres), an increase of approximately 0.9 ha (2.2 acres).

On average, workers would install approximately 5-9 piles each day, one pile at a time. At an average daily rate of 7 piles per day, it would take workers approximately 138 working days to install all of the piles. It is anticipated that some overlap would occur between demolition and installation with the 138 installation days occurring concurrently with 250 working days for demolition, for a total of 250 working days.

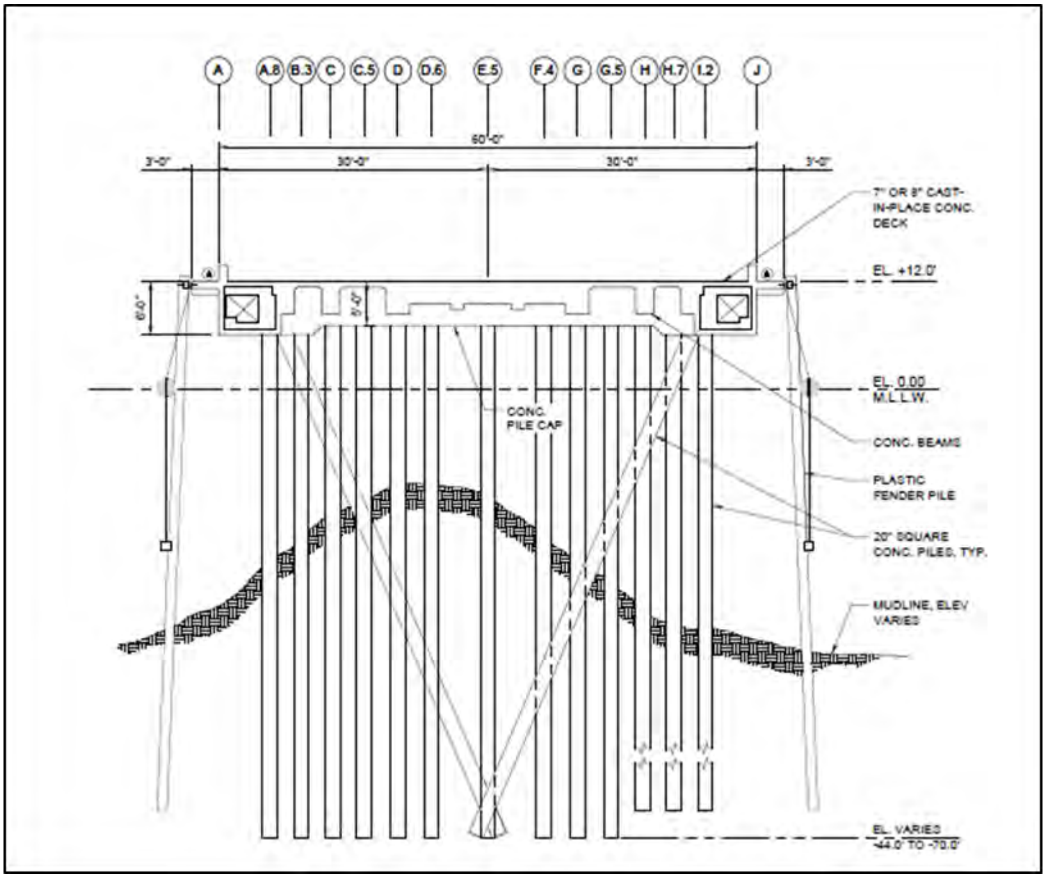

Figure 1-3 Existing Cross-Section of Pier 6 (typical)

In addition, approximately 15 additional test piles would be installed at the beginning of construction. Some or all of the structural test piles would likely be left in place as a permanent part of the project or be removed.

The total length of the piles would range from approximately 26 m (85 ft) (fender piles) to 34 m (110 ft) (structural piles); the length of the portion of the piles in the water column would range from approximately 3 to 9 m (10 to 30 ft), depending on pile type, location, and tide. The use of concrete and fiberglass rather than creosote-treated wood pilings would be consistent with Navy policy and would be preferable because, unlike creosote-treated wood pilings, the new piles would not be a potential source of polycyclic aromatic hydrocarbons to the bay.

Workers would construct the pier deck on-site with rebar-reinforced concrete. Pre-stressed concrete (structural) piles with cast-in-place concrete pile caps would support the concrete deck structure. All pile and deck construction for Pier 6 would follow current seismic standards and would be strong enough to support a 140-metric ton (154-US ton) crane. The design would position the pier deck above the predicted high tides and tidal surges to ensure that sea water would not damage the deck or pier utilities network. All construction material deliveries would be via truck. Because construction of the new pier deck would occur above the water line, it is not included in this analysis of in-water noise impacts to marine mammals.

1.4 Best Management Practices, Mitigation, and Minimization Measures

Section 11 describes the general Best Management Practices (BMPs), mitigation, and minimization measures that may be implemented for all in-water activities. BMPs are routinely used by the Navy during pile installation activities to avoid and minimize potential environmental impacts. Additional minimization measures have been added to protect marine mammals. These measures include vibratory removal of piles where possible, noise attenuation and performance measures for impact pile driving, and marine mammal monitoring as described in Section 11.

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2 DATES, DURATION, AND LOCATION OF ACTIVITIES

The dates and duration of such activity and the specific geographical region where it will occur.

2.1 Dates and Duration of Activities

For this analysis, it is assumed that the removal of all 2,000 piles (predominantly 20-inch square concrete structural piles) would be removed within a 12-month period. Accordingly, it is estimated that 8 piles would be removed (pulled or cut) per day over the course of 250 workdays of in-water demolition activities. The new pier would require the installation no more than 966 concrete and fiberglass piles at a rate of 7 piles per day over the course of 138 days.

It is anticipated that overlap between demolition and installation activities would occur over the 250-day project period (Table 2-1). Pile removal would begin on day 1 and progress at a rate of 8 piles per day, for an expected 250 days of pile removal. Pile installation is anticipated to begin after removal of one third of the piles, or approximately 83 days of pile removal, at a rate of 7 piles per day for an expected 138 days of pill installation. Pile installation is expected to periodically occur alongside ongoing pile removal activities over 138 days of the remaining 167 project days of pile removal. Because pile installation cannot continue where demolition activities are incomplete, there would be 29 days (167 days – 138 days of pile installation) where only pile removal would occur after pile installation has started. Demolition and installation activities would end on day 250. In summary, the 250-day project period would include 112 days of pile removal-only activities and 138 days of concurrent pile removal and installation activities.

Table 2-1. Activity Summary, Pile Driving and Demolition, Pier 6 Replacement Project.

Method	Pile Type	Number of Piles	Piles/ Day	Total Estimated Days
Demolition Existing Pier				
Vibratory Extraction High-pressure Water Jetting Hydraulic Pile Clipper Hydraulic Chainsaw	24-inch square pre-cast concrete, 20-inch square pre-stressed/pre-cast concrete piles	1,833	**8**	**250**
	12-inch composite (timber-plastic) piles	149		
Vibratory Extraction	16-inch I-shaped steel piles	16		
	Total	**1,998**		
Construction New Pier				
Impact Pile Driving	24-inch octagonal concrete structural test piles	15	**7**	**138**
	24-inch octagonal concrete structural piles	513		
	24-inch square concrete fender system test piles	4		
	24-inch square concrete primary fender piles	204		
	20-inch square concrete pile for load-out ramp cradle	4		
	16-inch fiberglass secondary and corner fender piles	226		
High-pressure Water Jetting	20- and 24-inch concrete piles	Within Above Counts		
	Total	**966**		

Note: high-pressure water jetting may be used to assist pile installation/extraction and a hydraulic cutter may be used to clip piles at the mudline.

2.2 Project Area Description

San Diego Bay is a narrow, crescent-shaped natural embayment oriented northwest-southeast with an approximate length of 24 kilometers (km; 15 miles) and a total area of roughly 4,450 ha (11,000 acres) (Port of San Diego [POSD] 2007). The width of the bay ranges from 0.3 km to 5.8 km (0.2 to 3.6 miles), and depths range from 23 m (74 ft) mean lower low water (MLLW) near the tip of Ballast Point (refer to Figure 1-2) to less than 1.2 m (4 ft) at the southern end (Merkel & Associates, Inc. 2009). About half of the bay is less than 4.6 m (15 ft) deep and most of it is less than 15 m (50 ft) deep (Merkel & Associates, Inc. 2009).

2.2.1 Bathymetric Setting

The northern and central portions of San Diego Bay have been shaped by historical dredging and filling to support large ship navigation and shoreline development; only the southernmost portion of the bay retains its natural shallow bathymetry (Merkel & Associates Inc. 2009). The bathymetry and bedform of the bay are defined by a main navigation channel that steps up to shallower dredged depths toward the sides and south end of the bay (Merkel & Associates, Inc. 2009). U.S. Army Corps of Engineers (USACE) dredges the main navigation channel in San Diego Bay to maintain a depth of -14.3 m (-47 ft) MLLW and is responsible for providing safe transit for private, commercial, and military vessels within the bay (NOAA 2010). Outside of the navigation channel, the bay floor consists of platforms at depths that vary slightly (Merkel & Associates, Inc. 2009). Within the Central Bay, typical depths range from -11 m to -12 m (-35 to -38 ft) MLLW to support large ship turning and anchorage (Merkel & Associates, Inc. 2009). Small vessel marinas are typically dredged to depths of 4.6 m (-15 ft) MLLW (Merkel & Associates, Inc. 2009). Water depth at Pier 6 ranges from 6 to 8 m (20.5 to 26 ft).

2.2.2 Circulation, Tides, Temperature, and Salinity

Circulation within San Diego Bay is affected by its crescent shape and narrow bay mouth, tides, and seasonal salinity and temperature variations (POSD 2007). San Diego Bay can be divided into four regions based on circulation characteristics:

- The North Bay – Marine Region extends from the bay mouth to the area offshore downtown San Diego. Tidal action has the greatest influence on circulation in this area, where bay water is exchanged with sea water over a period of two to three days (POSD 2007).
- The North-Central Bay – Thermal Region runs from the North Bay to Glorietta Bay (south of Coronado Island). In the Thermal Region, currents are mainly driven by surface heating. Incoming tides bring cold ocean water from deeper areas, which is then replaced with warm bay surface water when the tide recedes. These tidal processes lead to strong vertical mixing (POSD 2007).
- The South-Central Seasonally Hypersaline Region (i.e., with higher salt content than seawater) occurs between Glorietta Bay and Sweetwater Marsh. Here, variations in salinity due to warm-weather evaporation at the surface separate the water into upper and lower zones driven by density differences (POSD 2007).
- The South Bay Estuarine Region, located south of Sweetwater Marsh, receives occasional freshwater inflows from the Otay and Sweetwater Rivers. Residence time of bay water in the estuarine region may be greater than 1 month (POSD 2007). Common salinity values for the bay range from 33.3 to 35.5 practical salinity units for the bay mouth and the south bay, respectively (Chadwick et al. 1999).

San Diego Bay has mixed diurnal/semi-diurnal tides, with the semi-diurnal component being dominant (Largier 1995). The interaction between these two types of tides is such that the higher high tide occurs before the lower low tide, creating the strongest currents on the large ebb tide (Largier 1995). The tidal range (difference between MLLW and mean highest high water) is approximately 1.7 m (5.5 ft) (Largier 1995). In general, tidal currents are strongest near the bay mouth, with maximum velocities of 0.5 to 1.0 m per second (1.6 to 3.3 feet per second) (Largier 1995). Tidal current direction generally follows the center of the channel (Chadwick et al. 1999). Residence time for water in San Diego Bay increases from approximately 5 to 20 days in mid-bay to over 40 days in the South Bay (Chadwick et al. 1999). During an average tidal cycle, approximately 13 percent of the water in the San Diego Bay mixes with ocean water and then moves back into the bay (POSD 2007). The complete exchange of all the water in the San Diego Bay can take between 10 and 100 days, depending on the amplitude of the tidal cycle (POSD 2007). Tidal flushing and mixing are important in maintaining water quality within San Diego Bay. The tidally induced currents regulate salinity, moderate water temperature, and disperse pollutants (POSD 2007). Water temperature in San Diego Bay ranges from 59.1 to 78.9 degrees Fahrenheit (°F). This range can be attributed to thermoclines exhibited in deeper industrial/port waters, which are typical of this geographic region (Amec Foster Wheeler Environment & Infrastructure, Inc. 2016).

Temperature and density gradients, both with depth and along a longitudinal cross-section of the bay, drive tidal exchange of bay and ocean water beginning in the spring and continuing into fall. The seasonal thermal cycle has an amplitude of about 8 to 9 degrees Celsius (° C; 14 to 16 degrees Fahrenheit [° F]). Maximum water temperatures occur in July and August, and minimums in January and February. In the winter, thermal gradients are absent, with cooler air temperatures and higher winds causing the bay to be nearly isothermal. During 1993 surveys, the warmest temperature was 84.7° F (29.3° C) in south bay, and the coolest temperature, 15.1 ° C (59.2° F), was just north of the Coronado Bridge in January. The average surface temperature is estimated to be 17.4° C (63.3° F). Maximum vertical temperature gradients of about 0.5° C/m (0.3° F/ft) occur during the summer. Typical longitudinal temperature range is about 7 to 10° C (45 to 50° F) (about 0.3 to 0.5° C/km) over the length of the bay during the summer. Temperature inversions also occur diurnally due to night cooling.

Salinities of the project area resemble those of the nearby open ocean, i.e. 32.8 to 33 parts per thousand (Tierra Data, Inc. 2012).

2.2.3 Water Quality

Water quality is commonly assessed by measuring dissolved nutrients, dissolved oxygen, pH, turbidity, chlorophyll *a* (a measure of the amount of phytoplankton present in San Diego Bay), and coliform bacteria (Chadwick et al. 1999). Measured values for dissolved nutrients in the bay such as phosphate and silicates range from 0.9 to 4 parts per million (ppm) for silicon and 0.02 to 0.3 ppm phosphorus in the winter, to 0.3 to 1.3 ppm for silicates and 0.2 ppm phosphorus in the summer (Chadwick et al. 1999). This variation is the result of inflow of these nutrients with winter runoff, and uptake by phytoplankton growth in the summer (Chadwick et al. 1999). Dissolved oxygen levels range from approximately 4 milliliters per liter (mL/L) during the summer to 8 mL/L during the winter (Chadwick et al. 1999). These oxygen levels are typically at or near atmospheric equilibrium levels. The pH of seawater in San Diego Bay is relatively uniform, ranging from approximately 7.9 to 8.1 throughout the bay and the year (Chadwick et al. 1999).

Surface water chemistry is analyzed by the Regional Harbor Monitoring Program using primary and secondary indicators, including total and dissolved levels of copper (primary), and total and dissolved zinc and nickel (secondary). Copper concentrations in San Diego Bay show improvement in comparison with a historical baseline, and average copper concentrations do not exceed the California Toxics Rule (CTR) threshold of 5.8 micrograms per liter (µg/L) total and 4.8 µg/L dissolved. Less than 20 percent of measurements throughout the bay still exceed the CTR threshold. Both total and dissolved zinc and nickel concentrations are well below CTR threshold values used for the Regional Harbor Monitoring Program. All other dissolved and total metals have concentrations below their respective acute and chronic CTR thresholds (Amec Foster Wheeler Environment & Infrastructure, Inc. 2016). Polycyclic aromatic hydrocarbon concentrations are also below their respective CTR threshold values (Amec Foster Wheeler Environment & Infrastructure, Inc. 2016).

Turbidity is a measure of water clarity or murkiness and can be caused by suspended sediments transported in runoff or increased algal/bacterial growth (Tierra Data, Inc. 2010). Turbidity can also be created by natural and manmade resuspension of bottom sediments. Increased turbidity reduces the amount of light available for plant growth underwater, so it can affect the ability of San Diego Bay to support living organisms (Tierra Data, Inc. 2010). Turbidity in San Diego Bay varies, depending on the tides, seasons, and location within the bay (Tierra Data, Inc. 2010).

Chlorophyll *a* ranges from 0.2 to 25 µg/L (Chadwick et al. 1999). The highest values were measured in the South Bay in winter, when runoff carries high levels of nutrients into the South Bay. In summer, chlorophyll *a* levels return to background levels of 1 to 2 µg/L. These chlorophyll *a* levels are generally much higher than those found in the adjacent open ocean. Before 1964, when untreated sewage was still being discharged into the San Diego Bay, bacterial counts (fecal coliform) were as high as 82 milliliters in the South Bay (Chadwick et al. 1999). Since these discharges ended, bacterial counts typically remain below 10 milliliters except during some winter storms. These levels are below federal limits for water contact, implying that the San Diego Bay is generally safe for recreational use (Chadwick et al. 1999).

Current sources of pollution to San Diego Bay include underground dewatering, industries on the bay and upstream, marinas and anchorages, U.S. Naval activities, materials used for underwater hull cleaning and vessel antifouling paints, and urban runoff (Chadwick et al. 1999). Additional pollution sources include creosote-treated wood pier pilings, which are a source of polycyclic aromatic hydrocarbons, stormwater runoff from land used for industrial, commercial, and transportation purposes, bilge water discharge, and oil spills (Chadwick et al. 1999). Changes in Navy procedures since the mid-1990s have included replacing approximately half of the pier pilings with plastic, concrete, or untreated wood, and implementing the Bilge Oily Waste Treatment System for treatment of construction and repair wastewater.

Overall, the levels of contamination in the water and sediment in San Diego Bay appear to be lower now than in previous decades, including levels of some metals and polycyclic aromatic hydrocarbons (POSD 2007). However, copper concentrations remain routinely higher than federal and state limits for dissolved copper (POSD 2007).

2.2.4 Substrates and Habitats

Sediments in San Diego Bay are relatively sandy (NAVFAC SW and POSD 2013) as tidal currents tend to keep the finer silt and clay fractions in suspension, except in harbors and elsewhere in the lee of structures where water movement is diminished. Much of the shoreline consists of riprap and manmade structures as can be seen in aerial views. The predominant habitats of the project area are moderately deep (3.7 to 6.0 m [12 to 20 ft] below MLLW) and deep (>6 m [20 ft] below MLLW) subtidal and artificial hard substrates. Over-water structures (the existing piers) provide substrates for the growth of algae and invertebrates off the bottom and support more abundant fish populations than occur in the adjacent deep water habitat. Eelgrass is not present within the project area.

2.2.5 Vessel Traffic and Ambient Underwater Soundscape

As illustrated by Table 2-2 below, San Diego Bay is heavily used by commercial, recreational, and military vessels, with an average of 80,691 vessel movements (in or out of the bay) per year. This equates to about 221 vessel transits per day, a majority of which are presumed to occur during daylight hours. The number of transits does not include recreational boaters that use San Diego Bay, estimated to number 200,000 (San Diego Harbor Safety Committee 2020).

Acoustic monitoring of ship noise in Glacier Bay, Alaska (Kipple and Gabriele 2007), found that sound source levels from a variety of vessel types and sizes was typically within the range of 157-180 decibels (dB) referenced to 1 microPascal (re 1 µPa) at 1m. Ship noise was characterized by a broad frequency range (roughly 0.1 to 35 kilohertz [kHz]), with peak noise at higher frequency for smaller vessels. Similar broad-spectrum (10 Hz to >1 kHz) noise has been reported for a variety of categories of ships (NRC 2003). Within southern California, in the Santa Barbara Channel, large cargo ships at transit speeds range from 177 to 188 dB re 1 µPa (McKenna 2011).Ship noise in San Diego Bay thus has the potential to obscure underwater sound that would otherwise emanate from the project site to locations farther up the bay or offshore through the mouth.

In February 2019, data were collected over a three-day period at two locations on NBSD, with one location approximately 200 m (656 ft) south of the end of Pier 13 (at the far southern end of NBSD), and the second location approximately 20 m (66 ft) off the end of Pier 6 (closer to the northern end of NBSD). The ambient noise levels varied at these locations, with median L_{50} levels of 121 dB re 1 µPa and 131 dB re 1 µPa at the Pier 13 and Pier 6 locations, respectively (Dahl and Dall'Osto 2019). The L_{50} values represent a statistical descriptor of the sound level exceeded for 50% of the time measurement period. Because this data was collected over a relatively short time period, and during one season, an average of the two L_{50} values was used to describe ambient noise values in the south-central San Diego Bay, knowing that some of the time ambient noise levels may be higher or lower than 126 dB re 1 µPa (Dahl and Dall'Osto 2019). Furthermore, because ambient noise levels at the Pier 6 monitoring location were louder than 126 dB re 1 µPa, this is considered as a conservative estimate of the ambient levels around the project area. Therefore, while the Level B threshold criteria for non-impulsive noise is 120 dB re 1 µPa, noise from non-impulsive sources associated with the Pier 6 project is assumed to become indistinguishable from background noise as it diminishes to 126 dB re 1 µPa with distance from the source.

Table 2-2. Port of San Diego Average Annual Vessel Traffic

VESSEL TYPE	VESSEL MOVEMENTS (Total Calls by Vessel Type)		
	Subtotal by Vessel Type		*Total*
	Cargo	*Others*	
Total Annual Movements for All Vessel Types			**80,691**
Deep Draft Commercial Vessel (Cargo plus Cruise)[1]			
Cargo Ships (largest vessel: 1,000' length,106' beam, 41'draft)	197		197
Barge	5		
Bulk	5		
Container Ships	52		
General Cargo	90		
Roll On/Roll Off	45		
Cruise Ships (largest vessel: 1,000' length, 106' beam, 34' draft)		100	100
Excursion Ships[2] (largest vessel: 222' length, 57' beam, 6' draft)		68,000	68,000
Commercial Sportfishing[2] (average vessel size: 123' length, 32' berth, 13' draft)		10,094	10,094
Military[1] (largest vessel: 1,115' length, 252'beam (flight deck), 39' draft)		2,300	2,300

Note: Tug traffic was not included in the above statistics since inner harbor tug movements alone exceed 7,000 for a typical year.

Source: San Diego Harbor Safety Committee (2009)
San Diego Harbor Safety Committee (2020)

3 MARINE MAMMAL SPECIES AND NUMBERS

The species and numbers of marine mammals likely to be found within the activity area.

The most frequently observed marine mammal in San Diego Bay is the California sea lion (*Zalophus californianus*), which often rests on buoys and other structures and occurs throughout the North to North-Central Bay. Other species include coastal bottlenose dolphin (*Tursiops truncatus*), which is regularly seen in the North Bay; harbor seal (*Phoca vitulina*), which frequently enters the North Bay; and common dolphins (*Delphinus* spp.), which are rare visitors in the North Bay. California gray whales (*Eschrichtius robustus*) are also occasionally sighted near the mouth of San Diego Bay during their winter migration (NAVFAC SW and POSD 2013).

The project action area for marine mammals is determined by the limits of potential effects, which in this case are defined by acoustic zones of influence (ZOIs) (see Section 6.6). Because sound transmission is impeded by natural and manmade barriers on the shore, the project's acoustic ZOIs are primarily concentrated south of the Coronado Bridge (see Section 6.6).

Based on many years of observations and Navy-funded surveys in San Diego Bay, marine mammals are often observed in the north and north-central San Diego Bay (Merkel & Associates, Inc. 2008; Sorensen and Swope 2010; Graham and Saunders 2014; Tierra Data, Inc. 2016; NAVFAC SW 2020). For instance, during five years of monitoring efforts associated with the Naval Base Point Loma Fuel Pier Replacement project in north San Diego Bay, of the 21,643 marine mammals observed, 19,091 (88.2%) were of California sea lions (NAVFAC SW 2020). However, relative this project area, only one dedicated line transect survey (Sorensen and Swope 2010) surveyed an area south of the Coronado Bridge. During the Sorensen and Swope (2010) survey, two sightings of one California sea lion each were reported in the water adjacent to NBSD. More recently in 2019 and 2020 during marine mammal monitoring for a project adjacent to Pier 1 (approximately 1.4 km [0.87 mile] to the north of Pier 6), California sea lions were the only pinniped observed (n=8) during 12 days of observations (Chollas Creek Quaywall Repairs, unpublished data). Given that the best available science for the project area indicates that California sea lions are the most likely species to occur in the project area, only impacts to the California sea lion are evaluated in this IHA. If other marine mammal species are observed, procedures identified in Chapter13 and in the Monitoring Plan will be implemented which will stop all in-water pile demolition and/or installation activities if a non-IHA marine mammal enters the Level B ZOI.

3.1 Species Descriptions and Abundances

3.1.1 California Sea Lion

3.1.1.1 Species Description

The California sea lion is now considered to be a full species, separated from the Galapagos sea lion (*Z. wollebaeki*) and the extinct Japanese sea lion (*Z. japonicus*) (Carretta et al. 2019). The breeding areas of the California sea lion are on the Channel Islands, western Baja California, and the Gulf of California. Mitochondrial DNA analysis of California sea lions has identified five genetically distinct geographic populations: (1) Pacific Temperate, (2) Pacific Subtropical, (3) Southern Gulf of California, (4) Central Gulf of California and (5) Northern Gulf of California. The Pacific Temperate population makes up the U.S. stock and includes rookeries within U.S. waters and the Coronado Islands just south of the U.S.-Mexico border.

The California sea lion is sexually dimorphic. Males may reach 453 kilograms (kg; 1,000 pounds) and 2.4 m (8 ft) in length; females grow to 136 kg (300 pounds) and 1.8 m (6 ft) in length. Their color ranges from chocolate brown in males to a lighter, golden brown in females. At around 5 years of age, males develop a bony bump on top of the skull called a sagittal crest. The crest is visible in the “dog-like” profile of male California sea lion heads, and hair around the crest gets lighter with age (NOAA Fisheries 2019).

3.1.1.2 Population Abundance

The entire population cannot be counted because all age and sex classes are never ashore at the same time. In lieu of counting all California sea lions, pups are counted when all are ashore, in July during the breeding season, and the number of births is estimated from pup counts (Carretta et al. 2019). The size of the population is then estimated from the number of births and the proportion of pups in the population. Based on these censuses, the U.S. stock has generally increased from the early 1900s, to the most recent estimate of 257,606, with a minimum estimate of 233,515 (Carretta et al. 2019). There are indications that the California sea lion may have reached or is approaching carrying capacity, although more data are needed to confirm that leveling in growth persists (Carretta et al. 2019).

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.

The California sea lion is the only marine mammal expected to occur within the project area and may potentially be affected by project activities. The stock status, distribution, and site-specific occurrence of California sea lions is described below.

4.1 California Sea Lion, U.S. Stock

4.1.1 Status and Management

California sea lions are protected under the MMPA and are not listed under the Endangered Species Act (ESA). The NOAA Fisheries has defined one stock for California sea lions (U.S. Stock), with five genetically distinct geographic populations: Pacific Temperate, Pacific Subtropical, Southern Gulf of California, Central Gulf of California, and Northern Gulf of California. The Pacific Temperate population includes rookeries within U.S. waters and the Coronado Islands just south of the United States-Mexico border. Animals from the Pacific Temperate population range north into Canadian waters, and movement of animals between U.S. waters and Baja California waters has been documented (Carretta et al. 2019). The U.S. stock is not considered strategic or depleted under the MMPA.

4.1.2 Distribution

More than 95% of the U.S. Stock breeds and gives birth to pups on San Miguel, San Nicolas, and Santa Barbara islands. Some movement has been documented between the U.S. Stock and Western Baja California, Mexico Stock, but rookeries in the United States are widely separated from the major rookeries of western Baja California. Smaller numbers of pups are born on San Clemente Island, the Farallon Islands, and Año Nuevo Island (Lowry et al. 1991). The California sea lion is by far the most commonly sighted pinniped species at sea or on land in the vicinity of San Diego Bay. In California waters, California sea lions represented 97 percent (381 of 393) of identified pinniped sightings at sea during the 1998–1999 NOAA Fisheries surveys (Carretta et al. 2000). They were sighted during all seasons and in all areas with survey coverage from nearshore to offshore areas (Carretta et al. 2000). California sea lions while potentially present at-sea, are most commonly seen hauled-out on piers and buoys within and leading into San Diego Bay, (Merkel & Associates, Inc. 2008). In a study of California sea lion reaction to human activity, Holcomb et al. (2009) showed that in general California sea lions are rather resilient to human disturbance.

The distribution and habitat use of California sea lions varies with the sex of the animals and their reproductive phase. Adult males haul-out on land to defend territories and breed from mid-to-late May until late July. Individual males remain on territories for 27 to 45 days without going to sea to feed. During August and September, after the mating season, the adult males migrate northward to feeding areas as far away as Washington (Puget Sound) and British Columbia (Lowry et al. 1991). They remain there until spring (March through May), when they migrate back to the breeding colonies. Thus, adult males are present in offshore areas only briefly as they move to and from rookeries. Distribution of immature California sea lions is less well known, but some make northward migrations that are shorter in length than the migrations of adult males (Huber 1991). However, most immature California sea lions are presumed to remain near the rookeries for most of the year. Adult females remain near the rookeries throughout the year. Most births occur from mid-June to mid-July (peak in late June).

Survey data from 1975 to 1978 were analyzed to describe the seasonal shifts in the offshore distribution of California sea lions near the Channel Islands (Bonnell and Ford 1987). The seasonal changes in the center of distribution were attributed to changes in the distribution of the prey species. If California sea lion distribution is determined primarily by prey abundance as influenced by variations in local, seasonal, and interannual oceanographic variation, these same areas might not be the center of California sea lion distribution every year. Melin et al. (2008) showed that foraging female California sea lions showed significant variability in individual foraging behavior and foraged further offshore and at deeper depths during El Niño years as compared to non-El Niño years.

There are limited published at-sea density estimates for pinnipeds within southern California. At-sea densities likely decrease during warm-water months because females spend more time ashore to give birth and attend their pups. Radio-tagged female California sea lions at San Miguel Island spent approximately 70% of their time at sea during the nonbreeding season (cold-water months) and pups spent an average of 67% of their time ashore during their mother's absence (Melin and DeLong 2000). Different age classes of California sea lions are found in the San Diego region throughout the year (Lowry et al. 1991). Although adult male California sea lions feed in areas north of San Diego, animals of all other ages and sexes spend most, but not all, of their time feeding at sea during winter. During warm-water months, a high proportion of the adult males and females are hauled-out at terrestrial sites during much of the period.

The geographic distribution of California sea lions includes a breeding range from Baja California to southern California. During the summer, California sea lions breed on islands from the Gulf of California to the Channel Islands and seldom travel more than about 50 km (31 miles) from the islands (Bonnell et al. 1983). The primary rookeries are located on the California Channel Islands of San Miguel, San Nicolas, Santa Barbara, and San Clemente (Le Boeuf and Bonnell 1980; Bonnell and Dailey 1993). Their distribution shifts to the northwest in fall and to the southeast during winter and spring, probably in response to changes in prey availability (Bonnell and Ford 1987). In the nonbreeding season, adult and subadult males, and juvenile males and females (McHuron et al. 2018) migrate northward along the coast to central and northern California, Oregon, Washington, and Vancouver Island in British Columbia, and return south in the spring.

4.1.3 Site-Specific Occurrence

In San Diego Bay, in general, California sea lions regularly occur on rocks, buoys and other structures, and especially on bait barges, although numbers vary greatly. As discussed in Chapter 3, California sea lion occurrence in the project area is expected to be rare based on sighting of only two individuals in the water off of NBSD during one 2010 survey (Sorensen and Swope 2010).

4.1.4 Behavior and Ecology

Sexual maturity occurs at around 4 to 5 years of age for California sea lions, and the pupping and mating season begins in May and continues through July (Heath 2002). California sea lions are gregarious during the breeding season and social on land during other times. California sea lions' food consists of squid, octopus, and a variety of fishes. While no studies have occurred of their diet in the bay, studies of food sources have been done in other California coastal areas (Antonelis et al. 1990; Lowry et al. 1990; Melin et al. 1993; Hanni and Long 1995; Henry et al. 1995). Fish species found in the bay that California sea lions most likely feed on include spiny dogfish, jack mackerel, Pacific herring, Pacific sardine, and northern anchovy. They also eat octopus and leopard shark (NAVFAC SW and POSD 2013).

California sea lions show a high tolerance for human activity (Holcomb et al. 2009), modify their foraging in response to spatial and temporal variations in the availability of different prey species (Lowry et al. 1991), and make opportunistic use of almost any available structures as haulouts (NAVFAC SW and POSD 2013).

California sea lions seek a variety of structures, such as rocks, piers, and buoys and low-profile docks for hauling out. These behaviors can be destructive to structures due to the weight of the animal and fouling. If California sea lions find an easy food source at tourist spots or fishing piers, their presence can become a nuisance at certain areas in the bay as they have at marinas in Monterey and San Francisco Bay (Leet et al. 1992). Marina operators and commercial and sport fishermen tend to consider them a major nuisance, leading to some human-caused mortality.

4.1.5 Acoustics

On land, California sea lions make incessant, raucous barking sounds with most of the energy at less than 2 kHz (Schusterman et al. 1967). Males vary both the number and rhythm of their barks depending on the social context; the barks appear to control the movements and other behavior patterns of nearby conspecifics (Schusterman 1977). Females produce barks, squeals, belches, and growls in the frequency range of 0.25 to 5 kHz, while pups make bleating sounds at 0.25 to 6 kHz. California sea lions produce two types of underwater sounds: clicks (or short-duration sound pulses) and barks (Schusterman et al. 1966, 1967, Schusterman and Baillet 1969), both of which have most of their energy below 4 kHz (Schusterman et al. 1967). The functional hearing range for California sea lions on land is 50 Hz to 75 kHz (Schusterman 1981) and in-water is 60 Hz to 39 kHz (NOAA Fisheries 2018a).

5 HARASSMENT AUTHORIZATION REQUESTED

The type of incidental taking authorization that is being requested (i.e., takes by harassment only, takes by harassment, injury and/or death), and the method of incidental taking.

Under Section 101 (a)(5)(D) of the MMPA, the Navy requests an IHA for the take of a small numbers of California sea lions, by Level B behavioral harassment only, incidental to the replacement of Pier 6 at Naval Base San Diego. The Navy requests an IHA for proposed activities that will be conducted between October 1, 2021 and September 30, 2022.

Except with respect to certain activities not pertinent here, the MMPA defines ‘‘harassment’’ as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) 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 [Level B harassment] (50 CFR, Part 216, Subpart A, Section 216.3-Definitions). The proposed activities are not anticipated to result in any Level A harassment due to anticipated small ZOIs generated from pile driving and extracting activities and implementation of marine mammal monitoring and a 10-m (33-ft) Physical Interaction Shutdown Zone with an additional 10-m (33-ft) buffered shutdown area.

5.1 Method of Incidental Taking

This authorization request considers noise from impact pile driving, pile removal, and high pressure water jetting. These activities were deemed as the only activities that have the potential to disturb or displace marine mammals or produce a temporary shift in their hearing ability (temporary threshold shift [TTS]) resulting in Level B harassment, as defined above. The project has the potential to produce a permanent shift in the ability of California sea lions to hear from impact pile driving resulting in Level A harassment. However, Level A zones will be fully monitored to avoid take. To further reduce the likelihood of Level A takes, a buffered shutdown zone out to 20 m (66 ft) would be implemented to halt activities that could potentially injure a marine mammal that is near in-water Project-related activities. All pile driving will either be delayed from starting, or halted if any marine mammals approach the buffered shutdown zone (20 m [66 ft]) which would include all distances calculated for the Level A zone. No Level A take is anticipated with implementation of this buffered shutdown zone. The Proposed Action is not anticipated to affect the prey base or significantly affect other habitat features of California sea lions that would meet the definition of take.

Table 5-1 Number of Takes Requested per Species (Level B Harassments)

Species	*Number of Level B Takes Requested*
California sea lion	1,000

6 NUMBERS AND SPECIES EXPOSED

By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in [Section 5], and the number of times such takings by each type of taking are likely to occur.

6.1 Introduction

In-water pile installation and removal will temporarily increase the local underwater noise environment in the vicinity of the project. Pile driving can also generate airborne noise that could potentially result in disturbance to marine mammals (pinnipeds) that are hauled out; however, due to the absence of haulouts in the project area, the potential for acoustic harassment by airborne noise is considered negligible and is not analyzed.

Research suggests that increased noise may impact marine mammals in several ways and that these impacts depend on many factors. Noise impacts are discussed in more detail in Section 7. Assessing whether a sound may disturb or injure a marine mammal involves understanding the characteristics of the acoustic source and the potential effects that sound may have on the physiology and behavior of that marine mammal. Sound is important for marine mammal communication, navigation, and foraging (NRC 2003, 2005), and understanding the auditory effects from anthropogenic sound on marine mammals has continued to be researched and developed (Southall et al. 2019). Furthermore, many other factors besides the received level of sound may affect an animal's reaction, such as the animal's physical condition, prior experience with the sound, and proximity to the source of the sound.

Sound sources associated with pile removal and/or installation are not expected to result in Level A exposures of marine mammals as defined under the MMPA, with all Level A ZOIs smaller than 10 m (33 ft; see Table 6-5 and Appendix A). Protocols identified in Chapter 13 and the Marine Mammal Monitoring Plan, are expected to stop all in-water sound producing activities prior to potential exposure to Level A thresholds. However, the noise-related impacts discussed in this application may result in Level B harassment. The methods for estimating the number and types of exposures are summarized below.

The following methods were used to determine exposure of California sea lions:

- Estimating the area of impact where noise levels exceed acoustic thresholds for marine mammals (Sections 6.3)
- Evaluating the potential presence of California sea lions based on historical occurrence or density or by site-specific survey as outlined in (Section 6.7)
- Estimating potential harassment exposures by multiplying the density or site-specific abundance, as applicable, of California sea lions calculated in the area by their probable duration during construction (Section 6.8)

These three methods are discussed in the sections that follow.

6.2 Description of Noise Sources

Ambient sound is a composite of sounds from multiple sources, including environmental events, biological sources, and anthropogenic activities. Physical noise sources include waves at the surface, precipitation, earthquakes, ice, and atmospheric noise, among other events. Biological sources include marine mammals, fish, and invertebrates. Anthropogenic sounds are produced by vessels (small and large), dredging, aircraft overflights, construction activities, geophysical explorations, commercial and military sonars, and other activities. Ambient noise levels in south-central San Diego Bay were measured at between 121 and 131 dB (Dahl and Dall'Osta 2019), depending on location, with an average L_{50} value of 126 dB. Known noise levels and frequency ranges associated with anthropogenic sources similar to those that would be used for this project are summarized in Table 6-1.

The sounds produced by in-water demolition and construction activities fall into two sound types: impulsive and non-impulsive (defined below). Impact pile driving produces impulsive sounds, while all other equipment used to install or extract piles produces non-impulsive sounds. The distinction between these two general sound types is important because their potential to cause physical effects differs, particularly with regard to hearing (Ward, 1997).

Impulsive sounds (e.g., explosions, seismic air gun pulses, and impact pile driving), which are referred to as pulsed sounds by Southall et al. (2007, 2019), are brief, broadband, atonal transients (Harris, 1998) and occur either as isolated events or are repeated in some succession (Southall et al., 2007, 2019). Impulsive sounds are characterized by a relatively rapid rise from ambient pressure to a maximal pressure value, followed by a decay period that may include a period of diminishing, oscillating maximal and minimal pressures (Southall et al., 2007). Impulsive sounds generally have a greater capacity to induce physical injury compared with sounds that lack these features (Southall et al., 2007, 2019).

Non-impulsive sounds (referred to as non-pulsed in Southall et al., 2007, 2019) can be tonal, broadband, or both. They lack the rapid rise time and can have longer durations than impulsive sounds. Non-impulsive sounds can be either intermittent or continuous. Examples of non-impulsive sounds include vessels, aircraft, and machinery operations such as drilling, dredging, and vibratory pile driving and extraction (Southall et al., 2007, 2019). In some environments, the duration of both impulsive and non-impulsive sounds can be extended due to reverberations.

Table 6-1 Representative Levels of Underwater Anthropogenic Noise Sources

Noise Source	***Frequency Range (Hz)***	***Source Level***	***Reference***
Dredging	1–500	161–186 dB RMS re: 1 µPa at 1 meter	Richardson et al., 1995; DEFRA 2003; Reine et al., 2014
Small vessels	860–8,000	141–175 dB RMS re: 1 µPa at 1 meter	Galli et al., 2003; Matzner & Jones 2011; Sebastianutto et al., 2011
Large ship	20–1,000	157–188 dB re: 1 µPa^{2}sec SEL at 1 meter	McKenna 2011; Kipple and Gabriele 2007
Tug docking gravel barge	200–1,000	149 dB at 100 meters	Blackwell and Greene 2002

Key: dB = decibel; Hz = Hertz; RMS = root mean square; sec = second; SEL = sound exposure level
dB re 1 µPa @ 1 m = decibels (dB) referenced to (re) 1 micro (µ) Pascal (Pa) at 1 meter

6.3 Sound Exposure Criteria and Thresholds

Under the MMPA, the NOAA Fisheries 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." 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."

To date, no studies have been conducted that examine impacts to marine mammals from pile-driving sounds from which empirical noise thresholds have been established. Currently, the NOAA Fisheries uses underwater sound exposure thresholds to determine when an activity could result in impacts to a marine mammal defined as Level A (injury) or Level B (disturbance including behavioral and TTS) harassment (NOAA Fisheries 2018a). The NOAA Fisheries has developed acoustic threshold levels for determining the onset of permanent threshold shift (PTS) in marine mammals in response to underwater impulsive and non-impulsive sound sources (Table 6-2). The criteria use cumulative sound exposure level (SEL) metrics (dB SEL_{CUM}) and peak pressure (dB PEAK) rather than the previously used dB root mean square (RMS) metric. The NOAA Fisheries equates the onset of PTS, which is a form of auditory injury, with Level A harassment under the MMPA, and with "harm" under the ESA. Level B harassment occurs when marine mammals are exposed to impulsive underwater sounds above 160 dB RMS re 1 µPa, such as from impact pile driving, and to non-impulsive underwater sounds above 120 dB RMS re 1 µPa, such as from vibratory pile driving (NOAA Fisheries 2005) (Table 6-2). The onset of TTS is a form of Level B harassment under the MMPA and a form of "harassment" under the ESA. All forms of harassment, either auditory or behavioral, constitute "incidental take" under these statutes.

Table 6-2 Injury and Disturbance Threshold Criteria for Underwater and Airborne Noise

Marine Mammals	***Underwater Non-impulsive Noise (non-impulsive sounds) (re 1 µPa)***		***Underwater Impact Pile-Driving Noise (impulsive sounds) (re 1 µPa)***	
	PTS Onset (Level A) Threshold	***Level B Disturbance Threshold***	***PTS Onset (Level A) Threshold [1]***	***Level B Disturbance Threshold***
Otariidae (sea lions)	219 dB SEL_{CUM}	120 dB RMS	232 dB Peak[2] 203 dB SEL_{CUM}[3]	160 dB RMS

Notes:
[1]Dual metric acoustic thresholds for impulsive sounds. Whichever results in the largest isopleth for calculating PTS onset is used in the analysis.
[2]Flat weighted or unweighted peak sound pressure within the generalized hearing range.
[3]Cumulative sound exposure level over 24 hours.
Abbreviations: µPa = microPascal; dB = decibel; PTS = permanent threshold shift; RMS = root mean square; SEL = sound exposure level;

6.4 Limitations of Existing Noise Criteria

The application of the 120 dB RMS re 1 µPa behavioral threshold can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. The 120 dB RMS re 1 µPa threshold level for non-impulsive noise originated from research conducted by Malme et al. (1984, 1988) for California gray whale response to continuous industrial sounds, such as drilling operations.

To date, there is no research or data supporting a response by pinnipeds or odontocetes to non-impulsive sounds from vibratory pile driving as low as the 120 dB threshold. Southall et al. (2007) reviewed studies conducted to document the behavioral responses of harbor seals and northern elephant seals to non-impulsive sounds under various conditions. They concluded that those limited studies suggest that exposures between 90 dB and 140 dB RMS re 1 µPa generally do not appear to induce strong behavioral responses. While the Level B threshold criteria for non-impulsive noise is 120 re 1 µPa, noise from non-impulsive sources associated with the Pier 6 project is assumed to become indistinguishable from background noise as it diminishes to 126 dB re 1 µPa with distance from the source (Dahl and Dall'Osto 2019). This value is used as a local baseline ambient noise value for all noise sources, including demolition and construction activities.

6.5 Auditory Masking

Natural and artificial sounds can disrupt behavior through auditory masking or interference with a marine mammal's ability to detect and interpret other relevant sounds, such as communication and echolocation signals (Wartzok et al., 2004). Masking occurs when both the signal and masking sound have similar frequencies and either overlap or occur very close to each other in time. A signal is very likely to be masked if the noise is within a certain "critical bandwidth" around the signal's frequency and its energy level is similar or higher (Holt 2008). Noise within the critical band of a marine mammal signal will show increased interference with detection of the signal as the level of the noise increases (Wartzok et al., 2004). For example, in delphinid subjects, relevant signals needed to be 17 to 20 dB louder than masking noise at frequencies below 1 kHz to be detected and 40 dB greater at approximately 100 kHz (Richardson et al., 1995). Noise at frequencies outside of a signal's critical bandwidth will have little to no effect on the detection of that signal (Wartzok et al., 2004).

Additional factors influencing masking are the temporal structure of the noise and the behavioral and environmental context in which the signal is produced. Continuous noise is more likely to mask signals than intermittent noise of the same amplitude; quiet "gaps" in the intermittent noise allow detection of signals that would not be heard during continuous noise (Brumm & Slabbekoorn, 2005). The behavioral function of a vocalization (e.g., contact call, group cohesion vocalization, echolocation click) and the acoustic environment at the time of signaling may both influence the call source level (Holt et al., 2011), which directly affects the chances that a signal will be masked (Nemeth & Brumm, 2010). Miksis-Olds & Tyack (2009) showed that manatees modified vocalizations differently during increased noise, depending on whether or not a calf was present.

Masking noise from anthropogenic sources could cause behavioral changes if the masking disrupts communication, echolocation, or other hearing-dependent behaviors. As noted above, noise frequency and amplitude both contribute to the potential for vocalization masking; noise from pile driving typically covers a frequency range of 10 Hz to 1.5 kHz, which is likely to overlap with the frequencies of vocalizations produced by species that may occur in the project area. Amplitude of noise from both impact and vibratory pile-driving methods is variable and may exceed that of marine mammal vocalizations within an unknown range of each incident pile. Depending on the animal's location and vocalization source level, this range may vary over time.

Based on the frequency overlap between noise produced by both vibratory and impact pile driving (10 Hz to 1.5 kHz), animals that remain in a project area during pile driving may be vulnerable to masking for the duration of pile driving (typically 2 hours or less, intermittently over the course of a day depending on site and project). Energy levels of vibratory pile driving are less than half that of impact pile driving; therefore, the potential for masking noise would be limited to a smaller radius around a pile. The likelihood that vibratory pile driving would mask relevant acoustic signals for marine mammals is negligible. In addition, most marine mammal species that may be subject to masking are transitory within the project area. Possible behavioral reactions to vocalization masking include changes to vocal behavior (including cessation of calling), habitat abandonment (short- or long-term), and modifications to the acoustic structure of vocalizations (which may help signalers compensate for masking) (Brumm & Slabbekoorn, 2005; Brumm & Zollinger, 2011). Given the relatively high source levels for most marine mammal vocalizations, the Navy has estimated that masking events would occur concurrently within the zones of behavioral harassment estimated for vibratory and impact pile removal and installation (see Section 6.6.2, Underwater Noise from Pile Driving and Extraction) and are therefore taken into account in the exposure analysis.

6.6 Modeling Potential Noise Impacts from Pile Driving and Extracting

In this IHA application, the Navy has used site-specific acoustic models (Dall'Osto and Dahl 2019), the NOAA Fisheries Technical Guidance, NOAA Fisheries User Spreadsheet, and simple practical spreading loss models (NOAA Fisheries 2018a, 2020a) to identify the Level A (injury) and Level B (behavior) ZOIs that would result from pile removal and installation, as outlined in Section 6 (Table 6-3).

Table 6-3 Noise Model Used to Calculate Level A and B ZOI by Extraction / Installation Method by Pile Type

Installation / Extraction Method	*Pile Type*
Dall'Osto and Dahl Model (2019)	
Vibratory extraction	12-inch timber-plastic piles
	20-inch and 24-inch concrete piles
	16-inch I-shaped steel piles
Pile Installation	20-inch and 24-inch concrete piles
NOAA Fisheries User Spreadsheet (2020)/Simple Practical Spreading Loss Model (15LOGR)	
High-pressure water jetting	Removal of 20- and 24-inch square concrete piles
Underwater hydraulic chainsaw	Cutting all types of piles
Small pile clipper	Clipping 12-inch timber and plastic piles
Large pile clipper	Clipping 20- and 24-inch square concrete
Two large pile clippers	Simultaneously clipping two 20- or 24-inch concrete piles

6.6.1 Underwater Sound Propagation

Pile removal will generate underwater noise that potentially could result in disturbance to California sea lions swimming by the project area. Anticipated sound propagation during impact and vibratory pile driving and extraction was assessed using acoustic models developed for south-central San Diego Bay (Dall'Osto and Dahl 2019). The models take into account local environmental conditions (bathymetry, sediment type, seasonal water temperatures) and the physiography of the bay. Separate models were developed for concrete, plastic (applied to fiberglass, timber-plastic), and steel piles, and in-water demolition activities using other equipment (underwater hydraulic pile clippers, underwater chainsaw, and high-pressure water jetting).

Distances to the Otariid Level A acoustic threshold was based on SEL_{cum} (SEL x 10 Log[number of strikes or duration per 24 hours]) given that the anticipated peak values at 10-m (33-ft) during pile driving or removal are below injury thresholds[2]. Construction assumptions include 600 strikes per pile, 10-minute duration for all non-impulsive sources except water jetting (20-minutes), and 8 piles removed, and 7 piles installed per day. For the south-central Bay acoustic models, specific weighting factors were applied to adjust SEL_{cum} for the Otariid functional hearing group (-23.6 dB for concrete piles, -16.1 dB for composite piles). For all in-water construction and demolition activities, the distances to PTS onset (Level A) are modeled to be less than 10-m (33-ft) from the source pile (Dall'Osto and Dahl 2019). The models were also used to determine the distance to the Level B acoustic thresholds for continuous and intermittent noise sources.

Calculated distances to in-water Otarriid disturbance (Level B) and corresponding areas within the ZOIs are based on the average underwater noise level (126 dB) within the project area (Dahl and Dall'Osto

[2] Source levels for pile driving are typically measured at 10 m (33 ft) from the pile in order to standardize sound measurement data.

2019). ZOIs for impact and vibratory driving or extraction based on the south-central Bay acoustic models indicate that sound propagation is substantially influenced by local bathymetry, with the steep slope of the navigation channel limiting sound transmission across the bay (Figures 6-1, 6-2, 6-3, and 6-4). Closer to land, adjacent piers are expected to influence sound transmission, but the rate of reduction is uncertain. For instance, in Figure 6-1, the orange shaded area represents areas of uncertain sound propagation, while the unshaded area represents areas with unimpeded transmission loss. Therefore, ZOIs were calculated separately for the open water and areas influenced by piers.

6.6.2 Underwater Noise from Pile Driving and Extraction

The intensity of pile driving, or removal, sound is greatly influenced by factors such as the type of pile, the type of equipment, and the physical environment in which the activity takes place. To determine reasonable SPLs from pile removal, activities with similar properties to the proposed project were evaluated. Table 6-4 presents representative source sound levels at a distance of 10 m (33 ft) from the pile for demolition activities. Table 6-5 present both installation and demolition values including actual sound source data (i.e. PEAK, RMS, SPL) of those same size piles.

Source levels associated with non-impulsive sources, including use of a vibratory driver/extractor to loosen 20-inch square concrete, 16-inch steel piles, and 12-inch timber-plastic piles, high-pressure water jetting to loosen concrete piles, diver use of a hydraulic chainsaw to cut piles at the mudline, and the use of small and large pile clippers for the removal of 12-inch timber-plastic piles and 20-inch square concrete piles, respectively, are shown in Table 6-5. Data from the most similar activities reported in the Acoustic Compendium for San Diego Bay (NAVFAC SW 2020) or by Caltrans (2015) have been used as proxies for the proposed activities at Pier 6. For these purposes, the maximum RMS SPL is the only relevant criterion; peak SPLs and SELs for these types of sources would only exceed thresholds less than 1 m (3.3 ft) from the source.

Pile installation and/or extraction may take place concurrently as pier demolition progresses shoreward ahead of pile installation for pier construction, where multiple piles are extracted, installed or both during the workday. If pile installation via impact pile driving and pile extraction activities occur at the same time, the largest Level B ZOI (see Table 6-5) would be monitored for potential Level B "take." The Level A ZOIs are not anticipated to change and would remain less than 10 m (33 ft). If multiple pile extraction techniques are used at the same time, Level A and B ZOIs would use additive dB levels to determine the Level A/B ZOIs by adding between 1 to 3 dB to the higher of the two source levels. Per a methodology modified from the U.S. Department of Transportation (USDOT; 1995), Washington State Department of Transportation (WSDOT; 2020), and NOAA Fisheries (2020b), between 1 dB (where there is 4 to 8 dB difference between the two sources) to 3 dB (where sources are the same or there is less than 1 dB difference) would be added to the larger of the two source values. For instance if a large pile clipper (source level: 161 dB RMS) and small pile clipper (source level: 154 dB) were in use simultaneously, then 1 dB would be added to the greater large pile clipper source value, based on the 7 dB difference between the two, resulting in a combined source level of 162 dB and the Level B ZOIs would be based on this source level. In order to depict the largest possible ZOI, and consequentially greatest impact scenario, the Level B ZOI for the simultaneous use of two large pile clippers (additive source level of 164 dB RMS) is included in Tables 6-4 and 6-5 and depicted in Figure 6-4.

Table 6-4 Underwater Noise Source Levels Modeled for Non-Impulsive Sources for Demolition Activities

Method	*Pile Type and Size Measured*	*Used as Proxy Source Level for Pier 6 Piles*	*RMS SPL[1] (dB re 1 µPa)*
Vibratory extraction	Timber piles	12-inch timber-plastic piles	152[2]
	24-inch steel sheet	20-inch and 24-inch concrete piles	160[3]
		16-inch I-shaped steel piles	
High-pressure water jetting	24x30-inch concrete	Removal of 20-inch square concrete piles	158[4]
Underwater hydraulic chainsaw	16-inch concrete square piles	Cutting all types of piles	150[4, 5]
Small pile clipper	13-inch polycarbonate	Clipping 12-inch timber and plastic piles	154[4]
Large pile clipper	24-inch square concrete	Clipping 20- and 24-inch square concrete piles	161[4]
Two large pile clippers	24-inch square concrete	Simultaneously clipping 20- and 24-inch square concrete piles	164[4, 6]

Sources: Dahl 2019, Caltrans 2015, NAVFAC SW 2020
Notes:
1 All SPLs are unattenuated
2 Proxy source level for vibratory timber pile extraction from Greenbusch 2018
3 Proxy source level from Caltrans 2015
4 Proxy source level from NAVFAC SW 2020
5 NAVFAC SW (2020) reports a value of 147 dB RMS at 17 m for hydraulic chainsaw. While NAVFAC SW (2020) shows a higher TL factor of 27.3 at the NBPL Fuel Pier in the northern portion of San Diego Bay, given the differing environments of the northern and southern portions of San Diego Bay, a TL value of 15 is used here to arrive at the 150 dB RMS source value for the hydraulic chainsaw.
6 Additive source level for simultaneous use of two large pile clippers (161 dB RMS + 3 dB addition)
Abbreviations:
dB re 1 µPa = decibels referenced to a pressure of 1 microPascal (measures underwater SPL)
RMS = root mean square

For the analyses that follow, the TL model described above was used to calculate the expected noise propagation from pile removal, using the proxy source levels identified in Table 6-4. Distances to Level A (onset PTS) thresholds, based on cumulative SEL, have been calculated as shown in Appendix A using the NOAA Fisheries User Spreadsheets (NOAA Fisheries 2020a; Dahl and Dall'Osto 2019). Non-impulsive noise sources are assumed to operate for 20 minutes per pile (water jetting or underwater chainsaw) or 10 minutes per pile (other sources). Based on the average ambient sound level of 126 dB near Pier 6 (Dahl and Dall'Osto 2019), the Level B threshold distance is determined by the point at which sound from the project source diminishes to 126 dB.

The calculated radial distances to thresholds and corresponding areas within the ZOIs are summarized in Table 6-5. Figure 6-1 shows graphically the extent of the ZOIs associated with noise propagation from concrete pile driving and extraction, while Figure 6-2 shows the ZOIs associated with timber-plastic and fiberglass pile driving and extraction, Figure 6-3 shows the ZOI for steel pile extraction, and Figure 6-4 depicts ZOIs associated with high-pressure water jetting and pile cutting activities. ZOIs that extend less than the Physical Interaction Shutdown Zone (10 m) from the source, including all of the Level A distances, are not shown because the shutdown procedure (when a marine mammal could approach to within 20 m [66 ft]) would prevent any exposures.

Table 6-5 Calculated Distance(s) to Underwater Noise Thresholds and ZOIs within the Thresholds from Pile Driving and Removal

Activity Description/ Source Sound Levels at 10-m (33-ft)	*Minor Injury (PTS Onset) Level A[4]*		*Behavioral Disturbance Level B [5, 6]*	
	Radial Distance (m)	*ZOI Area (km²)*	*Maximum Radial or Length x Width Distance (m)*	*Total ZOI Area (km²) (Open Water / Around Piers)*
Demolition Activities				
Vibratory extraction 20-inch and 24-inch concrete[1], 160 RMS	<10	<0.001	6,990 x 1,173	5.35 (4.06 / 1.29)
Vibratory extraction 12-inch timber-plastic[1], 152 RMS	<10	<0.001	2,167 x 1,055	2.11 (1.49 / 0.62)
Vibratory extraction 16-inch I-shaped steel pile[1], 160 RMS	<10	<0.001	7,140 x 1,595	6.43 (5.15 / 1.28)
Water jetting installation/ extraction[3], 158 RMS	<10	<0.001	1,359	3.6 (2.8 / 0.8)
Large hydraulic pile clipper, concrete[3], 161 RMS	<10	<0.001	2,154	7.7 (6.5 / 1.2)
Two large hydraulic pile clippers, concrete[3], 164 RMS	<10	<0.001	3,415	15.37 (13.85 / 1.52)
Small hydraulic pile clipper, timber-plastic[3], 154 RMS	<10	<0.001	736	1.4 (1.0 / 0.4)
Underwater hydraulic chain saw[3], 150 RMS	<10	<0.001	398	0.48 (0.4 / 0.08)
Installation Activities				
Impact driving 20 and 24-inch concrete[1,2], 188 Peak, 176 RMS, 166 SEL	<10	<0.001	192	0.10 (0.10 / NA)
Impact driving 16-inch fiberglass[1,2], 166 Peak, 153 RMS, 144 SEL	<10	<0.001	<10	<0.001

Notes:

1 Distances to Level A and B thresholds were calculated for impact pile driving and vibratory or extraction using acoustic models developed for south-central San Diego Bay (Dall'Osto and Dahl 2019 and Caltrans 2015). The distances to the Level A SEL_{cum} threshold are adjusted for the representative frequency range of Otariid functional hearing group. The Level B ZOIs for impact pile installation and vibratory pile extraction are based on the 160 dB threshold and distance to ambient levels (126 dB), respectively.

2 Impact driving values as reported in Dall'Osto and Dahl 2019

3 For pile installation/extraction activities using other equipment (water jetting, pile clippers, chain saw), the 2020 NOAA Fisheries User Spreadsheet was used to calculate distances to the Level A SEL_{cum} threshold and practical spreading loss model was used to calculate distances to Level B thresholds. Weighting Factor Adjustments of 2 kHz for impact pile driving and 2.5 kHz for non-impulsive sounds, and the representative frequency range for Otariid functional hearing group were used (NOAA Fisheries, 2020).

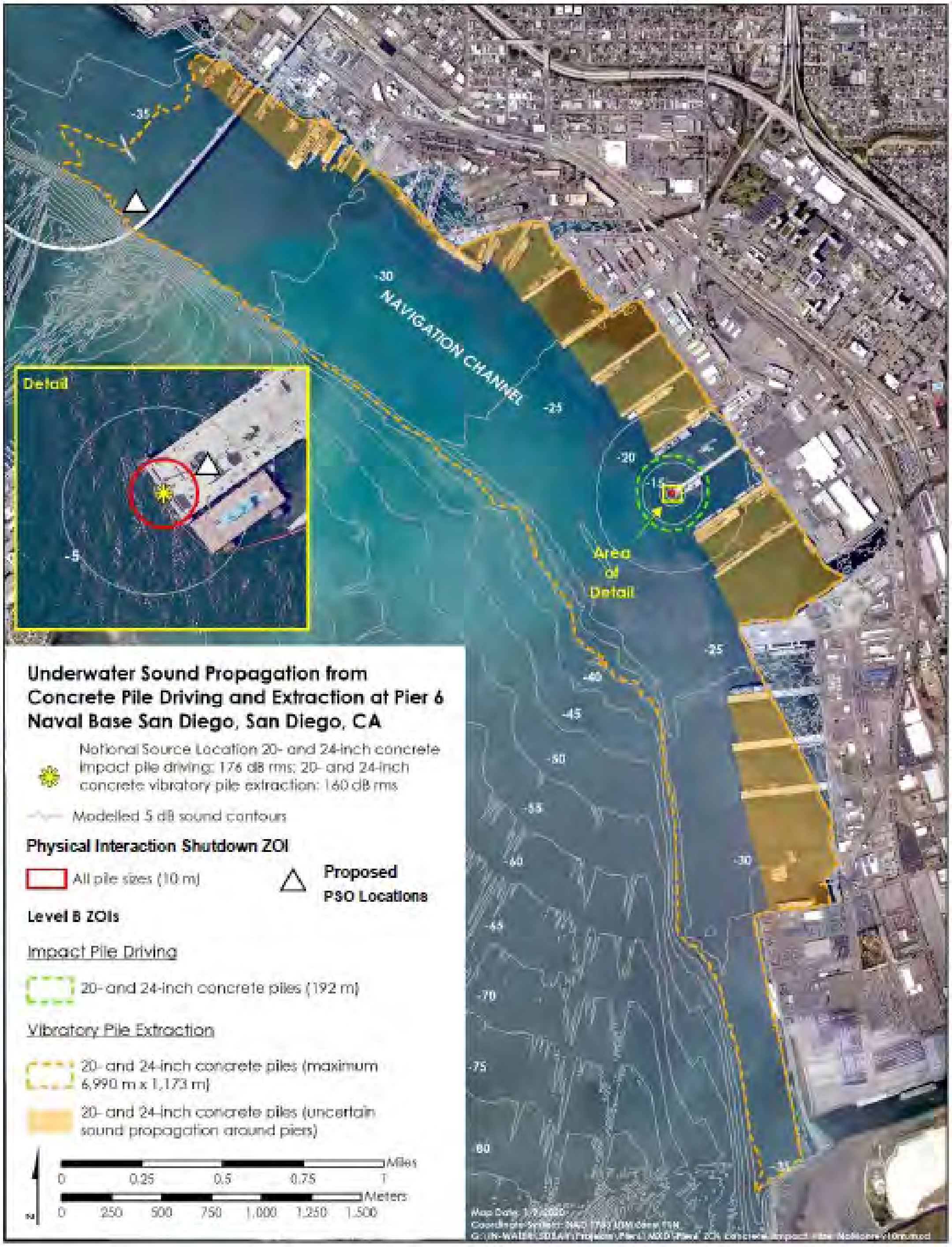
4 Assumes 600 strikes per pile, 10-minute duration for all non-impulsive sounds except for high-pressure water jetting (20-minute), and 7 piles installed and 8 piles removed per day.

5 The Level B ZOIs were calculated to the average ambient underwater noise value of 126 dB re 1 μPa within the project area (Dahl and Dall'Osto 2019).

6 Level B ZOI areas were calculated separately for open water versus areas around piers where the structure's influence on sound propagation is uncertain; slight variations between these estimated values and those presented in other documentation result from rounding at the hundredths level.

Abbreviations:

dB re 1 μPa = decibels referenced to a pressure of 1 microPascal; km² = square kilometers; m = meters;
N/A = not applicable because the ZOI is contained within the shutdown zone (less than 10-m [33-ft] from source);
PTS = permanent threshold shift; RMS = root mean square; SEL = sound exposure level; and
ZOI = Zone of Influence (area encompassed within acoustic threshold boundary).



Note: Additional Representative PSO Location at Naval Amphibious Base Coronado (obscured by insert here)

Figure 6-1 Underwater Sound Propagation from Concrete Pile Driving and Extraction and Proposed Monitor Locations at Pier 6

Note: Impact Driving of Fiberglass Piles is not expected to result in Level A or B acoustic harassment; a 20-m buffered (66-ft) shutdown zone will be monitored to avoid injury from physical interaction with operating in-water equipment.

Figure 6-2 Underwater Sound Propagation from Timber-Plastic and Fiberglass Pile Driving and Extraction and Proposed Monitor Locations at Pier 6

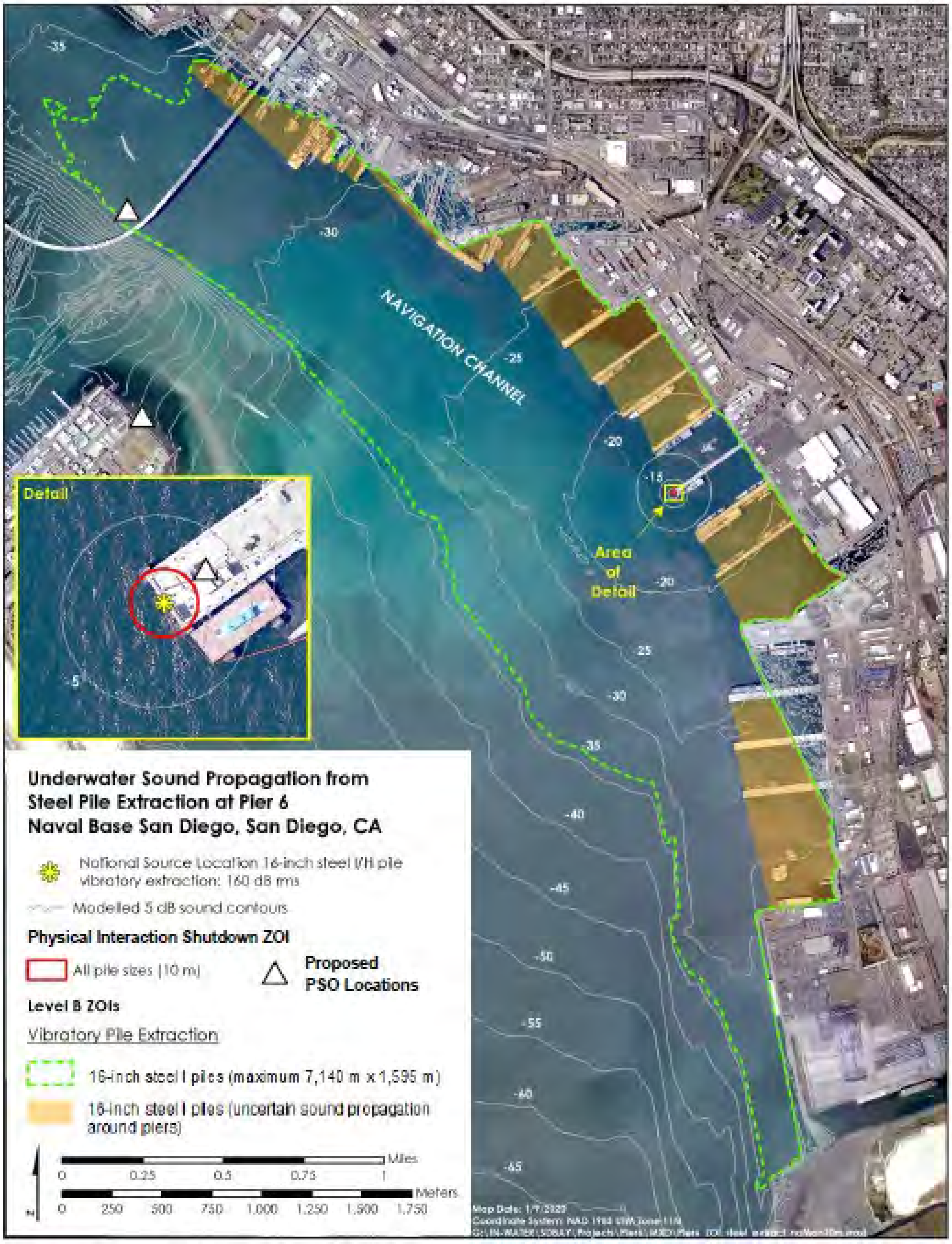


Figure 6-3 Underwater Sound Propagation from Steel Pile Extraction and Proposed Monitor Locations at Pier 6

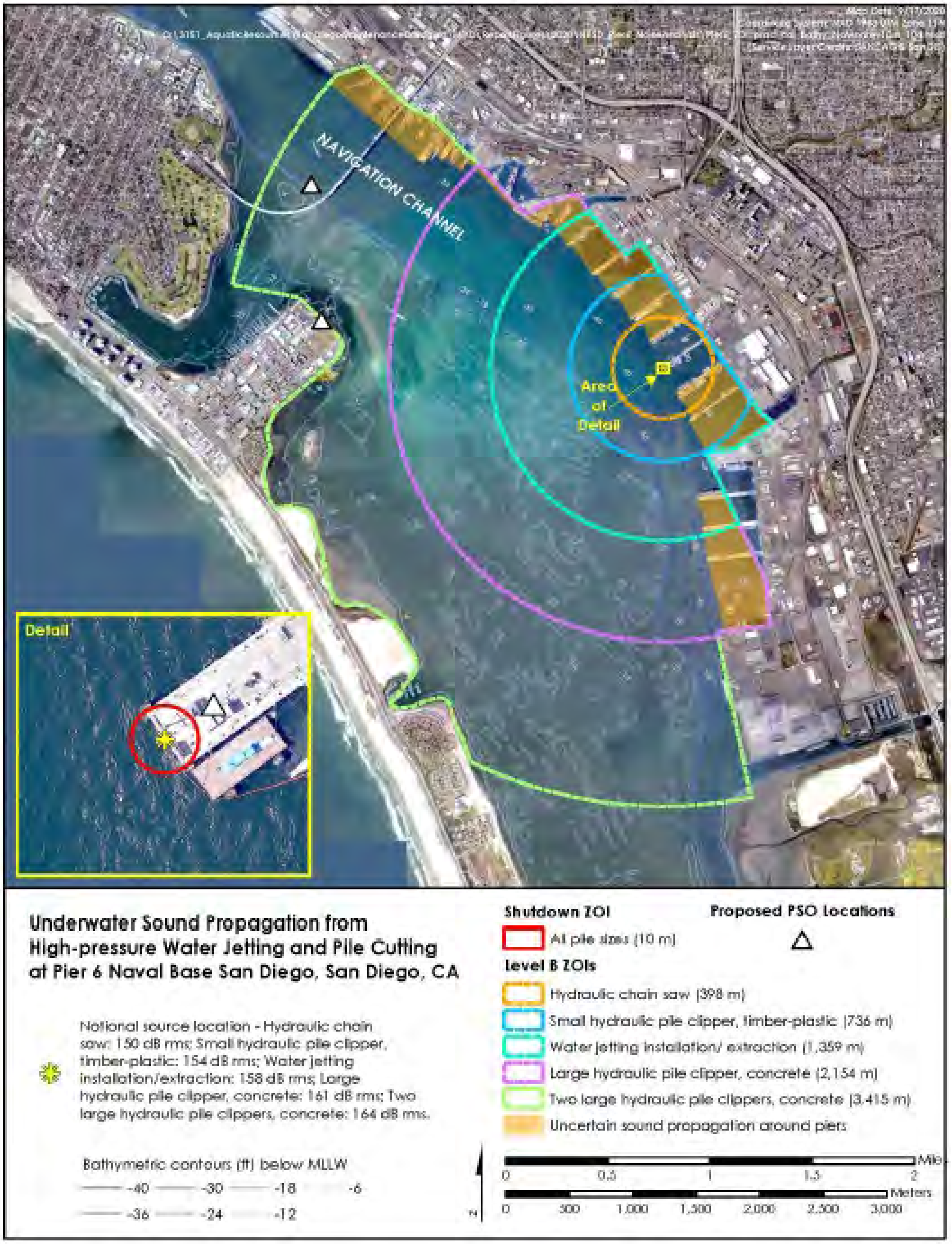


Figure 6-4 Underwater Sound Propagation from High-Pressure Water Jetting and Pile Cutting and Proposed Monitor Locations at Pier 6

6.7 Basis for Estimating Take by Harassment

The U.S. Navy is seeking authorization for the potential taking of small numbers of California sea lions in the project area as a result o f pile removal and installation associated with the replacement of Pier 6. California sea lions are present in San Diego Bay year-round, but as previously discussed, they are considered to be rare south of the Coronado Bridge (Sorensen and Swope 2010). The takes requested are expected to have no more than a minor effect on individual animals and no effect on the California sea lion population in general. Any effects experienced by individual marine mammals are anticipated to be limited to short-term disturbance of normal behavior or temporary displacement of animals near the source of the noise.

Level A (PTS onset) takes, as well as risks of physical injury, would not occur due to the small threshold distances (Table 6-5) and implementation of the 20-m (66-ft) buffered shutdown zone.

Potential Level B takes would occur throughout pile installation or removal activities if California sea lions are present within the ZOIs (Table 6-5, Figures 6-1, 6-2, 6-3, and 6-4). There are no known haul-outs in the project area, although there are structures, such as buoys, that could be used as haul-outs. California sea lions observed in the area would likely be swimming and/or foraging. As such, potential takes by disturbance will have a negligible short-term effect on individual California sea lions and would not result in population-level impacts.

6.8 Description of Take Calculation and Exposure Estimates

California sea lions are primarily observed north of the Coronado Bridge (Merkel and Associates, Inc. 2008; Sorensen and Swope 2010; Graham and Saunders 2014;) and sightings rates in the project area would be expected to be low based on Sorenson and Swope (2010), and more recent monitoring efforts in late 2019 and early 2020 for a quaywall repair project at the northern end of NBSD (Chollas Creek Quaywall Repairs, unpublished data). The more recent data recorded California sea lions observations at an average of 0.69 animals per monitoring day as observed from a restricted observation location set at the base of two pier with limited visibility (Chollas Creek Quaywall Repairs, unpublished data). Further, the nearby MGBW Floating Dry Dock project assumed 2 California sea lions per day would be in that project area which is further south in San Diego Bay and consequentially more distant from greater concentrations of California sea lions in the northern part of the Bay than the Pier 6 site. These data, and assumptions for other approved projects, were used to provide a rough approximation of the potential for California sea lion presence in the project area. Further, given the general lack of density data in the project area, an accepted observation protocol is to assume that for every California sea lion observed there is one more unseen because California sea lions tend to travel in groups of two or more (Melin et al. 2018). We have, therefore, used the conservative assumption that four California sea lions would be present within the project Level B ZOIs for every day of the 250-workday construction and demolition period.

Pile installation and/or extraction may take place concurrently as pier demolition progresses shoreward ahead of pile installation for pier construction, where multiple piles are extracted, installed or both during the workday. The following assumptions were used to calculate potential exposures to impact pile driving and vibratory extraction noise for each threshold:

- Each animal can be “taken” via Level B harassment once every 24 hours.
- 4 California sea lions have the potential to occur within the project ZOIs per day.

  Exposure Estimate = (250 workdays x 4 California sea lions))

  = 1,000 California sea lions

The estimate of four California sea lions per day within the project area is considered as a conservative estimate of potential presence in the project area based on the two California sea lions observed during the dedicated 2010 survey (Sorenson and Swope 2010), as well as during the recent monitoring efforts (Chollas Creek Quaywall Repairs, unpublished data). Therefore, a conservative assumption of four California sea lions is appropriate for the location and the scale of the project; hence, the estimate of 1,000 takes is a reasonable estimate of the maximum number of takes that would occur.

7 IMPACTS TO MARINE MAMMAL SPECIES OR STOCKS

The anticipated impact of the activity upon the species or stock of marine mammals

7.1 Potential Effects of Pile Driving on Marine Mammals

7.1.1 Potential Effects Resulting from Underwater Noise

The effects of pile driving on marine mammals are dependent on several factors, including the species, size, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the distance between the pile and the animal; and the sound propagation properties of the environment. Impacts on marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The farther away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, substrates that are soft (e.g., sand) will absorb or attenuate the sound more readily than hard substrates (e.g., rock), which may reflect the acoustic wave. Soft porous substrates will also likely require less time to drive the pile, and possibly less forceful equipment, which will ultimately decrease the intensity of the acoustic source (Dahl et al., 2015).

Potential impacts on marine species are expected to be the result of physiological responses to both the type and strength of the acoustic signature (Viada et al., 2008). Behavioral impacts may also occur, though the type and severity of these effects are more difficult to define due to limited studies addressing the behavioral effects of impulsive as well as non-impulsive sounds on marine mammals. Potential effects can range from brief acoustic effects such as behavioral disturbance, tactile perception, physical discomfort, slight injury of the internal organs and temporary to permanent impairment of the auditory system to death of the animal (Yelverton et al., 1973; O'Keefe and Young, 1984; Ketten, 1995; Navy, 2001; Dahl et al., 2015; Finneran 2015; Kastelein et al., 2016, 2018).

7.1.1.1 Physiological Responses

Direct tissue responses to impact/impulsive sound stimulation may range from mechanical vibration or compression with no resulting injury to tissue trauma (injury). Because the ears are the most sensitive organ to pressure, they are the organs most sensitive to injury (Ketten 2000). Sound-related trauma can be lethal or sub-lethal. Lethal impacts are those that result in immediate death or serious debilitation in or near an intense source (Ketten 1995). Sub-lethal damage to the ear from a pressure wave can rupture the tympanum, fracture the ossicles, damage the cochlea, cause hemorrhage, and leak cerebrospinal fluid into the middle ear (Ketten 2004). Sub-lethal impacts also include hearing loss, which is caused by exposure to perceptible sounds. Moderate injury implies partial hearing loss. Permanent hearing loss (also called PTS) can occur when the hair cells of the ear are damaged by a very loud event, as well as prolonged exposure to noise. Instances of TTS and/or auditory fatigue are well documented in marine mammal literature as being one of the primary avenues of acoustic impact. TTS has been documented in controlled settings using captive marine mammals exposed to strong SELs at various frequencies (Ridgway et al., 1997; Kastak et al. 1999; Finneran et al. 2005; Finneran et al. 2015). While injuries to other sensitive organs are possible, they are less likely since pile driving impacts are almost entirely acoustically mediated. Based on the mitigation measures outlined in Chapter 11 and the conservative modeling assumptions discussed in Chapter 6, California sea lions may be present, but would be expected in very low numbers. Therefore, California sea lions that are present during construction may experience auditory effects, but will not cause population-level impacts or affect the continued survival of the species.

7.1.1.2 Behavioral Responses

Behavioral responses to sound are highly variable and context-specific. For each potential behavioral change, the magnitude of the change ultimately determines the severity of the response. A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. Habituation occurs when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al., 2004). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure.

Behavioral state or differences in individual tolerance levels may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing noise levels than animals that are highly motivated to remain in an area for feeding (Richardson et al., 1995; NRC, 2003; Wartzok et al., 2004). Indicators of disturbance may include sudden changes in the animal's behavior or avoidance of the affected area. A marine mammal may show signs that it is startled by the noise and/or it may swim away from the sound source and avoid the area. Increased swimming speed, increased surfacing time, and cessation of foraging in the affected area would indicate disturbance or discomfort. Pinnipeds may increase their haul-out time, possibly to avoid in-water disturbance.

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al., 1997; Finneran et al., 2003) and an increase in the respiration rate of harbor porpoises (*Phocoena phocoena*) (Kastelein et al., 2013). Observed responses of wild marine mammals to loud pulsed sound sources (typically including seismic guns or acoustic harassment devices and pile driving) have been varied, but these responses often consist of avoidance behavior or other behavioral changes that suggest discomfort (Morton & Symonds 2002; also see reviews in Gordon et al., 2004; Wartzok et al., 2004; and Nowacek et al., 2007). Some studies of acoustic harassment and acoustic deterrence devices have found habituation in resident populations of seals and harbor porpoises (see the review in Southall et al., 2007). Blackwell et al. (2004) found that ringed seals (*Phoca hispida*) exposed to underwater pile-driving sounds in the 153 to 160 dB RMS range tolerated this noise level and did not seem unwilling to dive and did not react strongly to pile-driving activities. Responses of two pinniped species to impact pile driving at the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project were mixed (Caltrans, 2001). Harbor seals were observed in the water at distances of approximately 400 to 500 m (1,312 to 1,640 ft) from the pile-driving activity and exhibited no alarm responses, although several showed alert reactions. None of the seals appeared to remain in the area, although they may have been transiting to the haulout site or feeding areas. One of these harbor seals was even seen to swim to within 150 m (492 ft) of the pile-driving barge during pile driving. Several California sea lions, however, were observed at distances of 500 to 1,000 m (1,640 to 3,280 ft) swimming rapidly and porpoising away from pile-driving activities. Both harbor seals and California sea lions continued feeding on dense schools of herring that occasionally occurred during pile driving (Caltrans, 2001). Observations at other construction sites (for example, the Navy's Point Loma fuel pier project) indicated that California sea lions typically did not respond behaviorally to pile driving (NAVFAC SW, 2014;

Navy 2016). The reasons for these differences are not known and probably reflect the context of construction activities and the previous experiences of the animals.

Observations of marine mammals on Naval Base Kitsap at Bangor during the Test Pile Program project concluded that pinniped (harbor seal and California sea lion) foraging behaviors decreased slightly during construction periods involving impact and vibratory pile driving, and both pinnipeds and harbor porpoise were more likely to change direction while traveling during construction (HDR, 2012). Pinnipeds were more likely to dive and sink when closer to pile-driving activity, and a greater variety of other behaviors were observed with increasing distance from pile driving.

A comprehensive review of acoustic and behavioral responses to noise exposure by Nowacek et al. (2007) concluded that one of the most common behavioral responses is displacement. To assess the significance of displacements, it is necessary to know the areas to which the animals relocate, the quality of that habitat, and the duration of the displacement in the event that they return to the pre-disturbance area. Short-term displacement may not be of great concern unless the disturbance happens repeatedly. Similarly, long-term displacement may not be of concern if adequate replacement habitat is available.

Marine mammals encountering pile-driving operations over a project's construction time frame would likely avoid affected areas in which they experience noise-related discomfort, limiting their ability to forage or rest there. As described in the section above, individual responses to pile-driving noise are expected to vary. Some individuals may occupy a project area during pile driving without apparent discomfort, but others may be displaced with undetermined effects. Avoidance of the affected area during pile-driving operations would reduce the likelihood of injury impacts but would also reduce access to foraging areas. The ZOI is only a small portion of foraging habitat utilized in San Diego Bay in general. Noise-related disturbance may also inhibit some marine mammals from transiting the area. There is a potential for displacement of marine mammals from affected areas due to these behavioral disturbances during the in-water construction season. However, in some areas, habituation may occur, resulting in a decrease in the severity of the response. Since pile driving/removal activities will only occur during daylight hours, California sea lions swimming, foraging, or resting in a project area at night will not be affected. Effects of pile-driving activities will be experienced by individual California sea lions but will not cause population-level impacts or affect the continued survival of the species.

7.2 Conclusions Regarding Impacts to Species or Stocks

Individual California sea lions may be exposed to SPLs during pile driving and extraction operations at NBSD may result in Level B Behavioral harassment. Any California sea lions which are taken (harassed), may change their normal behavior patterns (i.e., swimming speed, foraging habits, etc.) or be temporarily displaced from the area of construction. Any takes would likely have only a minor effect on individuals and no effect on the population. The sound generated from vibratory pile extraction is non-pulsed (e.g., continuous) which is not known to cause injury to marine mammals. Mitigation is likely to avoid most potential adverse underwater impacts to California sea lions from impact pile driving. Nevertheless, some level of impact is unavoidable. The expected level of unavoidable impact (defined as an acoustic or harassment "take") is described in Section 6. This level of effect is not anticipated to have any detectable adverse impact to the California sea lion population recruitment, survival, or recovery.

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8 IMPACT ON SUBSISTENCE USE

The anticipated impact of the activity on the availability of the species or stock of marine mammals for subsistence uses.

Potential impacts resulting from the Proposed Action will be limited to individuals of California sea lions located in NBSD ZOI that have no subsistence requirements. Therefore, no impacts on the availability of species or stocks for subsistence use are considered.

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9 IMPACTS TO THE MARINE MAMMAL HABITAT AND THE LIKELIHOOD OF RESTORATION

The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat.

The proposed activities at NBSD are expected to have little if any effect on the distribution of California sea lions within the project area. Only small numbers of California sea lions are expected to be present during construction and there are no haulout structures within the project area. Therefore, the main impact issue associated with the proposed activity will be temporarily elevated noise levels and the associated direct effects on California sea lions, as discussed in Sections 6 and 7. The most likely impact to habitat will occur from pile driving effects on likely California sea lion prey (i.e., fish) and minor impacts to the immediate substrate during the removal of piles.

9.1 Pile Removal and Installation Effects on Potential Prey (Fish)

The current IHA application addresses non-impulsive and impulsive sounds associated with the machinery used to extract and install piles. Fish react to sounds which are especially strong and/or intermittent low-frequency sounds. Short duration and sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) and Popper and Hastings (2009) identified several studies that suggest fish may relocate to avoid certain areas of noise energy. Additional studies have documented effects of pile driving (or other types of continuous sounds) on fish, although several are based on studies in support of large, multiyear bridge construction projects (Scholik and Yan 2001, 2002, Govoni et al. 2003, Hawkins 2005, Hastings 1990, 2007, Popper et al. 2006, Popper and Hastings 2009). Sound pulses at received levels of 160 dB re 1 µPa may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Chapman and Hawkins 1969; Pearson et al. 1992; Skalski et al. 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality (Caltrans 2001; Longmuir and Lively 2001). Additionally, studies of fish response to pile driving for Pacific sardine and northern anchovy found that fish exhibited immediate startle response to individual strikes at 50 m (164 ft) but returned to “normal” pre-strike behavior following the conclusion of pile driving and no evidence of injury to fish as a result of pile driving (NAVFAC SW 2014, Appendix C). The most likely impact to fish from pile removal and installation activities at the Project Area would be temporary behavioral avoidance of the immediate area. The duration of fish avoidance of this area after pile driving or removal stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary.

Thresholds for fish mortality, injury, and temporary threshold shift from pile driving are shown in Table 9-1. These are the thresholds used in the *Hawaii-Southern California Training and Testing Final EIS/OEIS* (Navy 2018) and represent best available science (Popper et al. 2014). Use of a threshold dB value for behavioral responses is not supported, although a threshold of 150 dB has been used (Caltrans 2015). The likelihood of behavioral responses is qualitatively considered to be high within tens of meters, intermediate within hundreds of meters, and low at thousands of meters (Popper et al. 2014).

Table 9-1. Sound Exposure Criteria for Mortality, Injury, and TTS for Fish

Fish Hearing Group	*Onset of Mortality*		*Onset of Injury*		*TTS*
	SEL_{cum}	*SPL_{peak}*	*SEL_{cum}*	*SPL_{peak}*	*SEL_{cum}*
Fishes without a swim bladder	> 219	> 213	> 216	> 213	NC
Fishes with a swim bladder not involved in hearing	210	> 207	203	203	> 186
Fishes with a swim bladder involved in hearing	207	>207	203	> 207	186
Fishes with a swim bladder and high-frequency hearing	207	> 207	203	> 203	186

Source: Navy 2018

For impact pile driving, SEL_{cum} at the 10-m (33-ft) source distance is calculated as:

SEL_{cum} = Single-strike SEL + 10 log10 (number of strikes per day)

For 20 and 24- inch concrete piles the SEL_{cum} is 202.28 (refer to Table 6-5 for 166 SEL and assumed 600 strikes per pile and 7 piles installed per day)"

SEL_{cum} = 166 + 10 log10 (600 strikes/pile x 7 piles/day) = 202.2

which is below both mortality and injury thresholds for all fish groups. Relatively small portions of the project area would be affected, and the effects on EFH would be temporary, limited to the duration of sound-generating activities and would not exceed any mortality or injury thresholds.

Source levels associated with non-impulsive sources, including use of a vibratory driver/extractor to loosen 20-inch square concrete and 12-inch timber-plastic piles, high-pressure water jetting to loosen concrete piles, diver use of a hydraulic chainsaw to cut piles at the mudline, and the use of small and large pile clippers for the removal of 12-inch timber-plastic piles and 20-inch square concrete piles, respectively, at 10 m (33 ft) from the source are shown in Table 6-5. Data from the most similar activities reported in the Acoustic Compendium for San Diego Bay (NAVFAC SW 2020) or by Caltrans (2015) have been used as proxies for the proposed activities at Pier 6. For these purposes, the maximum RMS SPL for each activity type is the only relevant criterion; peak SPLs and SELs for these types of sources would not exceed California sea lion prey fish injury or mortality thresholds.

9.2 Pile Removal and Installation Effects on Potential Foraging Habitat

The area likely impacted by the Pier 6 Replacement Project is relatively small compared to the available habitat in San Diego Bay. The Navy's marine mammal surveys have documented small numbers of California sea lions within the project area and the affected area is used little, if at all, as foraging habitat. As a result, the removal and replacement of pilings, substrate disturbance, and high levels of activity at the project site would be inconsequential in terms of effects on marine mammal foraging.

Turbidity is expected to increase in the short-term during pile installation and removal. The size and shape of the turbidity plume from pile driving and removal are difficult to quantify because of variability in naturally occurring conditions, such as wind and currents. Consequently, it is difficult to predict the specific areas that may be influenced by the plume. Pile driving and removal activities are likely to increase turbidity in the immediate vicinity, for example when high-pressure water jetting is used. Turbidity monitoring during jetting to remove caissons for the Fuel Pier Replacement Project revealed relatively minor if any changes, with only localized decreases in water clarity that dissipated within 11 minutes or less (NAVFAC SW 2017). Pile removal and installation at the project site when jetting is employed would likely have similar effects, resulting relatively minor (local to the pile being worked on) and temporary negative effects on the water quality.

Eelgrass is not present with the project footprint. The nearest eelgrass beds are approximately 1.9 km northwest of Pier 6 on the west side of the Bay. Therefore, no impacts to eelgrass that provides habitat for California sea lion prey would be affected.

9.3 Summary of Impacts to Marine Mammal Habitat

Given that the project area and the affected area have limited use as foraging habitat for California sea lions, the removal and replacement of pilings, substrate disturbance, and high levels of activity at the project site would be inconsequential in terms of effects on marine mammal foraging. Therefore, pile driving / removal is not likely to have a permanent, adverse effect on California sea lion foraging habitat in the Project Area.

10 IMPACTS TO MARINE MAMMALS FROM LOSS OR MODIFICATION OF HABITAT

The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

The proposed activities at NBSD are not expected to have any habitat-related effects that could cause significant or long-term consequences for individual California sea lions or the population. As previously discussed, California sea lions do not occur in large numbers nor are they expected to use the project area as frequent foraging habitat. Based on the discussions in Section 9, there will be no impacts to California sea lions resulting from loss or modification of marine mammal habitat.

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11 MEANS OF EFFECTING THE LEAST PRACTICABLE ADVERSE IMPACTS – MITIGATION MEASURES

The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.

The exposures outlined in Section 6 represent the maximum expected number of marine mammals that could be exposed to acoustic sources reaching Level B harassment levels. The Navy proposes to employ a number of mitigation measures, discussed below, in an effort to minimize the number of marine mammals potentially affected.

11.1 Mitigation for Pile Driving and Removal Activities

11.1.1 Proposed Measures

1. Time Restriction - In-water pile driving and removal activities will only be conducted when sufficient light is available for visual observations (generally 30 minutes after sunrise and up to 45 minutes before sunset).
2. General Vessel & Machinery Stoppage - For in-water construction, heavy machinery activities other than pile driving (e.g., use of barge-mounted excavators, or dredging), if a marine mammal comes within 10 m (33 ft), the activity must cease operations and reduce vessel speed to the minimum level required to maintain steerage and safe working conditions.
3. Pre-Construction Briefing - Prior to the start of all in-water pile installation or extraction activities, briefings will be conducted for construction supervisors and crews and the monitoring team and when new personnel join the work, in order to explain responsibilities, communication procedures, the marine mammal protocol, and operational procedures.
4. Establishment of Level A and Level B Harassment ZOIs During Pile Driving and Removal
    a. During all pile driving and removal activities, regardless of predicted SPLs, a buffered shutdown area of 10 m (33 ft) will be added to the required 10-m (33 ft) Level A injury prevention Physical Interaction Shutdown Zone. Since California sea lions are fast-swimming, this is appropriate to reduce the likelihood of injury to marine mammal species due to physical interaction with construction equipment during in-water activities. If an animal enters the buffered shutdown zone, pile driving or extraction would be stopped until the individual(s) has left the zone of its own volition, or not been sighted for 15 min.
    b. To the maximum extent possible, Level A/B harassment ZOIs will be monitored throughout the time required to drive or extract a pile. Based on the small size of the Level A ZOIs (<10 m [33 ft], but with a 20 m [60 ft] monitoring area), the whole of the Level A ZOI will be monitored during pile extraction and/or installation. Because many of the Level B ZOIs (depending on the activity, see Table 6-5) are outside of the visual range of the PSOs, an extrapolation of take will be calculated based on the assumption that for every animal observed inside of the Level B ZOI, there is one animal that is inside of the ZOI, but outside of the visual range of the PSO. If a marine mammal is observed entering the Level B ZOI, an exposure would be recorded and behaviors documented. Work would continue without cessation, unless the animal approaches or enters the buffered shutdown zone, at which point pile driving or extraction shall be halted.

5. Visual Monitoring

   a. <u>Pile Installation and Extraction</u>: Monitoring will be conducted for a 20 m (66 ft) buffered shutdown zone and within the Level B ZOI before, during, and after pile installation and removal activities. The Level B ZOI may be adjusted based on acoustic monitoring results, subject to NOAA Fisheries concurrence. Monitoring will take place from 30 min prior to initiation through 30 min post-completion of installation or removal activities.

   b. Monitoring will be conducted by qualified protected species observers (PSOs). All PSOs would be trained in marine mammal identification and behaviors, and have experience conducting marine mammal monitoring or surveys. Trained PSOs will be placed at the best vantage point(s) practicable (e.g., from a small boat, the pile driving barge, on shore, or any other suitable location) to monitor for marine mammals and implement shutdown/delay procedures, when applicable, by notifying the hammer operator of a need for a shutdown of construction. Up to four PSOs will be deployed on land or vessel with a clear view of the shutdown zone and ZOIs.

   c. Up to four PSOs at up to three locations (including two PSOs on a captained vessel) will be deployed with a clear view of the shutdown zone and ZOIs. The number of PSOs may vary depending on the pile installation or removal activity and applicable size of the ZOI(s).

   d. Prior to the start of pile installation activity, the buffered shutdown zones will be monitored for 30 min to ensure that they are clear of marine mammals. Pile driving will only commence once observers have declared the buffered shutdown zones clear of marine mammals; Animals will be allowed to remain in the Level B ZOI and their behavior will be monitored and documented.

   d. If a marine mammal approaches/enters the buffered shutdown zone during the course of pile installation or extraction operations, pile driving will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone, or 15 min have passed without a re-detection of the animal(s) from the last observation time.

   e. If a marine mammal species not covered in this IHA enters the Level B harassment zone, all pile driving or extraction activities shall be halted until the animal(s) has been observed to have left the Level B ZOI, or has not been observed for at least one hour. NOAA Fisheries will be notified immediately with the species, and precautions made during the encounter. Pile installation or extraction will be allowed to proceed if the above measures are fulfilled for non-IHA species.

   f. In the unlikely event of conditions that prevent the visual detection of marine mammals, such as heavy fog, activities, prevent the visual detection of marine mammals within the buffered shutdown zone, in-water construction of demolition activities have been initiated, and conditions deteriorate so that the buffered shutdown zone is not completely visible, activities will be delayed until the full buffered shutdown zone is once again visible.

   g. If the take of a marine mammal species approaches the take limits specified in the IHA, NOAA Fisheries will be notified, and appropriate steps will be discussed.

6. Acoustic Measurements – Acoustic measurements will be used to empirically validate sound source levels. For further detail regarding our acoustic monitoring plan see Section 13.

7. Soft Start - The use of impact pile driving soft-start procedures are believed to provide additional protection to marine mammals by providing a warning and/or giving marine mammals a chance to leave the area prior to the hammer operating at full capacity. The soft start procedure is described below:

   Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must be implemented *at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.*

8. Daylight Construction – In-water pile installation and removal work will occur only during daylight hours that allow for sighting of marine protected species within all project area and defined monitoring zones.

11.1.2 Measures Considered but not Proposed

Silt curtains were considered but rejected as a mitigation measure for turbidity because 1) the sediments of the project site are sandy and will settle out rapidly when disturbed; 2) fines that do remain suspended would be rapidly dispersed by tidal currents; and 3) tidal currents would tend to collapse the silt curtains and make them ineffective. Additionally, the use of bubble curtains was evaluated during the previous Naval Base Point Loma Fuel Pier project (completed in 2018) and were eliminated from consideration for that project and, by extension, this project given the dynamic tidal cycle in San Diego Bay.

11.2 Mitigation Effectiveness

All PSOs utilized for mitigation activities will be experienced biologists with training in marine mammal detection and behavior. Due to their specialized training the Navy expects that visual mitigation will be highly effective. Visual detection conditions in San Diego Bay are generally excellent. By its orientation, the bay is sheltered from large swells and infrequently experiences strong winds; winds are less than 17 knots 98% of the time between November and April (San Diego Bay Harbor Safety Committee 2009). Fog is anticipated on 10-20% of the days, typically in late night and early morning hours (San Diego Bay Harbor Safety Committee 2009) and could occasionally limit visibility for marine mammal monitoring. However, observers will be positioned in locations which provide the best vantage point(s) for monitoring, such as on nearby piers or on a small boat, and the shutdown and buffer zones cover relatively small and accessible areas of the bay. As such, proposed mitigation measures are likely to be very effective.

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12 MINIMIZATION OF ADVERSE EFFECTS ON SUBSISTENCE USE

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. A plan must include the following:

(i) A statement that the applicant has notified and provided the affected subsistence community with a draft plan of cooperation;

(ii) A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation;

(iii) A description of what measures the applicant has taken an/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; and

(iv) What plans the applicant has to continue to meet with the affected communities, both prior to and while conducting activity, to resolve conflicts and to notify the communities of any changes in the operation.

There is no subsistence use of marine mammal species or stocks in the project area.

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13 MONITORING AND REPORTING MEASURES

The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding.

13.1 Monitoring Plan

The following monitoring measures would be implemented along with the mitigation measures (Section 11) in order to reduce impacts to marine mammals to the lowest extent practicable during the period of this IHA. A marine mammal monitoring plan will be developed further and submitted to NOAA Fisheries for approval well in advance of the start of construction during the IHA period. The monitoring plan includes the following components: acoustic measurements and visual observations.

13.1.1 Acoustic Measurements

For each distinct pile type, size, and method of installation or removal, the sound source level (SEL, peak and RMS SPL) will be measured at a 10-m (33-ft) distance at mid-depth. Measurements will be taken throughout the installation/removal of a single pile of each type, size, and method. Acoustic measurements also will be taken at the estimated limits of the Level B ZOIs for each type of pile. The acoustic data will be analyzed to verify, and if appropriate, to make adjustments to ZOI boundaries initially estimated using the models described above in Section 6.6. During pile installation monitoring specifically, the acoustician will obtain pertinent information from the construction contractor for the piles being driven during the acoustic monitoring (e.g., substrate composition, hammer model and size, hammer energy settings and any changes to those settings, depth of the pile being driven, and blows per foot) to support transmission loss calculations. Prior to any changes to the transmission loss calculations or monitoring methodology, NOAA Fisheries will be contacted to discuss the proposed changes. Monitoring methods from the IHA Monitoring Plan will be followed.

13.1.1.1 Methods of Monitoring

- Hydroacoustic monitoring stations will be located at source and at appropriate distances away from the in-water construction activities to confirm monitoring zone Level A and B ZOI distances and sound transmission loss.
- All underwater sound monitoring systems will deploy hydrophones at mid-water depth (as determined by direct measurement or vessel-based depth finder).
- The hydrophone will be deployed so as to maximize its distance from flat surfaces or structures that may produce excessive reflections.
- During all vessel-based recordings, the vessel will be anchored and the engine off.
- GPS coordinates will be recorded for all acoustic monitoring locations.

- Sound level meter will be set to applicable source sound type, impulsive or non-impulsive, depending on pile driving or extraction method. Recordings will be made for the duration of each individual pile driving or extraction activity.
- Data will be reported on electronic tablet or hardcopy data sheets.
    - Field data collection will include, but not be limited to: date, AT initials, general weather information (wind, waves, temperature), boat/ship traffic in area, pile number, hydrophone location, hydrophone depth, water depth, start/end time of activity, type of activity, and field-collected acoustic metrics.
    - The monitoring coordinator will supply the AT with the start and stop times for the activity, hammer model and size, hammer energy settings, blow counts, and any changes to those settings during the piles being monitored.
- Conduct pile driving sound source verification for the following types and sizes of piles.
    - At least five piles each during impact installation of the following pile sizes and types: 24-inch concrete octagonal piles, 16-inch fiberglass piles.
    - At least five piles each during vibratory extraction of 20-inch concrete piles and 12-inch timber-plastic piles.
    - At least three piles each during water jetting assisted pile installation and pile extraction.
    - At least three piles each during pile clipping and pile cutting with a chainsaw, as applicable.
- For impact pile driving source level measurements, reports will include: pulse duration and mean, median, and maximum sound levels (dB re: 1 µPa); cumulative sound exposure level (SEL_{cum});peak sound pressure level (SPL_{peak}), and single-strike sound exposure level (SEL_{s-s}).
- For vibratory pile driving/removal, water jetting, clipping and chainsaw cutting, source level measurements, reports will include: mean, median, and maximum source levels (dB re: 1 µPa); root mean square sound pressure level (SPL_{rms}); and cumulative sound exposure level (SEL_{cum}).
- Number of strikes (impact) or duration (vibratory or other non-impulsive sources) per pile measures, one-third octave band spectrum and power spectral density plot.
- Empirically determine the Level B harassment distance by extrapolating from in-situ measurements of received SPLs at several points between 10 m and 500 m (33 ft and 1,640 ft) from the source. It is recommended that, at a minimum, measurements be taken at 10, 50, 250 and 500 m (33, 164, 820, and 1,640 ft) from the source, and that the best fit regression equation be used to estimate the Level B harassment distance. Alternatively, the Level B harassment distance can be determined by direct measurements to locate the distance where the received levels reach the ambient noise level (126 dB) (Dahl and Dall'Osto 2019).

13.1.2 Visual Marine Mammal Observations

The Navy will collect sightings data and behavioral responses to construction for marine mammal species observed in the region of activity during the period of construction. All observers will be trained in marine mammal identification and behaviors.

13.1.2.1 Methods of Monitoring

The Navy will monitor the Level A (shutdown) and Level B ZOIs before, during, and after pile driving or extraction activities. Based on NOAA Fisheries requirements, the Marine Mammal Monitoring Plan would include the following procedures:

- Monitoring will be conducted during daylight hours. If lighting conditions do not allow PSOs to observe the buffered Level A ZOI effectively, in-water construction or demolition activities will not be allowed to start (or continue) until conditions improve.
- For each type of construction with in-water activities (removal of existing piles, installation of new piles), PSOs will be placed at the best vantage point(s) practicable (e.g., from a small boat, construction barges, on shore).
- Up to four PSOs at up to three location (including two PSOs on a captained vessel) will conduct the marine protected species monitoring depending on the activity and size of monitoring zones. When there are two or more PSOs, all will be in radio communication with each other to enhance tracking of marine mammals that may be moving through the area and to minimize duplicate observation records of the same animal by different PSOs (i.e., a re-sighting);
- One land-/barge-based PSO ("Command" position) will be stationed with clear view of the buffered shutdown and physical interaction shutdown zone(s) and will be responsible for the collection of pile driving/extraction start and stop times, identification of all marine protected species in the vicinity of the pile being installed or removed, and notifying the contractor if construction or demolition must be delayed or stopped due to the presence of a marine protected species within the shutdown zones.
- For activities with monitoring zones beyond the visual range of the PSO/Command position, additional monitoring locations or the use of a vessel with captain and up to three other PSOs (depending on width of the monitoring zones) will conduct monitoring. During pre-activity monitoring, the vessel will start from south of the Project area (where potential marine mammal occurrence is lowest) and proceed to the north. Data will be collected on any marine protected species observed within the monitoring zones in accordance with monitoring and data collection procedures. When the vessel arrives near the northern boundary of the ZOI, it will set up station so the PSO(s) are best situated to detect any marine mammals that may approach from the north.
- Monitoring will be conducted before, during, and after pile driving/removal activities. Pile driving activities include the time to remove a single pile or series of piles, as long as the time elapsed between use of the pile driving equipment is no more than 30 minutes.
- During all observation periods, the PSOs will use binoculars and/or the naked eye to search continuously for marine protected;
- A 20-m (66-ft) buffered shutdown zone will be established around all in-water construction and demolition activities to avoid the potential for physical or Level A acoustic injury of marine protected species.
- If a marine protected species enters the buffered shutdown zone, all pile driving or removal activities at that location must be halted. The animal(s) must be allowed to remain in the shutdown zone (i.e., must leave of their own volition) and their behavior must be monitored and documented. Work will

be allowed to restart once the animal has been observed either leaving the shutdown area, or 15 minutes has elapsed since the last observation without re-detection of the animal.

- Results of all marine protected species observations during pre-activity, during activity, and post-activity monitoring will be recorded on electronic tablet or hardcopy datasheets.
- If an injured, sick, or dead marine mammal is observed, procedures outlined in Section 4.0 will be followed.

Pre-, during, and post-activity visual survey protocols are further described below.

- Pre-Activity Monitoring:
  - Visual surveys will occur for at least 30 minutes prior to the start of construction.
  - If a marine mammal is present within the 20-m (66-ft buffered shutdown zone), in-water activities will be delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone, or 15 minutes as elapsed since the last observation time without a re-detection of the animal.
  - The buffered shutdown zone may only be declared clear, and pile driving or demolition started, when the entire buffered shutdown zone is visible (i.e., when not obscured by poor light, rain, fog, etc.). If the buffered shutdown zone is obscured by fog or poor lighting conditions, activity at the location will not be initiated until the buffered shutdown zone is visible.
  - If marine mammals are present within the Level B Behavioral Harassment Monitoring Zone, in-water construction or demolition will not need to be delayed.
- During Activity Monitoring:
  - If a marine protected species approaches, or appears to be approaching, the 20-m (66-ft) buffered shutdown zone, the PSO who first observed the animal will alert the PSO/"Command," who will notify the construction crew of the animal's current status; in-water activities will be allowed to continue while the animal remains outside the buffered shutdown zone.
  - If the marine protected species enters the 20-m (66-ft) buffered shutdown zone, a shutdown will be called by the PSO/"Command." As the animal enters the shutdown zone, all pile operations will be stopped and the animal(s) will be continually tracked. Once a shutdown has been initiated, all in-water activities that generate potentially impactful noise will be delayed until the animal has voluntarily left the shutdown zone and has been visually confirmed beyond the shutdown zone, or 15 minutes have passed without re-detection of the animal (i.e., the zone is deemed clear of marine protected species). The PSO/"Command" will inform the construction contractor that activities can re-commence.
  - If shutdown and/or clearance procedures would result in an imminent concern for human safety, then the activity will be allowed to continue until the safety concern is addressed. During that timeframe the animal will be continuously monitored, and the Navy point of contact will be notified and consulted prior to re-initiation of project-related activities.
  - Shutdown shall occur if a species, for which authorization has not been granted, or for which the authorized numbers of takes have been met, approaches or is observed within the Level B ZOI. The monitoring coordinator or lead PSO shall notify the Navy point of contact, who will then contact NOAA Fisheries immediately. For non-IHA species, pile installation/removal will

  - be allowed to proceed if the animal(s) is observed to leave the Level B ZOI, or if one hour has lapsed since the last observation.
  - The number, species, and locations of all marine mammals observed will be documented using an electronic tablet or hardcopy datasheets in compliance with NOAA Fisheries reporting requirements.
  - If a marine mammal is observed entering the Level B monitoring zones, the pile segment being worked on will be completed without cessation, unless the animal enters or approaches the buffered shutdown zone. Regardless of location within the Level B monitoring zone, an initial behavior and the location of the animal(s) will be logged. Behaviors will be continually logged until the animal is either passed off to another PSO, the animal is no longer visible, or it has left the Level B monitoring zone.
  - Due to the size of the larger Level B ZOIs, some animals may enter the ZOIs unseen by the PSOs. For these cases, the number of California sea lions observed during active pile driving or extraction by the PSOs inside of the Level B ZOI will also be counted as unobserved animals inside of the ZOI, effectively doubling take on any given day. These unobserved animals will be considered as “estimated” takes, as opposed to “observed” takes reported by the PSOs. For any regular or final reporting, the “estimated” and “observed” take will be added together to genera a total take for the reporting period.
- Post-Activity Monitoring:
  - Monitoring of all zones will continue for 30 minutes following completion of pile driving/extraction. These surveys will record all marine mammal observations following the same procedures as identified for the pre-construction monitoring time period, and will focus on observing and reporting unusual or abnormal behaviors.

- Concurrent Action
  - There is a possibility that an overlap of in-water construction or construction and demolition activities could occur. If construction and/or demolition activities were to occur simultaneously, then two PSO/“Command” positions would be in place. These positions would act independently and would have the ability to shutdown proximate construction or demolition if a marine protected species entered the buffered shutdown zone under their observation. Sightings of marine protected species at one location that are moving towards the other location will be communicated among the PSOs, to increase the awareness of an incoming potential sighting.
  - In the event that water jetting and pile driving or extraction occur at the same time or simultaneous use of multiple pile clippers, the action will be monitored as one sound source. The buffered shutdown or the Level B ZOI associated with the louder of the two actions or additive Level B ZOI will be monitored for species presence as appropriate.

13.1.2.2 Data Collection

NOAA Fisheries requires that at a minimum, the following information be collected by PSOs:

- Date and time that pile driving or removal begins or ends;
- Construction activities occurring during each observation period;
- Weather parameters (e.g., wind, temperature, percent cloud cover, and visibility);

- Tide stage and sea state (The Beaufort Sea State Scale will be used to determine sea-state);
- Species, numbers, and, if possible, sex and age class of marine mammals;
- Marine mammal behavior patterns observed, including bearing and direction of travel, and if possible, the correlation to SPLs;
- Distance from pile driving activities to marine mammals and distance from the marine mammal to the observation point;
- Locations of all PSOs; and
- Other human activity in the area.

The required fields will be incorporated into an electronic tablet form or hardcopy datasheets that will be used by the PSOs (example provided in Appendix A). Data collection forms shall be submitted to the Navy point of contact for review within a mutually agreeable timeframe prior to the start of construction.

To the extent practicable, the PSOs will also record behavioral observations that may make it possible to determine if the same or different individuals are being “taken” as a result of Project activities over the course of a day.

In addition, the PSOs will document any occurrences of green sea turtles within the designated monitoring zones. Sighting information for green sea turtles will include all data that was collected for marine mammals (e.g., distance, bearing, and number of individuals). All measures identified in the applicable ESA consultation documents will be incorporated into monitoring protocols.

The PSOs will monitor the applicable ZOIs before, during, and after all pile driving and demolition activities, except for dead-pull pile removal, which will be monitored within the buffered shutdown zone only to avoid the potential for physical interaction with operating equipment.

13.2 Reporting

A draft report would be submitted to NOAA Fisheries within 90 calendar days of the completion of marine mammal and acoustic monitoring or 60 days prior to the issuance of any subsequent IHA for this project. A final report would be prepared and submitted to the NOAA Fisheries within 30 days following resolution of comments on the draft report from NOAA Fisheries.

The marine mammal report shall contain informational elements including, but not limited to:

- Dates and times (begin and end) of all marine mammal monitoring.
- Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method (i.e., impact or vibratory).
- Weather parameters and water conditions during each monitoring period (e.g., wind speed, percent cover, visibility, sea state).
- The number of marine mammals observed, by species, relative to the pile location and if pile driving or removal was occurring at time of sighting.
- Age and sex class, if possible, of all marine mammals observed.
- PSO locations during marine mammal monitoring.
- Distances and bearings of each marine mammal observed to the pile being driven or removed for each sighting (if pile driving or removal as occurring at time of sighting).

- Description of any marine mammal behavior patterns during observation, including direction of travel and estimated speed time spent within the Level A and Leve B harassment zones while the source was active.
- Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone, and estimates of number of marine mammals taken, by species (a correction factor may be applied to total take numbers, as appropriate).
- Detailed information about any implementation of any mitigation triggered (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any.
- Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals.
- Submit all PSO datasheets and/or raw sighting data (in a separate file from the Final Report referenced immediately above).

The acoustic monitoring report must, at minimum, include the following:

- Hydrophone equipment and methods: recording device, sampling rate, distance (m) from the pile where recordings were made; depth of recording device(s).
- Type of pile being driven, substrate type, method of driving during recordings, and if a sound attenuation device was used.
- For impact pile driving and/or down the hole drilling: Pulse duration and mean, median, and maximum sound levels (dB re 1 μPa): cumulative sound exposure level (SEL_{cum}), peak sound pressure level (SPL_{peak}); and single strike sound exposure levels (SELs-s).
- For vibratory driving/removal: Mean, median, and maximum sound levels (dB re 1 μPa); RMS sound pressure levels (SPL_{RMS}); cumulative sound exposure level (SEL_{cum}).
- Number of strikes (impact) or duration (vibratory) per pile measures; one-third octave band spectrum and power spectral density plot.

14 RESEARCH

Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

The U.S. Navy is one of the world's leading organizations in assessing the effects of human activities on the marine environment including marine mammals. From 2004 through 2013, the Navy has funded over $240M specifically for marine mammal research. Navy scientists work cooperatively with other government researchers and scientists, universities, industry, and non-governmental conservation organizations in collecting, evaluating, and modeling information on marine resources. They also develop approaches to ensure that these resources are minimally impacted by existing and future Navy operations. It is imperative that the Navy's research and development (R&D) efforts related to marine mammals are conducted in an open, transparent manner with validated study needs and requirements. The goal of the Navy's R&D program is to enable collection and publication of scientifically valid research as well as development of techniques and tools for Navy, academic, and commercial use. Historically, R&D programs are funded and developed by the Navy's Chief of Naval Operations Energy and Environmental Readiness and Office of Naval Research (ONR), Code 322 Marine Mammals and Biological Oceanography Program. Primary focus of these programs since the 1990s is on understanding the effects of sound on marine mammals, including physiological, behavioral and ecological effects.

ONR's current Marine Mammals and Biology Program thrusts include but are not limited to: (1) monitoring and detection research; (2) integrated ecosystem research including sensor and tag development; (3) effects of sound on marine life (such as hearing, behavioral response studies, physiology [diving and stress], and the Population Consequences of Acoustic Disturbance model; and (4) models and databases for environmental compliance.

To manage some of the Navy's marine mammal research programmatic elements, OPNAV N45 developed in 2011 a new Living Marine Resources (LMR) Research and Development Program (http://www.lmr.navy.mil/). The goal of the LMR Research and Development Program is to identify and fill knowledge gaps and to demonstrate, validate, and integrate new processes and technologies to minimize potential effects to marine mammals and other marine resources. Key elements of the LMR program include:

- Providing science-based information to support Navy environmental effects assessments for research, development, acquisition, testing, and evaluation as well as Fleet at-sea training, exercises, maintenance, and support activities.
- Improving knowledge of the status and trends of marine species of concern and the ecosystems of which they are a part.
- Developing the scientific basis for the criteria and thresholds to measure the effects of Navy-generated sound.
- Improving understanding of underwater sound and sound field characterization unique to assessing the biological consequences resulting from underwater sound (as opposed to tactical applications of underwater sound or propagation loss modeling for military communications or tactical applications).
- Developing technologies and methods to monitor and, where possible, mitigate biologically significant consequences to living marine resources resulting from naval activities, emphasizing those consequences that are most likely to be biologically significant.

Other National Department of Defense Funded Initiative - Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) are the Department of Defense's environmental research programs, harnessing the latest science and technology to improve environmental performance, reduce costs, and enhance and sustain mission capabilities. The Programs respond to environmental technology requirements that are common to all of the military Services, complementing the Services' research programs. SERDP and ESTCP promote partnerships and collaboration among academia, industry, the military Services, and other Federal agencies. They are independent programs managed from a joint office to coordinate the full spectrum of efforts, from basic and applied research to field demonstration and validation.

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16 REFERENCES

Amec Foster Wheeler Environment & Infrastructure, Inc. 2016. Regional Harbor Monitoring Program 2013 Report. Submitted to: Unified Port of San Diego, City of San Diego, City of Oceanside, City of Orange.

Antonelis, G.A., Jr., B.S. Stewart, and W.F. Perryman. 1990. Foraging characteristics of female northern fur seals (*Callorhinus ursinus*) and California sea lions (*Zalophus californianus*). Canadian Journal of Zoology 68:150-158.

Blackwell, S.B. and C.R. Greene Jr. 2002. Acoustic measurements in Cook Inlet, Alaska during August 2001. Greeneridge Report 271-2. Report from Greeneridge Sciences, Inc., Santa Barbara for National Marine Fisheries Service, Anchorage, AK. 43 p.

Blackwell, S.B., J.W. Lawson, and M.T. Williams. 2004. Tolerance by ringed seals (*Phoca hispida*) to impact pipe-driving and construction sounds at an oil production island. Journal of the Acoustical Society of America. 115(5): 2346-2357

Bonnell, M.L. and M.D. Dailey. 1993. Marine mammals. Pages 604-681 in Dailey, M.D., D.J. Reish, and J.W. Anderson, eds. Ecology of the Southern California Bight: A synthesis and interpretation. Berkeley, California: University of California Press.

Bonnell, M.L. and R.G. Ford. 1987. California sea lion distribution: A statistical analysis of aerial transect data. Journal of Wildlife Management 51(1):13-20.

Bonnell, M.L., M.O. Pierson, and G.D. Farrens. 1983. Pinnipeds and sea otters of central and northern California, 1980 - 1983: Status, abundance, and distribution. Volume III, Book 1. OCS Study MMS 84-0044. Los Angeles, California: Minerals Management Service.

Brumm, H., & Slabbekoorn, H. 2005. Acoustic Communication in Noise, In: Slater, P. J. B., Snowdon, C. T. Roper, T. J., Brockmann, H. J., & Naguib, M. Editor(s), Advances in the Study of Behavior, Academic Press, Volume 35, Pages 151–209.

Brumm, H., & Zollinger, S. A. 2011. The evolution of the Lombard effect: 100 years of psychoacoustic research. *Behaviour, 148*(11-13), 1173–1198.

California Department of Transportation (Caltrans). (2001). Marine Mammal Impact Assessment for the San Francisco- Oakland Bay Bridge Pile Installation Demonstration Project. PIDP EA 012081

_____. (2015). Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Available online at: http://www.dot.ca.gov/hq/env/bio/fisheries_bioacoustics.htm. November 2015.

Carretta, J.V., M.S. Lowry, C.E. Stincomb, M.S. Lynn, and R.E. Cosgrove. 2000. Distribution and abundance of marine mammals at San Clemente Island and surrounding offshore waters: Results from aerial and ground surveys in 1998 and 1999. NMFS- SWFSC Administrative Report LJ-00-02:1-43.

Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L Brownell Jr. 2019. U.S. Pacific Marine Mammal Stock Assessments: 2018. US Department of Commerce. NOAA Technical Memorandum NMFS-SWFSC-617.

Chadwick, B. J. Leather, K. Richter, S. Apitz, D. Lapota, D. Duckworth, C. Katz, V. Kirtay, B. Davidson, A. Patterson, P. Wang, and S. Curtis. 1999. Sediment Quality Characterization Naval Station San Diego: Final Summary Report. Technical Report No. 1777. January.

Chapman, C.J. and A.D. Hawkins. 1969. The importance of fish behaviour in relation to capture by trawls. *FAO Fisheries Report* 62(3): 717-729.

Commander, Navy Region Southwest (CNRSW). 2010. Port Operations Shore Infrastructure Plan. Final Document. April 2009, Revised September 2010.

Dahl, P.H., de Jong, C.A.F., & Popper, A.N. 2015. The Underwater Sound Field from Impact Pile Driving and Its Potential Effects on Marine Life. *Acoustics Today,* 11(2), 12-25.

Dahl, P.H. and D.R. Dall'Osto. 2019. Ambient Underwater Sound at Naval Base San Diego, San Diego Bay, California. Prepared for Naval Facilities for Naval Facilities Engineering Command Southwest under contract to Tierra Data, Inc.

Dall'Osto, D.R. and P.H. Dahl. 2019. Hydroacoustic Modeling of Pile Driving for the South-Central Region of San Diego Bay. Prepared for Naval Facilities Engineering Command Southwest under contract to Tierra Data, Inc.

Department of Defense. 2017. Unified Facilities Criteria. Design: Piers and Wharves. 4-152-01. 24 January.

Department of Environment, Food and Rural Affairs (DEFRA). 2003. Preliminary investigation of the sensitivity of fish to sound generated by aggregate dredging and marine construction. Project AE0914 Final Report.

Finneran, J.J., R. Dear, D.A. Carder, and S.H. Ridgway. 2003. Auditory and behavioral responses of California sea lions (*Zalophus californianus*) to single underwater impulses from an arc-gap transducer. Journal of the Acoustical Society of America. 114(3): 1667-1677.

Finneran, J. J., D. A. Carder, C. E. Schlundt, and S. H. Ridgway, 2005. Temporary threshold shift in bottlenose dolphins (*Tursiops truncatus*) exposed to mid- frequency tones. Journal of the Acoustical Society of America 118:2696–2705.

Finneran, J.J., C.E. Schlundt, B.K. Branstetter, J.S. Trickey, V. Bowman, and K. Jenkins. 2015. Effects of multiple impulses from a seismic air gun on bottlenose dolphin hearing and behavior. Journal of the Acoustical Society of America 137:1634-1646.

Galli, L., Hurlbutt, B., Jewett, W., Morton, W., Schuster, S., & Van Hilsen, Z. 2003. *Source-level noise in Haro Strait: relevance to orca whales.* Colorado College, Colorado Springs, CO.

Gordon, J., D. Gillespie, J. Potter, A. Frantzis, M.P. Simmonds, R. Swift, and D. Thompson. 2004. A review of the effects of seismic surveys on marine mammals. Marine Technology Society Journal. 37: 16-34.

Govoni, J.J., L.R. Settle, and M.A. West. 2003. Trauma to juvenile pinfish and spot inflicted by submarine detonations. Journal of Aquatic Animal Health 15:111-119.

Graham, S.E. and Saunders, B.P. 2014. Occurrence, Distribution, and Population Estimates of Marine Mammals near Silver Strand Training Complex and San Diego Bay, CA. Prepared for Commander, Pacific Fleet. Submitted to Naval Facilities Engineering Command Southwest. February 2015.

Greenbusch Group. 2018. Pier 62 Project Draft Acoustic Monitoring Season 1 (2017/2018) Report (NWS-2016-WRD, WCR-2016-5583, 01EWF00-2016-F-1325. Prepared for City of Seattle Department of Transportation.

Hanni, K.D. and D.J. Long. 1995. "Food habits of California sea lions at a newly established haul-out in San Francisco Bay". Abstract in Eleventh Biennial Conference on the Biology of Marine Mammals, Dec. 14–18, Orlando, FL.

Harris. C.M. 1998. Handbook of acoustical measurements and noise control (3rd Edition). Huntington, NY: Acoustical Society of America.

HDR Inc. 2012. Naval Base Kitsap at Bangor Test Pile Program, Bangor, Washington. Final Marine Mammal Monitoring Report. Prepared for Naval Facilities Engineering Northwest, Silverdale, WA. April 2012.

Hastings, M. C. 1990. Effects of Underwater Sound on Fish. Document No. 46254-900206-01IM. Project No. 401775-1600, AT&T Bell Laboratories.

Hastings, M. 2007. Calculation of SEL for Govoni et al. (2003, 2007) and Popper et al. (2007) Studies. Report for Amendment to Project 15218, J&S Working Group, 14 December 2007. 7 pp.

Hastings, M.C., and A.N. Popper. 2005. Effects of Sound on Fish. Report prepared by Jones and Stokes for California Department of Transportation, Contract No. 43A0139, Task Order 1.

Hawkins, A. 2005. Assessing the impact of pile driving upon fish. UC Davis: Road Ecology Center. Retrieved from: http://www.escholarship.org/uc/item/28n858z1

Heath, C. B. 2002. California, Galapagos, and Japanese sea lions– *Zalophus californianus, Z. wollebaeki, and Z. japonicus.* Pages 180 to 186 *in:* Perrin, W. F., B. Würsig, and J. G. M. Thewissen, editors. 2002. Encyclopedia of Marine Mammals. Academic Press.

Henry, A.E., B.S. Stewart, and P.K. Yokem. 1995. Dynamics of dietary overlap between California sea lions and harbor seals near San Nicolas Island, California. Abstract in Eleventh Annual Conference on the Biology of Marine Mammals, Dec. 14–18, Orlando, FL.

Holcomb, K. J.K. Young, and L.R. Gerber. 2009. The influence of human disturbance on California sea lions during the breeding season. Animal Conservation 12:592-598.

Holt, M. 2008. Sound exposure and Southern Resident killer whales (*Orcinus orca*): A review of current knowledge and data gaps. NOAA Technical Memorandum NMFS-NWFSC-89.

Holt, M., Noren, D. P., & Emmons, C. K. 2011. Effects of noise levels and call types on the source levels of killer whale calls. *The Journal of the Acoustical Society of America, 130*(5), 3100–3106.

Huber, H.R. 1991. Changes in the distribution of California sea lions north of the breeding rookeries during the 1982-1983 El Niño. Pages 129-137 *in* F. Trillmich and K.A. Ono, eds. Pinnipeds and El Niño: responses to environmental stress. Springer-Verlag, Berlin.

Kastak, D., R.J. Schusterman, B.L. Southall and C.J. Reichmuth. 1999. Underwater temporary threshold shift induced by octave-band noise in three species of pinniped. Journal of the Acoustic Society of America. 106(2):1142-1148.

Kastelein, R., van Heerden, D., Gransier, R., and Hoek L. 2013. Behavioral responses of a harbor porpoise (*Phocoena phocoena*) to playbacks of broadband pile driving sounds. *Marine Environmental Research, 92*:206-214.

Kastelein, R.A., Helder-Hoek, L., Covi, J., & Gransier, R. 2016. Pile driving playback sounds and temporary threshold shift in harbor porpoises (*Phocoena phocoena*): Effect of exposure duration. *The Journal of the Acoustical Society of America*, 139, 2842-2851.

Kastelein, R.A., Helder-Hoek, L., Kommeren, A., Covi, J. & Gransier, R. 2018. Effect of pile driving sounds on harbor seal (*Phoca vitulina*) hearing. *The Journal of the Acoustical Society of America*, 143, 3583-3594.

Ketten, D.R. 1995. Estimates of blast injury and acoustic trauma zones for marine mammals from underwater explosions. Pp. 391-407. In: R.A. Kastelein, J.A. Thomas, and P.E. Nachtigall (eds.). Sensory Systems of Aquatic Mammals. Woerden, The Netherlands: De Spil Publishers.

Ketten, D.R. 2000. Cetacean ears. Pp. 43-108. In: W.W.L. Au, A.N. Popper, and R.R. Fay (eds.). Hearing by Whales and Dolphins. New York: Springer-Verlag. Krahn, M.M., M.J. Ford, W.F. Perrin, P.R. Wade, R.P. Angliss, M.B. Hanson, B.L.

Ketten, D.R., T. Rowles, S. Cramer, J. O'Malley, J. Arruda, and P. Evans. 2004. Cranial trauma in Beaked Whales *in* Proceedings of the Workshop on Active Sonar and Cetaceans, P.G.H. Evans and L.A. Miller (eds.) European Cetacean Society Newsletter 42 Special Issue, 21-27

Kipple, B.M. and C.M. Gabriele. 2007. Underwater noise from skiffs to ships *in* Piatt, J.F. and Gende, S.M., eds, Proceedings of the Fourth Glacier Bay Science Symposium, October 26-28, 2004. U.S. Geological Survey Scientific Investigations Report 2007-5047, p. 172-175.

Largier, J.L. 1995. San Diego Bay Circulation: A Study of the Circulation of Water in San Diego Bay for the Purpose of Assessing, Monitoring and Managing the Transport and Potential Accumulation of Pollutants and Sediment in San Diego Bay. Prepared for California Regional Water Quality Control Board, San Diego Region. July.

Leet, W.S., C.M. Dewees, and C.W. Haugen. 1992. California's living marine resources and their utilization. University of California Sea Grant Extension Publication UCSGEP-92-12. Davis, CA.

Le Boeuf, B. J., and M. L. Bonnell. 1980. Pinnipeds of the California islands: abundance and distribution. Pages 475-493 in D. Power, ed. The California islands. Santa Barbara Mus. Nat. Hist. 787 pp.

Longmuir, C. and T. Lively. 2001. Bubble curtain systems for use during marine pile driving. Report by Fraser River Pile and Dredge Ltd., New Westminster, BC.

Lowry, M.S., C.W. Oliver, C. Macky, and J.B. Wexler. 1990. Food habits of California sea lions *Zalophus californianus* at San Clemente Island, California, 1981-86. Fishery Bulletin 88(3): 509-521.

Lowry, M.S., B.S. Stewart, C.B. Heath, P.K. Yochem, and J.M. Francis. 1991. Seasonal and annual variability in the diet of California sea lions Zalophus californianus at San Nicolas Island, California, 1981-86. Fishery Bulletin 89:331-336.

Malme, C.I., P.R. Miles, C.W. Clark, P.L. Tyack, and J.E. Bird. 1984. Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior. Phase II, January 1984 migration. Prepared by Bolt, Beranek, and Newman, Cambridge, MA. Prepared for United States Minerals Management Service, Alaska, OCS Office, Anchorage, AK.

Malme, C.I., B. Wursig, J.E. Bird, and P.L. Tyack. 1988. Behavioral responses of gray whales to industrial noise: feeding observations and predictive modeling. Final Report, Outer Continental Shelf Environmental Assessment Program, Research Unit 675. Report No. 6265, BBN Laboratories Inc. August.

Matzner, S., & Jones, M. E. 2011. Measuring coastal boating noise to assess potential impacts on marine life. *Sea Technology, 52*(7), 41–44.

McHuron, E.A., Block, B.A., &Costa, D.P. 2018. Movements and dive behavior of juvenile California sea lions from Año Nuevo Island. Marine Mammal Science, January 2018, Vol.34(1), pp.238-249.

McKenna, M.F. 2011. Blue whale response to underwater noise from commercial ships. Dissertation. University of California, San Diego. 242 pages.

Melin, S.R., R.L. DeLong, J. R. Thomason, and D.E. Valesquez. 1993. “Foraging behavior of female California sea lions at San Miguel Island, California: winter 1992 and 1993”. Abstract in Tenth Biennial Conference on the Biology of Marine Mammals, Nov.11–15, Galveston, TX.

Melin, S.R. and R.L. Delong. 2000. At-sea distribution and diving behavior of California sea lion females from San Miguel Island, California. Pages 407-412 *in* D.R. Browne, K.L. Mitchell, and H.W. Chaney, eds. Proceedings of the Fifth Channel Islands Symposium. OCS Study MMS 99-0038. Minerals Management Service, Camarillo, CA.

Melin, S.R., R.L.Delong, and D.B.Sniff. 2008. The effects of El Niño on the foraging behavior of lactating California sea lions (*Zalophus californianus californianus*) during the non-breeding season. Canadian Journal of Zoology 86:192-206.

Melin, S. R., F. Trillmich, and D. Aurioles-Gamboa. 2018. California, Galapagos, and Japanese Sea Lions: *Zalophus californianus*, *Z. wollebaeki*, and *Z. japonicus*. *Encyclopedia of Marine Mammals* (Third Edition). Bernd Würsig, J.G.M. Thewissen and Kit M. Kovacs (Ed.)

Merkel & Associates, Inc. 2008. Marine Mammals Surveys in the Vicinity of the Point Loma Naval Complex, San Diego, California. Final Report. Prepared for NAVFAC SW. September.

_____. 2009. 2008 San Diego Bay Eelgrass Inventory and Bathymetry Update. January.

Miksis-Olds, J. L. & Tyack, P. L. 2009. Manatee (*Trichechus manatus*) vocalization usage in relation to environmental noise levels. *The Journal of the Acoustical Society of America 125*, 1806.

Moffatt and Nichol. 2019. Personal communication with Mr. Morales via email on 20 June 2019.

Morton, A.B., and H.K. Symonds. 2002. Displacement of *Orcinus orca* (L.) by high amplitude sound in British Columbia, Canada. *ICES Journal of Marine Science.* 59: 71-80.

National Marine Fisheries Service (NOAA Fisheries). 2005. Endangered Fish and Wildlife; Notice of intent to prepare an environmental impact statement. 70 FR 1871.

_____. 2018a. 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 pp.

_____. 2019. Species Directory – California Sea Lion. Retrieved from: fisheries.noaa.gov/California-sea-lion

_____. 2020a. Companion User Spreadsheet to: Technical Guidance for Assessing the Effects of Anthropogenic Noise on Marine Mammal Hearing: Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-)PR-59, 167 pp.

_____. 2020b. Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Treasure Island Ferry Dock Project, San Francisco, California. Federal Register Vol. 85, No. 140. Tuesday, July 21, 2020.

National Oceanic and Atmospheric Administration (NOAA). 2010. Office of Coast Survey. Chart 18773 San Diego Bay. Edition 41. Available at: http://www.charts.noaa.gov/OnLineViewer/18773.shtm.

National Research Council (NRC). 2003. Ocean Noise and Marine Mammals. National Academies Press, Washington D.C. 192 pp.

_____. 2005. Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects. Washington, D.C.: The National Academies Press.

NAVFAC Atlantic. 2017. Final Report, Pile Driving Noise Measurements at Atlantic Fleet Naval Installations: 28 May 2013-28 April 2016. Prepared by Illingworth & Rodkin, Inc.

NAVFAC SW. 2014. Naval Base Point Loma Fleet Logistics Center Fuel Pier Replacement Project. Acoustic, Marine Mammal, Green Sea Turtle, and California Least Tern Monitoring Report.

_____. 2015. Pier 6 Load Capacity Analysis. NBSD. Project #N62473-13-D-3004 PTO# X0012. November.

_____.2017. Monitoring Report for Fuel Pier Replacement Project (P-151) at Naval Base Point Loma, San Diego, CA. 8 October 2016 to 30 April 2017.

_____. 2019a. FY20 MILCON Project P-443. DD1391 Cost Estimate. Prepared by Pacific Cost Engineering, LLC. 17 February 2019.

_____. 2019b. Personal communication via email with Mr. Alberto Sanchez regarding the number of existing piles. 8 July.

_____. 2020. Compendium of Underwater and Airborne Sound Data during Pile Installation and In-Water Demolition Activities in San Diego Bay, California. October.

NAVFAC SW and Port of San Diego (POSD). 2013. San Diego Bay Integrated Natural Resources Management Plan, Final. San Diego, California. Prepared by Tierra Data Inc., Escondido, California. March.

Navy. 2001. Shock trial of the WINSTON S. CHURCHILL (DDG 81): final environmental impact statement.

_____. 2016. Final Environmental Assessment Pier 8 Replacement Naval Base San Diego. June.

_____. 2018. Final Environmental Impact Statement/Overseas Environmental Impact Statement for Hawaii-Southern California Training and Testing. October.

Nemeth, E., & Brumm, H. 2010. Birds and anthropogenic noise: are urban songs adaptive? *American Naturalist, 176*(4), 465–475.

Nowacek, D.P., L.H. Thorne, D.W. Johnston, and P.L. Tyack. 2007. Responses of cetaceans to anthropogenic noise. *Mammal Review.* 37(2): 81-115.

O'Keefe, D.J. and G.A. Young. 1984. Handbook on the environmental effects of underwater explosions. Naval Surface Weapons Center, Dahlgren and Silver Spring, NSWC TR 83-240.

Pearson, W.H., J.R. Skalski, and C.I. Malme. 1992. Effects of sounds from a geophysical survey device on behavior of captive rockfish (*Sebastes* spp.). Canadian Journal of Fisheries and Aquatic Sciences 49: 1343-1356.

Popper, A.N. and M. Hastings. 2009. The effects of human-generated sound on fish. Integrative Zoology 4: 43-52.

Popper, A.N., T.J. Carlson, B.L. Southall, and R.L. Gentry. 2006. Interim Criteria for Injury of Fish Exposed to Pile Driving Operations: A White Paper.

Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S.M. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry M.B. Halvorsen, S. Lokkeborg, P.H. Rogers, B.L. SOuthall, D.G. Zeddies, and W.N. Tavolga. 2014. *ASA S3/Sc1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A technical report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI.* New York, NY and London, United Kingdom: Acoustical Society of America Press and Springer Briefs in Oceanography.

Port of San Diego (POSD). 2007. State of the Bay. January.

Reine, K. J., Clarke, D., and Dickerson, C. 2014. Characterization of underwater sounds produced by hydraulic and mechanical dredging operations. *The Journal of the Acoustical Society of America*, 135(6), 3280–3294.

Richardson, W.J., G.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. *Marine mammals and noise*. San Diego, CA: Academic Press. 576 pp.

Ridgway, S.H., D.A. Carder, R.R. Smith, T. Kamolnick, C. E. Schlundt, and W. R. Elsberry, 1997. Behavioral responses and temporary shift in masked hearing threshold of bottlenose dolphins, *Tursiops truncatus*, to 1-second tones of 141 to 201 dB re 1 µPa. Technical Report 1751, Revision 1. San Diego, California: Naval Sea Systems Command.

San Diego Harbor Safety Committee. 2009. San Diego Harbor Safety Plan (Approved May 2009).

_____. 2020. San Diego Harbor Safety Plan (Approved July 2020).

Scholik, A.R., and H.Y. Yan. 2001. Effects of underwater noise on auditory sensitivity of a cyprinid fish. Hearing Research 152:17-24.

_____. 2002. The effects of noise on the auditory sensitivity of the bluegill sunfish, *Lepomis macrochirus*. Comp. Biochemical Physiology A 133:43-52.

Schusterman, R. 1977. Temporal patterning in sea lion barking (*Zalophus californianus*). Behavioral Biology, 20:404-408.

_____. 1981. Behavioral Capabilities of Seals and Sea Lions: A Review of Their Hearing, Visual, Learning and Diving Skills. The Psychological Record, 31, 125–143.

Schusterman, R.J. and R.F. Balliet. 1969. Underwater barking by male sea lions (*Zalophus californianus*). Nature 222(5199):1179-1181.

Schusterman, R.J., R. Gentry, and J. Schmook. 1966. Underwater vocalization by sea lions: Social and mirror stimuli. Science 154(3748):540-542.

Schusterman, R.J., Gentry, R., and Schmook, J. 1967. Underwater sound production by captive California sea lions. Zoologica, 52:21-2 4.

Sebastianutto, L., Picciulin, M., Costantini, M. and E. Ferrero. 2011. How boat noise affects an ecologically crucial behaviour: the case of territoriality in *Gobias cruentatus* (Gobiidae). *Environmental Biology & Fisheries*: 92, 207-213.

Skalski, J.R., W.H. Pearson, and C.I. Malme. 1992. Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes* spp.). *Canadian Journal of Fisheries and Aquatic Sciences* 49: 1357-1365.

Sorensen, K. and Swope, B. 2010. San Diego Bay Marine Mammal Survey Project. Report to Navy Region Southwest, San Diego, CA. Third Survey Report.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R. Jr., Kastak, D., Ketten, D.K., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A. and Tyack, P.L. 2007. Marine mammal noise exposure criteria: initial scientific recommendations. *Special Issue of Aquatic Mammals*. 33(4): 412-522.

Southall, B.L., Finneran, J.J., Reichmuth, C., P.E. Nachtigall, D.R. Ketten, A.E. Bowles, W.T. Ellison, D.P. Nowacek, and P.L. Tyack. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals* 45(2), 125-232, DOI 10.1578/AM.45.2.2019.125

Tierra Data, Inc. 2010. Characterizing the Spatial and Temporal Variation in Turbidity and Physical Water Quality Characteristics in San Diego Bay - A Study to Determine a Cost-Efficient Strategy for Longterm Monitoring. A Project for: Environmental Project to Benefit San Diego Bay San Diego Unified Port District Environmental Services Department. Final Report. Available at; http://www.portofsandiego.org/environment/projects-a-progress-reports.html

Tierra Data, Inc. 2012. Characterizing the Spatial and Temporal Variation of Key Physical Water Quality Parameters in San Diego Bay: The Importance of Continuous Baseline Data when Evaluating Physical, Biological, and Chemical Processes. Draft Final Report, prepared for Environmental Projects to Benefit San Diego Bay San Diego Unified Port District Environmental Services Department. February.

Unpublished data. Chollas Creek Quaywall Repairs. 2019/2020 Reported observations of California sea lions in San Diego Bay.

U.S. Department of Transportation. 1995. Highway Traffic Noise Analysis and Abatement Policy and Guidance. Federal Highway Administration, Office of Environment and Planning Noise and Air Quality Branch. July.

Viada, S.T., R.M. Hammer, R. Racca, D. Hannay, M.J. Thompson, B.B. Balcom, and N.W. Phillips. 2008. Review of potential impacts to sea turtles from underwater explosive removal of offshore structures. Environmental Impact Assessment. 28: 267-285.

Ward, W.D. 1997. Effects of high intensity sound. In M.J. Crocker (Ed.) *Encyclopedia of acoustics, Volume III*. (pp 1497-1507). New York: John Wiley and Sons.

Wartzok, D., A.N. Popper, J. Gordon and J. Merrill. 2003/04. Factors affecting the responses of marine mammals to acoustic disturbance. *Marine Technology Society Journal* 37(4):6-15.

Washington State Department of Transportation. 2020. Biological Assessment Preparation Manual – Chapter 7 Construction Noise Impact Assessment. Chapter updated August 2020.

Yelverton, J.T., D.R. Richmond, E.R. Fletcher, and R.K. Jones. 1973. Safe distances from underwater explosions for mammals and birds. Lovelace Foundation, Albuquerque, DNA 3114T. http://stinet.dtic.mil/cgibin/GetTRDoc?AD=AD766952andLocation=U2anddoc=Get TRDoc.pdf.

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Appendix A
Pier 6 PTS CALCULATIONS – NOAA Fisheries

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A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Vibratory extraction of timber-plastic piles
PROJECT/SOURCE INFORMATION	Vibratory extraction of 12-inch timber-plastic piles assumed to occur 10 minutes at time for up to 8 piles per day or 80 minutes per day

Please include any assumptions

PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2.5	

[¥] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	152
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	4800
10 Log (duration of sound production)	36.81
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**2.1**	**0.2**	**3.1**	**1.3**	**0.1**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Vibratory extraction of concrete and steel piles
PROJECT/SOURCE INFORMATION	Vibratory extraction of 20-inch and 24-inch concrete piles and 16-inch I-shaped steel piles assumed tooccur 10 minutes at time for up to 8 piles per day or 80 minutes perday

Please include any assumptions

PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2.5	

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	160
Number of piles within 24-h period	8
Duration to drive a single pile (minutes)	10
Duration of Sound Production within 24-h period (seconds)	4800
10 Log (duration of sound production)	36.81
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**7.1**	**0.6**	**10.5**	**4.3**	**0.3**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a\,[1+(f/f_2)^2]^b}\right\}$$

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Water Jetting - Pile Installation & Extraction
PROJECT/SOURCE INFORMATION	Water jetting assumed to occur 20 minutes at a time for up to 8 piles per day or 160 minutes per day for removal of 24-inch pre-cast concrete or 20-inch square pre-stressed/pre-cast concrete piles
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)¥	2.5	2.5

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	158
Duration of Sound Production (hours) within 24-h period	2.7
Duration of Sound Production (seconds)	9720
10 Log (duration of sound production)	39.88
Propagation loss coefficient	15

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**0.8**	**0.1**	**1.2**	**0.5**	**0.0**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a\,[1+(f/f_2)^2]^b}\right\}$$

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Hydraulic Chainsaw
PROJECT/SOURCE INFORMATION	Underwater Chainsaw assumed to occur 10 minutes at time for up to 8 piles per day or 80 minutes per day for extraction of all pile types
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)[¥]	2.5	2.5

[¥] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	150
Duration of Sound Production (hours) within 24-h period	1.33
Duration of Sound Production (seconds)	4788
10 Log (duration of sound production)	36.80
Propagation loss coefficient	15

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**0.2**	**0.0**	**0.2**	**0.1**	**0.0**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Small Hydraulic Pile Clipper
PROJECT/SOURCE INFORMATION	Small hydraulic pile clipper assumed to occur 10 minutes at a time for up to 8 piles per day or 80 minutes per day for removal of 12-inch composite (timber-plastic) piles
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)¥	2.5	2.5

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	154
Duration of Sound Production (hours) within 24-h period	1.33
Duration of Sound Production (seconds)	4788
10 Log (duration of sound production)	36.80
Propagation loss coefficient	15

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**0.3**	**0.0**	**0.4**	**0.2**	**0.0**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Large Hydraulic Pile Clipper
PROJECT/SOURCE INFORMATION	Large hydraulic pile clipper assumed to be used 10 minutes at a time for up to 8 piles per day or 80 minutes per day for removal of 24-inch square pre-cast concreteor 20-inch square pre-stressed/pre-cast concrete piles
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)[¥]	2.5	2.5

[¥] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	161
Duration of Sound Production (hours) within 24-h period	1.33
Duration of Sound Production (seconds)	4788
10 Log (duration of sound production)	36.80
Propagation loss coefficient	15

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**0.8**	**0.1**	**1.2**	**0.5**	**0.0**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Large Hydraulic Pile Clipper
PROJECT/SOURCE INFORMATION	Two large hydraulic pile clippers assumed to be used 10 minutes at a time for up to 8 piles per day or 80 minutes per day for removal of 24-inch square pre-cast concreteor 20-inch square pre-stressed/pre-cast concrete piles
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)[¥]	2.5	2.5

[¥] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	164
Duration of Sound Production (hours) within 24-h period	1.33
Duration of Sound Production (seconds)	4788
10 Log (duration of sound production)	36.80
Propagation loss coefficient	15

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**1.3**	**0.1**	**1.9**	**0.8**	**0.1**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.05**	**-16.83**	**-23.50**	**-1.29**	**-0.60**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Concrete
PROJECT/SOURCE INFORMATION	Concrete pile driving assumed to require 600 strikes at 166 dB SEL and 7 piles i2-- or 24-inch nstalled per day.
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2	

[¥] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-based source levels are not available.

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) **PREFERRED METHOD (pulse duration not needed)**

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**202.2**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B32)	166
Number of strikes per pile	600
Number of piles per day	7
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G29)	188
Distance of $L_{p,0\text{-}pk}$ measurement (meters)	10
$L_{p,0\text{-}pk}$ Source level	203.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**191.2**	**6.8**	**227.8**	**102.3**	**7.5**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**1.2**	**NA**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

E.1-2: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL_{cum}

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B53)	176
Number of piles per day	7
Strike (pulse) Duration[^] (seconds)	0.01
Number of strikes per pile	600
Duration of Sound Production (seconds)	42
10 Log (duration of sound production)	16.23
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

[^] Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G47)	188
Distance of $L_{p,0\text{-}pk}$ measurement (meters)	10
$L_{p,0\text{-}pk}$ Source level	203.0

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**41.2**	**1.5**	**49.1**	**22.0**	**1.6**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**1.2**	**NA**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.01**	**-19.74**	**-26.87**	**-2.08**	**-1.15**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a\,[1+(f/f_2)^2]^b}\right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.1: 2020

KEY

(green)	**Action Proponent Provided Information**
(pink)	**NMFS Provided Information (Technical Guidance)**
(blue)	**Resultant Isopleth**

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	NBSD Pier 6 Replacement Project - Fiberglass
PROJECT/SOURCE INFORMATION	Concrete pile driving assumed to require 600 strikes at 144 dB SEL and 7 16-inch piles installed per day.
Please include any assumptions	
PROJECT CONTACT	Todd McConchie todd.c.mcconchie@navy.mil

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)[¥]	2	

[¥] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-based source levels are not available.

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) **PREFERRED METHOD (pulse duration not needed)**

Unweighted SEL_{cum} (at measured distance) = SEL_{ss} + 10 Log (# strikes)	**180.2**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\text{single strike}}$) specified at "x" meters (Cell B32)	144
Number of strikes per pile	600
Number of piles per day	7
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\text{single strike}}$) measurement (meters)	10

PK

$L_{p,0\text{-pk}}$ specified at "x" meters (Cell G29)	166
Distance of $L_{p,0\text{-pk}}$ measurement (meters)	10
$L_{p,0\text{-pk}}$ Source level	181.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**6.5**	**0.2**	**7.8**	**3.5**	**0.3**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**NA**	**NA**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

E.1-2: METHOD TO CALCULATE PK AND SEL_{cum} (USING RMS SPL SOURCE LEVEL)

SEL_{cum}

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B53)	153
Number of piles per day	7
Strike (pulse) Duration[^] (seconds)	0.01
Number of strikes per pile	600
Duration of Sound Production (seconds)	42
10 Log (duration of sound production)	16.23
Transmission loss coefficient	15
Distance of sound pressure level (L_{rms}) measurement (meters)	10

[^] Window that makes up 90% of total cumulative energy (5%-95%) based on Madsen 2005

PK

$L_{p,0\text{-pk}}$ specified at "x" meters (Cell G47)	166
Distance of $L_{p,0\text{-pk}}$ measurement (meters)	10
$L_{p,0\text{-pk}}$ Source level	181.0

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**1.2**	**0.0**	**1.4**	**0.6**	**0.0**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**NA**	**NA**	**NA**	**NA**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.01**	**-19.74**	**-26.87**	**-2.08**	**-1.15**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a\,[1+(f/f_2)^2]^b}\right\}$$

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

INCIDENTAL HARASSMENT AUTHORIZATION

The U.S. Navy (Navy) is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)) to harass marine mammals incidental to the Naval Base San Diego Pier 6 Replacement Project in San Diego, CA, when adhering to the following terms and conditions.

1. This Incidental Harassment Authorization (IHA) is valid from October 1, 2021 through September 30, 2022.

2. This IHA is valid only for in water construction activities associated with the Naval Base San Diego Pier 6 Replacement Project in San Diego, CA.

3. General Conditions

(a) A copy of this IHA must be in the possession of the Navy, its designees, work crew personnel, and Protected Species Observers (PSOs) operating under the authority of this IHA.

(b) The species authorized for taking are California sea lions (*Zalophus californianus*).

(c) The taking, by Level B harassment, is limited to the species listed in condition 3(b). Table 1 provides the authorized number of takes per species and stock.

(d) The taking, by injury (Level A harassment), serious injury, or death of any of species listed in condition 3(b) of this IHA is prohibited.

(e) The taking, by Level A harassment, Level B harassment, serious injury, or death, of marine mammal species not identified in condition 3(b) is prohibited.

4. Mitigation Measures

The holder of this IHA is required to implement the following mitigation measures:

(a) For in-water construction, heavy machinery activities other than pile driving, if a marine mammal comes within 10 m, the Navy must cease operations and reduce vessel speed to the minimum level required to maintain steerage and safe working conditions.

(b) The Navy is required to conduct briefings for construction supervisors and crews, the monitoring team, and Navy staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.

(c) The Navy is required to employ up to 4 PSOs per the Marine Mammal Monitoring Plan, dated November 2020, and Monitoring Measures described in section 5 of this IHA.

(d) Marine mammal monitoring within the zones identified in Table 2 must take place from 30 minutes prior to initiation of pile driving activity through 30 minutes post-completion of pile driving activity. Pile driving may commence when observers have declared the shutdown zone (Table 3) clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone (Table 3), their behavior must be monitored and documented until they leave of their own volition, at which point the activity may begin.

(e) If a marine mammal is entering or is observed within an established shutdown zone (Table 3), pile driving must be halted or delayed. Pile driving may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without subsequent detections of marine mammals.

(f) Should environmental conditions deteriorate such that marine mammals within the entire shutdown zone would not be visible (e.g., fog, heavy rain), pile driving and removal must be delayed until the PSO is confident marine mammals within the shutdown zone could be detected.

(g) The Navy must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy strike sets. A soft start must be implemented at the start of each day’s impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.

(h) If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zone (Table 2), pile driving and removal activities must shut down immediately using delay and shut-down procedures. Activities must not resume until the animal has been confirmed to have left the area or the observation time period, as indicated in condition 4(b) above, has elapsed.

5. Monitoring Measures

The holder of this IHA is required to abide by the following marine mammal and acoustic monitoring measures:

(a) Marine mammal monitoring must be conducted in accordance with Marine Mammal Monitoring Plan, dated November 2020.

(b) Marine mammal monitoring during pile driving and removal must be conducted by NMFS-approved PSOs in a manner consistent with the following:

i. Independent PSOs (*i.e.*, not construction personnel) who have no other assigned tasks during monitoring periods must be used.

ii. Other PSOs may substitute education (degree in biological science or related field) or training for experience.

iii. Where a team of three or more PSOs are required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience working as a marine mammal observer during construction.

iv. The Navy must submit PSO CVs for approval by NMFS prior to the onset of pile driving.

v. PSO locations are at: (1) the pile driving site or best vantage point practicable to monitor the shutdown zones; (2) across from the project location along Inchon Road at Naval Amphibious Base Coronado, (3) For activities with Level B harassment zones larger than 400 m, two additional PSOs will be located in a small boat. The boat will conduct a pre-activity survey of the entire monitoring area prior to in-water construction. The boat will start from south of the project area (where potential marine mammal occurrence is lowest) and proceed to the north. When the boat arrives near the northern boundary of the Level B harassment zone (e.g., just north of the western side of the Coronado Bridge as depicted in the Figures in the monitoring plan) it will set up station so the PSOs are best situated to detect any marine mammals that may approach from the north. The two PSOs aboard will split monitoring duties in order to monitor a 360 degree sweep around the vessel with each PSO responsible for 180 degrees of observable area.

(c) The Navy is required to conduct hydroacoustic monitoring of at least three piles for each installation or removal method.

6. Reporting

The holder of this IHA is required to:

(a) Submit a draft report on all marine mammal monitoring conducted under the IHA within ninety calendar days of the completion of marine mammal and acoustic monitoring or sixty days prior to the issuance of any subsequent IHA for this project, whichever comes first. A final report shall be prepared and submitted within thirty days following resolution of comments on the draft report from NMFS.

(b) The marine mammal report must contain the informational elements described in the Monitoring Measures described in Marine Mammal Monitoring Plan, dated November 2020, including, but not limited to:

i. Dates and times (begin and end) of all marine mammal monitoring.

ii. Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method (*i.e*., impact or vibratory).

iii. Weather parameters and water conditions during each monitoring period (*e.g.,* wind speed, percent cover, visibility, sea state).

iv. The number of marine mammals observed, by species, relative to the pile location and if pile driving or removal was occurring at time of sighting.

v. Age and sex class, if possible, of all marine mammals observed.

vi. PSO locations during marine mammal monitoring.

vii. Distances and bearings of each marine mammal observed to the pile being driven or removed for each sighting (if pile driving or removal was occurring at time of sighting).

viii. Description of any marine mammal behavior patterns during observation, including direction of travel and estimated time spent within the Level A and Level B harassment zones while the source was active.

ix. Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone.

x. Detailed information about any implementation of any mitigation triggered (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any.

xi. Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals.

xii. Submit all PSO datasheets and/or raw sighting data (in a separate file from the Final Report referenced immediately above).

(c) The acoustic monitoring report must, at minimum, include the following:

i. Hydrophone equipment and methods: recording device, sampling rate, distance (m) from the pile where recordings were made; depth of recording device(s).

ii. Type of pile being driven or removed, substrate type, method of driving or removal during recordings.

iii. For impact pile driving: Pulse duration and mean, median, and maximum sound levels (dB re: 1μPa): cumulative sound exposure level (SELcum), peak sound pressure level (SPLpeak), and single-strike sound exposure level (SELs-s).

iv. For vibratory removal and other non-impulsive sources: Mean, median, and maximum sound levels (dB re: 1μPa): root mean square sound pressure level (SPLrms), cumulative sound exposure level (SELcum).

v. Number of strikes (impact) or duration (vibratory or other non-impulsive sources) per pile measured, one-third octave band spectrum and power spectral density plot.

vi. Hydroacoustic monitoring results can be used to adjust the size of the Level B harassment and monitoring zones after a request is made and approved by NMFS.

(d) Reporting Injured or Dead Marine Mammals

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder shall report the incident to the Office of Protected Resources (OPR) (301-427-8401), NMFS and to the West Coast regional stranding coordinator (562-980-3264) as soon as feasible. If the death or injury was clearly caused by the specified activity, the IHA-holder must immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder must not resume their activities until notified by NMFS.

The report must include the following information:

i. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

ii. Species identification (if known) or description of the animal(s) involved;

iii. Condition of the animal(s) (including carcass condition if the animal is dead);

iv. Observed behaviors of the animal(s), if alive;

v. If available, photographs or video footage of the animal(s); and

vi. General circumstances under which the animal was discovered.

7. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein, or if NMFS determines the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

8. Renewals - On a case-by-case basis, NMFS may issue a one-time one-year Renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical or nearly identical, or nearly identical, activities as described in the Specified Activities section of this notice is planned or (2) the activities as described in the Specified Activities section of this notice would not be completed by the time the IHA expires and a Renewal would allow for completion of the activities beyond that described in the Dates and Duration section of this notice, provided all of the following conditions are met:

(a) A request for renewal is received no later than 60 days prior to the needed Renewal IHA effective date (recognizing that the Renewal IHA expiration date cannot extend beyond one year from expiration of the initial IHA).

(b) The request for renewal must include the following:

i. An explanation that the activities to be conducted under the requested Renewal IHA are identical to the activities analyzed under the initial IHA, are a subset of the activities, or include changes so minor (e.g., reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).

ii. A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

(c) Upon review of the request for Renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

WIETING.DONNA.S.1365710607 Digitally signed by WIETING.DONNA.S.1365710607 Date: 2021.01.22 10:44:51 -05'00'

Donna S. Wieting,
Director, Office of Protected Resources
National Marine Fisheries Service

Date

Table 1. Authorized Amount of Taking, by Level A harassment and Level B harassment, by species and stock.

	Authorized Take	
Species	**Level B**	**Level A**
California sea lion (*Zalophus californianus*) U.S. Stock	1000	0

Table 2. Level B Harassment Monitoring Zones by Pile Driving Scenario.

Pile Driving Activity		Radial Distance or Maximum Modeled Length x Width (m)
Method	**Pile Type**	**Level B**
Vibratory Extraction	12-inch timber/plastic	2167 x 1055
	20 and 24-inch concrete	6,990 x 1,173
	16-inch steel	7,140 x 1,595
Water Jetting	20-inch concrete	1359
Underwater Chainsaw	12 to 24-inch concrete	398
Small Pile Clipper	12-inch timber/plastic	736
Large Pile Clipper	20 to 24-inch concrete	2154
Two Large Pile Clippers	20 to 24-inch concrete	3415
Impact Hammer	20 and 24-inch concrete	192
	16-inch fiberglass	<10

Table 3. Shut-down Zones (in meters).

Pile Driving Activity	Otariid Pinnipeds
Any	20

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

United States Navy
Naval Facilities Engineering Systems Command
750 Pacific Highway, Floor 12
San Diego, CA 92132-0058

Enclosed is an Incidental Harassment Authorization (IHA) issued to the U.S. Navy, under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq*.) to take, by Level B harassment only, small numbers of California sea lions (*Zalophus californianus*) incidental to the Naval Base San Diego Pier 6 Replacement Project in San Diego, CA for one year from October 1, 2021 through September 30, 2022.

You are required to comply with the conditions contained in the IHA, including all mitigation, monitoring, and reporting requirements. Along with mitigation measures, the IHA requires monitoring for the presence and behavior of marine mammals during construction activities associated with the project as outlined in the IHA.

If you have any questions concerning the IHA or its requirements, please contact Dwayne Meadows, Ph.D., Office of Protected Resources, NMFS at (301) 427-8467.

Sincerely,

Donna S. Wieting, Director
Office of Protected Resources

Enclosure

Appendix C

Coastal Consistency Negative Determination

CALIFORNIA COASTAL COMMISSION
455 MARKET STREET, SUITE 228
SAN FRANCISCO, CA 94105-2219
VOICE (415) 904-5200
FAX (415) 904-5400

August 24, 2020

J.R. Habeck
Public Works Officer
Naval Base San Diego
3455 Senn Road
San Diego, CA 92136-5084

Subject: Negative Determination ND-0023-20 (Replacement of Pier 6 at Naval Base San Diego, San Diego County)

Dear Mr. Habeck:

The Coastal Commission staff has reviewed the above-referenced negative determination for the replacement of Pier 6 at Naval Base San Diego (NBSD). The Navy states that the project is necessary in order for NBSD to support modern Navy ships and to provide modern berthing, logistics, maintenance, and utility support at the Pier 6 location. The existing Pier 6 is functionally obsolete, operationally constrained, and structurally deteriorated. The replacement pier would provide four berths and adequate deck space for homeported ships. The project consists of: (1) demolishing the 75-year-old, 60-foot-wide by 1,377-foot-long Pier 6 and disposing all pilings, concrete, debris, and other materials at an off-site location; and (2) constructing (and potentially concurrent with demolition activities) a new 120-foot-wide by 1,500-foot-long concrete single-deck pier supported by 966 concrete piles along with utility infrastructure at the same location. The Navy expects demolition and construction to take approximately 18 months.

Under the federal consistency regulations, a negative determination can be submitted for an activity "which is the same as or similar to activities for which consistency determinations have been prepared in the past." The proposed project is similar to previously concurred with consistency and negative determinations for adjacent pier replacement and construction projects at NBSD (CD-031-01, ND-011-11, and ND-0044-14).

The Navy reports that the proposed project includes and is consistent with the water quality and marine resource avoidance, monitoring, and mitigation commitments agreed to under the Commission's concurrence with demolition of Piers 10 and 11 and construction of a single replacement pier (CD-031-01), and the Executive Director's concurrence with the demolition of Piers 12 and 8 and construction of replacement piers (ND-011-11 and ND-0044-14, respectively). A storm water pollution prevention plan will be implemented to minimize water quality degradation from demolition and construction activities by using site-specific best management practices, standard erosion control measures, and spill prevention and containment measures to avoid or minimize the potential for accidental release of debris or fuels during construction.

No dredging would occur with this project. Disturbance of bottom sediments during removal of existing timber pilings and installation of new concrete pilings would cause a temporary increase in turbidity in the waters adjacent to the pier. The Navy will implement turbidity control measures to ensure that resuspension of bottom sediments into the water column during construction are confined to the immediate project area. The project area does not support eelgrass beds nor does it include nesting or foraging habitat for listed species. Pile driving could temporarily disturb fish, marine mammals, and sea turtles in the immediate vicinity of the project site. To minimize potential impacts to these species, the project includes monitoring and minimization measures to avoid exposing marine mammals and sea turtles to excessive noise from pile driving. Upon completion of construction, the reduced number of pilings supporting the new pier would result in improved water circulation through the pier area.

The Navy reports that the new Pier 6 would shade an additional 2.2 acres of bay water when compared to shading from the existing Pier 6. Mitigation of bay shading is currently offset through the Navy Eelgrass Mitigation Bank (NEMB) for increased shading of areas shallower than -29 feet mean lower low water (MLLW). For Pier 6, of the 2.2 acres of increased bay shading, only 0.5 acres would cover waters shallower than -29 feet MLLW (portions of the pier closer to the quaywall). Based on the mitigation rate used in the NEMB, the Navy would contribute 152 square feet to the mitigation bank to offset impacts from increased shading of bay waters. No eelgrass or other special aquatic sites are found within the project area.

The project will not adversely affect public access or boating recreation. The pier area is currently off limits to public access and boating for military security and public safety reasons, and the replacement pier would not create additional burdens on public access or recreation. The replacement of Pier 6 would not adversely affect the visual characteristics of the area and would be compatible with adjacent piers at NBSD. The industrial nature of NBSD, when viewed from either San Diego Bay or adjacent upland areas, would remain unchanged with construction of the replacement pier. To account for future sea level rise across the 75-year lifespan of the replacement pier, the Navy states that the pier is designed to adapt to three feet of sea level rise.

In conclusion, the Commission staff **agrees** that with the monitoring, avoidance, and mitigation measures the Navy has incorporated into the proposed Pier 6 replacement project, the project will not adversely affect coastal resources. With these commitments the project is similar to previously concurred with consistency and negative determinations for pier replacement projects at NBSD. We therefore **concur** with your negative determination made pursuant to 15 CFR 930.35 of the NOAA implementing regulations. Please contact Larry Simon at Larry.Simon@coastal.ca.gov should you have any questions regarding this matter.

Sincerely,

LARRY SIMON

(for) JOHN AINSWORTH
Executive Director

cc: CCC – San Diego Coast District
Deb McKay, Navy Region Southwest

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL BASE SAN DIEGO
3455 SENN ROAD
SAN DIEGO, CALIFORNIA 92136-5084

5090
Ser N411/U756
June 4, 2020

Mr. Larry Simon
Federal Consistency Supervisor
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Dear Mr. Simon:

SUBJECT: COASTAL CONSISTENCY NEGATIVE DETERMINATION FOR NAVAL BASE SAN DIEGO PIER 6 REPLACEMENT PROJECT

In accordance with Section 930.35 of the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations, specifically 15 CFR 930.35, the Navy has determined the subject project would have no adverse effect to coastal resources or uses for the reasons identified in the enclosed Coastal Consistency Negative Determination.

The Pier 6 Replacement Project would demolish the aging and inadequate Pier 6 at Naval Base San Diego and replace it with a new general-purpose pier having the infrastructure necessary to support modern Navy ships. The project would demolish the existing Pier 6 and construct a new conventional concrete single-deck pier in the same location.

I request your review of and concurrence with this determination. When completed, please email a letter of concurrence to Ms. Deb McKay, Region NEPA Coordinator, at deborah.mckay@navy.mil. If you have any questions or need further information, please contact Ms. Deb McKay at (619) 532-2284.

Sincerely,

J. R. HABECK
Public Works Officer
By direction of the
Commanding Officer

Encl: (1) Coastal Consistency Negative Determination

COASTAL CONSISTENCY NEGATIVE DETERMINATION
FOR
NAVAL BASE SAN DIEGO PIER 6 REPLACEMENT PROJECT
SAN DIEGO, CALIFORNIA

In accordance with the Federal Coastal Zone Management Act of 1972 (CZMA), as amended, Section 307 (c) (1), the United States (U.S.) Navy (Navy) has determined that the Naval Base San Diego (NBSD) Pier 6 Replacement Project would not adversely affect coastal resources or uses within the coastal zone. Therefore, the Navy has concluded that a Coastal Consistency Determination is not required and is requesting your concurrence with this Coastal Consistency Negative Determination (CCND) in compliance with the Ocean and Coastal Resource Management (OCRM) regulations (15 Code of Federal Regulations [CFR] Section 930.35).

This submittal is similar to previously concurred determinations for recent pier construction in San Diego Bay (NBSD Pier 8 Replacement, ND-0044-14; NBSD Pier 12 Replacement, ND-011-11; and Naval Base Point Loma Fuel Pier Replacement, CD-011-13). In those decisions, the California Coastal Commission (Commission) found that the Navy's in-water construction activities would either have no effect on coastal resources or uses and would otherwise be consistent with relevant management program enforceable policies (15 CFR Section 930.33[a][1]), specifically chapter three of California's Public Resources Code, entitled Coastal Resources Planning and Management Policies (CRPMP). The Commission concurred that the activities complied with the water quality, public access and recreation, and environmentally sensitive habitat policies of the CRPMP.

The Navy is preparing an Environmental Assessment (EA) for the Proposed Action. The EA provides comprehensive descriptions for the action alternatives and describes the resources that could be affected by the proposed action, provides an analysis of the potential environmental consequences, and identifies proposed minimization measures to avoid/minimize adverse effects. The Navy published the Draft EA and provided a public review and comment period from 3 to 20 April 2020; no public comments on the EA were received.

PROJECT LOCATION

Pier 6 is located in San Diego Bay at NBSD (see Figure 1). NBSD is a major installation for Navy ships assigned to the Pacific Fleet and the major West Coast logistics base for surface forces of the Navy, dependent activities, and other commands. The mission of NBSD is to deliver support and quality of life services to the Pacific Fleet, warfighter and family. NBSD proper covers over 1,600 land acres (648 hectare [ha]) and 326 acres (132 ha) of water (Commander, Navy Installations Command [CNIC] 2019).

The Navy has 12 piers in the NBSD pier complex. There are seven piers (including Pier 6) which are intended to serve deep-draft ships. Constructed by the Navy in 1945, Pier 6 is 60 feet (18 meters) wide and 1,377 feet (420 meters) long and begins at the intersection of West Vesta and Brinser streets (see Figure 2).

BACKGROUND, PURPOSE OF AND NEED FOR PROJECT

Pier 6 is functionally obsolete and operationally constrained given its inadequate utilities capacity, load restrictions, and deck size (at only 60 feet [18 meters] wide) to support current and projected ship berthing operations. It is also structurally deteriorated with concrete spalling in many locations, cracked and broken concrete curbs, and exposed sections of corroded steel. A 2015 Load Capacity Analysis Report (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2015) cited Pier 6's overall condition as poor and in need of replacement. Due to Pier 6's limited width, utility deficiencies, and other infrastructure support limitations, only dock landing ships, guided-missile frigates, and older amphibious transfer dock ships can berth at Pier 6.

The Proposed Action is needed to provide adequate ship berthing infrastructure to support modern Navy ships and ultimately, Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces. Unless the Navy replaces structurally deteriorating and operationally constrained piers such as Pier 6, NBSD will not be able to properly support the berthing of homeported ships. Unless replaced, Pier 6's structural integrity will continue to deteriorate and could pose unsafe working conditions, especially during berthing operations.

PROJECT DESCRIPTION

The Navy proposes to demolish the aging and inadequate Pier 6 at NBSD and replace it with a new general purpose pier having the infrastructure necessary to support modern Navy ships. The current dimensions of Pier 6 are 60 feet (18 meters) wide by 1,377 feet (420 meters) long. The proposed Pier 6 dimensions would be 120 feet (36 meters) wide by 1,500 feet (457 meters) long, reflecting the new standard width of a general berthing pier. Implementation of the project would provide NBSD with four berths to support the Pacific Fleet with the requisite utilities, deck space, and berthing capacity for modern Navy ships and rectify deteriorating infrastructure that – if not addressed – would severely limit the overall utility of the pier. Under the Proposed Action, there would be no change to existing operations at Pier 6 or in adjacent upland areas. The Proposed Action also does not include dredging at or adjacent to Pier 6.

As substantiated and analyzed in the Navy's EA, the Navy has identified one action alternative: demolishing the existing Pier 6 and constructing a new conventional concrete single-deck pier in the same location (see Figure 3).

Replacement of Pier 6 with a Conventional Concrete Single-Deck Pier

Under the Proposed Action, the Navy would demolish the existing Pier 6 and replace it with a conventional concrete single-deck pier. The phased demolition and construction of Pier 6 would begin in fiscal year (FY) 22 and last approximately 250 working days (which equates to approximately one calendar year). The Navy would initiate the action with demolition of the existing pier (Phase I) and then initiate construction of the new pier (potentially concurrent with demolition activities) as demolition progresses and space is available for workers to install the new pilings and pier structure (Phase II). While all in-water work (piling removal and installation) is anticipated to occur within one-year (250 working day period), other non-in-water project activities would occur prior to and after the in-water work. Therefore, while the majority of work would occur within a one-year period, the total project duration would be approximately one and a half years.

Pier demolition would take place bayward to landward and from the top down. First, the fender piles and exterior appurtenances (such as utilities and the fuel piping systems) would be demolished above and below the pier deck. Then, the deck would be demolished using concrete saws and a barge-mounted excavator. All existing piles (totaling approximately 2,000 structural, fender, and other piles) would be removed.

Workers would initially attempt to extract the piles out by securing the piles above the water line and applying upward pressure to the pile (dead-pull). Workers may also use the dead-pull method with pile jetting (where an external high-pressure water jet is used to loosen the sediment around the pile). A vibratory hammer may also be used to loosen the piles prior to removal. If the piles could not be pulled out by these methods, workers would place a hydraulic cutter over each pile and lower it to the mudline (with diver assistance). Workers would secure the pile above the water line and the hydraulic cutter or a diver with a saw would cut the pile at the mudline. A crane would remove the pile and set it onto a barge.

While the method of removal is still in development, one of the above methods, or a similar method, would be used for pile removal. The final pile removal method would be determined based on the most efficient and timely technique.

Based on similar work completed at other Navy piers, workers would remove on average approximately 8 piles per day, one pile at a time, subject to external factors (e.g., weather). Based on five working days per week, workers would require approximately 50 weeks (250 working days) to remove the piles.

Trucks would haul concrete and debris to an off-site recycler for processing in compliance with recycling facility requirements. Workers would separate steel from concrete for recycling. Trucks would then transport unrecyclable materials to a permitted landfill. Throughout the demolition effort, material floats and collection bins would capture demolition debris before it enters the water. Workers in support boats would gather any floating debris for recycling or disposal, as appropriate.

The Navy would construct a conventional concrete single-deck berthing pier measuring 120 feet (37 meters) wide by 1,500 feet (457 meters) long. Workers would install 966 piles using a floating crane and diesel and/or hydraulic hammer (pile driver). Workers may also use high-pressure water jetting to assist pile driving. On average, workers would install 7 piles each day, one pile at a time. At an average daily rate of 7 piles per day, it would take workers approximately 140 working days to install all of the piles. In addition, approximately 15 additional structural test piles would be installed at the beginning of construction.

It is anticipated that overlap between pier demolition and pile installation activities would occur over the total 250 working-day in-water work period. Pile removal would begin on day 1 and progress at a rate of 8 piles per day, for an expected total of 250 days of pile removal. Pile installation is anticipated to begin after removal of one third of the piles, or approximately day 83 of pile removal, at a rate of 7 piles per day for expected 138 days of pile installation. Pile installation is expected to periodically occur alongside ongoing pile removal activities over 138 days of the remaining 167 project days of pile removal. Because pile installation cannot continue where demolition activities are incomplete, there would be 29 days (167 days – 138 days of pile installation) where only pile removal would occur after pile installation has started. Pile demolition would end on day 250 and pile installation would cease on day 250.

In summary, the 250-day in-water project period would include 112 days of pile removal-only activities and 138 days of concurrent pile removal and installation activities. These assumptions were used to estimate the in-water noise generated by the project and subsequent MMPA take of California sea lions.

The total length of the piles would range from approximately 85 feet (26 meters) (fender piles) to 110 feet (34 meters) (structural piles); the length of the portion of the piles in the water column would range from approximately 10 to 30 feet (3 to 9 meters), depending on pile type, location, and tide. The use of concrete and fiberglass rather than creosote-treated wood pilings would be consistent with Navy policy and would be preferable because, unlike creosote-treated wood pilings, the new piles would not be a potential source of polycyclic aromatic hydrocarbons to the bay.

The total surface area of Pier 6 would increase from approximately 1.9 acres (0.8 ha) to approximately 4.1 acres (1.7 ha), an increase of approximately 2.2 acres (0.9 ha).

EFFECTS ANALYSIS

As defined in Section 304 of the CZMA, the term “coastal zone” does not include “lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government.” NBSD is owned and operated by the Navy and, therefore, is excluded from the coastal zone. Although the Navy does not own the adjacent submerged lands in San Diego Bay, it does maintain navigational servitude of them through implementation of a security zone (33 CFR 165.1101) as shown in National Oceanic and Atmospheric Administration (NOAA) Nautical Chart 18773 (NOAA Office of Coast Survey 2012).

The Navy recognizes that federal actions on land excluded from the coastal zone may affect resources and uses within the coastal zone. Accordingly, the Navy has analyzed the impacts of the Proposed Action on the coastal zone by looking at reasonably foreseeable direct and indirect effects on the coastal resources or uses. The Navy has also analyzed the relevant management program enforceable policies (15 CFR Section 930.33[a][1]) and CRPMP.

Sections of the California Coastal Act relevant to the Proposed Action, as determined by the Navy, include: Article 2 – Public Access (Section 30210); Article 3 - Recreation (Section 30220); Article 4 – Marine Environment (Section 30230, 30231, and 30232); Article 5 – Land Resources (Sections 30240 and 30244); and Article 6 – Development (Section 30251, 30253, and 30255). Sections and articles of the California Coastal Act not addressed below are not relevant to the Proposed Action.

Article 2 – Public Access (CRPMP Section 30210) and Article 3 Recreation (CRPMP Sections 30220)

Article 2, Section 30210 – Public Access; Recreational Opportunities; Posting. In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Article 3, Section 30220 – Recreation; Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

NBSD is located in the southern portion of San Diego Bay in a heavy industrial area. There are no publicly accessible recreation areas within the project footprint. The U.S. Coast Guard restricts public access to the piers and wharf areas of NBSD with a designated security zone (33 C.F.R. Section 165.1101). The Navy further restricts access to the piers with placement of floating port security barriers and enforces the restrictions with roving security boat patrols. The Navy controls Pier 6 and restricts access to military personnel, U.S. Department of Defense (DoD) and Navy employees, and authorized contractors. Surrounding land uses are designated for military activities and include waterfront operations, industrial uses, and parking. The Proposed Action would be compatible with existing adjacent land uses, and no changes would occur to public access or recreational opportunities.

Therefore, there would be no effect to public access or recreation.

Article 4 – Marine Environment (CRPMP Sections 30230 et seq.)

Section 30230 – Marine Resources; Maintenance. Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Activities associated with in-water demolition and pile driving would disturb a portion of bottom sediments within the project site. Disturbance of bottom sediments (mostly sand) may cause the formation of localized but temporary turbidity plumes with elevated concentrations of suspended particles and decreased light transmittance and localized but temporary decreases in dissolved oxygen concentrations in bottom waters. Decreases in light penetration levels and dissolved oxygen would occur within a few hundred feet of the project site but would end several hours after cessation of dredging activities. Effects would be localized and temporary because suspended sediments would eventually resettle from the water column to the bottom (particularly in the vicinity of the project site where the sediments are composed primarily of sand-sized particles). This temporary bottom disturbance would not result in toxicity to aquatic organisms or increase potentials for contaminant bioaccumulation.

In-water demolition and pile-driving activities would cause minor and short-term impacts to existing unvegetated soft-bottom benthic communities within the project site. Organisms occurring in the immediate area would be lost or displaced either directly by equipment and noise associated with activities, or indirectly by exposure to short-term changes in suspended sediments, turbidity, dissolved oxygen, or light diffusion. However, no permanent change in habitat would result.

In-water work – including demolition and pile driving – would produce noise that would temporarily disturb fish, marine mammals, and sea turtles in the immediate vicinity of the project site.

The Navy is initiating informal consultation with NOAA Fisheries for potential impacts to Essential Fish Habitat (EFH) and the federally-listed green sea turtle. In addition, under Section 101 (a)(5)(D) of the Marine Mammal Protection Act (MMPA), the Navy is requesting an Incidental Harassment Authorization for the anticipated take, by Level B behavioral harassment only, of California sea lions.

NBSD is located within a general area designated as EFH by two Fishery Management Plans: Pacific Coast Groundfish and Coastal Pelagic Species. Four managed coastal pelagic fish species (i.e., jack mackerel, northern anchovy, Pacific mackerel, and Pacific sardine) and seven managed groundfish species (i.e., curlfin sole, California scorpionfish, English sole, grass rockfish, leopard shark, soupfin shark, and spring dogfish) are likely to occur within in the project site. The Navy has prepared an EFH Assessment. As described in the Navy's EFH Assessment, temporary impacts to EFH species may occur from increased suspended sediments and noise levels associated with dredging activities; however, fish would be able to move out of the area during in-water activities and return after in-water activities are completed. Therefore, no significant long-term effect would be anticipated.

Marine mammals protected under the MMPA and the federally listed green sea turtle and California least tern, protected under the federal Endangered Species Act, may be encountered in San Diego Bay and may transit through the project site. The likelihood of encountering marine mammals, green sea turtles, or California least terns during construction is low and because these species are highly mobile, they would be able to detect the noise and may temporarily avoid the area.

Because there are no sea lion rookeries or haulouts anywhere in the project site or surrounding vicinity, the potential for airborne acoustic harassment is considered negligible. Any sea lions which are taken (i.e., harassed) during in-water construction activities (e.g., pile driving), may change their normal behavior patterns or be temporarily displaced from the construction area. The maximum potential Level B harassment take of sea lions is estimated at 1,000 individual incidents. However, any takes would likely have only a minor effect on individuals and no effect on the overall population.

Potential impacts to green sea turtles from in-water construction activities would have minor, inconsequential effects that would not rise to a level of take under the federal Endangered Species Act. A qualified biological monitor would be present to look for marine mammal and green sea turtle activity in the vicinity of the project site and would provide a brief training to project vessel operators. Operations would be temporarily halted if any marine mammals or green sea turtles are observed in transit or occupying the project site. If individuals are observed within 20 meters of construction activity, operations would be suspended for at least 15 minutes following observations that the individual has vacated the area.

Prior to the start of impact pile driving each day, or at any time pile driving has ceased for more than 30 minutes, the Navy would use a soft-start procedure consisting of three strikes from the impact hammer at 40 percent energy, followed by a 30 second waiting period, then two additional 3-strike sets. Full-powered pile driving would commence after a final 30-second wait period following the final 3-strike set.

California least terns are present in the San Diego Bay environment, including nesting and foraging sites in the vicinity of Naval Base Coronado across the Bay from NBSD. The Pier 6 project area does not have any special characteristics such as: extraordinary size; eelgrass beds; unique fish habitat; or an abundance of California least tern prey species. California least terns are not expected to occur within the project area. Due to the distance to known nesting areas and high value foraging areas and the localized nature of impacts associated with project activities, project activities would not affect individuals or have a persistent effect on numbers and distribution of the species, or result in behavioral disruption of California least tern prey fish that would have secondary impacts on California least terns.

Following construction, Pier 6 would shade an additional 2.2 acres, representing approximately 0.02 percent of the 12,000-acre Bay. The deep subtidal area is muddy, lacking eelgrass or attached algae, so any effects on productivity would be negligible. The number and in-water surface area of pilings would be reduced, resulting in better circulation through the pier and less artificial substrate which is habitat for both native and introduced species.

Eelgrass, which is a Habitat Area of Potential Concern, occurs near the location of former Pier 14 at the south end of NBSD. Otherwise, the nearest eelgrass beds are found approximately 1.5

miles (2.4 kilometers [km]) west and 1.5 miles (2.4 km) south of Pier 6, on the opposite shore of the Bay and at the mouth of the Sweetwater River, respectively (see Figure 4).

Pursuant to the methodology described in Marine Taxonomic Services (2020), the Navy is currently mitigating project-related increases in Bay shading occurring over waters that are -8.8 m (-29 ft) or less. Below -8.8 m (-29 ft) MLLW, light penetration is reduced to 1% of ambient light at the Bay surface which does not support photosynthesis. Mitigation of bay shading is currently offset through the Navy Eelgrass Mitigation Bank at a rate of (0.07%) of increased shading of areas less than -8.8 m (-29 ft) MLLW depth. In the case of Pier 6, only portions of the expanded pier closer to the quaywall would cover any areas less than -8.8 m (-29 ft) in depth while all of the bayside length expansion would cover waters greater than -8.8 m (-29 ft) MLLW in depth. Of the 0.9 ha (2.2 acres) of increased bay shading, only 0.2 ha (0.5 acres) would cover waters less than -8.8 m (-29 ft) MLLW in depth.

Based on the 0.7% mitigation rate described above, the Navy would contribute 0.0014 ha (0.0035 acres), or 14 square meters (152 square feet) to the Navy Eelgrass Mitigation Bank. Further, benthic invertebrate species are expected to recolonize the disturbed benthic habitat within a relatively short period of time from adjacent undisturbed areas, and a typical epifaunal invertebrate community would gradually develop on the new pilings. Therefore, because no eelgrass or any other special aquatic sites are found in the project area, and the Navy would enact habitat offsets in the Navy Eelgrass Mitigation Bank, no effects to special aquatic sites would occur due to any project activities.

Section 30231 – Biological Productivity; water quality. The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Section 30232 – Oil and hazardous substance spills. Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

Hazardous materials that could be encountered during the proposed demolition and construction include lead-based paint chips and dust removed from deck hardware and striping; fuel and hydraulic fluid contained in heavy equipment, vehicles, and vessels performing the overall demolition and construction tasks; and paints to be used on upland deck infrastructure and deck striping.

Contractors involved with the construction activities would be subject to all federal, state, and San Diego County requirements for hazardous materials and hazardous waste management and would follow the Navy Region Southwest Hazardous Waste Management Plan (HWMP) for the San Diego Metro Area (Commander Navy Region Southwest [CNRSW] 2007). The contractor would also develop, receive NBSD Base Environmental approval of, and implement a project-specific Storm Water Pollution Prevention Plan (SWPPP) that would include best management practices (BMPs) for minimizing and containing dust and debris. The SWPPP would specify BMPs to prevent construction pollutants from contacting storm water, eliminate or reduce non-storm water discharges, and perform inspections of all BMPs. The SWPPP would also include BMPs to minimize potential impacts related to the on-shore construction components, such as: preventing erosion; the use of sediment barriers; inlet covers; covering stockpiles; inspecting equipment and vehicles for drips; and placing drip pans beneath vehicles and equipment.

The BMPs for demolition and construction activities include berms around the electrical substations to contain potential oils leaks from the transformers; overpack containers for hazardous materials being loaded onto berthed ships; checking vehicles and equipment for leaks; and having absorbent materials on hand to control spills. With the implementation all appropriate BMPs, there would be no increase in human health risk or environmental exposure to hazardous materials or hazardous wastes and no significant effects associated with the use, storage, or disposal of hazardous materials or hazardous wastes.

Therefore, with implementation of the avoidance and minimization measures and BMPs, there would be no adverse effects to marine resources.

Article 5 – Land Resources (CRPMP Sections 30240 et seq.)

Section 30240 – Environmentally Sensitive Habitat Areas; Adjacent Developments. (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

There are no Environmentally Sensitive Habitat Areas, as defined by the California Coastal Act, occurring within the project site. While green sea turtles and California least terns may occur as transients, there are no federally or state listed species that occupy the project site. Furthermore, the San Diego Bay Integrated Natural Resources Management Plan (INRMP) (Navy Region Southwest and Unified Port of San Diego 2013) as well as the NBSD INRMP (NBSD 2014) provides conservation management for listed and non-listed special status species.

Section 30244 – Archeological or paleontological resources: Where development would adversely impact archeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

The nearest cultural resources to the project site are the Naval Station San Diego Historic District (revised 2007) and the individually eligible Dry Dock No. 1 Site, both located more than 328 feet (100 meters) from Pier 6. NBSD is located on lands created by backfilling tidelands with excavated material in 1930 (NAVFAC SW 2016), thus precluding the potential for presence of buried archaeological deposits. Therefore, there are no archaeological sites or other cultural resources found within the Area of Potential Effect, as defined under the Programmatic Agreement (PA) between the Commander Naval Base San Diego the California State Historic Preservation Officer regarding Naval Base San Diego Undertakings, San Diego County, California (Commander Navy Region Southwest 2014).

Consistent with Stipulation 6.A. of the PA, Pier 6 and associated construction laydown areas would be outside the 328 feet (100 meter) Area of Potential Effect buffer of identified historic properties, the Naval Station San Diego Historic District (revised 2007), and individually eligible Dry Dock No. 1. Thus, consistent with Stipulation 8.A. of the PA, the Proposed Action qualifies for a determination of "No Historic Properties Affected."

Therefore, there would be no effects to land resources.

Article 6 – Development (CRPMP Section 30250 et seq.)

Section 30251 – Scenic and visual qualities: The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

Scenic and Visual Quality. The replacement of Pier 6 would not affect views available to the public and would be consistent with the surrounding military-industrial uses characteristic of this region of the San Diego Bay. The height of existing Pier 6 is approximately 12 feet (4 meters) above mean lower low water level (MLLW) for its entire length. The height of the proposed Pier 6 would be approximately 12.7 feet (3.9 meters) above MLLW at the quay wall and approximately 17 feet (5 meters) above MLLW at the end of the pier. The proposed watch tower would be approximately 22 feet (7 meters) tall. The new Pier 6 would have the same general appearance as the existing Pier 6 and therefore, would visually blend in with the suite of piers in the vicinity and other piers along the NBSD waterfront. Views within San Diego Bay would remain consistent with the military and industrial nature of the surrounding area.

Section 30253 – Minimization of adverse impacts: New development shall: (1) minimize risks to life and property in areas of high geologic, flood, and fire hazard. (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. (3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development.

Minimization of Adverse Impacts. Demolition and construction activities would not result in adverse impacts to geological resources. The majority of the proposed activities would occur within previously developed areas of San Diego Bay. San Diego is a seismically active region, as is most of Southern California. Seismic hazards can include landslides, ground shaking, surface displacement, and rupture, liquefaction, and tsunamis. The construction of Pier 6 would adhere to the provisions of the Unified Facilities Criteria (UFC) for Design of Piers and Wharves (UFC 2017). In addition, the Pier 6 design would incorporate industry standard seismic engineering measures to minimize any potential effects of seismically induced ground movement (Earth Mechanics 2019). Therefore, the Proposed Action would have no impact to geologic resources.

Sea Level Rise. To account for future sea level rise anticipated in the 75 year lifespan of the new pier, the final pier design would reflect a final elevation based on sea level rise predictions and the UFC requirements (specifically, UFC 4-152-01 Design of Piers and Wharves [UFC 2017]). The new Pier 6 would be able to adapt to a potential sea level rise of 3 feet (1 meter).

Air Quality. The Proposed Action would follow applicable San Diego County Air Pollution Control District (SDCAPCD) policies. As described in the Navy's Record of Non-Applicability (prepared as part of the Navy's EA), emissions from the proposed demolition and construction activities would not exceed the *de minimis* thresholds identified for the San Diego Air Basin (SDAB). Therefore, the Proposed Action would conform to the SDAB State Implementation Plan and would not trigger a conformity determination under the Clean Air Act, as amended.

Section 30255 – Priority of coastal-dependent developments: Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.

Coastal-Dependent Development. The Navy's mission "is to maintain, train and equip combat ready Naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas." Having installations on the coast, near the seas where their primary mission takes them, is vitally important to the Navy and thus can be considered a coastal-dependent use with priority in development. The replacement of Pier 6 at NBSD is needed to provide adequate ship berthing infrastructure to support modern Navy ships and ultimately Fleet readiness as part of the Navy's overall mission to maintain, train, and equip combat-ready Naval forces.

Therefore, there would be no effect to visual, scenic, or air quality of coastal resources.

CONCLUSION

In accordance with the Federal Coastal Zone Management Act of 1972, as amended, Section 307(c)(1), the Coastal Consistency Negative Determination demonstrates that the Proposed Action would be undertaken in a manner that would avoid or minimize effects on coastal uses or resources. The Navy respectfully requests your concurrence. If you need additional information or if you have any questions, please do not hesitate to contact Ms. Deb McKay at (619) 532-2284 or via email at deborah.mckay@navy.mil.

REFERENCES

Commander Navy Region Southwest. (2014). Programmatic Agreement between the Commander NBSD and the California State Historic Preservation Officer regarding NBSD Undertakings, San Diego County, CA.

Earth Mechanics, Inc. (2019). Draft Geotechnical Investigation Report. FY21 MCON Project P-443, NBSD, Pier 6. 21 June.

Marine Taxonomic Services. (2020). Bay Habitat Mitigation Planning for Commercial Out Lease of Floating Dry Dock at the MGBW Maintenance Piers in San Diego Bay, California. 6 February.

Merkel & Associates. (2018). 2017 San Diego Bay Eelgrass Inventory Update. Prepared for NAVFAC SW and San Diego Unified Port District. March.

Naval Base San Diego. (2014). Final Integrated Natural Resources Management Plan for NBSD. June.

NAVFAC SW. (2015). Pier 6 Load Capacity Analysis. NBSD. Project #N62473-13-D-3004 PTO# X0012. November.

NAVFAC SW. (2016). Final Environmental Assessment for Pier 8 Replacement. NBSD, CA. June.

Navy Region Southwest and Unified Port of San Diego. (2013). San Diego Bay Integrated Natural Resources Management Plan.

NOAA Office of Coast Survey. (2012). Nautical Chart 18773. https://www.charts.noaa.gov/OnLineViewer/18773.shtml

Unified Facilities Code (UFC). (2017). UFC 4-152-01, “Design: Piers and Wharves.” 24 January.

Figure 1. Regional Location of Naval Base San Diego

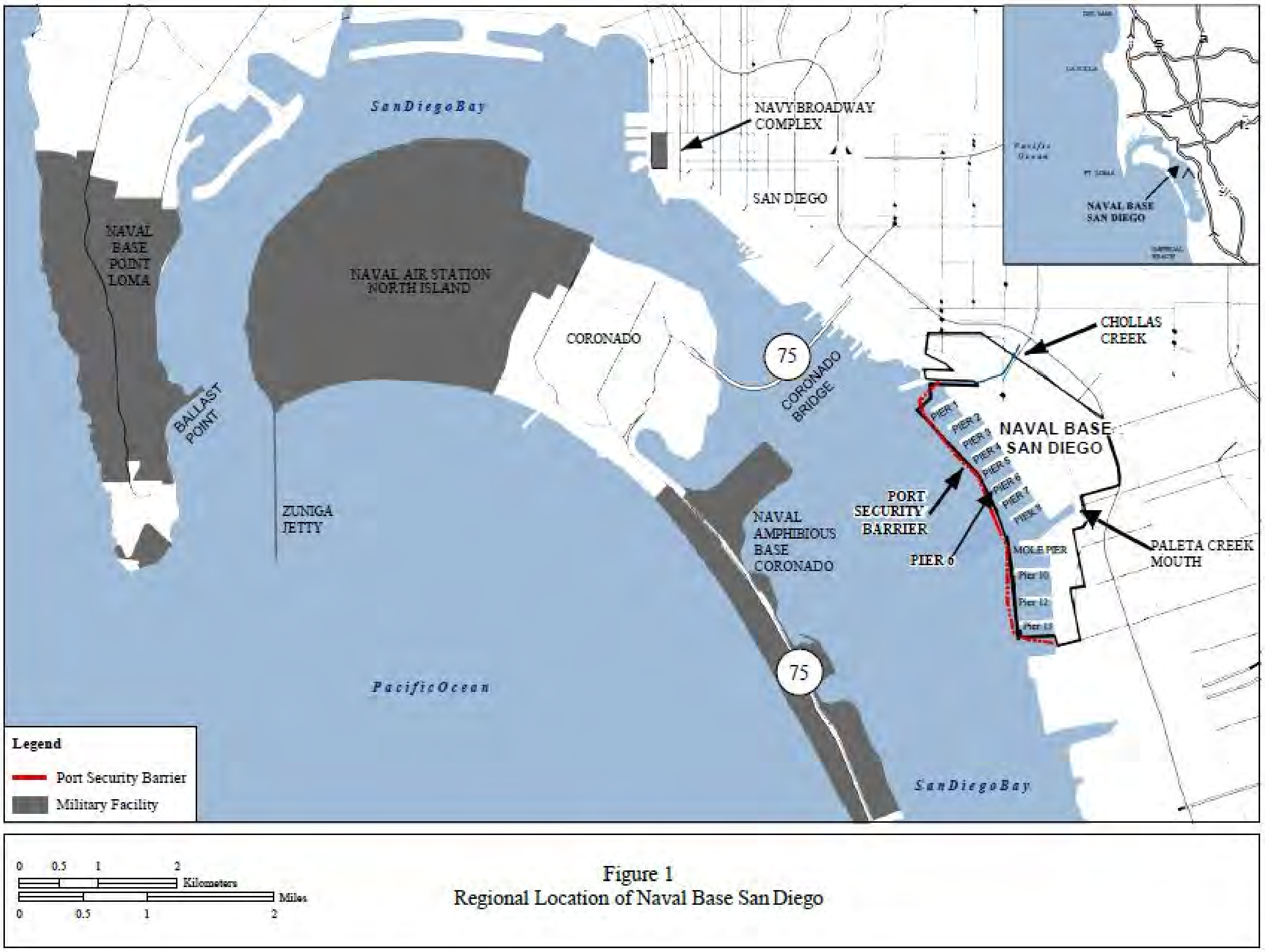

Figure 1
Regional Location of Naval Base San Diego

Figure 2. Pier 6 Location at Naval Base San Diego

Figure 2
Pier 6 Location at Naval Base San Diego

Figure 3. Proposed Pier 6 Replacement

Figure 4. Surveyed Eelgrass Locations and California Least Tern Nesting and Foraging Areas Pier 6, Naval Base San Diego, San Diego, CA

Figure 4 Surveyed Eelgrass Locations Near Pier 6

Table 1 – Impact Avoidance and Minimization Measures

Table 1 presents the impact avoidance and minimization measures that would be incorporated into the Proposed Action. These measures consist of existing policies, practices, and measures that the Navy would apply to reduce environmental impacts of designated activities, functions, or processes.

Table 1: Impact Avoidance and Minimization Measures

Resource Area	*Measure*	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Section 3.0: Public Health and Safety	The construction contractor would develop a rescue plan for all water activities, with specifications for the retrieval and rescue of personnel. The construction contractor would ensure all workers receive information on all relevant safety plans.	Support the safety of project personnel	Project safety record	Prepare and brief before project and implement during project	Construction contractor	Completion of construction activities
	Naval Ordnance Safety and Security Activity and/or Department of Defense Explosives Safety Board approval of the contractor's Explosives Safety Submission (ESS) or Explosives Safety Submission Determination Request (ESS DR)	Support the safety of project personnel	Project safety record	Prepare and follow ESS or ESS DR	Construction contractor and Navy	Completion of construction activities
	The Navy would provide the NBSD Explosives Safety Officer with contractor points of contact for notification and evacuation during explosives handling at Piers 5 or 7.	Personnel safety during explosives handling	Project safety record	Regular communication/ notification	Navy and construction contractor	Completion of construction activities
	The Navy would inform the contractor of potential presence of unexploded ordnance (UXO). If workers encounter potential UXO, all work would stop pending Navy evaluation and notification to proceed.	Minimize potential for encountering UXO/personnel safety	Project safety record	In accordance with Naval Ordnance Safety and Security Activity Instruction 8020.15	Navy and construction contractor	Completion of in-water construction activities
	The Navy or the construction contractor would submit a Local Notice to Mariners (via U.S. Coast Guard District 11) at least 14 days prior to the start of the project.	Notify boaters of in-water activity	Publication of notice and project safety record	Submit to USCG District 11 at least 14 days prior to project start	Construction contractor	Completion of construction activities
Section 3.0: Hazardous Materials and Wastes	Contractors would abide by the provisions of the Hazardous Waste Management Plan for the San Diego Metro Area (CNRSW 2007) to ensure management of hazardous waste in accordance with all applicable requirements.	Protection of marine resources	Project safety record	Prepare and brief before project and implement during project	Construction contractor	Completion of construction activities
	Contractors would not discharge oil, fuel, or chemicals to waters of the state.	Protection of marine resources	No discharges	Observe for spills, sheens, etc.	Construction contractor	Completion of construction activities
	The contractor would develop and abide by site-specific Storm Water Pollution Prevention Plan (SWPPP), to include implementation of appropriate best management practices (BMPs).	Protection of marine resources	BMPs perform as designed	Regularly inspect BMPs for performance	Construction contractor	Completion of construction activities
	Any hazardous materials or wastes generated will be subject to Emergency Planning and Community Right-to-Know Act reporting requirements.	Informational for action, as needed	Continued positive community relations	Understanding and following of reporting requirements	Construction contractor	Completion of construction activities
	Certified workers would remove and manage lead-based paint in compliance with all applicable federal, state, and local regulations.	Minimize risk of exposure	No exposures	Follow applicable regulations	Construction contractor	Completion of demolition activities

Resource Area	*Measure*	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
	Certified workers would remove and manage asbestos containing materials in compliance with all applicable federal, state, and local regulations.	Minimize risk of exposure	No exposures	Follow applicable regulations	Construction contractor	Completion of demolition activities
	Develop a Solid Waste Management Plan to characterize demolition and construction waste for proper reuse, recycling, or disposal.	Maximize reuse/recycling and minimize solid waste disposal	Successful characterization and reduction in disposal	Monthly diversion summary reports and weight tickets	Construction contractor	Completion of construction activities
Section 3.1: Water Resources	Adhere to the California State Water Resources Control Board Construction General Permit and develop and implement SWPPP.	Protection of marine resources	No discharges	Draft and implement SWPPP; periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	Develop and implement a Construction and Demolition Plan (CDP).	Contain demolition debris	Containment of debris	Draft and implement CDP; periodic inspections for effectiveness	Construction contractor	Completion of demolition activities
	Develop and implement a Spill Prevention Plan (SPP).	Minimize potential for spills to marine waters	No spills	Draft and implement SPP; periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	Deploy a floating boom and cable net around the project area.	Protection of marine resources	Catch devices, ensnare debris	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	Keep spill containment equipment on-hand as specified in the NBSD Facility Response Plan.	Immediate response to inadvertent discharges/spills	Fast and effective response	Periodic inspections to confirm equipment is on-hand and in good working order	Construction contractor	Completion of construction activities
	Subject to the terms and conditions identified in the project-specific USACE Section 404 and Section 10 permit and San Diego Regional Water Quality Control Board Section 401 Permit, the Navy would deploy precautionary measures to alleviate turbidity associated with demolition and construction activities.	Minimize impacts to marine resources	Success in achieving permit conditions	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities

Resource Area	*Measure*	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Section 3.2 Biological Resources	The contractor would use only clean construction materials suitable for use in the oceanic environment. The contractor would ensure no: debris; soil; silt; sand; sawdust; rubbish; cement or concrete washings thereof; chemical; oil or petroleum products from construction would be allowed to enter into or place where it may be washed by rainfall or runoff into waters of the U.S. Upon completion of the project, any and all excess material or debris would be completely removed from the work area and disposed of in an appropriate upland site. Following the removal of all project-related materials and equipment, project lay-down areas would be thoroughly cleaned (no visible sediment or other contaminants) by the contractor.	Avoid/minimize impacts to marine resources	Containment of debris and no spills	Periodic inspections for effectiveness	Construction contractor	Completion of construction activities
	A *Caulerpa* survey (Surveillance Level) would be conducted prior to in-water project activities, consistent with National Marine Fisheries Service and California Department of Fish and Wildlife requirements. If Caulerpa was found in the project area during this survey, eradication techniques would be used in accordance with approved Caulerpa Control Protocols.	Identify and eradicate invasive species	If detected, complete removal	Survey results and implementation	Navy	Prior to demolition activities

Resource Area	*Measure*	*Anticipated Benefit*	*Evaluating Effectiveness*	*Implementing and Monitoring*	*Responsibility*	*Estimated Completion Date*
Section 3.3: Biological Resources	The following avoidance and minimization measures would be followed during proposed pile driving activities. • Prior to the start of pile driving each day, or after a break in marine species monitoring efforts of more than 30 minutes, the Navy would not start pile driving until a visual sweep of the Bay has been completed. The visual sweep of the surrounding area would occur for at least 15 minutes prior to pile driving. • Prior to the start of pile driving, if any marine mammal(s) or green sea turtle(s) is observed approaching, or within, 66 ft (20 m) of the pile being driven, the Navy would not start pile driving activities until either the animal(s) is observed leaving the shutdown radii, or 15 minutes have passed since the last observation. • During active pile driving, if any marine mammal(s) or green sea turtle(s) is observed approaching, or within, the shutdown radii (66 ft [20 m] for marine mammals or green sea turtles), the Navy would stop pile driving activities. Pile driving could start again until either the animal(s) is observed leaving the shutdown radii, or 15 minutes have passed since the last observation. All stoppages and sightings of protected species within monitoring zones would be logged and available for submittal to the Navy. • Prior to the start of pile driving each day, or after a break in marine species monitoring efforts of more than 15 minutes, the Navy would use a soft-start procedure consisting of three unpowered blows of the hammer separated by thirty seconds. Full-powered pile driving would commence on the fourth blow after a final thirty-second wait period. • If a marine mammal or sea turtle is stuck by a project-related watercraft or piece of equipment, the Navy would immediately contact the NOAA Fisheries Stranding Coordinator, Justin Viezbicke, at (562) 980-3230. • After pile driving has stopped for the day, or if there will be a long break in-between pile driving bouts, the Navy would perform a visual sweep of the Bay. The visual sweep of the surrounding area would occur for at least 30 minutes after pile driving has stopped.	Avoidance/Minimization of impacts to marine biological resources	Minimal impact	Visual sweep	Navy and construction contractor	End of construction activities

Appendix D

Clean Water Act Compliance Documentation

San Diego Regional Water Quality Control Board

November 23, 2020

CDR. Jackson Habeck
U.S. Navy, Naval Base San Diego
Public Works
2730 McKean Street, Bldg 121
San Diego, CA 92136

In reply refer to / attn:
R9-2020-0255:869831:amonji

Subject: Completeness Review for Application Place ID No. 869831: Naval Base San Diego Pier 6 Replacement Project

Dear CDR. Habeck:

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), received your application for Water Quality Certification for the **Naval Base San Diego Pier 6 Replacement** Project (Project) on October 19, 2020 and it was assigned Place ID No. **869831**. Further information to clarify, amplify, correct, or otherwise supplement the application may be requested following receipt of this notification.

On November 12, 2020 your application was deemed incomplete due to not including dredge and sediment chemistry information for Pier 6. Furthermore, additional information regarding Best Management Practices that may be used to control turbidity and sediment resuspension was also requested.

The requested material was submitted on November 16, 2020.

Pursuant to California Code of Regulations Title 23 section 3856, your application has been deemed **complete**.

Please note that paper copies of future documents are not required. The San Diego Water Board is implementing a Paperless Office system to reduce our paper use and increase efficiency. Please convert all regulatory documents, submission, materials, and correspondence that you would normally submit to us as hard copies to a searchable Portable Document Format (PDF). Data may be submitted in Excel spreadsheets. Documents that are less than 50 MB should be emailed to sandiego@waterboards.ca.gov. Documents that are 50 MB or larger should be transferred to a disk and mailed to the following address:

California Regional Water Quality Control Board

San Diego Region
2375 Northside Drive, Ste. 100
San Diego, California 92108

If you have any questions regarding this matter, please contact the appropriate staff assigned to your program/project. If you have a specific question about large document submittal procedures, please contact the Mission Support Services Staff at (619) 516-1990.

In the subject line of any response, please include the reference number R9-2020-0255:869831:amonji. For questions or comments, please contact Alan Monji by phone at (619) 521-3968 or by email at Alan.Monji@waterboards.ca.gov.

Respectfully,

Alan Monji
Environmental Scientist

cc: Ms. Melissa Scianni
U.S. EPA, OWOW, Region 9
Scianni.melissa@epa.gov

State Water Resources Control Board
Division of Water Quality
401 Water Quality Certification and Wetlands Unit
Stateboard401@waterboards.ca.gov

Mr. Eric Becker
San Diego Water Board
Eric.Becker@waterboards.ca.gov

Ms. Kari Coler
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Mr. Robert Smith
U.S. Army Corp of Engineers
Robert.R.Smith@usace.army.mil

WDID	900003651
Reg Measure ID	440933
Place ID	869831
Party ID	540133
Person ID	606382

Appendix E

Public Participation

The San Diego Union-Tribune

PROOF OF PUBLICATION

STATE OF CALIFORNIA
County of San Diego

The Undersigned, declares under penalty of perjury under the laws of the State of California: That he/she is the resident of the County of San Diego. That he/she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that he/she is not a party to, nor interested in the above entitled matter; that he/she is Chief Clerk for the publisher of

The San Diego Union-Tribune

a newspaper of general circulation, printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instruction of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

April 3, 4, 5, 2020

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Dated in the City of San Diego, California
on this 6th of April 2020

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NOTICE OF AVAILABILITY
DRAFT ENVIRONMENTAL ASSESSMENT
PIER 6 REPLACEMENT
NAVAL BASE SAN DIEGO
SAN DIEGO, CALIFORNIA

The United States Department of the Navy (Navy) announces the availability of, and invites public comments on, the Draft Environmental Assessment (EA) for the proposed replacement of Pier 6 at Naval Base San Diego (NBSD), CA. The Navy proposes to demolish and replace Pier 6 with a new pier in the same location. The Draft EA is available for public review at https://www.cnic.navy.mil/navysouthwestprojects. The public may also request a hard copy or CD copy by sending an email to: navypier6ea@scoutenv.com. Submit comments on the Draft EA to NAVFAC SW, Attn: Pier 6 EA Project Mgr, 937 N. Harbor Drive, Building 1, 3rd Floor, San Diego, CA 92132, no later than April 20, 2020.