

**FINAL**  
**ENVIRONMENTAL ASSESSMENT**  
**for**  
**Transit Protection Program Pier and Support Facilities**  
**Naval Base Kitsap Bangor**  
**Silverdale, Washington**

**March 2023**

**Volume 1: Main Text**



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## Abstract

<b>Designation:</b>	Environmental Assessment
<b>Title of Proposed Action:</b>	Transit Protection Program Pier and Support Facilities
<b>Project Location:</b>	Naval Base Kitsap Bangor, Silverdale, Washington
<b>Lead Agency for the EA:</b>	Department of the Navy
<b>Cooperating Agency:</b>	None
<b>Affected Region:</b>	Kitsap County, Washington
<b>Action Proponent:</b>	Naval Base Kitsap
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<b>Date:</b>	March 2023

### Abstract:

Naval Base Kitsap, an installation of the United States Navy (hereinafter referred to as the Navy), has prepared this Environmental Assessment in accordance with the National Environmental Policy Act, as implemented by the Council on Environmental Quality regulations and Navy regulations implementing the National Environmental Policy Act. The Navy is proposing to construct a pier and upland support facilities for the Transit Protection Program at Naval Base Kitsap Bangor, Washington. This Environmental Assessment evaluates the potential environmental impacts associated with the two action alternatives, Alternatives 1 and 2, and the No Action Alternative to the following resource areas: Water Quality and Sediments, Biological Resources, Noise, Cultural Resources, American Indian Traditional Resources, Socioeconomics, Traffic/Transportation, and Visual Resources.

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## Executive Summary

### ES.1 Proposed Action

The United States (U.S.) Department of the Navy (Navy) proposes to construct and operate a Transit Protection Program (TPP) Pier and upland support facilities for berthing TPP blocking vessels and maintaining TPP vessels at Naval Base (NAVBASE) Kitsap, Washington. The TPP utilizes up to nine naval vessels including 250-foot blocking vessels, 87-foot coastal patrol boat/reaction vessels, 64-foot screening vessels (SV 64), and 33-foot screening vessels (SV-33). The TPP mission is to provide security escort to TRIDENT submarines along their transit route between their homeport at NAVBASE Kitsap Bangor in Hood Canal and the points where the submarines dive and surface in the Strait of Juan de Fuca. The action proponent for the Proposed Action is Naval Base Kitsap; the lead agency for this Environmental Assessment (EA) is the Navy. For the purposes of this EA, “operations” is defined as any long-term activity related to moored TPP vessels, including mooring of these vessels, and post-construction use of the proposed upland support facilities.

### ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to support the TPP mission at NAVBASE Kitsap Bangor. The Proposed Action is needed to improve long-term operational effectiveness of the TPP. There are no existing berthing and maintenance facilities available at NAVBASE Kitsap Bangor or at other Navy installations in the Hood Canal/Puget Sound region that can meet TPP mission requirements. The TPP has identified three separate and independent elements that could be pursued to improve mission support:

- Provide dedicated berthing for the 250-foot blocking vessels
- Provide a dedicated vessel maintenance facility for the smaller vessels (SV-64 and SV-33)
- Improve the fueling system for the smaller vessels (SV-64 and SV-33) berthed at K/B Dock.

The two TPP blocking vessels are currently berthed on a temporary, space-available basis at other locations along the NAVBASE Kitsap Bangor waterfront that are dedicated to other Navy missions. As a result, extensive berth shifts and days spent away from the Bangor homeport occur when no pier space is available. Travel away from homeport averages 46 round trip transits (six-hours / 240 nautical miles) to an alternate berthing location located in Port Angeles, Washington. Bangor berthing for the TPP mission is required approximately 253 days per year.

Separately, maintenance for the 33-foot and 64-foot TPP vessels is currently accomplished using three facilities intended for other purposes and seven temporary storage structures, located along Sea Lion Road near the head of the Service Pier. The TPP vessel maintenance is inefficient due to the segregated maintenance and storage facilities that are shared with other missions. The inefficiencies increase costs and negatively affect the schedules of current TPP activities.

Finally, fueling for the 33-foot and 64-foot vessels is currently accomplished through the use of a fueling barge moored at K/B Dock. Safety features onboard the fueling barge do not meet current standards. A new fueling system built to current standards would improve safety and reduce the risk of fuel spills for current and future TPP activities.

While these elements represent three separate problem sets, for which three independent solutions are proposed, each problem set needs to eventually be addressed for the broad purpose of improving TPP mission support. Therefore, and solely for purposes of administrative convenience, the Navy is analyzing these three independent actions together in a single Environmental Assessment.

### **ES.3 Alternatives Considered**

Alternatives that meet the purpose of and need for the Proposed Action were developed using the following screening factors:

- Provides adequate maneuvering space for TPP blocking vessels
- Does not impose additional underway time for TPP blocking vessel crews
- Is compatible with other Navy missions
- Meets Department of Defense (DoD) Anti-terrorism and Force Protection standards.

The Navy is considering a No Action Alternative and two action alternatives that meet the purpose of and need for the Proposed Action.

#### **ES.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur. The TPP blocking vessels would continue to be berthed on a temporary basis at piers designated for other missions. Upland maintenance of the smaller TPP vessels would continue to take place at various facilities designed for other purposes. No additional structures would be built.

As required by the National Environmental Policy Act (NEPA), the No Action Alternative is carried forward for analysis in this EA and provides a baseline for measuring the environmental consequences of the action alternatives.

#### **ES.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

Under this alternative, a pile-supported pier and a pile-supported trestle connecting the pier to the shore, would be built at Keyport/Bangor (K/B) Spit. The trestle would include a raised utilidor with a pedestrian walkway located next to a 24-foot wide roadway. The pier would be approximately 397 feet long and 69 feet wide; the trestle would be approximately 463 feet long and 39 feet wide. A fender system would be installed along the west face of the pier with two berthing camels where the blocking vessels would tie up to the pier. The camels, camel brows, and brow platforms would be constructed of grated material. Total overwater coverage would be approximately 47,587 square feet (sq ft). Thirty-two light-emitting diode (LED) dimming lighting fixtures would be mounted below the trestle in sections between the pile bents. The range of depths where the lighting would be physically placed is from 5 to 25 feet below mean lower low water. This physical placement would illuminate the area between 0 feet to 30 feet below mean lower low water. The lighting would mimic natural daylight and be controlled to vary light intensity throughout the day according to the position of the sun and resulting shading conditions.

A shoreline abutment under the pier trestle would be 99 feet 8 inches long and constructed landward of mean higher high water (MHHW). The abutment would be constructed of steel sheet piles. A total of 216 permanent steel pipe piles that are 24, 30, or 36 inches in diameter and approximately 100

temporary falsework piles would be installed. The contractor would need to construct an approximately 140-foot by-20-foot temporary work trestle (falsework piles and timber decking). Pile driving would be primarily by vibratory methods but some of the 36-inch permanent support piles may also be driven by impact methods. A security post would be installed at the main pier entrance. An approximately 1,950-foot long section of the floating port security barrier that encloses the NAVBASE Kitsap Bangor waterfront would be relocated to allow for maneuvering of construction vessels and of the TPP vessels during mooring operations.

Two 20,000-gallon diesel fuel marine tanks would be installed upland, east of Sea Lion Road, with buried fuel lines connecting the tanks to fueling facilities at the small craft floats at the K/B Dock. Other upland facilities to be installed at the site would include an asphalt parking area for approximately five vehicles, an oil-water separator within a 3,000 gallon capacity underground storage tank, one 20,000-gallon sanitary sewer underground storage tank, and a guard station. An 18,290-sq ft Vessel Maintenance Facility (VMF) would be built on a forested site along Sturgeon Street, approximately 4,500 feet south of the proposed pier site.

Total construction duration would be approximately 36 months including two in-water construction periods (July 22 through January 15). Construction is currently planned to occur from 2023 to 2025 and require a maximum of 150 pile-driving days over two in-water work periods. This would include the trestle, main pier and camels, utilities supplying the pier, the diesel fuel tanks and a fuel line to K/B Dock, re-routing the fuel lines to the new TPP Pier, and the VMF.

### **ES.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative) Potential Impacts**

This alternative would differ from Alternative 1 in that the trestle and main pier would be considerably shorter and the trestle and pier would be angled more toward the south. The trestle would be approximately 114 feet and 39 feet wide and the main pier would be 299 feet long by 69 feet wide. Two dolphins would be constructed south and north of the pier and used solely for mooring support. Access to the mooring dolphins would be provided by brows spanning from the pier deck. The dolphins would support mooring hardware for the bow and stern lines of the blocking vessels. The dolphin brows would be made of grated material. The total overwater coverage for this alternative would be approximately 26,017 sq ft, 21,570 sq ft less than under Alternative 1. A total of 124 permanent steel piles would be installed that are 24, 30, or 36 inches in diameter. There would also be 60 temporary falsework steel piles that are 36 inches in diameter. Pile-driving methods would be the same as for Alternative 1. The trestle would include a raised utilidor with a pedestrian walkway located next to a 24-foot wide roadway. The temporary work trestle, abutment wall, fenders, and camels would be as described for Alternative 1. The under-pier lighting system would be similar to that described for Alternative 1, but would consist of 83 LED dimming lighting fixtures mounted below the trestle and the pier. The upland features and construction schedule for Alternative 2 would be the same as for Alternative 1. The total number of pile-driving days would be considerably less than with Alternative 1, 90 days or less over two in-water work seasons.

## **ES.4 Summary of Environmental Resources Evaluated in the Environmental Assessment**

Council on Environmental Quality regulations, 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.

The following resources have been addressed in this EA: water quality and sediments, biological resources, noise, cultural resources, American Indian traditional resources, socioeconomics, traffic and transportation, and visual resources. The following resources were not evaluated in this EA because potential impacts were considered to be negligible or nonexistent: land use, air quality, wetlands, hazardous materials and wastes, environmental justice, utilities, and public health and safety.

The impacts of TPP vessel movements are addressed in the *Northwest Training and Testing Activities Final Environmental Impact Statement/Overseas Environmental Impact Statement* (NWTT FEIS; Navy, 2015a). This EA evaluates the impacts of building and operating the proposed TPP Pier and support facilities, and includes construction activities and operational functions such as the fueling and maintenance of vessels moored at the pier.

## **ES.5 Summary of Environmental Consequences of the Action Alternatives**

### **ES.5.1 Water Quality and Sediments**

The impacts of the two action alternatives on water quality and sediments would be similar. Impacts to upland surface water and groundwater from construction-related erosion and stormwater runoff would be minimized by implementing a construction stormwater pollution prevention plan (SWPPP) and best management practices (BMPs). Minor changes to marine resources could occur throughout the in-water construction phase of the project due to disturbances to bottom sediments from installation of pilings, repositioning of port security barrier anchors, and marine construction equipment anchor deployments. Effects on water quality conditions likely would persist for minutes to hours following disturbances, whereas changes to sediment conditions (small-scale changes in bottom bathymetry and surface sediment grain size) would persist for weeks to months. Construction-related marine water quality changes (turbidity, dissolved oxygen, and pH) would not exceed water quality criteria, occur beyond the immediate project site, or affect beneficial uses in Hood Canal.

Impacts on upland and marine water and sediment resources from long-term operations would be minimal. The project would not involve discharges of waste or other materials with the potential for impacting water or sediment quality. The impacts of potential fuel spills would be minimized through adherence to of the Commander Navy Region Northwest *Integrated Oil and Hazardous Substance Contingency Plan*. Small-scale changes in current flow patterns could result in localized scouring or accumulation of sediments in the immediate vicinity of the support piles, and lateral accretion seaward of up to ten feet along the tip of K/B Spit down-drift (east) of the proposed pier site over an estimated 10 years. Alternative 2 would have the potential for slightly more accretion than Alternative 1. The presence of the pier would result in marginal, localized changes in current velocity, but would not substantially affect sediment deposition/erosion patterns or longshore sediment transport processes within the project area. Impacts from construction and operations would not be significant.



### ES.5.2 Biological Resources

Pier construction would displace approximately 1,367 sq ft of seafloor habitat under Alternative 1 and 787 sq ft under Alternative 2, and cause turbidity that would affect vegetation and invertebrates on a temporary and localized basis. Total overwater shading would be approximately 45,686 sq ft under Alternative 1 and 26,017 sq ft under Alternative 2. Under both alternatives, the new pier and trestle would shade shallow habitat, causing some impacts to marine vegetation and invertebrates. Alternative 2 would shade considerably more shallow-water habitat (24,752 sq ft) than Alternative 1 (8,080 sq ft).

Construction of the pier would temporarily increase localized turbidity, and shade or physically disturb forage, refuge, and migration habitats used by fish, but not physically affect documented forage fish spawning habitats, the nearest of which is just over 190 feet away. Pile driving would occur over approximately 150 days during two seasons under Alternative 1, compared to 90 days during two seasons under Alternative 2. Both alternatives would produce noise above the fish injury thresholds at documented forage fish spawning habitats. In-water construction would occur during the in-water work window. Upland construction could occur at any time throughout the year.

Under both alternatives impacts to aquatic vegetation, including from 20 to 309 sq ft of eelgrass, and benthic communities would decrease habitat for fish foraging, refuge, and migration in the footprint of the pier trestle. The addition of in-water piles, overwater shade, and nighttime lighting across the juvenile migratory pathway may result in short-term delays in nearshore migration. However, an integrated under-trestle (Alternative 1) and under-pier/trestle (Alternative 2) lighting system would mimic natural daylight under these structures and minimize shading impacts to marine vegetation, benthic communities, and fish. Due to the location and alignment of the Alternative 2 pier and trestle being primarily in nearshore waters, these measures may not completely eliminate the barrier to migrating juvenile salmonids and forage fish for this alternative. No impacts to forage fish spawning habitats are expected. Underwater noise during operations would be similar to existing conditions and would not affect fish behavior, including migration.

Pile driving under both alternatives would temporarily produce noise above marine mammal behavioral and auditory injury thresholds. Monitoring and shutdown protocols during pile driving would preclude injury (in the form of auditory injury) for all marine mammals in the vicinity with the possible exception of a small number of harbor seals that may be present under existing structures along the shoreline. Under both alternatives, monitors would be able to detect marine mammals and halt pile driving as appropriate according to the protocols that would be followed. The duration of noise-related effects would be shorter under Alternative 2 than Alternative 1 (a maximum of 90 days versus 150 days).

Pile driving would temporarily produce noise above marbled murrelet behavioral thresholds within 42 meters of pile driving. Prey availability would be temporarily affected in a very localized area centered on driven piles. These effects would be similar under both project alternatives, but the duration of these effects would be shorter under Alternative 2 than Alternative 1 (a maximum of 90 days versus 150 days).

Under both alternatives, 1.1 acres of native and non-native vegetation at the pier site and fuel tanks site would be permanently disturbed by upland construction and 0.07 acre would be disturbed and revegetated following construction. Under both alternatives, 5.2 acres of native vegetation would be permanently removed at the VMF and laydown/parking sites. Terrestrial wildlife species would be temporarily exposed to disturbance due to elevated construction noise and human activity levels.

The Navy consulted with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) under Endangered Species Act (ESA) section 7, and consulted with NMFS under the Marine Mammal Protection Act and the Magnuson-Stevens Act, regarding the Preferred Alternative. The Navy submitted a Biological Assessment to NMFS on January 15, 2020, and to USFWS on January 14, 2020; an Essential Fish Habitat Assessment to NMFS on January 15, 2020; and an application for an Incidental Harassment Authorization to NMFS on January 14, 2020. The Navy concluded consultation with NMFS under the ESA and under the Magnuson-Stevens Act on April 27, 2021, and under the Marine Mammal Protection Act on October 20, 2020. The Navy concluded consultation with USFWS under the ESA on March 25, 2021, and under the Bald and Golden Eagle Protection Act on October 27, 2020. As a result of BMPs and mitigation addressed by the consultations, impacts from construction and operations would not be significant.

### **ES.5.3 Noise**

Noise-related impacts on humans would be similar under the two action alternatives. The main source of construction noise would be pile driving. Under the worst-case scenario, which would involve impact driving of 36-inch steel piles (Alternatives 1 and 2), on- and off-base residential and school areas would not experience noise above background levels of 60 A-weighted decibels. Boaters on Hood Canal would experience levels above 60 A-weighted decibels. Noise impacts from vibratory pile driving and other construction sources would be significantly less. The maximum duration of pile-driving noise would be 150 days over two in-water work seasons for Alternative 1, and 90 days over two in-water work seasons for Alternative 2.

Under both alternatives, there would be no increase in overall noise levels at the NAVBASE Kitsap Bangor waterfront. Noise associated with TPP vessel berthing would shift locations within the waterfront. There would be no off-base noise impacts. Impacts from construction and operations would not be significant.

### **ES.5.4 Cultural Resources**

The impacts of the two action alternatives on cultural resources would be very similar. There would be no historic properties affected by construction. Project elements are located in an area with “Very High Risk” of encountering archaeological materials. In the case of “inadvertent discovery” of potentially significant archaeological resources in the course of construction, the Navy would stop work in the immediate area and follow the Section 106 process of the National Historic Preservation Act for discoveries documented in the NAVBASE Kitsap Bangor Inadvertent Discovery Plan. This includes evaluating the effects to such resources through consultation with the State Historic Preservation Officer, affected American Indian tribes, and other interested parties. Operation of either alternative would not change the determination of no historic properties affected for construction. No other cultural resources would be affected by operation of the pier. In compliance with Section 106, the Navy consulted with the State Historic Preservation Officer and federally recognized tribes regarding the Proposed Action. The Navy sent a Final Finding of Effect to SHPO on June 30, 2021, with copies to the tribes. The SHPO did not respond. The Suquamish Tribe acknowledged receipt of the letter. The Jamestown S’Klallam withdrew (or rescinded) concurrence on October 3, 2022. The other tribes did not respond. Impacts from construction and operations would not be significant.

### **ES.5.5 American Indian Traditional Resources**

The tribal shellfish beach in the intertidal portions of the Devil's Hole Beach are accessed by tribes for clam and oyster harvesting. The nearest edge of the tribal shellfish beach is approximately 200 feet from the project site. Access to the tribal shellfish beach for tribal harvesters would continue during and following implementation of the Proposed Action. The in-water work window for each construction year would minimize impacts to all juvenile salmonid species. Implementation of BMPs and mitigations including the installation of under-pier/trestle lighting would also minimize impacts to juvenile salmonids. Construction and operation of diesel marine fueling storage site, fuel lines, VMF, and parking as well as associated utilities would not affect traditional resources. Impacts to protected Tribal resources could occur if forested areas are among those that are accessed by Tribes for harvesting plant materials. However, these impacts are not expected to be significant. The Navy continues to consult with federally recognized tribes, as required by DoD policy, Navy instructions, and Executive Order 13175, to reach agreement on mitigation measures to resolve impacts to tribal rights and resources. The Navy and Skokomish Tribe signed a Memorandum of Agreement for the project on March 3, 2021. Government-to-government consultation with the remaining tribes is currently ongoing. When consultations conclude, the Navy will update the NEPA documentation as appropriate. As a result of BMPs and mitigation for effects to habitat, impacts from construction and operations would not be significant. Accordingly, no significant impacts to American Indian traditional resources would occur with implementation of the Proposed Action.

### **ES.5.6 Socioeconomics**

The socioeconomic impacts of the two action alternatives would differ slightly based on differences in construction costs. Construction would take place over approximately 3 years. For Alternative 1, construction activities are expected to generate up to 501 construction jobs and an additional 195 indirect and induced jobs from the estimated \$70.6 million in construction expenditures. For Alternative 2, construction activities are expected to generate up to 373 construction jobs and an additional 145 indirect and induced jobs from the estimated \$52.6 million in construction expenditures. While some construction positions may be filled by people outside the local area, the majority would likely be filled from the local workforce and would not be associated with a permanent increase in population. Construction activities associated with this alternative would provide direct, indirect, and induced benefits from the use of local labor and supplies for the duration of construction.

During operations, there would be no personnel changes anticipated as a result of either alternative. Therefore, no impacts to population, housing, and schools would result from operation of the TPP Pier. Any annual operation and maintenance costs associated with the pier and supporting facilities would contribute directly and indirectly to the economy. Therefore, impacts from construction and operations would not be significant.

### **ES.5.7 Traffic and Transportation**

The impacts of the two action alternatives on traffic and transportation would be essentially the same. Construction traffic would not create congestion on base roadways, which are currently well below capacity. Peak-hour congestion at base gates would increase but public roadways would not be affected. For both alternatives, an average of six barge round trips (12 openings) per month would be required to support construction during the in-water work season from July 22 to January 15. Outside of this period,

an average of two barge round trips (4 openings) per month would be required. Onshore and marine traffic related to TPP vessel berthing would shift locations within the NAVBASE Kitsap Bangor waterfront; no congestion would result. Traffic elsewhere on the base and on public roadways would not be affected. Operational traffic would not differ significantly from current conditions. Therefore, impacts from construction and operations would not be significant.

#### **ES.5.8 Visual Resources**

Impacts of the two action alternatives on visual resources would be essentially the same. Construction activities would be visible from Hood Canal, but not from land areas outside of NAVBASE Kitsap Bangor. Construction activities would be compatible with the seven existing industrial pier and wharves at the waterfront. Both alternatives would add a new pier to the NAVBASE Kitsap Waterfront, which would be visually compatible with the existing industrial piers and wharves at the waterfront. The visual impacts would be minimal. Impacts from construction and operations would not be significant.

#### **ES.5.9 Public Involvement**

The Navy made the Draft EA available for a 30-day public review and comment period from December 12, 2019, through January 10, 2020, with a Notice of Availability published in the Kitsap Sun newspaper. The Draft EA was posted on the internet at <https://www.navfac.navy.mil/NWNEPA> for review and comment. The Navy received two comment letters from the Port Gamble S'Klallam Tribe. Comments contained in these letters were thoroughly analyzed and, where appropriate, changes have been incorporated into the Final EA. All substantive comments are addressed in the Finding of No Significant Impact.

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## Appendices

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- Appendix B National Historic Preservation Act Section 106 Documentation
- Appendix C Tribal Government-to-Government Documentation

## Abbreviations and Acronyms

Acronym	Definition
°C	degrees Celsius
°F	degrees Fahrenheit
ACZA	ammoniacal copper zinc arsenate
APE	area of potential effect
BA	Biological Assessment
BMP	best management practice
CAA	Clean Air Act
CCD	Coastal Consistency Determination
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFU	colony forming units
CNRNW	Commander Navy Region Northwest
CPB	coastal patrol boat
CSL	Cleanup Screening Levels
cu yd	cubic yard
CV	coefficient of variation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DAHP	Department of Archaeology and Historic Preservation
dB	decibels
dB re 1 $\mu$ Pa	decibels referenced at 1 microPascal
dBA	A-weighted decibels
DIP	demographically independent population
DO	dissolved oxygen
DoD	Department of Defense
DPS	distinct population segment
EA	Environmental Assessment
EDNA	environmental designation for noise abatement
EFH	Essential Fish Habitat
EHW-1	Explosives Handling Wharf 1
EHW-2	Explosives Handling Wharf 2
EO	Executive Order
ESA	Endangered Species Act
ESU	evolutionarily significant unit
fc	foot-candle
FEIS	Final Environmental Impact Statement
FWWG	Fisheries Hydroacoustic Working Group
FMC	Fishery Management Council
FMP	Fishery Management Plan
FR	Federal Register
HAPC	Habitat Areas of Particular Concern

Acronym	Definition
HCCC	Hood Canal Coordinating Council
HCDOP	Hood Canal Dissolved Oxygen Program
HDPE	high density polyethylene
HRA	Historical Research Associates
Hz	hertz
IHA	Incidental Harassment Authorization
ILF	In-Lieu Fee
IMPLAN	Impact Analysis for Planning
in	inch/inches
INRMP	Integrated Natural Resource Management Plan
JARPA	Joint Aquatic Resources Permit Application
K/B	Keyport/Bangor
kHz	kilohertz
km	kilometer
km <sup>2</sup>	square kilometer
L <sub>max</sub>	maximum sound level
LED	light-emitting diode
LOS	level of service
LWI	Land-Water Interface
MBTA	Migratory Bird Treaty Act
mg/L	milligram per liter
MHHW	mean higher high water
MLLW	mean lower low water
mm	millimeter
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
mph	miles per hour
MPN	most probable number
MPR	Marine Structure Maintenance and Pile Replacement Program
MS4	municipal separate storm sewer system
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSF	Magnetic Silencing Facility
MSGP	Multi-Sector General Permit
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAVBASE	Naval Base
Navy	U.S. Department of the Navy
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NKSD	North Kitsap School District
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

Acronym	Definition
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NTU	nephelometric turbidity unit
NUWC	Naval Undersea Warfare Center
NWFSC	Northwest Fisheries Science Center
NWTRC	Northwest Training Range Complex
NWTT	Northwest Testing and Training
NVPZ	Naval Vessel Protection Zone
OA	Operational Area
OEIS	Overseas Environmental Impact Statement
OPNAVINST	Chief of Naval Operations Instruction
Pa	Pascals
PCE	Primary Constituent Elements
PFMC	Pacific Fisheries Management Council
PSAT	Puget Sound Action Team
PSB	port security barrier
PTS	permanent threshold shift
PVC	polyvinyl chloride
RCW	Revised Code of Washington
Region	Navy Region Northwest
RMS	root mean square
ROD	Record of Decision
ROI	Region of Influence
ROV	remotely operated vehicle
sec	second
SECNAVINST	Secretary of the Navy Instruction
SEL	sound exposure level
SEL <sub>CUM</sub>	cumulative sound exposure level
SHPO	State Historic Preservation Office
SMS	Sediment Management Standards
SPE	Service Pier Extension
SPL	sound pressure level
sq ft	square feet/foot
SQS	Sediment Quality Standards
SR	State Route
SRKW	Southern Resident killer whale
SSBN	Fleet Ballistic Missile Submarine
SV	screening vessel
SWPPP	stormwater pollution prevention plan
TBD	to be determined
TMDL	Total Maximum Daily Load
TPP	Transit Protection Program
TTS	temporary threshold shift



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<b>Acronym</b>	<b>Definition</b>
U&A	Usual and Accustomed
U.S.	United States
USACE	U.S. Army Corps of Engineers
USBEA	U.S. Bureau of Economic Analysis
U.S.C.	United States Code
USCB	United States Census Bureau
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VMF	Vessel Maintenance Facility
WA DOH	Washington Department of Health
WAC	Washington Administrative Code
WCQ	Water Quality Certification
WDFW	Washington State Department of Fish and Wildlife
WDOE	Washington State Department of Ecology
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WQMP	water quality monitoring plan
WRA	Waterfront Restricted Area
WSDOT	Washington State Department of Transportation

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# 1 Purpose of and Need for the Proposed Action

## 1.1 Introduction

Naval Base Kitsap, a Command of the United States (U.S.) Navy (herein jointly referred to as the Navy) proposes to construct a Transit Protection Program (TPP) Pier and upland support facilities at Naval Base (NAVBASE) Kitsap Bangor (Figure 1-1). The total construction duration would be approximately 3 years, from early 2023 through 2025.

The Navy has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) (42 U.S. Code [U.S.C.] sections 4321-4370h), as implemented by the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] parts 1500-1508) and Navy regulations for implementing NEPA (32 CFR part 775).

## 1.2 Background

Security is a concern for U.S. bases and assets worldwide. The Navy continues to increase security to protect its assets and critical support facilities, including its Fleet Ballistic Missile Submarines (SSBNs) homeported at NAVBASE Kitsap Bangor. The Navy substantially increased security for in-transit SSBNs by establishing a TPP that utilizes multiple escort vessels.

The TPP mission is to provide security escort to SSBNs along their surface transit route between their homeport at NAVBASE Kitsap Bangor in Hood Canal and the points where the submarines dive and surface in the Strait of Juan de Fuca. U.S. Coast Guard (USCG) personnel or civilian mariners operate the Navy's TPP vessels. The USCG personnel are known as the Maritime Force Protection Unit. The TPP utilizes up to nine naval vessels including 250-foot blocking vessels, 87-foot coastal patrol boat/reaction vessels, 64-foot screening vessels (SV-64), and 33-foot screening vessels (SV-33).

The USCG is authorized by 14 U.S.C. section 91 to control the anchorage and movement of vessels operating near a Navy vessel. As such, the USCG has implemented provisions to establish and enforce a Naval Vessel Protection Zone (33 CFR section 165.2015) and Security Zone (33 CFR section 165.1327).

## 1.3 Location

NAVBASE Kitsap is the largest naval facility in Navy Region Northwest and includes installations in Bremerton, Bangor, and Keyport, all located within Kitsap County, Washington. The mission of NAVBASE Kitsap is to serve as the host command for the fleet throughout the West Puget Sound region and to provide installation operating services, including support for surface ships and submarines homeported at NAVBASE Kitsap Bremerton and NAVBASE Kitsap Bangor. NAVBASE Kitsap Bangor is located along Hood Canal (Figure 1-1), approximately 20 miles west of Seattle. The installation encompasses approximately 7,000 acres including developed lands (military, industrial, residential, commercial, and recreational uses), forested lands, and brush and shrub lands, with 4.5 miles of waterfront along the eastern shoreline of Hood Canal.

There are two areas in which vessel traffic is restricted along the Bangor waterfront: Naval Restricted Areas 1 and 2 (Title 33 of the CFR, section 334.1220 [33 CFR section 334.1220]) (Figure 1-2). Naval Restricted Area 1 covers the area to the north and south along Hood Canal encompassing the Bangor

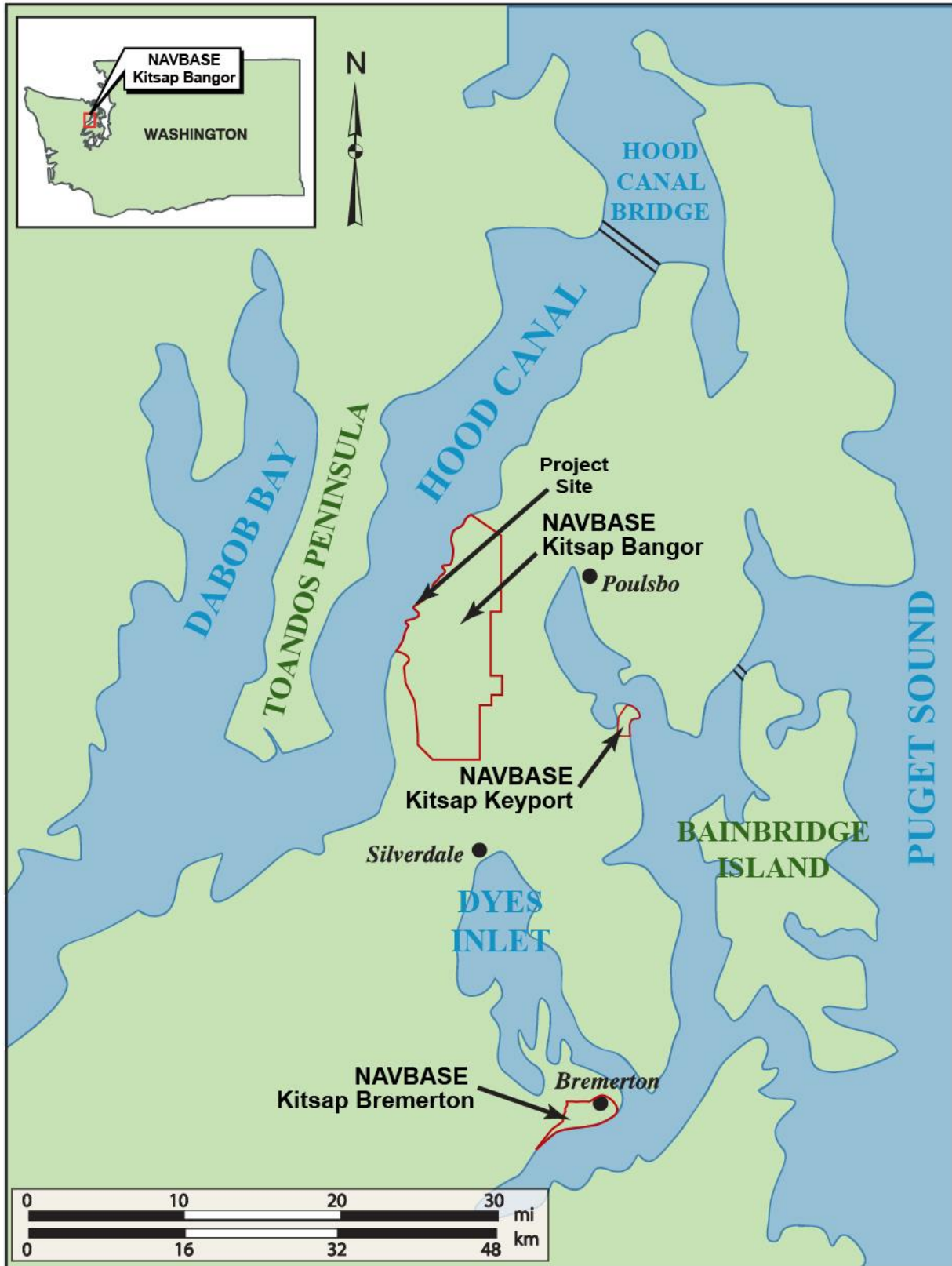


Figure 1-1. Vicinity Map

waterfront, including the proposed TPP Pier project site. Naval Restricted Area 2 encompasses the waters of Hood Canal within a circle of 3,000 feet in diameter centered at the north end of NAVBASE Kitsap Bangor and partially overlapping Naval Restricted Area 1. No person or vessel is allowed to enter these areas without permission of the Commanding Officer, NAVBASE Kitsap, or his authorized representative. Within the Naval Restricted Areas, floating port security barriers provide a physical barrier to prevent unauthorized access to the NAVBASE Kitsap Bangor waterfront from Hood Canal (shown in blue on Figure 1-2).

#### **1.4 Purpose of and Need for the Proposed Action**

The purpose of the Proposed Action is to support the TPP mission at NAVBASE Kitsap Bangor. The Proposed Action is needed to improve long-term operational effectiveness of the TPP. There are no existing berthing and maintenance facilities available at NAVBASE Kitsap Bangor or at other Navy installations in the Hood Canal/Puget Sound region that can meet TPP mission requirements. The TPP has identified three separate and independent elements that could be pursued to improve mission support:

- Provide dedicated berthing for the 250-foot blocking vessels
- Provide a dedicated vessel maintenance facility for the smaller vessels (SV-64 and SV-33)
- Improve the fueling system for the smaller vessels (SV-64 and SV-33) berthed at K/B Dock

The two TPP blocking vessels are currently berthed on a temporary, space-available basis at other locations along the NAVBASE Kitsap Bangor waterfront that are dedicated to other Navy missions. As a result, extensive berth shifts and unnecessary days spent away from homeport occur when no pier space is available. Travel away from homeport averages 46 round trip transits (six-hours / 240 nautical miles) to an alternate berthing location located in Port Angeles, Washington. Bangor berthing for the TPP mission is required approximately 253 days per year.

Separately, maintenance for the 33-foot and 64-foot TPP vessels is currently accomplished using three facilities intended for other purposes and seven temporary storage structures, located along Sea Lion Road near the head of the Service Pier. The TPP vessel maintenance is inefficient due to the segregated maintenance and storage facilities that are shared with other missions. The inefficiencies increase costs and negatively affect the schedules of current TPP activities.

Finally, fueling for the 33-foot and 64-foot vessels is currently accomplished through the use of a fueling barge moored at K/B Dock. Safety features onboard the fueling barge do not meet current standards. A new fueling system built to current standards would improve safety and reduce the risk of fuel spills for current and future TPP activities.

While these elements represent three separate problem sets, for which three independent solutions are proposed, each problem set needs to eventually be addressed for the broad purpose of improving TPP mission support. Therefore, and solely for purposes of administrative convenience, the Navy is analyzing these three independent actions together in a single EA.



Figure 1-2. NAVBASE Kitsap Bangor Restricted Areas



## 1.5 Scope of Environmental Analysis

This EA includes an analysis of potential environmental impacts associated with the action alternatives and the No Action Alternative. The environmental analysis presented in this EA focuses on the specific environmental resources and topics that could reasonably be affected by the Proposed Action. Only those resources with a potential for impacts under the Proposed Action are analyzed in this EA, including the following: water quality and sediments, biological resources, noise, cultural resources, American Indian traditional resources, socioeconomics, traffic and transportation, and visual resources. The study area for the resources analyzed may differ based on how the Proposed Action interacts with or impacts each resource. For instance, the study area for vegetation includes only the construction footprint, whereas the noise study area expands outward to include areas that include receptors of airborne noise.

This EA evaluates the impacts of building and operating the proposed TPP Pier and support facilities, and includes construction activities and operational and support functions such as the fueling and maintenance of vessel activities that support the TPP mission. For the purposes of this EA, the term “operations” is defined as any long-term activity related to the moored TPP vessels, and use of the proposed upland support facilities after project construction is completed.

## 1.6 Key Documents

Key documents are sources of information incorporated by reference into this EA. Documents are considered to be key because of similar actions, analyses, or impacts that may apply to this Proposed Action. CEQ guidance encourages incorporating documents by reference to improve the conciseness of NEPA documents.

- Cultural Resources Record Search for the Transit Protection Program Pier and Support Facilities, Naval Base Kitsap Bangor, Silverdale, Washington (Historical Research Associates [HRA], 2017). This report focused on background and archival research to identify any archaeological resources within the Proposed Action’s area of potential effects.
- Naval Base Kitsap Bangor TPP Pier Sediment Transport Study – Final (Environmental Science Associates, 2019). This study evaluated the potential changes in littoral sediment transport resulting from the proposed alternatives.
- Eelgrass Survey Report (Transit Protection System Project resource survey) (Navy, 2016a). This report documents the eelgrass survey that was conducted for the Proposed Action in 2015.
- Eelgrass Survey Report (Transit Protection Program Project resource survey) (Navy, 2019a). This report documents the eelgrass survey that was conducted for the Proposed Action in 2019.
- Macroalgae Survey Report (Transit Protection Program Project resource survey) (Marx et al., 2019). This report documents the macroalgae survey that was conducted for the Proposed Action in 2019.

## 1.7 Relevant Laws and Regulations

The Navy has prepared this EA based on federal and state laws, statutes, regulations, and policies that are pertinent to 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 CFR parts 1500–1508)
- Navy regulations for implementing NEPA (32 CFR part 775), which provide Navy policy for implementing CEQ regulations and NEPA
- Clean Air Act (42 U.S.C. section 7401 et seq.)
- Clean Water Act (33 U.S.C. section 1251 et seq.)
- Coastal Zone Management Act (16 U.S.C. section 1451 et seq.)
- Rivers and Harbors Act (33 U.S.C. section 403)
- National Historic Preservation Act (54 U.S.C. section 306108 et seq.)
- Endangered Species Act (16 U.S.C. section 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 U.S.C. section 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. section 1361 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. sections 703–712)
- Bald and Golden Eagle Protection Act (16 U.S.C. section 668–668d)
- 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 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis

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, is presented in Chapter 5 of this EA.

## **1.8 Public and Agency Participation and Intergovernmental Coordination**

CEQ regulations (40 CFR section 1506.6) direct agencies to involve the public in preparing and implementing NEPA procedures. The Navy made the Draft EA available for public review and comment with a Notice of Availability published for three consecutive days in the Kitsap Sun newspaper for a 30-day review period. The Draft EA was posted on December 12, 2019, on the Naval Facilities Engineering Systems Command website at <https://www.navfac.navy.mil/NWNEPA>. Paper copies of the Draft EA were made available to the public at the Poulsbo and Silverdale, Washington branches of the



Kitsap Regional Library. The Navy received two comment letters from the Port Gamble S'Klallam Tribe. Comments included concerns related to environmental and cultural impacts beyond those identified in the scope of the EA; impacts to tribal shellfish harvest; consideration for other alternatives and locations; and cumulative impacts to water quality. These comments were thoroughly analyzed, and where appropriate, changes have been incorporated in the Final EA. The Navy continues to engage the affected Tribes through the NEPA process. All substantive comments are addressed in the Finding of No Significant Impact.

The Navy consulted with the National Marine Fisheries Service (NMFS) on fish and marine mammal species listed under section 7 of the Endangered Species Act. The Navy submitted a Biological Assessment to NMFS on January 15, 2020, and completed consultation on April 27, 2021. The Navy requested an Incidental Harassment Authorization from NMFS for incidental take of marine mammals, based on likely exposure of marine mammals to elevated noise levels during construction of the Proposed Action. The Incidental Harassment Authorization was submitted on January 14, 2020, and NMFS published a Final Rule in the Federal Register on October 28, 2020.

The Navy consulted with the U.S. Fish and Wildlife Service (USFWS) on bull trout and the marbled murrelet listed under section 7 of the Endangered Species Act. The Navy submitted a Biological Assessment to USFWS on January 14, 2020, and completed consultation on March 25, 2021. The Navy also consulted with USFWS under the Bald and Golden Eagle Protection Act and requested a permit on August 27, 2020. USFWS issued the permit on October 27, 2020.

A Coastal Consistency Determination was submitted to the Washington State Department of Ecology on June 8, 2020. Ecology issued a conditional concurrence on April 5, 2021, with the following conditions: (1) that the Navy submit a final In-Lieu Fee Use Plan with demonstration of credits purchased for review and concurrence at least 30 days prior to the start of in-water work, and (2) that NAVBASE Kitsap Bangor obtain a Section 401 Water Quality Certification decision from the Department of Ecology prior to conducting any work at the site. Through the Joint Aquatic Resources Permit Application process, the Navy applied for a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, and for a Clean Water Act Section 401 Water Quality Certification from the Washington State Department of Ecology.

The Navy consulted with the Washington State Historic Preservation Officer under the National Historic Preservation Act. Navy consultations with the State Historic Preservation Officer (SHPO) were completed on July 30, 2021. The Navy also consulted with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes under the National Historic Preservation Act. Details are provided in Section 3.4.

The Navy engaged in government-to-government consultation with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes. The Skokomish Tribe has primary adjudicated usual and accustomed treaty rights in the project area and the Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes have secondary rights. The Skokomish Tribe signed a memorandum of agreement for the project on March 3, 2021. Consultation with the other Tribes is ongoing. Additional details are presented in Section 3.5.

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## 2 Proposed Action and Alternatives

This chapter describes the Proposed Action and alternatives evaluated to build and operate the Transit Protection Program (TPP) Pier and support facilities at Naval Base (NAVBASE) Kitsap Bangor, Washington. The U.S. Department of the Navy (Navy) identified a range of alternatives to meet the Proposed Action's purpose and need (Chapter 1). After applying screening factors detailed below, the Navy selected two action alternatives for detailed analysis in the Environmental Assessment (EA), along with the No Action Alternative. This chapter addresses these three alternatives, as well as alternatives considered but not carried forward for detailed analysis in the EA.

### 2.1 Proposed Action

The Navy proposes to build a pier and support facilities for berthing TPP blocking vessels and maintaining TPP vessels, which provide security escort to Fleet Ballistic Missile Submarines between NAVBASE Kitsap Bangor and the surface and dive points in the Strait of Juan de Fuca. The TPP vessels are currently berthed on a temporary, space-available basis at various locations at NAVBASE Kitsap Bangor. The Proposed Action would construct a new pier for berthing two 250-foot blocking vessels. The other TPP vessels would continue to be berthed at the TPP floats connected to the Keyport/Bangor (K/B) Dock.

Upland support facilities would include a Vessel Maintenance Facility (VMF) for servicing the 64-foot and 33-foot screening vessels. This function is currently executed using three facilities intended for other purposes and seven temporary storage structures, located along Sea Lion Road near the head of the Service Pier. New upland facilities would also include a guard station installed at the main pier entrance, two 20,000-gallon diesel fuel marine tanks, a diesel fuel marine distribution system, one 20,000-gallon sanitary sewer underground storage tank (UST), and an oil-water separator within a 3,000-gallon capacity UST. At present, a fueling barge moored at K/B Dock supplies fuel to the smaller screening vessels. Under either action alternative, the Proposed Action would deactivate and decommission the fueling barge as well as two of these tanks after the new fueling system is commissioned and fully activated.

The proposed location of the TPP Pier is the K/B Spit on the NAVBASE Kitsap Bangor waterfront (Figure 2-1). Operation and maintenance of the pier would include fueling, utilities (power, potable water, and sanitary and oily waste), and periodic cleaning of pier structures.

### 2.2 Screening Factors

The National Environmental Policy Act's (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 that meet the purpose and need require detailed analysis. The alternatives undergoing detailed analysis were determined reasonable during the draft EA process.

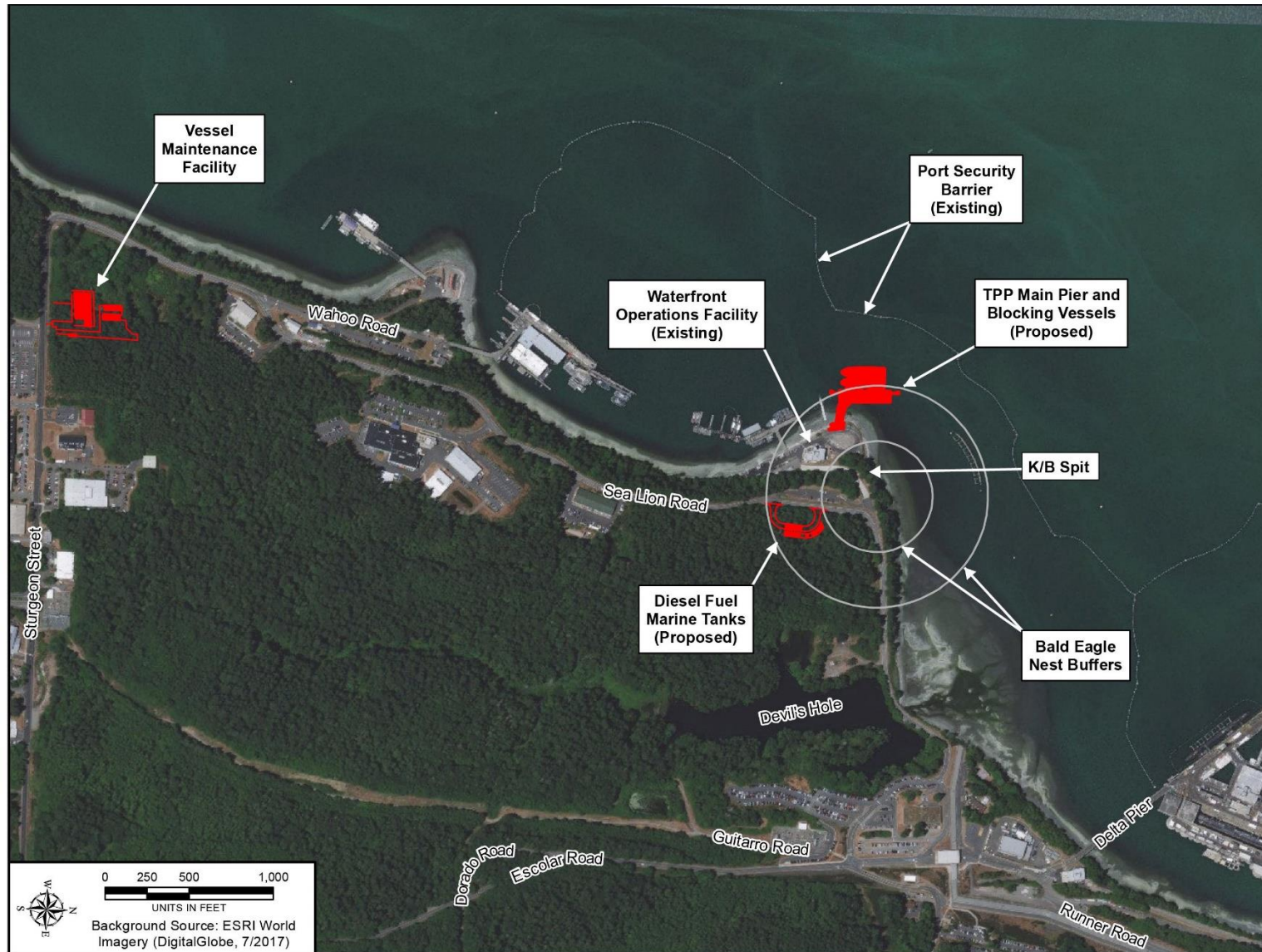


Figure 2-1. Location of Key Project Components

Potential alternatives that meet the purpose and need were evaluated against the following screening factors:

- New pier provides adequate maneuvering space for TPP blocking vessels
- Does not impose additional underway time for TPP blocking vessel crews
- Is compatible with other Navy missions
- Meets Department of Defense (DoD) Anti-terrorism and Force Protection standards

## **2.3 Alternatives Carried Forward for Analysis**

The Navy has determined that two action alternatives meet the Purpose and Need and the screening factors. These two action alternatives, in addition to the No Action Alternative as required by NEPA, are carried forward for detailed analysis in the EA. These alternatives are described in the following sections.

### **2.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur. The TPP blocking vessels would continue to be berthed on a temporary basis at piers designated for other missions. Upland maintenance of the smaller TPP vessels would continue to take place at various facilities designed for other purposes. No new structures would be built.

As required by NEPA, the No Action Alternative is carried forward for analysis in this EA and provides a baseline for measuring the environmental consequences of the action alternatives.

### **2.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility**

#### **2.3.2.1 Pier Features**

Alternative 1 would include an L-shaped pile-supported trestle from the shore connecting to a pile-supported main pier section (Figure 2-2). The trestle would be concrete and approximately 463 feet long and 39 feet wide, including a pedestrian walkway. The trestle would include a raised utilidor with a pedestrian walkway located next to a 24-foot wide roadway. The main pier section would also be concrete and approximately 397 feet long and 69 feet wide. The trestle and pier would need to support vehicles including a mobile crane and emergency vehicles including fire department vehicles. Therefore, these structures would require concrete surfaces rather than grated surfaces. A fender system would be installed along the west face of the pier with two berthing camels where the blocking vessels would tie up to the pier. Each camel would be approximately 65 feet long by 12 feet wide and constructed of grated material. The camels would serve as both a standoff for the blocking vessels and a platform for boarding the blocking vessels. The camels would be accessed via brows down from the main pier deck. The brow platforms and brows would also be constructed of grated material. A shoreline abutment under the pier trestle would be approximately 99 feet 8 inches long and constructed landward of mean higher high water (MHHW). The abutment would be constructed of steel sheet piles.



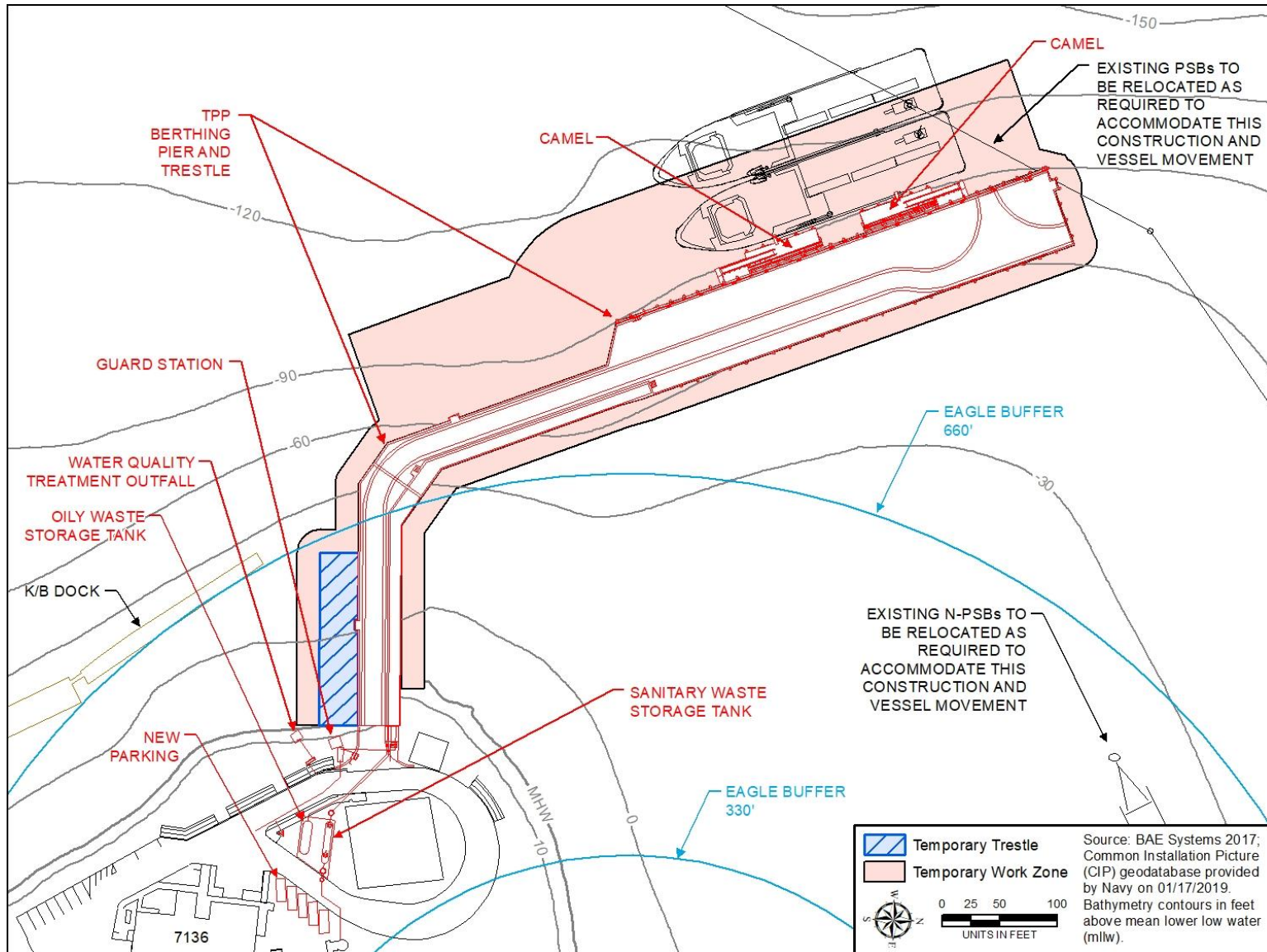


Figure 2-2. Alternative 1 Pier Components

Thirty-two light-emitting diode (LED) dimming lighting fixtures would be mounted below the trestle in sections between the pile bents. The range of depths where the lighting would be physically placed would be from 5 to 25 feet below mean lower low water (MLLW). This physical placement would illuminate the area between 0 to 30 feet below MLLW. The lighting would mimic natural daylight and be controlled to vary light intensity throughout the day according to the position of the sun and resulting shading conditions. No lighting would be installed under the pier because the majority of the pier would be located in deep water.

The trestle and pier would require a total of approximately 216 permanent steel piles that are 24, 30, or 36 inches in diameter and approximately 100 temporary steel falsework piles that are 36 inches in diameter (Table 2-1). Of these piles, approximately four 36-inch trestle support piles and twenty 36-inch falsework piles would be located above MHHW. The contractor would need to construct an approximately 140-foot by-20-foot temporary work trestle (falsework piles and timber decking). The permanent trestle piles in the intertidal area would be driven from the deck of the temporary work trestle; the temporary trestle would subsequently be removed. The fender piles and camels would be installed on the outer (west) side of the pier to protect it from accidental damage by vessels. Piles, including all fender and falsework piles, primarily would be driven using vibratory methods. An impact hammer would be used to “proof” pier and trestle piles to ensure that they provide the required load-bearing capacity.

Where geotechnical conditions do not allow piles to be driven to the required depth using vibratory methods, an impact hammer may be used to drive some of the 36-inch support piles for part or all of their length. The 24-inch fender piles and 30-inch guide piles would not be impact driven. Pile driving is expected to take place during no more than 150 days over two in-water work seasons (July 22 through January 15). No more than one impact driver and one vibratory driver would operate at the same time. Under expected conditions, the number of impact hammer strikes per day would not exceed 1,600. A total of approximately 1,367 square feet (sq ft) of seafloor would be occupied by all permanent piles combined; of this total, approximately 177 sq ft would be shallower than 30 feet below MLLW. In addition, there would be approximately 565 sq ft of seafloor occupied by the temporary falsework piles (Table 2-1).

The above structures would create a total of approximately 47,587 sq ft of overwater coverage; of this total, approximately 8,080 sq ft would be shallower than 30 feet below MLLW. Approximately 1,901 sq ft would be grated. The elevation of the bottom of the trestle and pier would be 3.5 feet above MHHW; the elevation of the top of the trestle and pier would be 9 feet above MHHW. Stormwater from the pier and trestle would be directed to treatment cartridges in compliance with a General Use Level Designation from the Washington State Department of Ecology prior to discharge of the water to Hood Canal.

The trestle would have six 30-foot high light standards, and the pier would have five 50-foot high light standards. All of the lights would be LED type lights for which illumination levels at the surface would not exceed 30 foot-candles (fc) at 30 feet, 10 fc at 50 feet, and 5 fc at 100 feet.

The new pier would require relocation of a section of the floating port security barrier (PSB) that encloses the NAVBASE Kitsap Bangor waterfront, to allow for maneuvering of construction vessels and of the TPP vessels during mooring operations. The relocated section would be approximately 1,950 feet long and would include relocation of three buoys and associated anchors.

**Table 2-1. Features of the Action Alternatives for the Transit Protection Program Pier and Support Facilities**

<i>TPP Facility Feature</i>	<i>Alternative 1: Extended Pier and VMF</i>	<i>Alternative 2: Shortened Pier and VMF (Preferred)</i>
Length and width of trestle	463 feet long by 39 feet wide	114 feet long by 39 feet wide
Length and width of pier	397 feet long by 69 feet wide	299 feet long by 69 feet wide
Mooring dolphin dimensions	N/A	Two 12-by-12-foot concrete caps
Mooring dolphin brow dimensions	N/A	Two dolphin brows, each 43 feet long by 6 feet wide
Camel dimensions (grated material, 80 percent light transmittance)	Two camels each 65 feet long by 12 feet wide	Same as Alternative 1
Camel brow dimensions (grated material, 60 percent light transmittance)	Two brow access platforms each 14 feet long by 5 feet 6 inches wide Two brows each 50 feet long by 5 feet 6 inches wide	Same as Alternative 1
Number of 24-inch steel pipe piles	Fender piles: 28	Fender piles: 10
Number of 30-inch steel pipe piles	Guide piles: 10	Guide piles: 10
Number of 36-inch steel pipe piles	Pier deck and trestle support piles: 178 (4 would be above MHHW) Falsework piles: 100 (20 would be above MHHW)	Pier deck, trestle support, and dolphin piles: 104 (4 would be above MHHW) Falsework piles: 60 (4 would be above MHHW)
Elevation of the trestle and pier	Bottom: 3.5 feet above MHHW Top: 9 feet above MHHW	Trestle Bottom: 4 feet 9 inches above MHHW Trestle Top: 17 feet (highest); 12 feet 10 inches (lowest) Pier Top: 9 feet 8 inches above MHHW (highest); 9 feet 5 inches above MHHW (lowest) – pier deck slopes to drain Pier Bottom: 4 feet 2 inches (highest) and 1 foot 1 inch (lowest)
Total area displaced by piles (permanent) <sup>1</sup>	1,367 sq ft (177 sq ft shallower than 30 feet below MLLW)	787 sq ft (760 sq ft shallower than 30 feet below MLLW)
Total area displaced by piles (temporary) <sup>1</sup>	565 sq ft (424 sq ft shallower than 30 feet below MLLW)	283 sq ft (141 sq ft shallower than 30 feet below MLLW)



**Table 2-1. Features of the Action Alternatives for the Transit Protection Program Pier and Support Facilities (continued)**

<i>TPP Facility Feature</i>	<i>Alternative 1: Extended Pier and VMF</i>	<i>Alternative 2: Shortened Pier and VMF (Preferred)</i>
Total volume of in-water fill (concrete pile caps, permanent)	1.75 cu yd	1.75 cu yd
Total overwater area	47,587 sq ft (8,080 sq ft of this total would be shallower than 30 feet below MLLW; 1,901 sq ft would be grated material)	26,017 sq ft (24,752 sq ft of this total would be shallower than 30 feet below MLLW; 2,506 sq ft would be grated material)
Shoreline abutment	Sheet pile, 99 feet 8 inches long, landward of MHHW	Same as Alternative 1
Upland excavation volume at the pier site	5,400 cu yd	Same as Alternative 1
Upland fill volume at the pier site	1,200 cu yd	Same as Alternative 1
Area disturbed for VMF and laydown/parking area	5.2 acres, permanent	Same as Alternative 1
VMF new impervious surface	3 acres	Same as Alternative 1
Excavation volume for VMF	2,200 cu yd	Same as Alternative 1
Fill volume for VMF	990 cu yd	Same as Alternative 1
Other new facilities	Diesel (two 20,000-gallon tanks), oil-water separator (3,000-gallon tank), sanitary sewer (20,000-gallon tank), guard station	Same as Alternative 1
Upland area disturbed by construction at pier site, including fuel tanks (maximum)	Permanent: 1.1 acre Temporary: 0.07 acre	Same as Alternative 1
Overall construction duration	Total of 36 months, including 16 months for upland construction	Total of 32 months, including 16 months for upland construction
Duration of in-water work	Two in-water work seasons with maximum of 150 pile-driving days in the first and second seasons combined	Two in-water work seasons with a maximum of 90 pile-driving days in the first and second seasons combined

**Key:** cu yd = cubic yard; MHHW = mean higher high water; MLLW = mean lower low water; N/A = not applicable; sq ft = square feet; TPP = Transit Protection Program; VMF = Vessel Maintenance Facility

**Note:** 1. Does not include upland piles.

### 2.3.2.2 Utilities and Upland Features

Potable water, power, and communication lines would be provided to the berthing areas on the pier. All utility lines would be contained in utility trenches built into the concrete trestle and pier decks. Connections for removal of sanitary sewer and oily waste from the blocking vessels would be constructed on the pier. Lines would convey the sanitary sewer and oily waste to below-deck holding tanks on the pier and then would be pumped ashore via separate double-contained lines to separate holding tanks on shore (Figure 2-2). Two 20,000-gallon diesel tanks would be installed on shore. The upland tanks would replace an on-water temporary fueling barge that is currently used to fuel small crafts at K/B Dock. The onshore fuel tanks would provide improved safety for fueling operations. Fuel would be pumped to fueling facilities at the small craft floats at the K/B Dock through double-contained, insulated lines with leak and fire detection and alarm systems. The diesel tanks would be below ground and a fueling access point would be built on the east side of Sea Lion Road (Figure 2-3). The facility would include a full loop road for tanker trucks to pull entirely off of Sea Lion Road. The diesel fuel line would be installed in a trench running downhill across Sea Lion Road and aligned beneath Shore Boundary Road. All fuel tanks would be enclosed in double-walled secondary containment structures with a capacity of 110 percent of the tank volume.

Other upland facilities to be installed at the site would include an asphalt parking area for approximately five vehicles, an oil-water separator within a 3,000-gallon capacity UST, one 20,000-gallon sanitary sewer UST, and a guard station (Figure 2-2). A 38-foot long roadway would be installed to connect the trestle to the existing roadway. Construction of upland facilities would result in total surface disturbance of 33,250 sq ft. Of this total, 25,600 sq ft would be located in disturbed areas that do not support native vegetation and 7,650 sq ft would be located in a currently vegetated area. Construction of the diesel fuel tanks and fueling access point on the east side of Sea Lion Road would require clearing 15,960 sq ft of forested area. Of this total, 2,871 sq ft would be occupied by the new tanks and fueling access point, 9,889 sq ft would be occupied by a stormwater infiltration pond, and 3,200 sq ft would be revegetated with native forest species. A total of 3,650 sq ft of new impervious surface would be created to support resupplying the tanks with fuel. Stormwater from all impervious surfaces would be routed to an oil-water separator and then to a surface water treatment system. Long-term lighting at the upland site would be provided by high-mast LED pole lights to provide uniform foot-candle illumination.

Upland construction at the pier site would require a maximum of 5,400 cubic yards (cu yd) of excavation and 1,200 cu yd of fill, including 50 cu yd of fill behind the abutment and 1,150 cu yd for the sanitary sewer and oil-water separator systems.

### 2.3.2.3 Vessel Maintenance Facilities

The location for the VMF site and project laydown/parking area would be a 500-by-500-foot (5.7-acre) site located on Sturgeon Street (Figure 2-4). This entire site would be cleared of native vegetation, except for 0.5 acre that was previously cleared. The VMF would occupy 18,290 sq ft, including a 1,725 sq ft detached wash rack area, and an adjacent storage area would occupy 2,450 sq ft (total of 0.49 acre). Paving would occupy an additional approximately 2.5 acres, resulting in new impervious surface of approximately 3 acres. An additional approximately 5,000 sq ft (0.11 acre) would be occupied by bio-retention cells associated with the VMF. The total VMF site size would be approximately 3.1 acres. The project laydown and parking area would occupy the remaining approximately 2.6 acres of the site. This area would be cleared of vegetation and covered in gravel. After TPP construction, this site would be left in gravel for use on future projects. The VMF and laydown sites are moderately sloped and construction would require soil excavation and fill to provide adequate flat space: a maximum of 2,200 cu yd of excavation and 990 cu yd of fill. The VMF would include utilities for maintaining and cleaning small (trailerable) boats, including water lines, floor drains with appropriate runoff treatment, and electrical service.

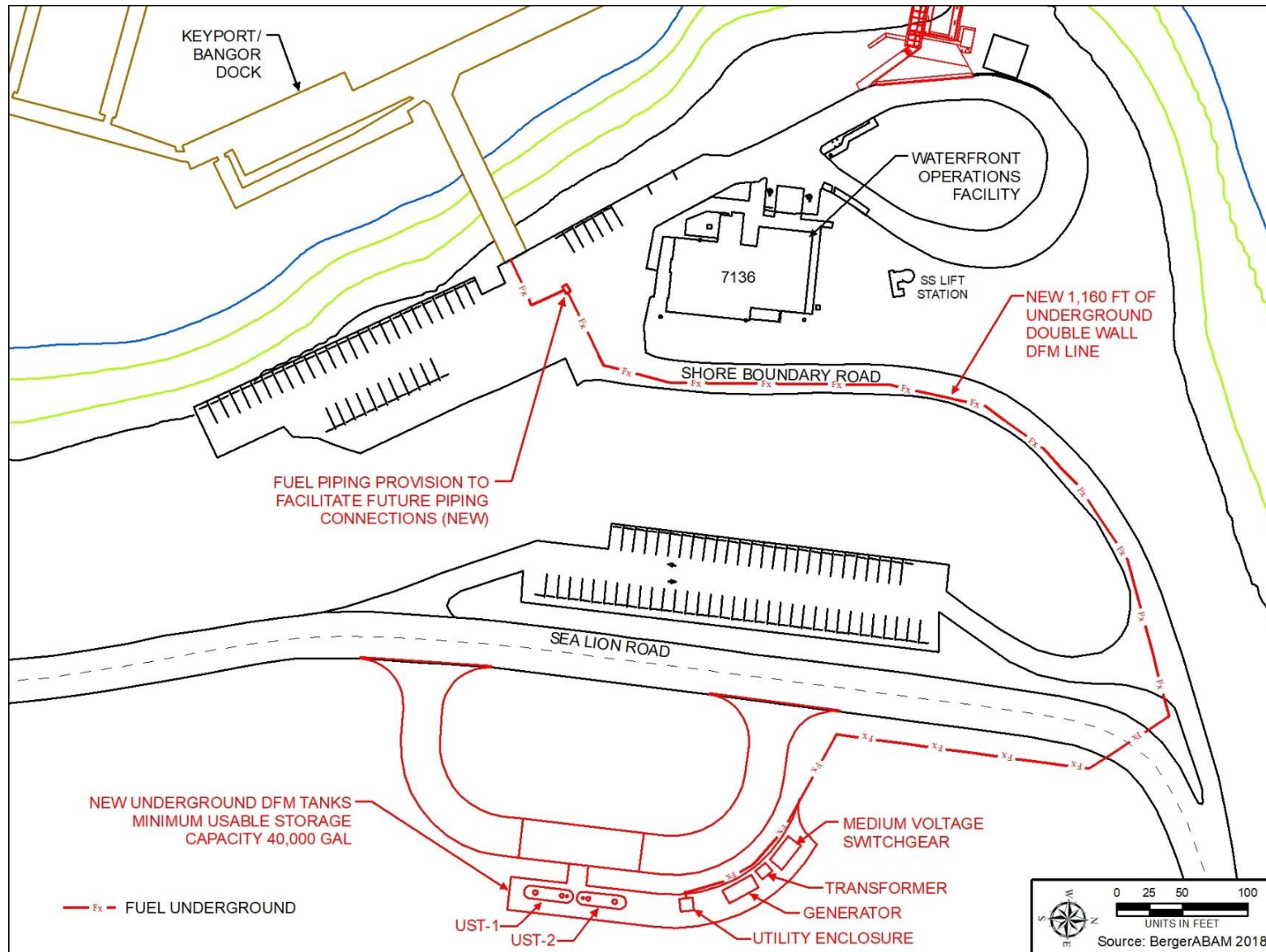


Figure 2-3. Diesel Marine Fuel System

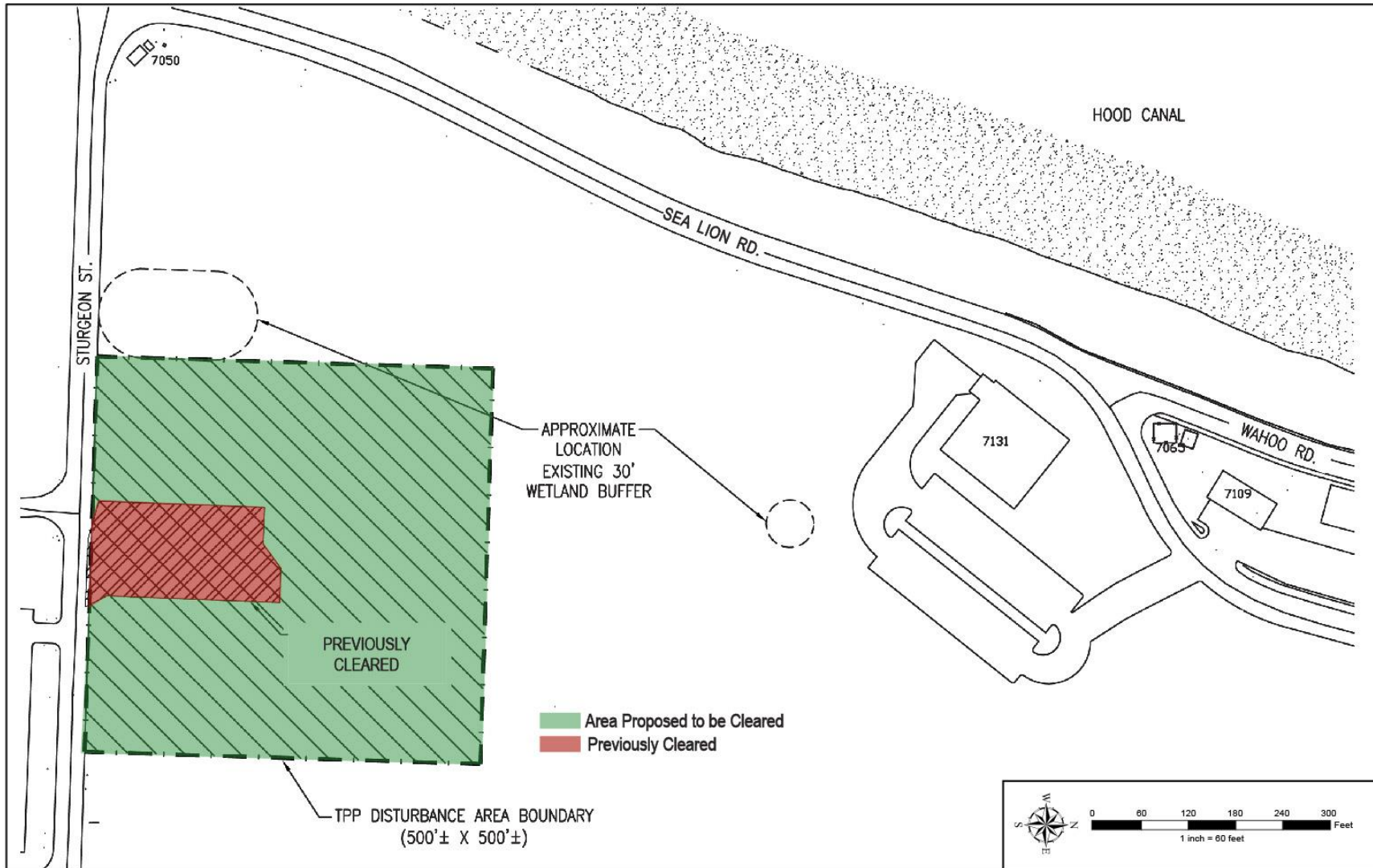


Figure 2-4. Site of Vessel Maintenance Facility and Laydown/Parking Area

#### 2.3.2.4 Construction Schedule

Total construction time is estimated at 36 months including two in-water construction periods (July 22 through January 15). Construction would occur from 2023 to 2025 and require a maximum of 150 in-water pile-driving days over two in-water work periods. This would include the trestle, main pier and camels, utilities supplying the pier, the diesel fuel tanks and a fuel line to K/B Dock, re-routing the fuel lines to the new TPP Pier, and the VMF. Upland construction would last approximately 16 months. For upland construction, the following equipment would be needed: dump trucks, bulldozers, front-end loaders, cranes, drill rigs, concrete saws, jackhammers, and other typical equipment. The total number of construction workers for both the upland and in-water constructions is estimated to range between 50 during peak construction periods to 10 during lulls in construction activity.

Proposed in-water construction activities would require use of marine-based construction equipment (e.g., derrick/supply barges and cranes, barge-mounted pile-driving equipment, and tugboats) to support construction of the access trestle and pier and transport of materials to and from the project site. Construction materials (including piles, concrete panels, and structural materials) would remain on barges until used for construction. Pier and trestle construction would require one derrick barge with a crane and one support/material barge. An average of six barge round trips (12 openings) per month would be required to support construction during the in-water work season from July 22 to January 15. Outside of this period, an average of two barge round trips (4 openings) per month would be required. It is anticipated that up to two construction barges, each up to 200 feet long and 70 feet wide, would be moored at the construction site for the entire project duration, including during times when the in-water work window is closed. Any support boat or barge used during in-water construction activities would be located within the immediate construction zone and in areas away from non-Navy navigational activities.

#### 2.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative)

Alternative 2 would differ from Alternative 1 in that the trestle and main pier sections would be considerably shorter (Figure 2-5) and the trestle and pier would be angled more toward the south. The trestle would be approximately 114 feet long by 39 feet wide and the main pier would be 299 feet long by 69 feet (Table 2-1). The trestle would include a raised utilidor with a pedestrian walkway located next to a 24-foot wide roadway. The abutment wall, fenders, and camels would be as described for Alternative 1. The under-pier lighting system would be similar to that described for Alternative 1 but would consist of 83 LED dimming lighting fixtures mounted below the trestle and the pier.

Two dolphins would be constructed south and north of the pier and used solely for mooring support. The dolphins would support mooring hardware for the bow and stern lines of the blocking vessels. The dolphins would be centered approximately 46 feet off the ends of the pier and approximately 11 feet landward of the front face of the pier. Access to the mooring dolphins would be provided by 43-foot long by 6-foot wide brows spanning from the pier deck. The dolphin brows would be made of grated material. The structural system for the mooring dolphins would consist of a 12- by 12-foot cast-in-place concrete pile cap and four 36-inch battered steel pipe piles. Total overwater coverage would be much less than for Alternative 1 (26,017 sq ft versus 47,587 sq ft for Alternative 1). Approximately 2,506 sq ft would be grated. Most (24,752 sq ft) of the overwater coverage in Alternative 2 would be in waters shallower than 30 feet below MLLW.



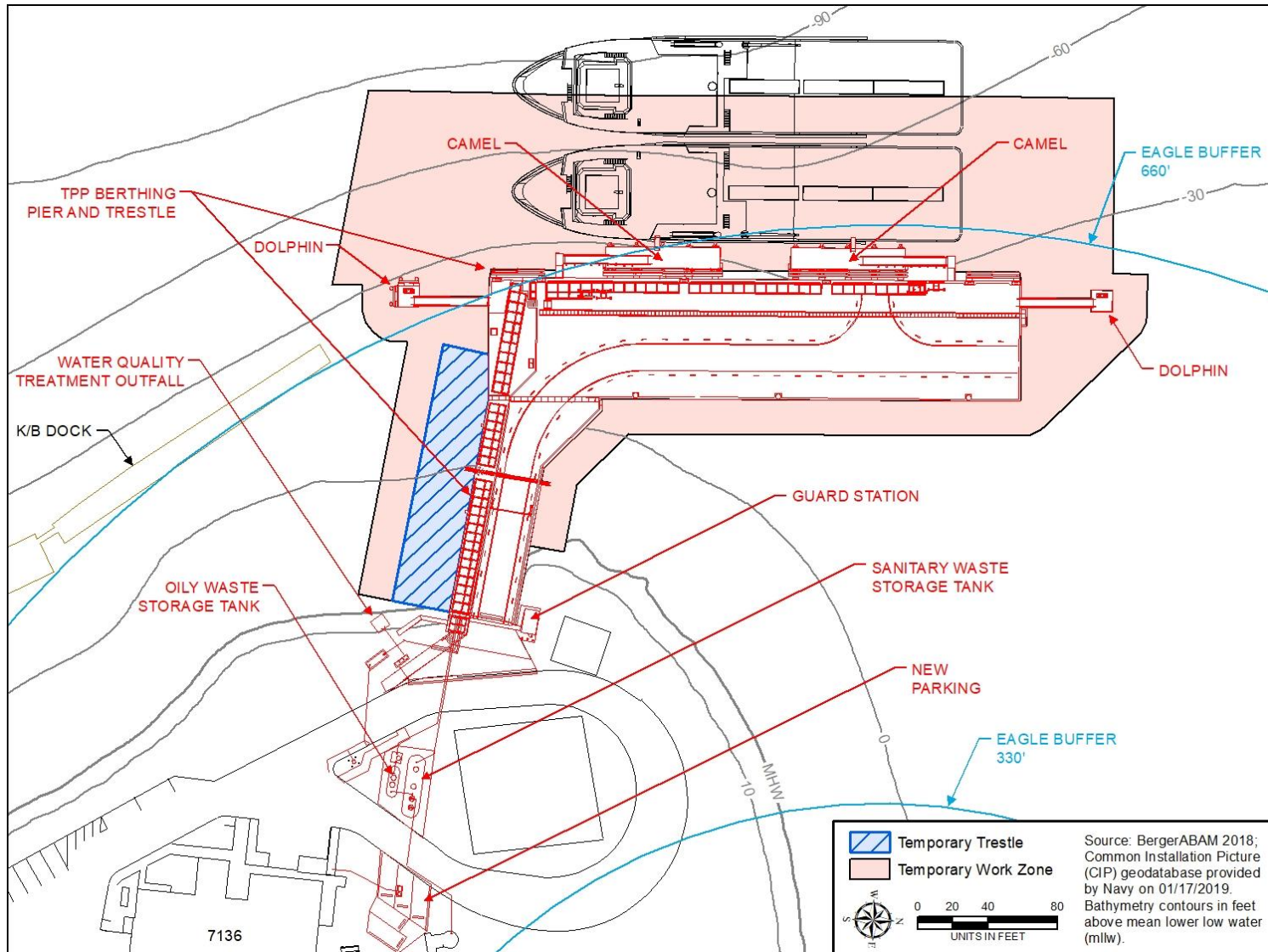


Figure 2-5. Alternative 2 Pier Components

There would be a total of 124 permanent steel piles that are 24, 30, or 36 inches in diameter (Table 2-1). There would also be 60 temporary falsework steel piles that are 36 inches in diameter; four of these piles would be located above MHHW. As for Alternative 1, the contractor would need to construct a 140-foot by 20-foot temporary work trestle that would be removed after trestle and pier construction in the intertidal is complete. Pile-driving methods would be the same as for Alternative 1. No more than one impact driver and one vibratory driver would be used at the same time. Under expected conditions, the number of impact hammer strikes per day would not exceed 1,600. The total number of pile-driving days would be considerably less than with Alternative 1, 90 days or less over two in-water work seasons. The total seafloor area occupied by permanent piles would be 787 sq ft. Alternative 2 would not require a reconfiguration of the PSB system. The trestle would have five 30-foot high light standards and the pier would have three 50-foot high light standards.

The upland features and construction schedule for Alternative 2 would be the same as for Alternative 1, including the Sturgeon Street VMF location. The project laydown and parking area would be the same 2.6-acre site located along Sturgeon Street as described for Alternative 1. This site would include the 0.5 acre that was previously cleared and graveled (Figure 2-4). Therefore, 2.1 acres of new area would be cleared of vegetation and graveled for the TPP project. After TPP construction, this site would be left in gravel for use on future projects.

## **2.4 Alternatives Considered but not Carried Forward for Detailed Analysis**

The following alternatives were considered, but were not carried forward for detailed analysis in this EA as they did not satisfy the reasonable alternative screening factors presented in Section 2.2 at the time of this evaluation. Any developing facts altering the screening factors may prompt further analysis.

### **2.4.1 NAVBASE Kitsap Magnetic Silencing Facility Site**

Under this alternative, the TPP Pier would be built at the site of the existing Magnetic Silencing Facility at NAVBASE Kitsap Bangor, located approximately 2.5 miles north of the preferred site. This alternative would not meet the screening factors because it would be incompatible with other Navy missions that would prevent landside access to the TPP Pier about 50 percent of the time during each year. Due to potential conflicts with other existing missions and topography (steep bluffs) along the waterfront, no other locations were evaluated at NAVBASE Kitsap Bangor.

### **2.4.2 Naval Magazine Indian Island Site**

Under this alternative, the Navy would construct a TPP Pier and support facilities at Naval Magazine Indian Island, located about 40 miles north of NAVBASE Kitsap Bangor. This alternative would not meet the screening factors because (1) using this location would require additional underway time (e.g., 2 hours transit time for passage to NAVBASE Kitsap Bangor to start the outward leg of the escort mission, and thereby affecting crew endurance standards to an unacceptable level; and (2) construction and operation would be incompatible with the primary mission of Naval Magazine Indian Island.

## **2.5 Operations and Maintenance**

Operation of the new TPP Pier and associated facilities would be the same for both action alternatives and would include periodic cleaning of pier surfaces and long-term maintenance of piles and other pier components. No additional employees would be required. Berthed vessels would be provided with power, potable water, communications, fire protection, sewage connections, and oily waste collection.

Fuel would be provided by the storage and transmission facilities described in Section 2.3.2.2 above. Motor vehicles would operate as needed at the VMF and on the pier.

## **2.6 Best Management Practices and Impact Minimization Measures**

Design features and measures have been built into the project to avoid environmental impacts. Where avoidance is not possible, the design has been modified to minimize impacts. Implementation of the action alternatives would include incorporation of the following design measures and construction and operations best management practices (BMPs) to avoid or minimize potential environmental impacts. Mitigation measures are discussed in Chapter 3 of this EA. In addition, compensatory mitigation and mitigation for impacts to treaty-reserved rights and resources would be implemented (see discussion in Chapter 3 of this EA).

### **2.6.1 Design Avoidance and Minimization Measures**

The Navy carefully analyzed all alternatives and modified the design to minimize environmental impacts to the extent feasible. In addition, impact avoidance and minimization measures were included in the design of the alternatives, as listed below:

- The trestle and pier were designed to minimize the amount of overwater shading as much as practical. For example, the trestle height where it crosses nearshore habitats would be 3.5 feet above MHHW and 4 feet 9 inches above MHHW for Alternatives 1 and 2, respectively.
- Under-pier/trestle lighting fixtures would be mounted below the trestle and/or pier in sections between the pile bents. The lighting would mimic natural daylight and be controlled to vary light intensity throughout the day according to the position of the sun and resulting shading conditions.
- The trestle and pier were designed to minimize the amount of disturbance to the seabed and nearshore migration barriers.
- Floating booms would be deployed around in-water construction activities to contain any accidental spills of construction debris, including cement.
- The pier and trestle would be sloped to capture stormwater, which would then be filtered for basic treatment.
- The camels, camel brows, camel platforms, and dolphin brows would be constructed of grating to minimize shading.
- The VMF would be designed to meet Unified Facilities Criteria 1-200-02 High Performance and Sustainable Building Requirements, which require that the building be constructed in an environmentally responsible way for sustainability. This includes the use of recycled material and facilities that save water and energy, management of stormwater runoff, and measures to manage waste.

### **2.6.2 Best Management Practices and Current Practices**

This section presents an overview of the BMPs that are incorporated into the Proposed Action. BMPs are existing policies, practices, and measures that the Navy would adopt to reduce the 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 would represent (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 NEPA environmental review process for the Proposed Action. Table 2-2 includes a list of BMPs that would be included. More detailed descriptions of these measures are included in the various resource sections in Chapter 3 of this EA.

**Table 2-2. Best Management Practices**

<b>BMP</b>	<b>Description</b>	<b>Impacts Reduced/Avoided</b>
Fuel Leak Controls	Fuel hoses, oil or fuel transfer valves, and fittings would be checked regularly for drips or leaks and would be maintained and stored properly.	Reduces the likelihood of any petroleum products, chemicals, or other toxic or deleterious materials from entering the water
Storm Water Pollution Prevention Plan (SWPPP)	A SWPPP would be prepared and implemented for construction in conformance with the <i>Stormwater Management Manual for Western Washington</i> (WDOE, 2019).	Limits soil erosion and potential pollutants contained in stormwater runoff
Oil Booms	Oil booms would be deployed around in-water construction sites.	Minimizes water quality impacts during construction
Debris Prevention	During in-water construction activities, floating booms would be deployed and maintained to collect and contain any floatable materials released accidentally. Any accidentally released materials or equipment would be immediately retrieved and removed from the water. Following completion of in-water construction activities, an underwater survey would be conducted to remove any remaining construction materials that were missed previously. Retrieved debris would be disposed of at an upland disposal site.	Protects sediment and water quality
Vessel Operations Controls for Construction	Limitations would be placed on construction vessel operations, anchoring, and mooring line deployment. A mooring and anchoring plan would be developed by the contractor and approved by the Navy to minimize vessel movement. Barge and other large construction vessel operations would be restricted to an area 100 feet to the west from the proposed pier. No large construction vessels would be allowed to operate east or north of the proposed pier to reduce potential temporary impacts to the marine aquatic environment. To provide access for construction workers, small skiffs would operate in a narrow band east, north, and south of the proposed pier. Anchoring in existing eelgrass habitat would be avoided. Vessel operators would be provided with maps of the construction area with eelgrass beds clearly marked.	Minimizes impacts on marine habitats
Sediment Management Plan	A Sediment Management Plan would be developed and implemented to control the spread of silt from pile driving.	Minimizes impacts on marine habitats including eelgrass and macroalgae beds

**Table 2-2. Best Management Practices (continued)**

<i>BMP</i>	<i>Description</i>	<i>Impacts Reduced/Avoided</i>
Construction Timing Restrictions	In-water work (i.e. pile driving) would not start until July 22, when bald eagle nestlings have fledged. Upland construction elements within the 660-foot buffer would be limited to September 1 to January 1. Biologists will monitor nest occupancy and productivity per the Bald and Golden Eagle Protection Act permit issued by USFWS.	Minimizes impacts to nesting bald eagles.
In-water Work Timing Window	In-water construction would be conducted within the WDFW-approved in-water work window for Tidal Reference Area 13 (July 16 through January 15) (USACE, 2017), modified by restrictions for the protection of nesting bald eagles to July 22 through January 15.	Minimizes impacts on Endangered Species Act (ESA)-listed fish species and nesting bald eagles, protected by the Bald and Golden Eagle Protection Act.
Water Treatment (pier deck)	The pier deck would be graded to drain runoff into water quality control vaults (approximately four dual cartridge vaults) that provide standard water treatment. The water quality control vaults would intercept and treat drainage of all traffic-bearing surfaces on the pier and trestle.	Prevents impacts to marine water quality and habitats
Stormwater Controls (paved surfaces)	Runoff from impervious paved surfaces subject to vehicular traffic would require basic treatment in accordance with WDOE standards, as well as low impact measures. Use of pervious concrete pavement would be investigated during detailed design as an option to address stormwater runoff and meet Low Impact Development goals. Where impervious pavement is used, runoff from the site would be surface drained or captured in catch basins with filter cartridges and conveyed to a bio-retention cell for treatment and infiltration.	Prevents impacts to surface water quality
Stormwater Controls (VMF site)	The VMF would add new impervious surfaces, associated with the roof of the building and asphalt pavement, which would generate stormwater runoff. Catch basins would convey stormwater to a series of detention vaults. Stormwater would then flow to control structures then to a tight-line system, which would then discharge detained and treated stormwater to the existing ditch on Sturgeon Street. The collector pipe for the roof drains could be piped separately to the existing ditches along Sturgeon Street, as runoff from the roof would not require treatment.	Reduces the overall volume of stormwater runoff associated with the project and reduce impacts to surface water quality

**Key:** BMP = best management practice; ESA = Endangered Species Act; SWPPP = Storm Water Pollution Prevention Plan; USACE = U.S. Army Corps of Engineers; VMF = Vessel Maintenance Facility; WDFW = Washington Department of Fish and Wildlife; WDOE = Washington State Department of Ecology

### 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 the National Environmental Policy Act (NEPA), the 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. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

“Significantly,” as used in NEPA, requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts, including society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant (40 CFR section 1508.27). Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of the likely change. In general, the more sensitive the context, the less intense a potential impact needs to be in order to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would need to be in order to be significant.

This section includes water quality and sediments, biological resources, visual resources, noise, socioeconomics, historic properties and cultural resources, American Indian traditional resources, and traffic/transportation.

The potential impacts to the following resources are considered to be negligible or non-existent, and so were not analyzed in detail in this EA.

**Land Use:** Implementation of either action alternative would not alter existing land use on or off Naval Base (NAVBASE) Kitsap Bangor. All project activities would be conducted in previously disturbed areas or adjacent to existing structures or facilities. The Transit Protection Program (TPP) project would be consistent with the Navy Region Northwest Naval Base Kitsap *Installation Appearance Plan* (Navy, 2007), the NAVBASE Kitsap Integrated Natural Resources Management Plan (INRMP) (Navy, 2018a), and existing structures and activities at the Bangor waterfront. Construction would not affect residential areas. Implementation of the TPP project would have no impact on parklands or prime farmlands. Because the TPP project would have no long-term socioeconomic impacts, it would not affect local or regional development patterns.

**Air Quality:** Effects on air quality from implementation of either action alternative would be negligible based on the types of air pollutant sources and the attainment designation of Kitsap County in relation to the National Ambient Air Quality Standards. As described in 40 CFR part 93, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* (the “General Conformity Rule”), federal actions occurring in air basins designated in nonattainment or in a maintenance area must conform to an applicable implementation plan. However, since Kitsap County is designated an attainment area for all criteria pollutants, the General Conformity Rule does not apply. Proposed activities are limited to mobile sources and sources excluded from Notice of Construction requirements

in accordance with Puget Sound Air Pollution Control Agency regulations. Therefore, New Source Review and Prevention of Significant Deterioration requirements do not apply.

**Wetlands:** No wetlands would be affected by either action alternative. A wetland near one of the project sites is discussed in the Biological Resources section of the EA, along with measures taken to protect the wetland from development in its vicinity.

**Hazardous Materials and Wastes:** Because access to the installation is restricted, the risk to public health from hazardous materials and wastes is minimal. Hazardous wastes generated by construction or operation of the new pier would be handled and disposed of according to the NAVBASE Kitsap Hazardous and Industrial Waste Management Plan (NAVBASEKITSAPINST 5090.3G). Hazardous materials would be handled in accordance with the Navy's Regional Hazardous Material Control and Management Plan (COMNAVREG Northwest Instruction 5090.6D). Although hazardous materials and wastes are not covered as a separate resource area in this EA, contaminated marine sediments in the vicinity of the proposed pier, and potential releases of contaminants from spills or from sediments during construction and operations are addressed in the sections on water resources and marine sediments.

**Environmental Justice:** Environmental justice concerns related to construction activity typically focus on health and safety hazards such as exposure to traffic, noise, pollutants, and other hazardous activities and materials. Although low-income and minority populations, and children, are present in the region, demographic analysis shows they are not disproportionately represented in areas potentially affected by NAVBASE Kitsap Bangor projects (U.S. Census Bureau [USCB], 2010a–h). Residential areas would not be adversely affected by noise from either action alternative. Therefore, the TPP project would not have disproportionately high and adverse environmental, human health, and socioeconomic effects on minority and low-income populations or children.

**Utilities:** Utilities serving the proposed TPP Pier would tie into existing lines operated by NAVBASE Kitsap Bangor for wastewater services, potable and fire water, telecommunications, and electrical power. Because the TPP Pier would provide berthing for vessels currently moored at other locations on NAVBASE Kitsap Bangor, operation of the proposed TPP Pier and upland facilities would not create a notable net increase in demand on utilities.

**Public Health and Safety:** Because NAVBASE Kitsap and adjacent waters are restricted from public access, there would be very little potential for construction and operation of the TPP Pier and upland facilities to affect public health and safety. The Washington Department of Health could impose a shellfish consumption restriction up to 200 feet from the sanitary sewer connection point. Under Alternative 2, the restriction would have the potential to affect a small portion of the southern end of Devil's Hole Beach. However, this would be an administrative restriction and not due to any anticipated spills. The Navy will work with the WA DOH and the affected Tribes to assess the potential effects a restriction would have on tribal access to tribal traditional resources. As discussed under Hazardous Materials and Wastes, the potential for the public to be exposed to such materials is minimal. As discussed under Air Quality above, the TPP Pier and upland facilities would have negligible impacts on air quality.

### 3.1 Water Quality and Sediments

This discussion of water resources includes surface water, marine waters, and marine sediments. Groundwater, which is water that flows or seeps downward and saturates soil or rock, supplying springs and wells, is not addressed in detail because the Proposed Action would not result in any changes to groundwater resources. Surface (or upland) water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. A Total Maximum Daily Load (TMDL) is the maximum amount of a substance that can be assimilated by a water body without causing impairment. A water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

Marine waters would typically include estuaries, waters seaward of the historic height of tidal influence, and offshore high salinity waters. Marine water quality would be described as the chemical and physical composition of the water as affected by natural conditions and human activities.

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. Components of sediment range in size from boulders, cobble, and gravel to sand (particles 0.05 to 2.0 millimeters [mm] in diameter), silt (0.002 to 0.05 mm), and clay (less than or equal to 0.002 mm). Most sediment in nearshore areas and on the continental shelf is aluminum silicate derived from rocks on land that is deposited at rates of greater than 10 centimeters per 1,000 years. Sediment may also be produced locally as nonliving particulate organic material (“detritus”) that travels to the bottom (Hollister, 1973; Milliman et al., 1972). Through the downward movement of organic and inorganic particles in the water column, substances that are otherwise scarce in the water column (e.g., metals) are concentrated in bottom sediment (Chapman et al., 2003; Kszos et al., 2003).

Water quality describes the chemical and physical composition of marine and surface (upland) water as affected by natural conditions and human activities. Water quality parameters include temperature and salinity, which affect density layering and stratification, as well as chemical characteristics such as dissolved oxygen (DO), nutrients, pH, turbidity/water clarity, and contaminant levels that affect the suitability of the water body as habitat for marine organisms and other beneficial uses.

Sediment quality focuses on the physical and chemical properties of marine sediments. Physical parameters include grain size, which is a quantitative description of the proportions of gravel, sand, silt, and clay-size particles and the dominant size classes for the sediment matrix. Sediment quality also considers concentrations of total organic carbon, as well as the concentrations of trace constituents, including metals, petroleum-derived hydrocarbons, and chlorinated organic compounds, which may reflect a combination of natural and human-derived sources. The combination of sediment texture (grain size), organic content, and contaminant levels affect the suitability of the sediments as habitat for marine organisms and other beneficial uses.

#### 3.1.1 Regulatory Setting

Through the National Pollutant Discharge Elimination System (NPDES) program, the Clean Water Act (CWA) establishes federal limits on the amounts of specific pollutants that can be 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., stormwater) of water pollution.

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 U.S. Any discharge of dredge or fill into waters of the U.S. requires a permit from the U.S. Army Corps of Engineers (USACE). Activities that require compliance with Section 404 of the CWA must also obtain a Section 401 Water Quality Certification from Washington State Department of Ecology (WDOE). Section 401 is regulated by WDOE through the U.S. Environmental Protection Agency (USEPA). Compliance under Section 401 is described further below under 3.1.1.2, Marine Water.

Section 438 of the Energy Independence and Security Act establishes stormwater design requirements for development and redevelopment projects. Under these requirements, federal facility projects larger than 5,000 square feet (sq ft) must “maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.”

Section 10 of the Rivers and Harbors Act specifies USACE permit requirements for any in-water construction. Permits are required for construction of piers, wharfs, bulkheads, pilings, marinas, docks, ramps, floats, moorings, and like structures; construction of wires and cables over the water, and pipes, cables, or tunnels under the water; dredging and excavation; any obstruction or alteration of navigable waters; depositing fill and dredged material; filling of wetlands adjacent or contiguous to waters of the U.S.; construction of riprap, revetments, groins, breakwaters, and levees; and transportation of dredged material for dumping into ocean waters.

The Coastal Zone Management Act of 1972 (CZMA) provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in coastal zones. Actions occurring within the coastal zone commonly have several resource areas that may be relevant to the CZMA. Properties under control of the federal government are excluded from the coastal zone.

#### **3.1.1.1 Upland Water**

The U.S. Environmental Protection Agency (USEPA) has regulatory authority for NPDES related to federal facilities in Washington State, including NAVBASE Kitsap Bangor. An NPDES Construction Stormwater General Permit is required for construction activities that disturb 1 acre or more and may result in a discharge of stormwater to surface waters of the state, including storm drains, ditches, wetlands, creeks, rivers, lakes, and marine waters. The permit requires construction site operators to prepare a Stormwater Pollution Prevention Plan (SWPPP) and to install and maintain erosion and sediment control measures to prevent soil, nutrients, chemicals, and other harmful pollutants from being washed by stormwater runoff into surface water bodies. An NPDES permit is required for the discharge of wastewater into surface waters through a conveyance system (e.g., an outfall). During construction of the upland project facilities, stormwater runoff would be handled in accordance with an NPDES Construction General Permit. A SWPPP would be developed, following guidance in WDOE’s *Stormwater Management Manual for Western Washington* (WDOE, 2019) and utilizing USEPA’s *NPDES General Permit for Discharges from Construction Activities* (USEPA, 2022). The SWPPP would specify which Best Management Practices (BMPs) would be implemented to limit erosion and contaminant discharges, including sedimentation, to upland water bodies and Hood Canal.

Industrial stormwater discharges on NAVBASE Kitsap Bangor are covered under the existing USEPA 2021 Multi-Sector General Permit (MSGP). Stormwater runoff discharges associated with operation of the Proposed Action would also be covered under the MSGP (USEPA, 2021a). This permit may include limits on the quantity and quality of discharges, as well as requirements for monitoring the effluent and the receiving water. Non-industrial developed areas of NAVBASE Kitsap Bangor that are not covered by the MSGP are covered by an NPDES permit that authorizes discharges from the municipal separate storm sewer system (MS4) to Hood Canal (USEPA, 2021b). The MS4 permit requires permittees to develop and implement a comprehensive Storm Water Management Program that must include pollution prevention measures, treatment or removal techniques, monitoring, use of legal authority, and other appropriate measures to control the quality of stormwater discharged. The purpose of the ongoing program is to detect and address non-stormwater discharges, spills, and illicit connections into their MS4. The MS4 permit also requires the Navy to submit a written plan to USEPA that documents future investments and upgrades in Naval Base Kitsap's stormwater infrastructure designed to improve MS4 discharge quality. The Navy's Stormwater Management Plan (Navy, 2022) discusses how the comprehensive Storm Water Management Program is implemented, and compliance with the permit requirements is described in the Navy's annual reports (per Section 9 of the Stormwater Management Plan [Navy, 2022]).

Oil Pollution Prevention regulations (40 CFR part 112) are intended to protect water quality from releases of petroleum products. The regulations apply to facilities that store or use more than 1,320 gallons of petroleum products (inclusive of amounts stored in all drums, tanks, and operating equipment containing 55 gallons or more). These regulations are administered by USEPA and require that a spill prevention, control, and countermeasure plan be developed and that secondary containment be provided for containers and tanks. The regulations would apply to project components that use or store petroleum products. NAVBASE Kitsap Bangor follows the Commander Navy Region Northwest *Integrated Oil and Hazardous Substance Contingency Plan*.

### **3.1.1.2 Marine Water**

Washington surface water quality standards contained in Washington Administrative Code (WAC) 173-210A provide the basis for protecting and regulating the quality of surface waters in Washington State. The standards implement portions of the CWA by specifying the designated and potential uses of waterbodies in the state and set water quality criteria to protect those uses and acknowledge limitations. The standards also contain policies to protect high-quality waters (antidegradation) and specify how criteria are to be implemented. WAC 173-201A establishes four water body quality classifications as summarized in Table 3.1-1.

The federal CWA requires that all states restore their waters to be "fishable and swimmable." The CWA contains the requirements to set water quality standards for all contaminants in surface waters. USEPA is the designated regulatory authority to implement pollution control programs and other requirements of the CWA. However, USEPA has delegated regulatory authority for the CWA to WDOE for the implementation of pollution control programs in Washington State, as well as other CWA requirements.

Section 303(d) of the CWA establishes a process to identify and clean up polluted waters. Every 2 years, all states are required to perform a water quality assessment of the quality of surface waters in the state, including all the rivers, lakes, and marine waters where data are available. WDOE compiles its own water quality data, and invites other groups to submit water quality data they have collected.

The water quality assessments rate water bodies from Category 1, for waters that meet tested standards for clean waters, to Category 5, for waters that fall short of state surface water quality standards and are not expected to improve within the next 2 years. The 303(d) list comprises those waters that have been designated as Category 5, impaired. Water bodies placed on the 303(d) list require the preparation of a water cleanup plan, such as a TMDL.

The Proposed Action described in Section 2.1 would require construction below the mean higher high water (MHHW) line. Placement of fill in the intertidal zone is regulated under the CWA, and a USACE permit under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act would be required. Projects requiring a Section 404 permit must also obtain a Section 401 Water Quality Certification from WDOE. Issuance of a certification means that WDOE anticipates that the project will comply with state water quality standards and other aquatic resource protection requirements. The water quality certification covers both construction and operation of a project. Conditions of the certification become conditions of the Section 404 permit.

The Navy submitted a Joint Aquatic Resources Permit Application (JARPA) to USACE and WDOE on June 9, 2020, to obtain a permit for work within affected waters.

**Table 3.1-1. Marine Water Quality Criteria**

<i>Water Quality Classification</i>	<i>Water Quality Criteria</i>			
	<i>Aquatic Life</i>	<i>Temperature<sup>1</sup></i>	<i>Dissolved Oxygen<sup>2</sup></i>	<i>Turbidity<sup>3</sup></i>
Extraordinary Quality	13°C (55.4°F)	7.0 mg/L	+5 NTU or +10% <sup>4</sup>	7.0–8.5 <sup>6</sup>
Excellent Quality	16°C (60.8°F)	6.0 mg/L	+5 NTU or +10% <sup>4</sup>	7.0–8.5 <sup>7</sup>
Good Quality	19°C (66.2°F)	5.0 mg/L	+10 NTU or +20% <sup>5</sup>	7.0–8.5 <sup>7</sup>
Fair Quality	22°C (71.6°F)	4.0 mg/L	+10 NTU or +20% <sup>5</sup>	6.5–9.0 <sup>7</sup>
<b><i>Coliform Bacteria</i></b>				
Shellfish Harvesting	Fecal coliform must not exceed a geometric mean value of 14 CFU or MPN/100 mL.			
Primary Contact Recreation	Enterococci: Enterococci organism levels within an averaging period must not exceed a geometric mean value of 30 CFU or MPN/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample values exist) obtained within the averaging period 110 CFU or MPN/100 mL.			

**Source:** WAC 173-201A-210, as amended in December 2019, effective January 30, 2020.

**Key:** °C = degrees Celsius; CFU = colony forming units; DO = dissolved oxygen; °F = degrees Fahrenheit; mg/L = milligrams per liter; mL = milliliter; MPN = most probable number; NTU = nephelometric turbidity unit

**Notes:**

1. One-day maximum (°C [°F]). Temperature measurements should be taken to represent the dominant aquatic habitat of the monitoring site. Measurements should not be taken at the water’s edge, the surface, or shallow stagnant backwater areas.
2. One-day minimum (mg/L). When DO is lower than the criteria or within 0.2 mg/L, then human actions considered cumulatively may not cause the DO to decrease more than 0.2 mg/L. DO measurements should be taken to represent the dominant aquatic habitat of the monitoring site. Measurements should not be taken at the water’s edge, the surface, or shallow stagnant backwater areas.
3. Measured in NTU; point of compliance for non-flowing marine waters — turbidity not to exceed criteria at a radius of 150 feet from activity causing the exceedance.
4. 5 NTU over background when the background is 50 NTU or less; or 10 percent increase in turbidity when background turbidity is more than 50 NTU.
5. 10 NTU over background when the background is 50 NTU or less; or 20 percent increase in turbidity when the background turbidity is more than 50 NTU.
6. Human-caused variation within range must be less than 0.2 units.
7. Human-caused variation within range must be less than 0.5 units.



### 3.1.1.3 Marine Sediments

The Washington State Sediment Management Standards (SMS) (WAC 173-204) provide the framework for the long-term management of marine sediment quality. The SMS establishes standards for the quality of sediments as the basis for management and reduction of pollutant discharges by providing a management and decision-making process for contaminated sediments.

The Marine Sediment Quality Standards (SQS) established by the SMS define the lower limit of sediment quality expected to cause no adverse impacts to biological resources. The SMS Cleanup Screening Levels (CSL) represents cleanup thresholds. Concentrations between the SQS and CSL values require further investigation to determine whether actual adverse impacts exist at the site due to contaminated sediments.

Washington State's Water Quality Assessment and 303(d) list includes an assessment of sediments in the state's waterbodies. The current assessment (2018) and 303(d) list was approved by USEPA on August 26, 2022 (WDOE, 2022a). Assessed sediments are classified into six categories:

- Category 5 – Polluted sediments/303(d) list
- Category 4C – Sediments impaired by a non-pollutant
- Category 4B – Sediments that have a pollution control plan
- Category 4A – Sediments that have a TMDL
- Category 3 – Insufficient data
- Category 2 – Sediments of concern
- Category 1 – Sediments that meet tested standards

### 3.1.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under water quality resources at NAVBASE Kitsap Bangor.

The proposed project site is located in Hood Canal. The primary features of Hood Canal are the entrance, Dabob Bay, the central region, and The Great Bend at the southern end (Gustafson et al., 2000). Over most of its length Hood Canal varies in width from 1.0 to 2.5 miles (Kellogg, 2004). The shoreline of NAVBASE Kitsap Bangor on Hood Canal trends north-northeast. Several small spits extend from the NAVBASE Kitsap Bangor shoreline into water depths of 120 feet. Between these spits are shallow embayments with somewhat gentler bottom slopes.

NAVBASE Kitsap Bangor includes two main watersheds. The smaller Clear Creek watershed drains the southeastern portion of the installation. All runoff from this watershed flows into Clear Creek, which discharges into Dyes Inlet approximately 3 miles downstream of the base. The larger Hood Canal watershed streams flow westward into several steep drainages that empty into Hood Canal (van Heeswijk & Smith, 2002).

Freshwater inflow into Hood Canal consists of groundwater, stormwater outfalls, and creeks and rivers. Principal rivers discharging to Hood Canal are the Dosewallips and the Duckabush (south and southwest of NAVBASE Kitsap Bangor). Five small streams discharge to Hood Canal from the base, three of which

flow through Cattail Lake, Hunter's Marsh, and Devil's Hole. A series of stormwater outfalls discharge much of the overland flow from the western portion of the installation to Hood Canal.

Artesian seeps along the shore cliff faces of NAVBASE Kitsap Bangor provide additional freshwater input to Hood Canal. These seeps have a positive effect on water quality and tend to reduce salinity levels along the NAVBASE Kitsap Bangor shoreline (Kahle, 1998).

### **3.1.2.1 Upland Water**

Precipitation and seepage are the sources of surface water for the upland areas on NAVBASE Kitsap Bangor. Kitsap County has a temperate maritime climate, with annual precipitation averaging approximately 49 inches per year. The total annual snowfall is approximately 7.4 inches. Most precipitation falls during late fall and winter (Sound Publishing, 2016).

#### **3.1.2.1.1 Upland Water Quality**

Surface water monitoring in the overall Hood Canal watershed is performed on an ongoing basis by Kitsap Public Health District (2016) and WDOE (2017a). However, with the exception of Kitsap County performing periodic sampling for fecal coliform, no other monitoring of streams is known to take place on NAVBASE Kitsap Bangor. No freshwater bodies within the NAVBASE Kitsap Bangor upland area appear on the most recent 303(d) list (WDOE, 2022b).

#### **3.1.2.1.2 Floodplains/Frequently Flooded Areas**

The Hood Canal shoreline in the TPP project area below an elevation of 17 feet mean sea level is identified as a zone of coastal flooding. The waterfront shoreline area is designated by the Federal Emergency Management Agency as subject to flooding during a 100-year flood, which indicates that it has a 1 percent chance of flooding annually (National Flood Insurance Program, 2017).

#### **3.1.2.1.3 Upland Water Supply**

None of the surface water bodies described in this section are used as a potable water source. Potable water on NAVBASE Kitsap Bangor is provided by four deep groundwater supply wells (Navy, 2016b). Wells for other purposes, including standby wells, are also maintained on the base (WDOE, 2017b).

### **3.1.2.2 Marine Water**

NAVBASE Kitsap Bangor is located in northern Hood Canal. WAC 173-201A-612 has established designated uses for Hood Canal as follows: extraordinary (aquatic life uses); primary contact (recreation); shellfish harvesting; and wildlife habitat, commerce/navigation, boating, and aesthetics (miscellaneous uses). Applicable water quality criteria for Hood Canal are listed in Table 3.1-1. The current 303(d) list includes two grid segments along the Bangor waterfront impaired by low DO levels. One is to the north, adjacent to Marginal Wharf and Delta Pier; the other is to the south of Service Pier (WDOE, 2022c). No TMDL has been developed by WDOE for this area (WDOE, 2022d). Areas of Hood Canal near the base have also been listed as Category 2, waters of concern, for isolated exceedances of bacteria (fecal coliform) and pH.

The Navy has sampled the waters off NAVBASE Kitsap Bangor numerous times for water quality parameters (temperature, salinity, DO, and turbidity) (Hafner & Dolan, 2009; Phillips et al., 2009). These studies have shown that marine waters are consistently within the Washington State standards for

extraordinary water quality for each of these parameters (Hafner & Dolan, 2009; Phillips et al., 2009). An exception to these findings was temperature, which typically met extraordinary water quality levels in the winter months and excellent water quality standards in the summer months. Waters south of Explosives Handling Wharf-1 (EHW-1) and further offshore showed similar results with the exception of DO, which typically ranged from excellent to extraordinary.

DO, turbidity, and pH are the only water quality parameters that could potentially be impacted by the Proposed Action. Therefore, these are the only water quality parameters discussed in this EA.

#### **3.1.2.2.1 Dissolved Oxygen**

Concentrations of DO in extraordinary quality marine surface waters, such as those in northern Hood Canal, should exceed 7 milligrams per liter (mg/L) of DO, allowing for only 0.2 mg/L reductions in the natural condition by human-caused activities (WAC 173-201A).

Although some waters along the NAVBASE Kitsap Bangor waterfront are on the 303(d) list, mean DO measurements during July 2005 through June 2006 indicate that nearshore stations at the waterfront consistently met extraordinary quality standards for DO. From July 2005 through June 2006 and January 2007 through April 2008, DO levels met the extraordinary standard for surface waters (0 to 20 feet in depth) year round and for deep water (66 to 197 feet in depth) most of the year. (Deeper waters can drop to only a fair standard for DO in late summer.) However, in late summer–early fall, DO levels drop from typical ranges of approximately 6 to 10 mg/L to a range of 4.7 to 9.1 mg/L (Phillips et al., 2009). The variation in mean DO measurements for deeper waters (66 to 197 feet in depth) near the project site was consistent with DO patterns within the rest of Hood Canal. During the late summer and early fall period (July through September 2005), mean DO measurements met fair to excellent quality standards. At 66 to 197 feet in depth, these measurements are at the upper range of low DO conditions measured historically throughout Hood Canal during the late summer and fall periods. Mean DO measurements at 66 to 197 feet in depth from March through May 2006 met extraordinary quality standards (Phillips et al., 2009).

#### **3.1.2.2.2 Turbidity**

Washington State-designated extraordinary quality marine surface waters should have an average turbidity reading of less than 5 nephelometric turbidity units (NTU) (WAC 173-201A). Turbidity measurements were performed along the NAVBASE Kitsap Bangor waterfront, including the vicinity of the project site, from July 2005 through May 2006, except for October to December 2005 (Phillips et al., 2009). These mean monthly turbidity measurements for both nearshore and offshore waters ranged from 0.7 to 3 NTUs and were consistently within the Washington State standards for extraordinary quality.

#### **3.1.2.2.3 pH**

Extraordinary quality marine waters should have pH values between 7 and 8.5 (WAC 173-201A; see Table 3.1.1). The Washington State Water Quality Assessment 303(d) list indicates impairments of Hood Canal waters (Category 2) at King Spit near Bangor based on 5 excursions beyond the criterion out of 72 samples collected between 1993–2000 (Listing i.d. 10272) at WDOE Ambient Monitoring Station HCB006 (Hood Canal – King Spit Bangor)<sup>1</sup>. Water quality monitoring during construction of the Explosives

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<sup>1</sup> <https://apps.ecology.wa.gov/approvedwqa/approvedpages/viewapprovedlisting.aspx?ListingId=10272>

Handling Wharf 2 (EHW-2) project in 2012–2013 reported pH values from 7.31 to 8.28, which is within the range for extraordinary quality marine waters.

### 3.1.2.3 Marine Sediments

The proposed project site includes a mixed sand gravel shoreline and a bluff-backed beach with little to no backshore. The feeder bluff at Keyport/Bangor (K/B) Spit supplies sediment to the beach through ongoing gradual erosion and episodic slope failure due to undercutting and saturated soil conditions on the bluff. The precise amount of sediment supplied to the beach from the feeder bluff is not known. The feeder bluffs that supply sediment to the adjacent point and beach is an important contributor to the overall stability of the littoral system (Environmental Science Associates, 2019).

Shoreline modifications immediately south of the K/B Spit include a large pile-supported pier (K/B Dock), multiple floating docks secured by piles and pile-dolphins, and a bulkhead located in the intertidal zone. Structures are typically located more than 100 feet offshore from MHHW. Based on aerial photographs, large barges and other vessels are typically moored to the fixed piers and floating docks. Further south of these structures the shoreline transitions to a bluff-backed beach (Environmental Science Associates, 2019).

Existing marine sediments at the proposed project site are composed of gravelly sands with some cobbles in the intertidal zone, transitioning to silty sands in the subtidal zone (Hammermeister and Hafner, 2009). The presence of glacial till approximately 6 feet below mud line in the intertidal zone, increasing to over 10 feet in the subtidal zone was found in subsurface coring studies performed in 1994 (URS, 1994). Sediments north of EHW-1 and at K/B Dock contain medium sand and organic matter with a slight hydrogen sulfide odor. The mid/upper beach face of the project site is composed of fine to coarse gravel (6 to 40 mm top size), mixed with medium to coarse sand at the spit and underlain by sandy gravel pavement below the surface. Surface materials grade to more sandy gravel with occasional cobbles to the east of the spit. South of the spit, materials primarily consist of gravel, with sand/shell hash more prevalent leeward of docks (Environmental Science Associates, 2019). Shell hash is prevalent in the backshore, particularly leeward of existing K/B Dock.

Net northward sediment transport south of K/B Spit, and at locations approximately 800 feet east of the point along the bluff-backed beach (Environmental Science Associates, 2019) is indicated by the following:

- Accumulation of sediment on the south/west side of a fallen tree along the bluff-backed beach approximately 800 feet east of the K/B Spit; and
- Apparent south-to-north transport at the boat ramp and culvert outfall on the north side of Carlson Spit. This site is protected from north waves by both a large fixed wave screen and the K/B Spit to the north.

Marine sediments in the general vicinity of the proposed project were affected by chemical contamination in the past. NAVBASE Kitsap Bangor has been listed twice on the Comprehensive Environmental Response, Compensation, and Liability Act National Priorities List for investigation and, if necessary, cleanup of past waste disposal sites. In January 1990, the Navy and USEPA entered into a Federal Facilities Agreement to ensure that environmental impacts associated with past practices at the

base are investigated and remedial actions are completed as needed to protect human health and the environment. As of 2005, all required actions were completed. WDOE concurred that there was no increasing trend of contaminants of concern and additional sampling was not needed (Madakor, 2005). Results from a 2007 base-wide sediment investigation confirmed that, with a few exceptions, sediment quality at NAVBASE Kitsap Bangor is within SQS standards (Hammermeister & Hafner, 2009). Surface samples collected near the K/B Dock (south of the TPP Pier project site) contained lead concentrations that exceeded the CSL, a zinc concentration that was equal to the SQS, and concentrations of several high molecular weight polycyclic aromatic hydrocarbons that exceeded the SQS. No subsurface samples at any location exceeded numeric criteria. No marine sediments at or near the Bangor waterfront are currently included on the 303(d) list (WDOE, 2022b). The grid at K/B Spit, which is part of Operable Unit 7, is rated Category 4b (sediments with a pollution control plan) based on sampling results from 1992 that indicated potentially elevated concentrations of metals, polycyclic aromatic hydrocarbons, and phthalates. Based on the results of multiple sampling events, the Third Five Year Review, Naval Base Kitsap Bangor concluded that no further sampling was needed at that location (Navy, 2010a).

### **3.1.3 Environmental Consequences**

In this EA the analysis of water resources looks at the potential impacts on upland surface water, marine water, and marine sediments. The analysis of surface water quality considers the potential for impacts that may change the water quality, including both improvements and degradation of current water quality. Marine waters analysis considers whether and to what extent project-related construction and operation activities would create conditions that violate state water quality standards or interfere with beneficial uses of the water body. The evaluation of impacts on marine sediments considers whether project-related construction and operation activities would create conditions, such as sediment contaminant concentrations or physical changes, which exceed marine SQS or interfere with beneficial uses of the water body.

#### **3.1.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to baseline water quality and sediments. Therefore, no significant impacts to water quality and sediments would occur with implementation of the No Action Alternative.

#### **3.1.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

##### **3.1.3.2.1 Upland Water**

Construction activities within upland portions of the project site would not directly affect surface water resources. However, clearing, grading, and excavation would disturb soils and create the potential for erosion and runoff during storm events. (The exception is that 0.5 acre of the Vessel Maintenance Facility (VMF) project laydown/parking area has been partially cleared and graveled.)

The shoreline abutment area and access roadways are adjacent to the shoreline, but above MHHW. Erosion and runoff from the abutment area and the lower part of the paved access roads as a result of excavation and hauling activities have the potential to cause impacts to marine water quality in the intertidal environment. Construction BMPs related to surface water resources are listed below.

The following BMPs and current practices would be implemented to control runoff and siltation and minimize impacts on surface water:

- An SWPPP would be prepared and implemented in conformance with the *Stormwater Management Manual for Western Washington* (WDOE, 2019) to limit soil erosion and potential pollutants contained in stormwater runoff.
- Measures to control stormwater would include installation of a temporary runoff capture and discharge system and installation of temporary siltation barriers, such as straw wattles, below the excavation/construction zone.
- During clearing, grading, hauling, maintenance, and other activities such as utility work, measures would be employed as needed to control erosion and sedimentation. These measures would include diversion berms and interceptor ditches on both sides of the roadways, sediment traps outfitted with rock check dams and stand pipes, straw bale barriers on the sides of roads, erosion control blankets or turf reinforcement mats, plastic coverings, straw bales, and silt fences along the sides of roads.
- Any accidental fluid spills or leakage from vehicles onto soil would be cleaned up immediately, in accordance with the project-specific spill response plan.
- Gravel would be installed at construction area access points to prevent tracking of soil onto paved roads.
- Water-spraying on soil would be used as necessary to control dust generation during earthmoving and hauling activities per the Puget Sound Clean Air Agency Regulation I emission standards for fugitive dust.
- Following construction, areas disturbed by construction and not occupied by new impervious surface would be revegetated with native species. Stormwater from all impervious surfaces would be routed to a coalescing plate oil-water separator and then to a surface water treatment device.
- Additional BMPs would be implemented to control runoff and siltation and minimize impacts to surface water per the *Stormwater Management Manual for Western Washington* (WDOE, 2019).

Additionally, use of pervious concrete pavement would be investigated during detailed design as an option to address stormwater runoff and meet low impact development goals. Where impervious pavement is used, runoff from the site would be surface drained or captured in catch basins with filter cartridges and conveyed to a bio-retention cell for treatment and infiltration.

Therefore, with implementation of these BMPs and current practices, Alternative 1 would not result in significant impacts to upland water resources.

#### **3.1.3.2.2 Marine Water**

Construction and operation activities associated with Alternative 1 would not result in any direct discharges of waste to the marine environment. However, construction activities would result in minor changes in suspended sediment and DO concentrations and turbidity levels due to localized disturbances to bottom sediments associated with pile installation, barge anchoring, and port security barrier (PSB) relocation, as well as the potential for changes in pH and petroleum hydrocarbons concentrations due to accidental spills or releases of cement, other construction debris, or fuel into Hood Canal. Resuspended sediments would contribute to temporary and localized increases in suspended

sediment concentrations and turbidity levels associated with decreases in light transmittance/clarity. Pile-driving activities, which would contribute to resuspension of bottom sediments and associated increases in suspended sediment concentrations and turbidity levels, would occur during 150 days over two in-water work seasons. However, construction activities would not result in persistent increases in turbidity levels or cause changes that would exceed water quality standards because processes that increase turbidity levels would be short-term (minutes to hours) and localized and suspended sediments would disperse and/or settle rapidly.

Construction could result in disturbance and suspension into the water of oxygen-demanding sediments, which would consume some DO in the water column. The amount of oxygen consumed would depend on the magnitude of the oxygen demand associated with suspended sediments (Jabusch et al., 2008). Considering the modest amount of sediment that would be suspended and currents and dilution, the impacts of sediment resuspension from pile removal and installation on DO concentrations would be minimal and would not violate the marine water quality criterion for DO.

For other, recent in-water construction projects at NAVBASE Kitsap Bangor (e.g., the Service Pier Extension), a water quality protection and monitoring plan (WQPMP) was developed and implemented that specifically addressed potentials for spills and debris control. Spill kits will be maintained onsite and on vessels. In particular, the WQPMP specified that “No debris shall be allowed to enter the water during any demolition or new construction work, including sawdust, concrete or asphalt rubble.” The WQPMP also required that the construction contractor deploy a floating barrier around construction activities where debris may enter the water to prevent dispersion and maximize recovery of any spilled construction debris. Similar requirements would apply to the Proposed Action. During installation of pile caps, wet cement could spill into Hood Canal, with potential for short-term and localized changes to water pH levels. However, BMPs included in a WQPMP and the practices described in the following paragraphs would limit the likelihood of a spill, the amount of cement spilled, and the spatial extent of any potential change to water quality. As a result, any potential impacts to water pH levels would be negligible.

The existing facility response and prevention plan for the Bangor waterfront (Commander Navy Region Northwest [CNRNW] *Integrated Oil and Hazardous Substance Contingency Plan*) provides guidance that would be used in a spill response, such as a response procedures, notification, and communication plan; roles and responsibilities; and response equipment inventories. In the event of an accidental spill, response measures would be implemented immediately to minimize potential impacts on the surrounding environment. BMPs and current practices applicable to construction of the TPP Pier would include preparation and implementation of debris management procedures for retrieving and cleaning up any accidental spills.

The following BMPs and current practices would be implemented to minimize impacts on marine waters:

- The contractor would prepare and implement a spill response plan to clean up any fuel or fluid spills. Floating booms would be deployed around in-water construction sites to minimize water quality impacts during construction. Spill kits would be maintained onsite and on vessels. Additionally, personnel will be trained in spill prevention and containment techniques, spill prevention will be implemented daily by maintaining awareness in the construction crew and monitoring activities, and tools and equipment will clean, maintained, and inspected.
- The contractor would prepare and implement a debris management plan. Debris would be prevented from entering the water during all demolition or new construction work. During

in-water construction activities, floating booms would be deployed where debris may enter the water and maintained to collect and contain floatable materials released accidentally. Any accidental release of equipment or materials would be immediately retrieved and removed from the water. The contractor would have several working skiffs available to retrieve debris from the water at any time. Following completion of in-water construction activities, an underwater survey would be conducted to remove any remaining construction materials that may have been missed previously. Retrieved debris would be disposed of at an upland disposal site.

- To minimize impacts on marine water quality, limitations would be placed on construction vessel operations, anchoring, and mooring line deployment. A mooring and anchoring plan would be developed and implemented to avoid dragging anchors and lines. Resulting seafloor disturbance would be confined to a 100-foot wide corridor on the west side of the structure under construction, and narrower 20-foot wide corridors to the north, east, and south (see temporary work zone shown in Figures 2-2 and 2-5). Barges and other construction vessels would not be allowed to run aground. Additionally, vessel operators would be instructed to avoid excess engine thrust in water depths shallower than 30 feet. The contractor will conduct briefings with vessel operators prior to start of in-water construction activities.
- The contractor would follow all fueling requirements and restrictions identified in the project's WQPMP.
- The contractor would follow all requirements in the project's WQPMP regarding inspection and maintenance of hydraulic lines.
- The contractor would follow all requirements in the project's WQPMP regarding concrete placement overwater and underwater.

Debris, fuel, or fluid spills during construction would not affect water quality because the construction contractor would implement existing facility spill response and prevention plans for the NAVBASE Kitsap Bangor waterfront, as well as the above BMPs and current practices. Construction-related impacts to water quality would be limited to short-term, temporary, and localized changes associated with resuspension of bottom sediments. These changes would be spatially limited to the construction corridor, including areas immediately adjacent to the pile locations and would not result in conditions that exceeded water quality standards. Construction in the intertidal zone would be conducted at low tide ("in the dry") to minimize impacts to marine water quality.

Operations associated with the proposed project would not result in any direct discharges of wastewaters, other than treated stormwater, with the potential to adversely affect marine water quality. During operations of the proposed project, stormwater from the pier and trestle would be directed to treatment cartridges with a General Use Level Designation from WDOE prior to discharge of the water to Hood Canal. Stormwater discharges to Hood Canal would be in accordance with discharge permits, and discharges meeting permit limits would not impact receiving water quality or interfere with beneficial uses. Vessel fueling activities would be subject to the same spill prevention plans for the Bangor waterfront discussed above for construction activities associated with Alternative 1. In the event of a spill or release of fuel, implementation of the CNRNW *Integrated Oil and Hazardous Substance Contingency Plan* would minimize the potential for impacts to marine water quality. The Washington Department of Health (WA DOH) anticipates imposing an approximately 200-foot harvest restriction on shellfish from the sanitary sewer connection point on the pier. This is an administrative restriction and



not due to any anticipated spills. However, the pier configuration in this alternative is far enough off-shore that the harvest restriction zone would not reach adjacent beaches.

In general, impacts to marine water quality from construction of Alternative 1 would be temporary and localized, and would not violate any state or federal water quality standards. Similarly, operations of the proposed project would not result in any non-permitted discharges with the potential for adversely affecting marine water quality. Therefore, Alternative 1 would not violate applicable standards, interfere with beneficial uses, or result in significant impacts to water quality at NAVBASE Kitsap Bangor.

### **3.1.3.2.3 Marine Sediments**

Construction activities associated with Alternative 1 would result in minor physical disturbances to marine sediments. For example, the use of vibratory and impact hammers and relocation of PSB anchors could cause resuspension of the sandy silt layers located above the hard glacial deposits. While most of the resuspended sediments would quickly settle back to the bottom at the project site, a portion of the finer grained material may be transported away from the project site by the tidal flow, resulting in minor changes to in the bathymetry and surface sediment grain size. Such suspension would be localized to the immediate area of the pile being driven or anchors being lifted from then replaced on the seafloor; effects would last from days to months. Measures described above to prevent contamination of marine waters during construction would also serve to prevent contamination of marine sediments.

Construction activities would not alter the chemical composition of bottom sediments, nor would construction activities result in the discharge of contaminants that would have the potential to affect sediment quality, violate state standards, or interfere with beneficial uses of Hood Canal.

The potential effects of the proposed Alternative 1 pier structure on littoral sediment transport processes were evaluated by Environmental Science Associates (2019). Results of this evaluation show that the pier structure would cause relatively small changes in current velocity (less than 0.3 feet per second) and stresses (wave-induced motion) on the seabed that would cause sediments to move. The pier would not change the trends in net sediment transport direction and the overall geomorphic processes and shoreline configuration would not change. However, rates of sediment transport may change by varying degrees. Over time, changes in sediment transport are anticipated to cause some accumulation of sediment in the area of the pier landing. For example, up to 10 feet of seaward accretion is anticipated along 100 feet of shoreline around the tip of K/B Spit over a period of 5 to 10 years. This rate of change is consistent with current seaward accretion rate in the vicinity of the K/B Dock and Carderock Pier (Environmental Science Associates, 2019).

Sediment transport pathways converge toward K/B Spit for both existing and proposed project conditions. Therefore, it is expected that transport and overall sediment supply to adjacent beaches to the south or east of K/B Spit along the bluffs, or to Devil's Hole Beach and shellfish harvest area approximately 200 feet to the east of the TPP Pier site, would not be affected. Eroding feeder bluffs and fronting beaches to the east of the K/B Spit are the primary sources of the sediment supply to Devil's Hole Beach (Figure 3.1-1). The shoreline abutment structure constructed for Alternative 1 would be above MHHW in the immediate vicinity of the pier landing and would not interfere with the current, ongoing erosion of the feeder bluff. Therefore, following construction of the proposed TPP Pier, the feeder bluffs would continue to provide sediment to adjacent beaches as they have in the past. South of K/B Spit, little to no change in sediment supply and distribution would occur compared to existing conditions. This is because wave attenuation due to the proposed TPP Pier would be minimal, the shoreline south of K/B Spit is already modified, and this stretch of shoreline is updrift from the proposed



Source: Environmental Science Associates (2019)

**Figure 3.1-1. Aerial Photograph of Study Area and Field Observations by  
Environmental Science Associates**

project site (Environmental Science Associates, 2019). Consequently, Alternative 1 would not result in significant changes to sediment quality or affect sediment supply or transport processes. Therefore, Alternative 1 would not have a significant impact to sediment quality.

### **3.1.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative) Potential Impacts**

#### **3.1.3.3.1 Upland Water**

Impacts to upland water quality from construction and operation of Alternative 2 would be the same as discussed in Section 3.1.3.1 for Alternative 1 because the project elements would be the same. The BMPs and current practices described above for Alternative 1 would be implemented to control runoff and siltation and minimize impacts on surface water.

Therefore, with implementation of these BMPs and current practices, Alternative 2 would not result in significant impacts to upland water resources.

#### **3.1.3.3.2 Marine Water**

Impacts to marine water quality from construction and operation of Alternative 2 would be the same as those associated with Alternative 1. The same BMPs and current practices would be implemented as discussed above for Alternative 1. No discharges, other than treated stormwater, would occur as a result of this alternative. All other potential changes to marine water quality associated with construction activities, such as resuspension of bottom sediments as a result of pile installation, are expected to be temporary and localized, and changes would not exceed applicable water quality standards. Pile-driving activities, which would contribute to resuspension of bottom sediments and associated increases in suspended sediment concentrations and turbidity levels, would occur during 90 days over two in-water work seasons, compared to 150 days for Alternative 1, due to the fewer numbers of piles required. Additionally, Alternative 2 would not require relocating any of the PSBs and anchors, thus eliminating a potential source of bottom sediment disturbance that would otherwise contribute to temporary and localized turbidity. Impacts from spills of construction debris, including cement, would be minimized by implementing BMPs and best practices, including deployments of floating booms as appropriate during in-water construction activities. Vessel fueling activities would be subject to spill prevention plans for the Bangor waterfront. In the event of a spill or release of fuel, implementation of the CNRNW *Integrated Oil and Hazardous Substance Contingency Plan* would minimize the potential for impacts to marine water quality. WA DOH may impose an approximately 200-foot harvest restriction on shellfish from the sanitary sewer connection point on the pier. This is an administrative restriction and not due to any anticipated spills. Therefore, impacts to marine water quality from Alternative 2 would be less than significant.

#### **3.1.3.3.3 Marine Sediments**

Impacts to marine sediment quality from construction and operation of Alternative 2 would be the same as those associated with Alternative 1. No discharges, other than treated stormwater, would occur as a result of this alternative. Stormwater discharges would be in accordance with a stormwater discharge permit and, consequently, would not affect sediment quality. All other potential changes to marine sediment quality associated with construction activities, such as physical disturbance of bottom sediments as a result of pile installation would be temporary and localized, and changes would not exceed applicable sediment standards.

Based on results of an evaluation of the proposed project alternatives on littoral sediment transport conducted by Environmental Science Associates (2019), changes in currents and bed shear stress for Alternative 2 would be larger than for Alternative 1, but still relatively small. The largest relative change in velocity would be a reduction of approximately 0.24 feet per second during flood tides immediately adjacent to the north end of the pier structure, with an associated 38 percent reduction in bed shear stress. Changes in velocity and shear stress at other locations associated with the pier structure would be comparatively smaller. Alternative 2 would have the potential for slightly more accretion than Alternative 1. Similar to Alternative 1, although bed shear stresses would decrease near the proposed Alternative 2 pier's facilities, these changes would not result in significant changes along the shoreline or in the vicinity of the tribal shellfish beach (Environmental Science Associates 2019).

Therefore, impacts to marine sediment quality from Alternative 2 would be less than significant.

## 3.2 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to generally as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal.

Within this EA, biological resources are divided into five major categories: (1) marine vegetation and benthic communities, (2) marine fish, (3) marine mammals, (4) marine birds, and (5) terrestrial resources. No wetlands or streams occur within any of the project construction sites; one nearby wetland is discussed briefly in Section 3.2.2.5.1. Threatened, endangered, and other special status species are discussed in their respective categories.

### 3.2.1 Regulatory Setting

Communities of rooted vegetation, such as eelgrass, are considered a special aquatic site under Section 404 (b)(1) of the Clean Water Act (Section 230.43). Special aquatic sites are provided additional protections from the discharge of dredge or fill material (Part 230.10(a)(3)). Marine vegetation and benthic communities are also provided additional consideration through the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Endangered Species Act (ESA), which are discussed below.

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires federal agencies to consult with National Marine Fisheries Service (NMFS) on activities that may adversely affect essential fish habit (EFH). Under the Act, EFH consists of the waters and substrate needed by fish to spawn, breed, feed, or grow to maturity (16 U.S.C. 1802(10)). Seagrasses are considered Habitat Areas of Particular Concern (HAPC), which are a subset of EFH. Designated HAPC's are not afforded any additional regulatory protection under MSA, but potential adverse impacts to HAPC are more carefully scrutinized during the EFH consultation process. The Navy consulted with NMFS under the MSA, submitted an EFH Assessment to NMFS on January 15, 2020, and concluded consultation on April 27, 2021.

Special-status species, for the purposes of this assessment, are those species listed as threatened or endangered under the ESA and species afforded federal protection under the Marine Mammal Protection Act (MMPA) or the Migratory Bird Treaty Act (MBTA).

The purpose of the 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 NMFS 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. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the Department of Defense (DoD) where an 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. The Navy consulted with NMFS and USFWS under the ESA and submitted a Biological Assessment to NMFS on January 15, 2020, and to USFWS on January 14, 2020. The Navy concluded consultations under the ESA with NMFS on April 27, 2021, and USFWS on March 25, 2021.

All marine mammals are protected under the provisions of the MMPA. The MMPA prohibits any person or vessel from “taking” marine mammals in the United States or 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.” The Navy consulted with NMFS in accordance with the MMPA and received Incidental Harassment Authorizations, one for each of the two in-water work seasons, from NMFS on August 25, 2020. NMFS published a Final Rule in the Federal Register on October 28, 2020.

Birds, both migratory and most native-resident bird species, are protected under the MBTA, and their conservation by federal agencies is mandated by Executive Order (EO) 13186 (Migratory Bird Conservation). 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 by regulation.

Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act. This act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs. The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Navy consulted with the USFWS and requested a permit under the Act on August 27, 2020. USFWS issued the permit on October 27, 2020.

### **3.2.2 Affected Environment**

The following discussions provide a description of the existing conditions for each of the categories under biological resources at NAVBASE Kitsap Bangor.

#### **3.2.2.1 Marine Vegetation and Benthic Communities**

Marine vegetation communities include species of aquatic plants such as eelgrass and macroalgae. Benthic communities inhabit the bottom of a body of water and include sea snails and worms, sea stars, and shellfish such as oysters, clams, crabs, and shrimp.

Marine vegetation includes macrophytes and macroalgae. Macrophytes are aquatic rooted, flowering plants. Macrophyte genera that occur in the Pacific Northwest include *Salicornia* (sea asparagus), *Zostera* (eelgrasses), and *Phyllospadix* (surfgrasses). Algae are a diverse group of simple plants that are mainly aquatic. These organisms are capable of photosynthesis and range in size from single-celled organisms (i.e., phytoplankton) to large plants, often referred to as seaweeds. Macroalgae lack true roots, stems, and leaves. They are divided into three taxonomic groups based upon their dominant photosynthetic pigmentation: green, red, and brown (Lamb & Hanby, 2005).

##### **3.2.2.1.1 Eelgrass**

Aquatic marine vegetation of the NAVBASE Kitsap Bangor shoreline is composed of intertidal and subtidal species, as well as floating and attached species. Eelgrass, often occurring in beds, is high-quality habitat and is most abundant in low-energy areas in the lower intertidal and shallow subtidal photic zone where organic matter and nutrients are abundant (Johnson & O’Neil, 2001). Eelgrass is one of the most important vegetation types in the marine ecosystem because eelgrass beds produce large amounts of carbon that fuel nearshore food webs and offer habitat to many marine species (Mumford, 2007). Fish and shellfish such as crabs and bivalves use eelgrass beds for habitat and nursery areas. Eelgrass is an important habitat for juvenile salmonids, which use eelgrass beds as migratory corridors, for protection from predators, and for foraging (review in Mumford, 2007). Well-established eelgrass

beds were documented in 2007 in most survey areas along the Bangor shoreline in shallow water depths ranging from 0 to 20 feet below mean lower low water (MLLW) (SAIC, 2009). That year no eelgrass was documented in the survey area that includes the current site of the TPP Pier project. The area was resurveyed in 2015 and no *Z. marina* was detected within or adjacent to the project site (Navy, 2015c). However, non-native dwarf eelgrass (*Z. japonica*) was observed infrequently within the survey area and in small, isolated patches outside of the transect locations during the 2015 survey.

The area was resurveyed in 2019 (Navy, 2019a). Figure 3.2-1 depicts the distribution of eelgrass in 2019 in relation to the proposed Alternative 1 trestle and pier alignment. Figure 3.2-2 depicts the distribution of eelgrass in 2019 in relation to the proposed Alternative 2 trestle and pier alignment. An area with large metal debris was observed during the 2019 survey (see Figures 3.2-1 and 3.2.2). The debris covers the bottom in that localized area, preventing eelgrass from growing but providing attachment sites for macroalgae (Section 3.2.2.1.2).

### **3.2.2.1.2 Macroalgae**

Macroalgae such as those found on NAVBASE Kitsap Bangor are ecologically important as primary producers and for providing habitat for other marine organisms. At NAVBASE Kitsap Bangor, green algae grow mainly in the lower intertidal and subtidal zones and include common species such as sea lettuce (*Ulva* spp.), which grows from the lower-intertidal subzone to depths of more than 50 feet below MLLW in protected areas. However, the *Ulva* community is concentrated at depths less than about 30 feet below MLLW and occurs only sparsely (less than 10 percent coverage) at greater depths (Pentec, 2003; SAIC, 2009; Marx et al., 2019). Boulders in the nearshore marine habitats are typically encrusted with sea lettuce (Pentec, 2003). During the 2015 survey at the TPP Pier site, *Ulva* was detected on all but one transect (Navy, 2015c). In 2019, *Ulva* was detected along all transects and in 64 of 78 quadrats surveyed (Marx et al., 2019). Macroalgae occurrence at the project site is shown in Figures 3.2-1 and 3.2-2 for Alternative 1 and Alternative 2, respectively.

Red algae are located in the cobble and gravel upper intertidal zone, but also occur subtidally. Red algae of the genera *Endocladia*, *Mastocarpus*, *Ceramium*, *Porphyra*, *Gracilaria*, *Chondracanthus*, *Gracilariopsis*, *Smithora*, *Polyneura*, and *Sparlingia* are present on NAVBASE Kitsap Bangor in intertidal zones (Pentec, 2003; SAIC, 2009; Leidos and Grette Associates, 2013a; Marx et al., 2019). During the 2015 survey, *Gracilaria/Gracilariopsis* and *Porphyra* were the most common species of red algae observed at the TPP Pier site. None of these three genera were detected from the 2019 survey (Marx et al., 2019).

Brown algae are found in nearshore environments of the Bangor shoreline from lower intertidal to subtidal zones and occur in a variety of forms, including encrusting, filamentous, and leafy varieties, on rocks and boulders. Several leafy brown algae species (e.g., *Egregia* and *Desmarestia*) are present on NAVBASE Kitsap Bangor (Pentec, 2003; SAIC, 2009; Navy, 2015c). Understory kelp (*Saccharina* sp.) provide an important source of nutrients to the seafloor (from fragmentation and decomposition) and multi-species vertical habitat in deeper marine waters (Mumford, 2007). The kelp beds on NAVBASE Kitsap Bangor occur to depths of about 25 feet below MLLW (SAIC, 2009). During the 2015 survey, *Saccharina latissima* was found throughout the TPP Pier survey area, often attached to rocks and/or large shells. In 2019 this species was the third most abundant in terms of frequency of occurrence (Marx et al., 2019). No attached, canopy-forming kelp beds (e.g., bull kelp) occur at the Bangor shoreline (SAIC, 2009).

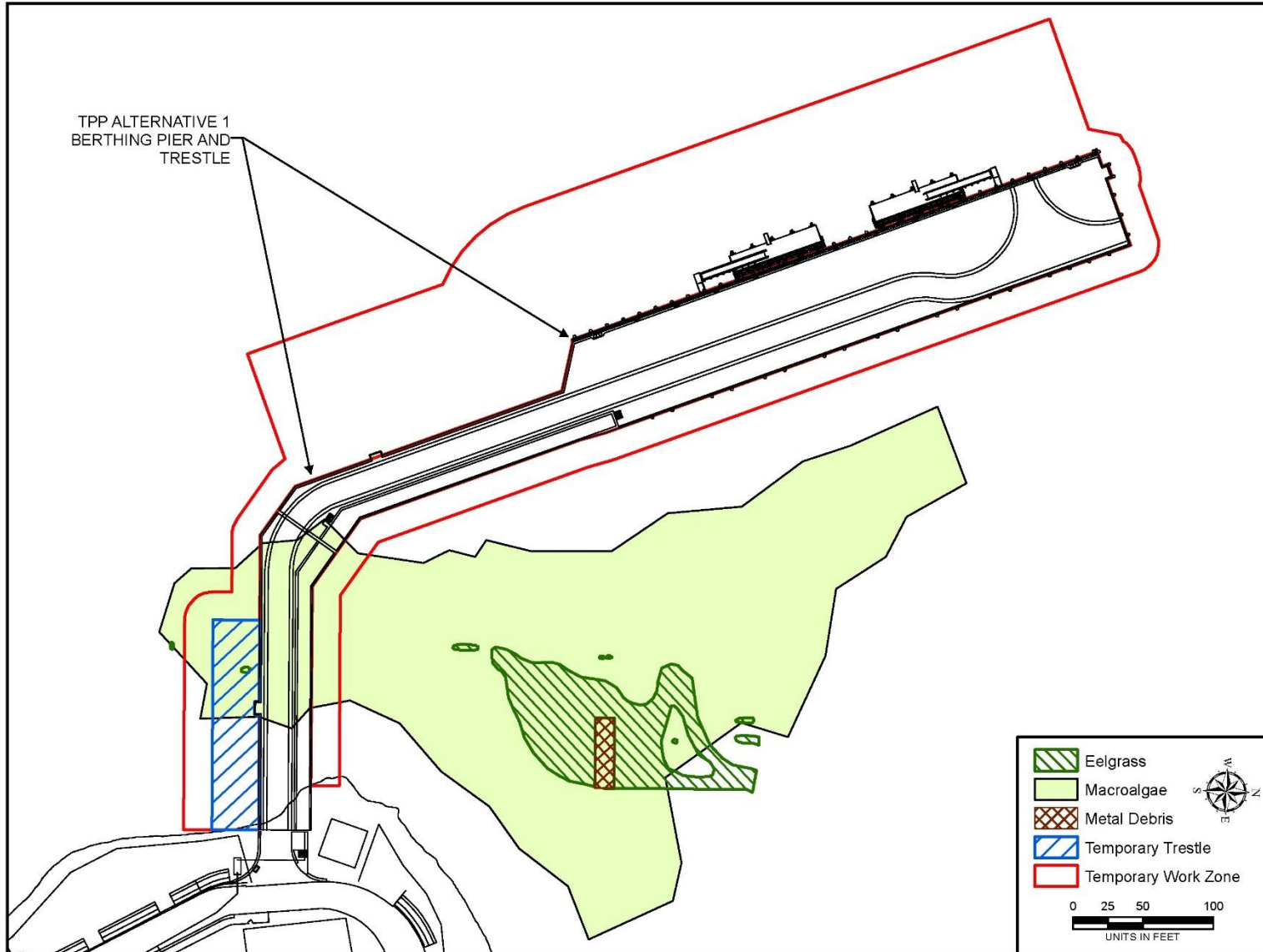


Figure 3.2-1. 2019 Eelgrass and Macroalgae Occurrence in Relation to Alternative 1 Alignment



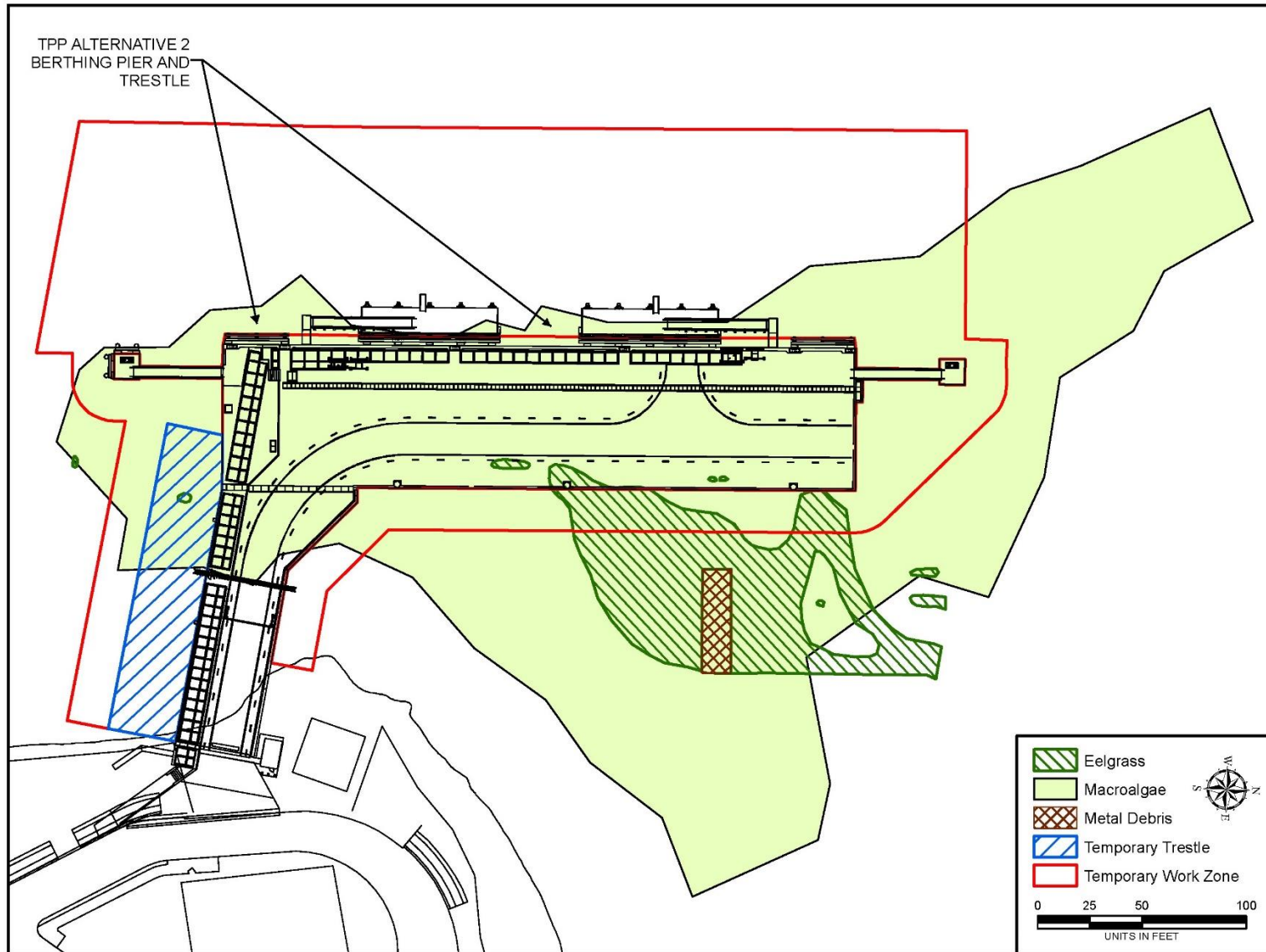


Figure 3.2-2. 2019 Eelgrass and Macroalgae Occurrence in Relation to Alternative 2 Alignment

*Sargassum muticum* is a species of brown macroalgae native to the Sea of Japan, but now occurs in most areas of the Pacific Coast of North America and is considered an invasive species. The complex branching of *Sargassum* plants provides habitat for amphipods and other invertebrates and their predators; however, where *Sargassum* overlaps with native marine vegetation (such as eelgrass, kelp, and other macroalgae), it outcompetes those species by shading (Whatcom County Marine Resources Committee, 2005). Two large beds of *Sargassum* occur along the Bangor shoreline south of Devil's Hole (SAIC, 2009). One of these is at the TPP Pier project site where this species was documented on every transect surveyed in 2015 (Navy, 2015c). In 2019, 15 out of 18 transects and nearly one-third of surveyed quadrats contained *Sargassum* (Marx et al., 2019). Other pockets of *Sargassum* on the base were small and isolated, based on a 2007 survey (SAIC, 2009).

Overall, macroalgae coverage along the transects surveyed at the TPP Pier site in 2015 ranged from moderate to dense, but not approaching 100 percent (Boyle, 2017). Dominant and common species were *Ulva*, *Sargassum*, *Saccharina*, and *Gracilaria/Graciliopsis*. Based on the survey, these conditions are considered characteristic of the TPP Pier site in general, at depths of less than 30 feet, below which algae is sparse. The 2019 survey confirmed the 2015 survey findings, though species composition varied (Marx et al., 2019).

### **3.2.2.1.3 Benthic Communities**

Animals that live on the seafloor are called benthos. Most of these animals lack a backbone and are called invertebrates. Typical benthic invertebrates include sea anemones, sponges, corals, sea stars, sea urchins, worms, bivalves, crabs, and many more. Benthic organisms, including both infaunal (living in the sediments) and epifaunal (living on top of the sediments) species, are abundant and diverse along the NAVBASE Kitsap Bangor waterfront (Pentec, 2003; Weston, 2006; Delwiche et al., 2008; Leidos and Grette Associates, 2013b). Local patterns of benthic community structure are influenced by physical and chemical characteristics; therefore, benthic organisms are useful indicators of habitat differences and quality. Hood Canal has been divided into nine biotic subregions based on soft-bottom benthic community structure, dominant taxa, sediment fines (i.e., the percent of silt and clay material), total organic carbon content of bottom sediments, and depth (WDOE, 2007). NAVBASE Kitsap Bangor and the TPP Pier project site are within the north Hood Canal biotic subregion, which is characterized by coarser sediment, lower total organic carbon, and higher DO values than the other biotic subregions of Hood Canal. These conditions support a relatively more abundant and diverse benthic community, including stress-sensitive species such as the seed-shrimp, a small ostracod crustacean (WDOE, 2007).

In a 2005 survey along the central portion of the NAVBASE Kitsap Bangor waterfront from just south of Delta Pier to just north of EHW-1, the intertidal benthic communities were composed largely of polychaetes, molluscs, and crustaceans, and the subtidal communities were dominated by molluscs and crustaceans (Weston, 2006). Oyster beds, composed of Pacific oysters (*Crassostrea gigas*), occur along approximately 72 percent of the Bangor shoreline and occasionally co-occur with beds of mussels (*Mytilus* spp.) (Delwiche et al., 2008). In addition to oysters and mussels, mollusk species at the waterfront include a wide variety of clams: geoduck (*Panopea generosa*), false geoduck (*Zirfaea pilsbryii*), butter (*Saxidomus gigantea*), littleneck (*Leukoma staminea*), softshell (*Mya arenaria*), horse (*Tresus* spp.), bent nose (*Macoma* spp.), purple varnish (*Nuttallia obscurata*), and Manila (*Venerupis philippinarum*). The benthic community of the TPP Pier site is expected to be typical of the NAVBASE Kitsap Bangor shoreline in general, although there are no oyster beds at the TPP Pier site (Figure 3.2-3).

Qualitative surveys indicated bivalve siphon holes were moderate to abundant in the intertidal area, indicating the presence of other common bivalve species (Delwiche et al., 2008).



**Figure 3.2-3. Beach Substrate at TPP Pier Project Site**

ROV surveys conducted at NAVBASE Kitsap Bangor in August 2014 and February 2015 outside of the restricted areas documented over 1,000 spot prawns plus dozens of sea stars and California sea cucumbers, one octopus, and multiple crab species (Dungeness, unidentified *Cancer* species, red rock, and tanner) (Frierson et al., 2016). Lighted fish trap surveys conducted in June 2014 and February 2015 at five locations (not including the specific TPP Pier site) along the NAVBASE Kitsap Bangor waterfront documented multiple shrimp species (crangon, stout, dock), caprellid amphipods, three crab species (graceful, decorator, and northern kelp), kelp isopods, blackeye hermit crabs, nudibranchs, and stubby squid (Frierson et al., 2016). Although these surveys were not conducted at the TPP project site, the noted species are expected to occur there, based on generally similar habitat types and depths.

### **3.2.2.2 Marine Fish**

The discussion of marine fish is separated into *Non ESA-Listed Fish Species*, *ESA-listed Fish Species and Critical Habitat*, and *Essential Fish Habitat* and includes a description and general life history for each ESA-listed fish species and EFH occurring within Hood Canal. A list of threatened and endangered species known to occur or potentially occurring in the ROI and critical habitat present in the region of influence (ROI) is provided in Table 3.2-1.

**Table 3.2-1. Threatened and Endangered Species Known to Occur or Potentially Occurring in the Region of Influence and Critical Habitat Present in the Region of Influence**

<i>Common Name (Scientific Name)</i>	<i>Federal Listing Status</i>	<i>Critical Habitat Present?</i>
Puget Sound ESU Chinook salmon, <i>Oncorhynchus tshawytscha</i>	Threatened 70 FR 37160, June 28, 2005	Designated critical habitat in Hood Canal from extreme high tide to a depth of 30 meters (98 feet) below MLLW (70 FR 52630). However, DoD lands, associated easements and right-of-ways, and Naval Restricted Areas listed under 33 CFR section 334.1220 are exempt from critical habitat designation because of implementation of an INRMP (Navy, 2018a) that outlines species protection measures.
Hood Canal summer-run ESU chum salmon, <i>Oncorhynchus keta</i>	Threatened 64 FR 14508, March 25, 1999	
Puget Sound DPS steelhead, <i>Oncorhynchus mykiss</i>	Threatened 72 FR 26722, May 11, 2007	Designated in Puget Sound freshwater and estuarine habitat. Streams with potential steelhead presence are not designated at NAVBASE Kitsap (81 FR 9252).
Bocaccio rockfish, Puget Sound/Georgia Basin DPS, <i>Sebastes paucispinis</i>	Endangered 75 FR 22276, April 28, 2010	Designated critical habitat in Hood Canal in nearshore areas from extreme high tide to a depth of 30 meters below MLLW for juvenile bocaccio and in waters deeper than 30 meters below MLLW for adult bocaccio and juvenile and adult yelloweye rockfish (79 FR 68042; 82 FR 7711). However, DoD lands, associated easements and right-of-ways, and Naval Restricted Areas listed under 33 CFR section 334.1220 are exempt from critical habitat designation because of implementation of an INRMP (Navy, 2018a) that outlines species protection measures.
Yelloweye rockfish, Puget Sound/Georgia Basin DPS, <i>Sebastes ruberrimus</i>	Threatened 75 FR 22276, April 28, 2010	
Bull trout, <i>Salvelinus confluentus</i>	Threatened 64 FR 58910, November 1, 1999	Designated along the shoreline to depth of 10 meters (33 feet) below MLLW (75 FR 63898). The closest critical habitat occurs along the western and northern shores of Dabob Bay beyond Hazel Point, at the southern tip of Toandos Peninsula, which is outside of the area affected by the Proposed Action (75 FR 63945).
Humpback Whale, Mexico DPS <i>Megaptera novaeangliae</i>	Endangered 81 FR 62250 September 8, 2016	No
Humpback Whale, Central America DPS <i>Megaptera novaeangliae</i>	Threatened 81 FR 62250 September 8, 2016	No
Marbled murrelet, <i>Brachyramphus marmoratus</i>	Threatened 57 FR 45328–45337 October 1, 1992	No

**Key:** CFR = Code of Federal Regulations; DoD = Department of Defense; DPS = distinct population segment; ESU = evolutionarily significant unit; FR = Federal Register; INRMP = Integrated Natural Resources Management Plan; MLLW = mean lower low water; NAVBASE = Naval Base

### 3.2.2.2.1 Non-ESA-Listed Fish Species

Hood Canal is known to support at least 200 species of marine fish, including anadromous species (salmonids) that live part of their life cycle in fresh water (Schreiner et al., 1977; Miller & Borton 1980; Prinslow et al., 1980; Bax, 1983; Salo, 1991; Bhuthimethee et al., 2009; Palsson et al., 2009; Burke Museum, 2010). Fish species include salmonids (some of which are ESA-listed) such as Chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*O. keta*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), pink salmon (*O. gorbuscha*), cutthroat trout (*O. clarki clarki*), anadromous steelhead trout (*O. mykiss*), and bull trout (*Salvelinus confluentus*). Commercial groundfish species that occur within Puget Sound include but are not limited to Pacific hake (*Merluccius productus*), Pacific cod (*Gadus microcephalus*), lingcod (*Ophiodon elongates*), English sole (*Parophrys vetulus*), spiny dogfish (*Squalus acanthias*), copper rockfish (*Sebastes caurinus*), quillback rockfish (*S. maliger*), and splitnose rockfish (*S. diploproa*), among many others.

Multiple fish surveys have been conducted at NAVBASE Kitsap Bangor (SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2016, 2017). None of the surveys sampled at the proposed TPP site, but results for survey locations near this site are expected to be representative where noted.

Fish surveys were conducted within the Bangor Naval Restricted Areas by the Washington Department of Fish and Wildlife (WDFW) from 2014 to 2016 using a variety of sampling methods that included a remotely operated vehicle (ROV), split-beam echosounder (hydroacoustics), scuba diving, lighted fish traps, and beach seining (Frierson et al., 2016, 2017). Beach seining targeted forage fish and juvenile salmonids in the nearshore, whereas the other remaining survey methods targeted rockfish and species occurrence offshore.

Surveys using an ROV at depths between 50 and 250 feet observed just over 900 fish that included various unidentified fish (less than 5 centimeters), flatfish (Order: Pleuronectiformes), eelpouts (Family: Zoarcidae), pricklebacks (Family: Stichaeidae), codfish (Family: Gadidae), sculpins (Family: Cottidae), and rockfish (*Sebastes* spp). Specific fish species recorded included English sole; rockfish (copper, brown [*Sebastes auriculatus*], and yellowtail [*Sebastes flavidus*]); spotted ratfish (*Hydrolagus colliei*); flatfish (rock sole [*Lepidopsetta bilineata*], Dover sole [*Solea solea*], starry flounder [*Platichthys stellatus*]); Sculpin (great [*Myoxocephalus polyacanthocephalus*], buffalo [*Enophrys bison*], Pacific staghorn [*Leptocottus armatus*]); lingcod; Pacific sand lance; Pacific sanddab (*Citharichthys sordidus*); and blackbelly eelpout (*Lycodes pacificus*) (Frierson et al., 2016). Flatfish and eelpout were the most common species recorded at 33 percent and 14 percent, respectively.

Beach seine surveys were conducted along the NAVBASE Kitsap Bangor shoreline from 2005 through 2008 (SAIC, 2006; Bhuthimethee et al., 2009), and more recent surveys were conducted at the northern and southern ends of the NAVBASE Kitsap Bangor waterfront, at Floral Point and Carlson Spit, respectively (Frierson et al., 2016, 2017). Shiner perch (*Cymatogaster aggregata*) was consistently one of the most abundant fish collected during each survey year (SAIC 2006; Bhuthimethee et al., 2009; Frierson et al., 2016, 2017). Salmonid species collected included Chinook, coho, chum, pink salmon, and cutthroat trout. Steelhead were collected in small numbers in earlier survey efforts (SAIC, 2006; Bhuthimethee et al., 2009), but not collected during surveys in 2015 and 2016 (Frierson et al., 2016, 2017). Eight groundfish species (Dover sole, English sole, kelp greenling [*Hexagrammos decagrammus*], lingcod, Pacific sanddab, rex sole [*Glyptocephalus zachirus*], sand sole [*Psettichthys melanostictus*], and starry flounder), as well as unidentified flatfishes/sole species and unidentified juvenile rockfish (*Sebastes* spp.) were recorded within

the nearshore area at locations approximately 1,300 feet north (near Devil's Hole) and 2,000 feet south (Carlson Spit) of the project area (SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2016).

### **Forage Fish**

Forage fish are an important and abundant group of species that occur in the marine waters of Washington. As the name implies, forage fish are important as prey for a large variety of other marine organisms, including birds, fish, marine mammals, and Pacific salmonids. Forage fish species occupy every marine and estuarine habitat in Puget Sound. The most common forage fish in Puget Sound include Pacific herring (*Clupea harengus pallasii*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*). All three of these species occur within the project area (Navy, 2014b).

Beach surveys were conducted along NAVBASE Kitsap Bangor's waterfront and recorded small numbers of Pacific herring during winter months and large numbers during summer months (SAIC, 2006; Bhuthimethee et al., 2009). Surf smelt are expected to be present within the nearshore areas at the TPP Pier site year round. A high abundance of surf smelt was recorded during late spring through early summer and juvenile surf smelt were observed within nearshore areas of the TPP site from January through mid-summer months. Juvenile sand lance were also observed from January through mid-summer months within nearshore cove areas mixed in with larval sand lance and surf smelt (SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2017). All life stages of surf smelt and sand lance are expected to be present along the NAVBASE Kitsap Bangor waterfront.

Large spawning areas of herring have been observed in Hood Canal (Stick and Lindquist, 2009; Stick et al., 2014) but none have been documented within the NAVBASE Kitsap Bangor boundary. WDFW surveys conducted in December 1995, November 1996, and January 1997 documented sand lance spawning along the shoreline, including beaches adjacent to Carderock Pier, Service Pier, K/B Dock (adjacent to the project site), Delta Pier, Marginal Wharf, EHW-1, and the Magnetic Silencing Facility Pier (WDFW, 2017).

Spawning surveys conducted in 2013–2016 occurred at six distinct beaches and transects encompassing approximately 1.25 miles of shoreline (Navy, 2016c) (Figure 3.2-4). Spawning grounds for surf smelt and Pacific herring have not been historically documented along the NAVBASE Kitsap Bangor shoreline and are largely absent from the north-central portion of Hood Canal in general (Frierson et al., 2017). Pacific sand lance spawning habitat has been documented approximately 250 feet south of the TPP project footprint, south of K/B Dock (Figure 3.2-4). In May 2013, Pacific sand lance were documented along the stretch of beach from Marginal Wharf to EHW-1, which is approximately 5,000 feet north of the TPP project footprint (Navy, 2014b). Surveys of six beaches in 2015 did not document the presence of Pacific sand lance (Navy, 2016c).

Five beaches were surveyed at Bangor in 2017–2018: from the Carderock Pier to Service Pier (three transects); KB pier (three transects); from Delta South to Marginal Wharf (four transects); Marginal Wharf to EHW-1 (four transects); and EHW-1 to the Magnetic Silencing Facility (four to five transects) (Navy, 2018b). Adjustments were made to sample the best potential spawning substrates at each location. Surf smelt spawning was not detected at any of the five beaches sampled at NAVBASE Kitsap Bangor during the 2017–2018 surveys. Pacific sand lance spawning was detected at Carlson Spit in November 2017 and January 2018; at K/B Spit approximately 190 feet northeast of the TPP Pier site in February 2018; and between Marginal Wharf and the Magnetic Silencing Facility in November 2017 at NAVBASE Kitsap Bangor.



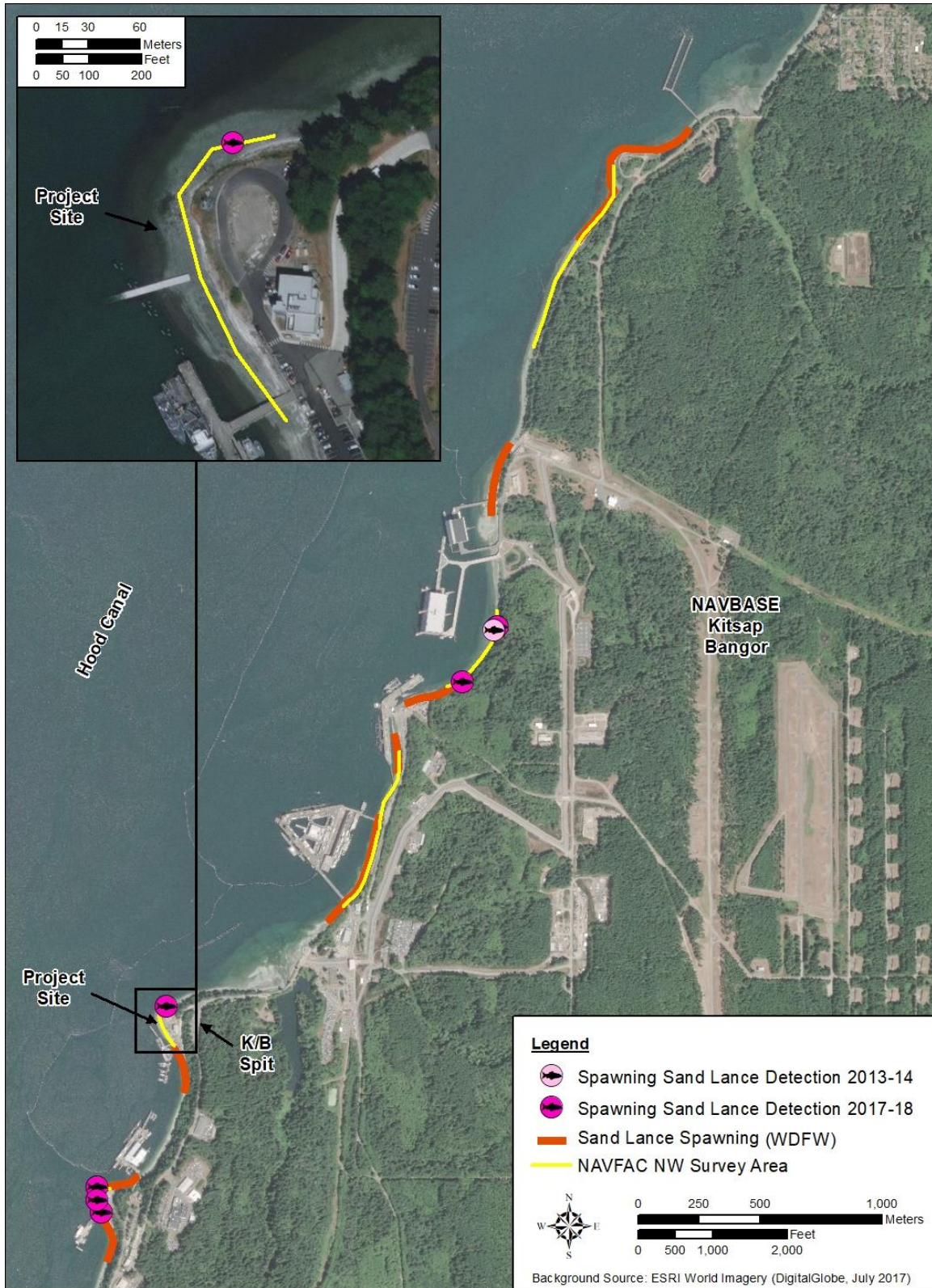


Figure 3.2-4. Documented Forage Fish Spawning at or Near NAVBASE Kitsap Bangor

### **3.2.2.2.2 ESA-Listed Fish Species and Critical Habitat**

ESA-listed fish species that occur along or within the vicinity of NAVBASE Kitsap Bangor waterfront include Puget Sound evolutionarily significant unit (ESU) Chinook salmon (*Oncorhynchus tshawytscha*); Hood Canal summer-run ESU chum salmon (*O. keta*); and Puget Sound distinct population segment (DPS) steelhead (*O. mykiss*); and Puget Sound/Georgia Basin DPSs of bocaccio (*Sebastes paucispinis*) and yelloweye rockfish (*S. ruberrimus*); and bull trout (*Salvelinus confluentus*) (Table 3.2-1).

#### **Puget Sound ESU Chinook Salmon**

The Puget Sound ESU Chinook salmon was listed as threatened under the ESA in 1999 (64 *Federal Register* [FR] 14308) with the threatened status reaffirmed in 2005 (70 FR 37160). The listing includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound, to include the Strait of Juan de Fuca from the Elwha River eastward, including rivers and streams flowing into Hood Canal; South Sound; North Sound; the Strait of Georgia in Washington; and 26 artificial propagation programs (NMFS, 2011; 81 FR 72759).

#### **Critical Habitat**

Critical habitat was designated for the Puget Sound Chinook salmon ESU in February 2000 and re-designated September 2005 (70 FR 52630). Critical habitat consists of water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches. In marine waters, designated critical habitat includes all nearshore marine areas (including areas adjacent to islands) of the Strait of Georgia (south of the international border), Puget Sound, Hood Canal, and the Strait of Juan de Fuca (to the western end of the Elwha River delta) from the line of extreme high tide out to a depth of 30 meters (100 feet). However, DoD lands, associated easements and right-of-ways, and associated Naval Restricted Areas listed under 33 CFR part 334 were exempted from designation because of implementation of INRMPS that outline species protection measures (70 FR 52630).

Of the five primary constituent elements (PCEs) identified as essential for conserving Puget Sound Chinook, two PCEs occur in marine waters (NMFS, 2005):

- (1) Estuarine areas free of obstruction and excessive predation with: (i) water quality and quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders side channels; and (iii) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation;
- (2) Nearshore marine areas free of obstruction and excessive predation with: (i) water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

#### **Occurrence**

Juvenile Puget Sound Chinook salmon outmigrating from streams and hatcheries occur most frequently along the Bangor waterfront from late May to early July (SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2016). Juvenile Chinook salmon were collected during seining at Floral Point and Carlson Spit, with peak collection in June (Frierson et al., 2016, 2017). Adult Chinook salmon enter Hood Canal waters from



August to October and would likely pass by NAVBASE Kitsap Bangor, within the deeper offshore waters, on their way to natal streams to spawn (Table 3.2-2).

**Table 3.2-2. Potential Endangered Species Act-Listed Species Occurrence During In-Water Work Window**

<i>Species</i>	<i>Presence</i>
Chinook, Puget Sound ESU	Returning adults/residents/some juvenile outmigrants
Chum, summer-run ESU	Adults only (August – October)
Steelhead, Puget Sound DPS	Returning adults/outmigrating smolts (offshore deeper waters; only expected to pass through Hood Canal; presence in nearshore discountable).
Bull Trout	Rare. Adults may use Hood Canal as a migration corridor.
Bocaccio, Puget Sound/Georgia Basin DPS	Adults occur at depths greater than 100 feet and on complex structured habitats. Lack of suitable habitat at project site. Juveniles occur in eelgrass; kelp and eelgrass occur along Naval Base Kitsap Bangor shoreline (SAIC, 2009; Leidos and Grette Associates, 2013a).
Yelloweye rockfish, Puget Sound/Georgia Basin DPS	Adult and juveniles occur at depths greater than 100 feet and on complex structured-rocky habitat. Lack of suitable habitat at project site. Larval yelloweye rockfish are pelagic, occur within the surface waters, and are associated with free-floating vegetation, which could occur within the project site.
Humpback whale, Mexico DPS and Central America DPS	Rare

**Key:** ESU = evolutionarily significant unit; DPS = distinct population segment

**Hood Canal Summer-Run ESU Chum Salmon**

The Hood Canal summer-run ESU chum salmon was listed as threatened in June 2005 (70 FR 37160). The listing includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries, as well as populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington, and eight artificial propagation programs (NMFS, 2011; 81 FR 72759). However, all Hood Canal summer chum hatchery programs except Lilliwaup were terminated by 2014. The last supplementation-origin spawners, outside of Lilliwaup River, are expected to return to the Tahuya River in 2018 (Northwest Fisheries Science Center, 2015). The NMFS recovery plan for this species was adopted on May 24, 2007 (72 FR 29121).

**Critical Habitat**

Critical habitat was designated for the Hood Canal summer-run chum salmon ESU in February 2000 and re-designated September 2005 (70 FR 52630). Designated critical habitat includes nearshore marine areas (including areas adjacent to islands) of Hood Canal and the Strait of Juan de Fuca (to Dungeness Bay) from the line of extreme high tide out to a depth of 30 meters. However, DoD lands, associated easements and right-of-ways, and associated Naval Restricted Areas listed under 33 CFR section 334.1220 were exempted from designation because of implementation of INRMPs that outline species protection measures (70 FR 52630)

The two PCEs occurring in marine waters, as described above for the Puget Sound Chinook salmon ESU, also are essential to conserving the Hood Canal summer-run chum ESU (NMFS, 2005).

### **Occurrence**

Hood Canal summer-run chum occur within the project area in Hood Canal (Table 3.2-2). Only adults are present during the in-water work window. Juvenile Hood Canal summer-run chum mature in the ocean for three to five years. Adult run timing of Hood Canal summer-run chum population begins in early August into October.

Summer and fall outmigrants are visually indistinguishable from non ESA-listed fall-run fish. Genetic studies differentiating fall-run and summer-run chum salmon found that summer-run fish comprised over 90 percent of all chum captured in the Duckabush River from January through the first week of April and over 90 percent of all chum captured in the Hamma Hamma River from January through mid-March (Weinheimer, 2013). During beach seine surveys conducted along Carlson Spit, peak chum collection occurred during January through June, with the majority of summer-run chum (97 percent) occurring in the January and February samples (Frierson et al., 2017). Based on these studies, juvenile summer-run chum are expected to occur near the proposed project area from January and be absent by June and, therefore, are not expected to be exposed to project work.

Summer-run chum adults return to Hood Canal from as early as August through the first week in October (Washington Department of Fisheries et al., 1993; WDFW and Point-No-Point Treaty Tribes, 2000). Adult summer-run chum may be present within the offshore waters of Hood Canal during their migration period August through October (Washington Department of Fisheries et al., 1993; WDFW and Point-No-Point Treaty Tribes, 2000). However, their presence would be expected to be brief (passing by NAVBASE Kitsap Bangor) and offshore (Table 3.2-2).

### **Puget Sound Steelhead DPS**

The Puget Sound DPS steelhead was listed in May 2007 under the ESA as threatened (72 FR 26722). The DPS includes all naturally spawned anadromous winter-run and summer-run steelhead populations originating below natural and manmade impassible barriers from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound, and the Strait of Georgia. Six artificial propagation programs are also included in this DPS (81 FR 72759).

The Puget Sound Technical Recovery Team identified three major population groups in the Puget Sound DPS steelhead (Myers et al., 2015). These include (1) Northern Cascades, (2) Central and South Puget Sound, and (3) Hood Canal and Strait of Juan de Fuca. These major population groups are composed of 32 demographically independent steelhead populations in Puget Sound (Table 3.2-3).

### **Critical Habitat**

Critical habitat for Puget Sound steelhead was designated in February 2016 for freshwater and estuarine habitat in Puget Sound I (81 FR 9252). DoD streams with potential steelhead presence are not designated at NAVBASE Kitsap (81 FR 9252). Therefore, no designated Puget Sound steelhead critical habitat occurs within the project area.

**Table 3.2-3. Demographically Independent Populations in  
Puget Sound Distinct Population Segment Steelhead**

<i>Major Population Group</i>	<i>Number of Winter-Run DIPs</i>	<i>Number of Summer-/Winter-Run DIPs<sup>1</sup></i>	<i>Number of Summer-Run DIPs</i>
Northern Cascades	8	3	5
Central and South Puget Sound	8	0	0
Hood Canal and Strait of Juan de Fuca	7	1	0

Source: Myers et al., 2015

Key: DIPs = demographically independent populations

Note:

1. Overlap of summer-run and winter-run steelhead spawning. Considered one DIP where noted in Myers et al. 2015 until further genetic analysis is conducted.

### Occurrence

Puget Sound steelhead typically rear in freshwater for two or three years. Migration to marine waters is generally from mid-April through late May, when smolts are approximately 150 to 220 millimeters (Ward et al., 1989, as cited by Moore et al., 2010a). Studies reviewed by NMFS indicated that “steelhead migratory behavior strongly suggests that juveniles spend little time (a matter of hours in some cases) in estuarine and nearshore areas and do not favor migration along shorelines” (Moore et al., 2010a,b). Early offshore movement of steelhead after entry into Puget Sound marine waters was concluded from a study of Green River steelhead (Goetz et al., 2015).

Steelhead do not occur in large numbers along the NAVBASE Kitsap Bangor waterfront and were only collected in small numbers with peaks in late spring and summer months. Steelhead collected during surveys accounted for less than 1 percent of the salmonid catch (SAIC, 2006; Bhuthimethee et al., 2009). Recent beach seine surveys conducted from May 2015 through September 2016 did not record any steelhead (Frierson et al., 2017). Further, acoustic telemetry studies conducted on downstream migrating steelhead smolts from Big Beef Creek did not detect any smolts within southern Hood Canal, confirming rapid migration to sea (Moore et al., 2010b). Therefore, Puget Sound steelhead would be unlikely to occur within the NAVBASE Kitsap Bangor waterfront and are not expected to occur in deeper waters of the project area (Table 3.2-2).

### Bull Trout

Bull trout was listed under the ESA as threatened in 1999 (USFWS, 1999). They are listed as a single DPS within the five-state (Idaho, Montana, Nevada, Oregon, and Washington) area of the coterminous United States. This DPS is subdivided into six biologically based recovery units that have been “documented as necessary to both the survival and recovery of the species in a final recovery plan.” The recovery units are identified in the final recovery plan as the following: (1) Coastal Recovery Unit; (2) Klamath Recovery Unit; (3) Mid-Columbia Recovery Unit; (4) Upper Snake Recovery Unit; (5) Columbia Headwaters Recovery Unit; and (6) Saint Mary Recovery Unit (USFWS, 2015a).

The Coastal Recovery Unit encompasses Washington and western Oregon. Within Washington, the major geographic regions containing this unit include the Olympic Peninsula, Puget Sound, and Lower Columbia River basins. The Olympic Peninsula and Puget Sound geographic regions also include their associated marine waters (Puget Sound, Hood Canal, Strait of Juan de Fuca, and Pacific Coast). The Puget

Sound region contains eight core areas (Chilliwack River, Nooksack River, Upper Skagit River, Lower Skagit River, Stillaguamish River, Snohomish and Skokomish Rivers, Chester Morse Lake, and Puyallup River). The Olympic Peninsula Region contains six core areas (Dungeness River, Elwha River, Hoh River, Queets River, Quinault River, and Skokomish River). The only core areas currently supporting anadromous populations of bull trout are located within the Puget Sound and Olympic Peninsula regions (USFWS, 2015b).

### **Critical Habitat**

Critical habitat was originally designated for bull trout in September 2005 (USFWS, 2005), with a revision to the designation published in October 2010 (USFWS, 2010a). Critical habitat was not proposed or designated at NAVBASE Kitsap Bangor (75 FR 63945). Bull trout critical habitat closest to NAVBASE Kitsap Bangor occurs along the western and northern shores of Dabob Bay beyond Hazel Point, at the southern tip of Toandos Peninsula (75 FR 63945), which is outside of the area affected by the Proposed Action (Section 3.2.3.2.2). Therefore, no designated bull trout critical habitat is present within the project area.

### **Occurrence**

The only core areas currently supporting anadromous populations of bull trout are located within the Puget Sound and Olympic Peninsula regions (USFWS, 2015b). Bull trout occurrence at NAVBASE Kitsap Bangor is anticipated to be rare. This is because bull trout require cold, clean, complex, and connected habitat, which do not occur within the streams at NAVBASE Kitsap Bangor. The only drainage to Hood Canal utilized by bull trout is the Skokomish River (WDFW, 2004; USFWS 2015b). In a 2011 biological opinion, the USFWS noted that summaries of recent tagging studies indicated that bull trout in the South Fork Skokomish River are not anadromous, and Cushman Dam currently blocks all upstream access and most downstream access to the marine environment for bull trout in the North Fork of the Skokomish River (USFWS, 2011). Historical observations of bull trout in accessible anadromous reaches of several west Hood Canal tributaries (Big Quilcene, Dosewallips, Duckabush, and Hamma Hamma Rivers) are noted from the 1980s (Hilgert, 2000, as cited by USFWS, 2009). Spawning was not believed to occur in these rivers, and bull trout were presumed to use Hood Canal marine waters as a migration corridor (USFWS, 2009). Further, no bull trout have been collected or observed during historic surveys or during more recent survey efforts conducted near NAVBASE Kitsap Bangor using beach seines, lampara seines, tow nets, ROV, or scuba (Schreiner et al., 1977; Salo et al., 1980; Bax, 1983; SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2016). Based on this information and the lack of documented anadromy from the Skokomish River core population, USFWS considered bull trout unlikely to migrate through the NAVBASE Kitsap Bangor waterfront from the Skokomish River (USFWS, 2011).

### **Rockfish Species**

Puget Sound/Georgia Basin DPSs of bocaccio and yelloweye rockfish were federally listed under the ESA in 2010 (75 FR 22276). Bocaccio were listed as endangered and yelloweye rockfish were listed as threatened. The listing includes bocaccio occupying all waters of Puget Sound/Georgia basin to the northern boundary of the Northern Strait of Georgia along the southern contours of Quadra Island and the western boundary of the U.S. side of the Strait of Juan de Fuca in a straight line to the Canadian side. For yelloweye rockfish, the listing includes those residing within Puget Sound/Georgia Basin, inclusive of the Queen Charlotte Channel to Malcom Island and the western boundary of the U.S. side in the Strait of Juan de Fuca in a straight line to the Canadian side (NMFS, 2017a).

## Critical Habitat

Critical habitat for bocaccio and yelloweye rockfish of the Puget Sound Georgia Basin DPS was designated in November 2014. Deepwater critical habitat (including depths greater than 30 meters below MLLW) for both rockfish species and nearshore critical habitat (including depths from extreme high water out to a depth of 30 meters below MLLW) for bocaccio is designated within Hood Canal (79 FR 68042). However, DoD lands, associated easements and right-of-ways, and associated Naval Restricted Areas listed under 33 CFR section 334.1220 were exempted from designation because of implementation of INRMPS that outline species protection measures (79 FR 68042).

## ESA-Listed Rockfish Occurrence

### *Puget Sound/Georgia Basin Distinct Population Segment Bocaccio*

Bocaccio are found from Stepovac Bay on the Alaska Peninsula to Punta Blanca in central Baja California (NMFS, 2014a). Information on habitat requirements for most rockfishes is limited despite years of research, and even less is known about bocaccio in Puget Sound (Palsson et al., 2009; Drake et al., 2010). Much of the information presented below on bocaccio life history and habitat use is derived from other areas where bocaccio occur in greater numbers.

Larval and juvenile stages of some rockfishes typically move from more open-water habitats to nearshore habitats as they grow. Larval rockfish are pelagic and occur within the surface waters, often being associated with free-floating vegetation from early spring through late summer, coinciding with the main primary production peaks in Puget Sound (NMFS, 2014a; NMFS, 2017b). Within these first few weeks to a few months, larval rockfish are extremely vulnerable because of their small size, relative inability to swim at rapid speeds, abundance, and use of the open-water environment (NMFS, 2016a). Even in a controlled laboratory study, Canino and Francis (1989) found that rockfish larvae experienced 70 percent mortality within 7 to 12 days of birth.

Bocaccio larvae are planktivores, feeding on larval krill, diatoms, and dinoflagellates. By the time they reach the pelagic juvenile stage, they are more opportunistic, feeding on fish larvae, copepods, krill, and other prey (Drake et al., 2010). Reviews of juvenile rockfish habitat utilization in Puget Sound indicate that nearshore vegetated habitats are particularly important for some species and serve as nursery areas (Palsson et al., 2009; NMFS, 2014a). Juvenile bocaccio settle to shallow, algae covered rocky areas or to eelgrass and sand (Love et al., 1991). Palsson et al. (2009) indicate that in Puget Sound waters, recruitment habitats may include nearshore vegetated habitats or deep-water habitats consisting of soft and low relief rocky substrates. In general, most subadult/adult bocaccio occur at variable depths from 100 to 1,400 feet within rocky habitat or complex structures and occasionally in sand, mud substrates (NMFS, 2016b).

Larval rockfish are pelagic and occur within the surface waters in two peaks (early spring, late summer), coinciding with the main primary production peaks in Puget Sound (NMFS, 2014a). Larval rockfish peak in abundance in April-May in Hood Canal and are typically absent from surface waters beginning in November (Greene & Godersky, 2012).

Bocaccio have historically been the least encountered of the two ESA-listed rockfish species in Puget Sound. Palsson et al. (2009) reviewed Puget Sound rockfish species distributions and the relative number of occurrences. This review relied heavily on Miller and Borton (1980) data, but also included the review of historical literature, fish collections, unpublished log records, and other sources.

Occurrence has been documented within the mid-Hood Canal and Southern Hood Canal Basin, representing approximately 35 miles of shoreline, including NAVBASE Kitsap Bangor (NMFS, 2014b). As of 2009, there had been no confirmed observations of bocaccio in Puget Sound for approximately seven years (74 FR 18516). Based on historical rockfish fishing occurrence locations and local ecological knowledge, no specific bocaccio fishing areas (“hot spots”) were identified in Hood Canal (Natural Resource Consultants, Inc., 2016). Further, surveys conducted by WDFW and the National Oceanic and Atmospheric Administration (NOAA) did not document bocaccio in Hood Canal; however, they did document the species in other parts of Puget Sound and the San Juan Islands. All sightings were at depths greater than 150 feet, with several in the 600-foot range (Pacunski, 2017).

WDFW ROV, acoustic, dive, and light trap surveys of the Bangor waterfront in 2014 and 2015 did not detect any ESA-listed rockfish species. WDFW concluded for the areas surveyed, that although high-relief rocky habitat can be patchy on a scale that often eludes detection by a single survey method, the variety of sampling methods employed during the surveys provided a nearly comprehensive assessment of available habitat. The survey found little adult rockfish critical habitat existing in the vicinity of NAVBASE Kitsap Bangor (Frierson et al., 2016).

Potential juvenile rearing habitat critical for bocaccio exists in the nearshore eelgrass beds adjacent to the project site. WDFW surveys at NAVBASE Kitsap Bangor did not document juvenile bocaccio (Frierson et al., 2016; Pacunski, 2017), but this life stage would be more difficult to detect. However, because of the limited historical presence of documented bocaccio or known “hot spots” in Hood Canal, the presence of juvenile or larval bocaccio rockfish would be unlikely.

#### *Puget Sound/Georgia Basin Distinct Population Segment Yelloweye Rockfish*

Recent reviews of Puget Sound rockfish species and their habitats (Palsson et al., 2009; Drake et al., 2010; NMFS, 2014a) suggest little distinction between rockfish species in terms of habitat use in Puget Sound. Both juveniles and adults occur at depths of at least 90 feet, and adults can occur as deep as 1,394 feet (NMFS, 2016b). NMFS states in a 2014 review that juvenile yelloweye rockfish are rarely found in nearshore waters less than 98 feet (NMFS, 2014a). Therefore, consistent with the discussion for adult bocaccio, adult yelloweye rockfish are considered associated with deeper, high-relief, rocky habitats, and larval stages may use open water and nearshore habitats, but juveniles are not anticipated to be in shallow nearshore habitats.

Similar to what was described for bocaccio, larval yelloweye rockfish are pelagic, occur within the surface waters, and are associated with free-floating vegetation from early spring through late summer (NMFS, 2014a; NMFS, 2017b). Larval and early pelagic juvenile rockfish are extremely vulnerable during their first few months of life due to their small size, relative inability to swim at rapid speeds, abundance, and use of the open-water environment where they are subjected to predation and sensitivity to environmental conditions (NMFS, 2016a). Although the relationship between larval and post-settlement rockfish and their habitats is poorly understood (NMFS, 2017b), as rockfish become more demersal and recruit to deeper water habitats, some of the vulnerabilities from the larval stage are reduced (NMFS, 2016a).

NMFS (2014b) documented occurrence of yelloweye rockfish mainly at the southern end of Hood Canal. Palsson et al. (2009) noted 113 documented Puget Sound yelloweye rockfish historical records associated with recreational catch. Of these records, 14 occurred in Hood Canal waters: 1 in the 1930s and 13 in the 1960s (Miller & Borton, 1980). Yelloweye rockfish accounted for 1 percent and 1.4 percent

of recreational catch in northern and southern Puget Sound, respectively, from 1996 to 2002 when their retention was prohibited (Palsson et al., 2009).

More recently, WDFW conducted rockfish surveys within Puget Sound and found that yelloweye rockfish were well-distributed within the central portion of Hood Canal and were always found in association with very specific habitats that include steep slopes/walls with high complexity (Pacunski, 2017). The closest sightings to the TPP project site were approximately 4.3 kilometers (km) south (Pacunski, 2017).

As noted above for bocaccio, WDFW concluded from rockfish surveys at the Bangor waterfront that little ESA-listed adult rockfish critical habitat exists in the vicinity of NAVBASE Kitsap Bangor (Frierson et al., 2016). Based on the habitat survey by WDFW and the depths at the project site, which are shallower than preferred by adult and juvenile yelloweye rockfish, no adult or juvenile rockfish would be expected in the immediate project vicinity.

### **3.2.2.2.3 Essential Fish Habitat**

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 designated EFH for these species within the FMPs for each of the four fisheries that they manage: Coastal Pelagic Species, West Coast Fisheries for Highly Migratory Species, Pacific Coast Groundfish, and Pacific Coast Salmon (PFMC, 2016a–d). Of these fisheries, three (coastal pelagic species, Pacific coast groundfish, and Pacific coast salmon) contain species for which EFH has been designated within the greater Puget Sound (PFMC, 2016a–d). The federally managed species, life stages, and habitats, as indicated the PFMC FMPs, are summarized for Hood Canal and the project area in Table 3.2-4.

#### **Coastal Pelagic Species**

The Pacific Council's Coastal Pelagic Species FMP specifies a management framework for northern anchovy (*Engraulis mordax*), market squid (*Loligo opalescens*), Pacific sardine (*Sardinops sagax*), Pacific (chub) mackerel (*Scomber japonicus*), and jack mackerel (*Trachurus symmetricus*). In October 2006, the Coastal Pelagic Species FMP was amended to include all krill species. EFH for non-krill coastal pelagic species addresses five pelagic species that are treated as a single species complex because of similarities in life histories and habitat requirements: northern anchovy, Pacific sardine, Pacific mackerel, jack mackerel, and market squid. Three of these coastal pelagic species are known to occur in the greater Puget Sound: northern anchovy, Pacific mackerel, and market squid. A summary of these species/life stages and their designated habitat is provided in Table 3.2-4. The definition for coastal pelagic species EFH is based on the geographic range and in-water temperatures where these species are present during a particular life stage (67 FR 2343–2383). EFH for these species includes all estuarine and marine waters above the thermocline where sea surface temperatures range from 50 to 68 degrees Fahrenheit (°F). These boundaries include the Hood Canal. Though extremely rare over the past 30 years based on nearshore surveys at NAVBASE Kitsap Bangor (Schreiner et al., 1977; Prinslow et al., 1980; Bax, 1983; SAIC, 2006; Bhuthimethee et al., 2009), two of these coastal pelagic species are known to occur along the NAVBASE Kitsap Bangor shoreline: northern anchovy and market squid. However, all three species (i.e., including Pacific mackerel) have been documented in Hood Canal (Bhuthimethee et al., 2009; Frierson et al., 2016).

**Table 3.2-4. Fish Species with Designated EFH in Hood Canal**

<i>Species</i>	<i>Applicable Life Stages</i>	<i>Designated Habitats</i>
<b>Groundfish</b>		
Big skate	A, J, E	Unconsolidated bottom
Black rockfish	A, J	Artificial structure, hard bottom, vegetated bottom, epipelagic zone, tide pool
Blue rockfish	A, J, L	Hard bottom, vegetated bottom, epipelagic zone
Bocaccio	J, L	Hard bottom, epipelagic zone
Brown rockfish	A, J	Artificial structure, hard bottom, mixed bottom, vegetated bottom, epipelagic zone
Butter sole	A, J, L, E	Unconsolidated bottom, epipelagic zone
Cabezon	A, J, L, E	Hard bottom, tide pool, unconsolidated bottom, vegetated bottom, epipelagic zone
China rockfish	A, J	Hard bottom, vegetated bottom, epipelagic zone
Copper rockfish	A, J	Artificial structure, hard bottom, mixed bottom, vegetated bottom, epipelagic zone
English sole	A, J, E	Unconsolidated bottom, epipelagic zone
Flathead sole	A, J	Unconsolidated bottom
Kelp greenling	A, J, L, E	Hard bottom, vegetated bottom, epipelagic zone
Lingcod	A, J, L, E	Hard bottom, vegetated bottom, unconsolidated bottom, epipelagic zone
Longnose skate	A	Unconsolidated bottom
Pacific sanddab	A, J, L, E	Mixed bottom, unconsolidated, epipelagic zone
Pacific whiting (hake)	A, J	Epipelagic zone
Petrале sole	A, J, L, E	Unconsolidated bottom
Quillback rockfish	A, J, L	Artificial structure, mixed bottom, vegetated bottom, hard bottom, biogenic, epipelagic zone
Redstripe rockfish	A, J, L	Hard bottom, mixed bottom, epipelagic zone
Rex sole	A, J	Unconsolidated bottom
Rock sole	A, J, L, E	Unconsolidated bottom, mixed bottom, epipelagic zone
Sablefish	A, J, L, E	Unconsolidated bottom, epipelagic zone
Sand sole	A, J, L	Unconsolidated bottom, epipelagic zone
Silvergray rockfish	A	Hard bottom
Soupin shark	A, J	Unconsolidated bottom, epipelagic zone
Spiny dogfish	A, J	Unconsolidated bottom, epipelagic zone
Splitnose rockfish	J, L	Epipelagic zone
Spotted ratfish	A, J, E	Hard bottom, unconsolidated bottom
Starry flounder	A, J, L, E	Unconsolidated bottom, epipelagic zone
Tiger rockfish	A, J, L	Hard bottom, epipelagic zone
Widow rockfish	A, J, L	Hard bottom, mixed bottom, epipelagic zone, unconsolidated bottom, vegetated bottom
Yelloweye rockfish	A, J, L	Hard bottom, mixed bottom, epipelagic zone, biogenic
Yellowtail rockfish	A, J	Hard bottom, unconsolidated bottom, vegetated bottom, epipelagic zone
<b>Coastal Pelagic Species</b>		
Anchovy	A, L, E	All estuarine waters above the thermocline and falling between 10 and 26°C
Market squid	A, L, E	Same as for anchovy



**Table 3.2-4. Fish Species with Designated EFH in Hood Canal (continued)**

Species	Applicable Life Stages	Designated Habitats
<b>Salmon</b>		
Coho	A, J	All estuarine waters and substrates, including the nearshore and tidal submerged environments, and freshwater bodies historically accessible to salmon
Chinook	A, J	Same as for coho
Pink	A, J	Same as for coho

Source: PFMC, 2011, 2014a, 2014b

Key: A = adult; E = eggs; J = juvenile; L = larvae

**Pacific Coast Groundfish**

Pacific coast groundfish species are considered sensitive to overfishing, the loss of habitat, and water and sediment quality (PFMC, 2016b). The groundfish EFH consists of the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem (PFMC, 2016b). The PFMC (2016b) identifies the overall area designated as groundfish EFH for all species covered in the FMP as all waters and substrate within “depths less than or equal to 3,500 meters [approximately 11,500 feet] to MHHW level or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand during the period of average annual low flow.” Furthermore, the PFMC (2016b) has also designated EFH for each individual groundfish species by life stage. These designations are contained within Appendix B of the FMP (PFMC, 2005a,b). Using the Pacific Habitat Use Relational Database developed by the PFMC, it was determined which groundfish species and life stages have EFH designated within the project area (Table 3.2-4). The management unit in the Pacific Coast Groundfish FMP includes over 90 groundfish species (PFMC, 2016b). Of these, 37 were identified through the analysis of the Habitat Use Relational Database as having EFH designated in the greater Puget Sound. Site-specific nearshore surveys at NAVBASE Kitsap Bangor confirmed occurrence of eight groundfish species (Dover sole, English sole, kelp greenling, lingcod, Pacific sanddab, rex sole, sand sole, and starry flounder) as well as unidentified flatfishes/sole species and unidentified juvenile rockfish (*Sebastes* spp.) (SAIC, 2006; Bhuthimethee et al., 2009).

Based on the analysis, the primary habitats designated as EFH for groundfish include the following:

- The epipelagic zone of the water column, including macrophyte canopies and “drift algae”
- Unconsolidated sediments consisting of mud, sand, or mixed mud/sand
- Hard-bottom habitats composed of boulder, bedrock, cobble, gravel, or mixed gravel/cobble
- Mixed sediments composed of sand and rocks
- Vegetated bottoms consisting of algal beds, macrophytes, or rooted vascular plants

### **Pacific Coast Salmon**

The Pacific salmon management unit includes Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and pink (*O. gorbuscha*) salmon. The EFH designation for the Pacific salmon fishery in estuarine and marine environments in the state of Washington extends from nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (200 miles) offshore (PFMC, 2014b). In addition to marine and estuarine waters, salmon species have a defined freshwater EFH, which includes all lakes, streams, ponds, rivers, wetlands, and other bodies of water that have been historically accessible to salmon (PFMC, 2014b).

Pacific salmon EFH is primarily affected by the loss of suitable spawning habitat, barriers to fish migration (habitat access), reduction in water and sediment quality, changes in estuarine hydrology, and decreases in prey food source (PFMC, 2014b). The most abundant Puget Sound forage fish species for salmonids include Pacific herring, surf smelt, and Pacific sand lance.

The current salmon FMP includes 19 subsequent amendments. As discussed above, prey (forage fish species) is included as EFH. Amendment 19 (PFMC, 2015) contains the final recommendations by the PFMC to protect unfished and unmanaged forage fish species. Amendment 18 was updated to reflect new information on EFH, including criteria for impassable barriers; addition of HAPCs; adjustments to geographic extent of EFH; and addition of non-fishing activities and conservation measures (PFMC, 2016c). As indicated in the 2008 Final Rule that codified Pacific coast salmon EFH (73 FR 60987), all streams, estuaries, marine waters, and other water bodies occupied or historically accessible to salmon in Washington, Oregon, Idaho, and California are included within the EFH description. The marine environment of NAVBASE Kitsap Bangor provides Pacific coast salmon EFH for various life stages of Chinook, pink, and coho salmon (PFMC, 2016c).

### **Habitat Areas of Particular Concern Designations**

Designated HAPCs are regarded as essential for protection of federally managed species. HAPCs may be more vulnerable to degradation than the more general EFH designated by the PFMC. HAPCs are designated based on four criteria: rarity of the habitat type, ecological importance to EFH species, sensitivity of the habitat to human-induced environmental degradation, and whether and to what extent development will stress the habitat type. Categorization as HAPC does not confer additional protection or restrictions to the designated area.

Four HAPCs designated for groundfish include: (1) seagrass; (2) canopy kelp; (3) rocky reef; and (4) estuarine habitats along the Pacific coast, including Puget Sound (PFMC, 2016a). The estuarine habitats HAPC extends landward to MHHW or the upriver extent of saltwater intrusion. The seagrasses HAPC includes eelgrass beds in estuaries. Five HAPCs have been designated for Pacific coast salmon, including: (1) complex channels and floodplain habitats; (2) thermal refugia; (3) spawning habitat; (4) estuaries; and (5) marine and estuarine submerged aquatic vegetation (PFMC, 2014a). Eelgrass and kelp provide important nursery, foraging, and shelter habitats to a variety of fish species, including salmon as well as spawning substrate to Pacific herring, which is an important prey species for all marine life stages of Pacific salmon. Juvenile salmon utilize eelgrass beds as migratory corridors as they transition to the open ocean, and beds of marine vegetation provide both refuge from predators and an abundant food supply. Of these HAPCs, only estuaries, representing all of Puget Sound and Hood Canal, seagrasses (eelgrass) and other submerged aquatic vegetation occur at NAVBASE Kitsap Bangor. There is no canopy kelp at NAVBASE Kitsap Bangor.

No HAPCs have been formally designated for coastal pelagic species.

### 3.2.2.3 Marine Mammals

Nine species of marine mammals have been documented within the waters surrounding NAVBASE Kitsap Bangor: the humpback whale (*Megaptera novaeangliae*), the Steller sea lion (*Eumetopias jubatus*), the California sea lion (*Zalophus californianus*), the harbor seal (*Phoca vitulina*), the transient killer whale (*Orcinus orca*), the gray whale (*Eschrichtius robustus*), the Dall's porpoise (*Phocoenoides dalli*), the harbor porpoise (*Phocoena phocoena*), and the bottlenose dolphin (*Tursiops truncatus*). However, only six of them, humpback whale, Steller sea lion, California sea lion, harbor seal, transient killer whale, and harbor porpoise, are carried forward in the analysis in this EA based on the potential for adverse impacts due to TPP Pier construction. With the exception of transient killer whale, all of these species are regularly detected in Hood Canal in the vicinity of NAVBASE Kitsap Bangor. The transient killer whale is also included in this analysis because groups were observed for lengthy periods in Hood Canal in 2003 and 2005 (London, 2006) and brief periods in 2016 through 2019 (Orca Network, 2016, 2017, 2019).

Occurrences of the remaining species are described below but not carried forward for analysis in this EA:

- Dall's porpoise was documented once in Hood Canal in 2009 and more recently once in 2018 (Orca Network, 2019). Because Dall's porpoises are unlikely to be present in Hood Canal, the species is not included in the analysis.
- Gray whales have been infrequently documented in Hood Canal waters over the past decade. There were five sightings in 2017 and one in 2018 (Orca Network, 2017, 2019). These sightings are an exception to the normal seasonal occurrence of gray whales in Puget Sound feeding areas. Because gray whales are unlikely to be present in Hood Canal, the species is not included in this analysis.
- Bottlenose dolphin was documented in Hood Canal twice in 2018 (Orca Network, 2019). Because bottlenose dolphins are unlikely to be present in Hood Canal, the species is not included in this analysis.

#### 3.2.2.3.1 Southern Resident Killer Whale

The Southern Resident killer whale (SRKW) DPS is comprised of a single population that is resident in the inland waters of Washington State and British Columbia, but has not been seen in Hood Canal for over 15 years. The DPS is listed as endangered under the ESA (70 FR 69903). Critical habitat for the SRKW includes the Strait of Juan de Fuca, Puget Sound, and the waters of Haro Strait/San Juan Islands, but does not include Hood Canal (71 FR 69054).

SRKW consume a variety of fish species, with 22 or more species documented, and at least one species of squid (Ford et al. 1998, 2000, 2016; Ford & Ellis 2006; Hanson et al. 2010), but salmon, specifically Chinook salmon, have been identified as their preferred prey in the summer months (Ford et al., 1998, 2009, 2010, 2016; Hanson et al., 2010; Hilborn et al. 2012; NMFS West Coast Region & WDFW, 2018). It is assumed that Chinook are selected by SRKW due to their large adult size and high lipid content (Ford & Ellis, 2006; Ford et al., 2009, 2017), despite the availability of more seasonally abundant pink and sockeye salmon (Ford et al., 2010, 2016).

Hanson et al. (2010) determined that Chinook salmon originating in Hood Canal comprised about 20.4 percent of the diet of SRKW foraging in the San Juan Islands in May (although this is based on a

sample size of nine), but was less than 5 percent in other months (June to September). Chinook and chum salmon were equally represented in prey samples (based on quantitative analysis of DNA in prey samples) acquired in Puget Sound during the period October through January (Hanson, 2011). However, the chum and Chinook salmon stocks in this study were not reported and, therefore, the importance of Hood Canal chum salmon in the diets of SRKW is not known. Any reduction in the availability of these fish species may cause SRKW to forage for longer periods, travel to alternate locations, or abandon foraging efforts (NMFS, 2016c). SRKW would not be exposed to direct stressors associated with the construction and operation of the TPP because they do not occur in Hood Canal. However, SRKW are included in this analysis because TPP impacts on prey species that originate in Hood Canal and migrate to areas inhabited by SRKW may indirectly affect the species.

#### **3.2.2.3.2 Humpback Whale**

NMFS has classified the humpback whale into 14 distinct population segments (DPSs) (81 FR 62260), of which two have the potential to occur in the proposed project area: the Mexico DPS, listed as threatened under the ESA, and the Central America DPS, listed as endangered (81 FR 62260). Humpback whales that occur within Puget Sound are members of the ESA-listed Mexico and Central America DPSs. There is no designated critical habitat for this species in the North Pacific. A number of take reduction and recovery plans as well as research and monitoring efforts are currently in place for the humpback whale.

Although humpback whales were common in inland Washington waters prior to the whaling period, only a few sightings had been reported in this area until the last 10 years (for historic sightings see Scheffer & Slipp, 1948; Calambokidis & Steiger, 1990; Pinnell & Sandilands, 2004). Humpback whales are now detected year round in small numbers in Puget Sound, but are still rarely seen in Hood Canal. After an absence of sightings for over 15 years an individual was seen for several weeks in January and February 2012 (Calambokidis, 2012; Orca Network, 2015). Additional sightings were reported in January and February 2015, January 2016, and June 2019 (Orca Network, 2017, 2019).

#### **3.2.2.3.3 Steller Sea Lion**

In Washington, Steller sea lions use haulout sites primarily along the outer coast from the Columbia River to Cape Flattery, as well as along the Vancouver Island side of the Strait of Juan de Fuca (Jeffries et al., 2000). A major winter haulout is located in the Strait of Juan de Fuca at Race Rocks, British Columbia, Canada (Canadian side of the Strait of Juan de Fuca) (Edgell & Demarchi, 2012). Numbers vary seasonally in Washington with peak numbers during fall and winter months and a decline in summer months that corresponds to the breeding season at coastal rookeries (approximately late May to early June) (Jeffries et al., 2000).

Steller sea lions have been seasonally documented in shore-based surveys at NAVBASE Kitsap Bangor in Hood Canal since 2008 with up to 15 individuals observed hauled out on submarines at Delta Pier and on PSB floats (Figure 3.2-5) (Navy, 2016d, 2019b). Surveys at NAVBASE Kitsap Bangor indicate Steller sea lions begin arriving in September and depart by the end of May (Navy, 2016d, 2019b); peak numbers occur in November.

#### **3.2.2.3.4 California Sea Lion**

During the summer, California sea lions breed on islands from the Gulf of California to the Channel Islands and seldom travel more than about 31 miles from the islands. In the nonbreeding season, adult

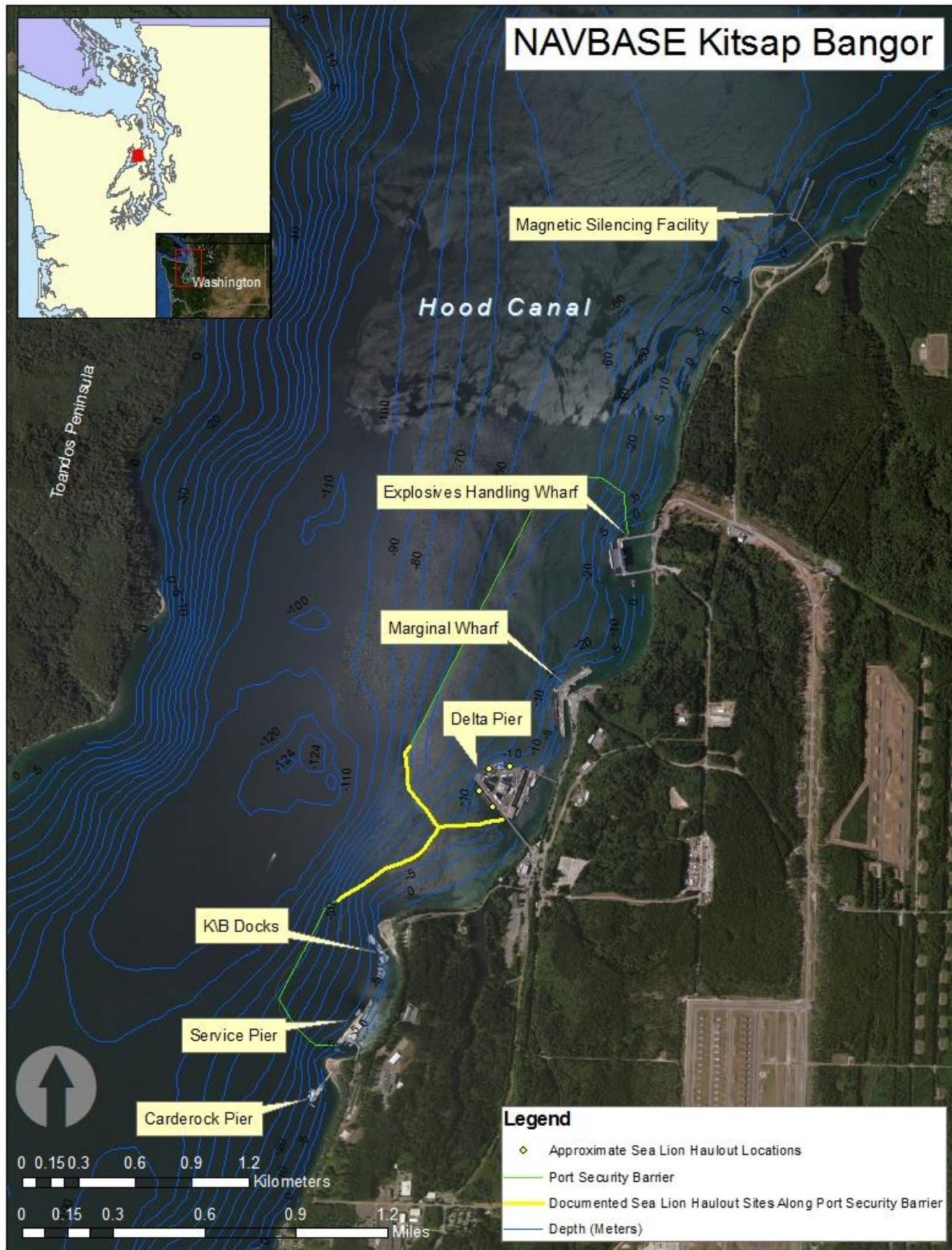


Figure 3.2-5. Pinniped Haulouts at NAVBASE Kitsap Bangor

and subadult males migrate northward along the coast to central and northern California, Oregon, Washington, and Vancouver Island, including inland Washington waters, and return south in the spring. California sea lions also enter bays, harbors, and river mouths and often haul out on man-made structures such as piers, jetties, offshore buoys, and oil platforms.

California sea lions are typically present between August and early June in Washington inland waters (Jeffries et al., 2000). California sea lions have been documented during shore-based surveys at NAVBASE Kitsap Bangor since 2008 in all survey months, with as many as 320 individuals observed at one time (in December 2018) hauled out on submarines at Delta Pier and on PSB floats (Figure 3.2-5) (Navy, 2016d, 2019b). Peak abundance at Bangor occurs from October through December, and a few individuals (less than 17 sighted per survey) were present June through August.

#### **3.2.2.3.5 Harbor Seal**

NAVBASE Kitsap Bangor reported harbor seals in every month of vessel-based surveys (Agness & Tannenbaum, 2009a; Tannenbaum et al., 2009a, 2011a). Harbor seals were routinely seen during marine mammal monitoring for two waterfront construction projects (HDR, 2012; Hart Crowser, 2013b, 2014, 2015). The closest major haulouts to NAVBASE Kitsap Bangor that are regularly used by harbor seals are the mouth of the Dosewallips River located approximately 8.2 miles away. No harbor seal haulouts have been seen on the shoreline opposite Bangor (the east side of the Toandos Peninsula) during 2015 and 2016 beach seine surveys. A small haulout occurs at NAVBASE Kitsap Bangor under Marginal Wharf and small numbers of harbor seals are known to routinely haul out around the Carderock Pier (Figure 3.2-5). Hauled out adults, mother/pup pairs, and neonates have been documented occasionally but quantitative data are limited. Incidental surveys in August and September 2016 recorded as many as 28 harbor seals hauled out under Marginal Wharf or swimming in adjacent waters. Assuming a few other individuals may be present elsewhere on the Bangor waterfront, the Navy estimates that 35 harbor seals may be present near the installation during summer and early fall months. Based on survey data from a large haulout location at Naval Station Everett (Navy, 2016d), the number of harbor seals present at Bangor is likely to be lower in late fall and winter months.

Following increased pinniped surveys on the waterfront and increased observations by waterfront personnel (Navy, 2016d), information has become available on harbor seal births and the presence of neonates at the NAVBASE Kitsap Bangor. Known harbor seal births include one on the Carderock wave screen in August 2011, at least one on a small 10- by 10-foot floating dock at EHW-2 in fall 2013 as reported by EHW-2 construction crew, and afterbirth on a float at the Magnetic Silencing Facility with an unknown date. In addition, harbor seal pupping has occurred on a section of the Service Pier since approximately 2001 according to the Port Operations vessel crews. Harbor seal mother and pup pairs were observed in 2014 hauled out on the Carderock wave screen and swimming in nearby waters, as well as swimming in the vicinity of Delta Pier (Navy, 2016d).

#### **3.2.2.3.6 Harbor Porpoise**

The harbor porpoise is protected under the MMPA, but not listed under the ESA. NMFS conservatively recognizes two stocks in Washington waters: the Oregon/Washington Coast stock and the Washington Inland Waters stock (Carretta et al., 2013). Individuals from the Washington Inland Waters stock are expected to occur in Puget Sound.



In Washington inland waters, harbor porpoises are most often detected in the Strait of Juan de Fuca and the San Juan Island area year round (Calambokidis & Baird, 1994; Osmek et al., 1996; Carretta et al., 2012). Harbor porpoises were historically one of the most commonly observed marine mammals in Puget Sound (Scheffer & Slipp, 1948); however, there was a significant decline in sightings beginning in the 1940s (Everitt et al., 1979; Calambokidis et al., 1992), and few harbor porpoise sightings were recorded during multiple ship and aerial surveys conducted in Puget Sound (including Hood Canal) between 1991 and 1999 (Calambokidis et al., 1992; Osmek et al., 1996; Nysewander et al., 2005). Annual winter aerial surveys conducted by the WDFW from 1995 to 2015 revealed an increasing trend in harbor porpoises in Washington inland waters, including the return of harbor porpoise to Puget Sound and Hood Canal from the mid-2000s to 2015 (Calambokidis, 2010; Evenson et al., 2016). Seasonal surveys conducted in spring, summer, and fall 2013–2015 in Puget Sound and Hood Canal for harbor porpoise reported that porpoise numbers were twice as high in spring as in fall or summer, suggesting a seasonal shift in distribution (Smultea et al., 2015; Jefferson et al., 2016).

Harbor porpoises are likely to occur in deeper marine waters near NAVBASE Kitsap Bangor. During line transect surveys conducted in Hood Canal in 2011 near NAVBASE Kitsap Bangor and Dabob Bay (HDR, 2012), an average of six harbor porpoises were sighted per day in the deeper waters. Group sizes ranged from 1 to 10 individuals (HDR, 2012). During construction monitoring for the EHW-2 project at Bangor in 2013, harbor porpoises were detected in deeper waters of Hood Canal, with mean group size of 5.7 animals (range up to 10 individuals) (Hart Crowser, 2013). Raum-Suryan and Harvey (1999) reported a group size range from 1 to 8 individuals (mean = 1.87 individuals) in the San Juan Islands. Aerial surveys conducted throughout 2013 to 2015 in indicated lower densities in Hood Canal (0.47 per square kilometers [km<sup>2</sup>], all seasons pooled) than elsewhere in Washington inland waters (0.9 per km<sup>2</sup>) (Smultea et al., 2015; Jefferson et al., 2016). Mean group size of harbor porpoises in Hood Canal in the 2013–2015 surveys was 1.7.

### **3.2.2.3.7 Transient Killer Whale**

Transient killer whales in the Pacific Northwest spend most of their time along the outer coast of British Columbia and Washington, but visit inland waters in search of harbor seals, sea lions, and other marine mammal prey species. Transients may occur in inland waters during any month (Orca Network, 2017, 2019). During the period of 2004 to 2010, transient killer whales occurred in Washington inland waters most frequently in August–September with a strong second peak in April–May (Houghton et al., 2015).

Earlier reports of group size indicate up to four individuals in the Salish Sea<sup>1</sup> (Baird & Dill, 1996), but Houghton et al. (2015) reported that group size appeared to be increasing from 2004 to 2010. According to unpublished data (Houghton, 2012), the most commonly observed group size in Puget Sound from 2004 to 2010 was six whales (Houghton, 2012). Reported occurrences in Hood Canal indicated group size was 11 in 2003, 6 in 2005, and 4 to 10 in 2016 (London, 2006; Orca Network, 2017).

Transient killer whale occurrences in Hood Canal have been sporadic and unpredictable. Groups were observed for lengthy periods in Hood Canal in 2003 (59 days) and 2005 (172 days) between the months of January and July (London, 2006), and again in 2016 over multiple days: March (2 days), April (1 day), and May (8 days). Transient killer whales were sighted in in Hood Canal in 2017 (4 days), 11 consecutive

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<sup>1</sup> Salish Sea is the term used to refer to the inland waters of southern British Columbia and Washington State, including the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound.

days in April 2018, and 1 day on two additional occasions in 2018 and 2019 (Orca Network, 2019). Some of the sightings in 2016 and 2018 were in Dabob Bay (Orca Network, 2017, 2019). Long-term use of Hood Canal is likely anomalous, and the more typical use of Hood Canal appears to be short-term occupancy for foraging in a small area, followed by departure from Hood Canal.

#### **3.2.2.4 Marine Birds**

Marine birds encountered at NAVBASE Kitsap Bangor include those listed in Table 3.2-5. Marine bird occurrence was documented in transect-based vessel surveys from 2008 through 2010 (Tannenbaum et al., 2009b, 2011b). The most frequently observed resident species included great blue heron, common merganser, Canada goose, glaucous-winged gull, double-crested cormorant, and belted kingfisher. Several migrant and over-wintering species were present in large flocks in nearshore waters, including dunlin and western plover, goldeneye species, surf scoter, Bonaparte's gull, ring-billed gull, and pigeon guillemot.

##### **3.2.2.4.1 Marbled Murrelet**

One ESA-listed marine bird species, the marbled murrelet, occurs in the vicinity of NAVBASE Kitsap Bangor. There is no designated critical habitat for this species within the project area for the TPP project (Table 3.2-1).

Marbled murrelets are pursuit-diving seabirds that spend most of their lives in the marine environment and nest in mature and old-growth forests (USFWS, 1997). Murrelets occur year round in Puget Sound, although their flock size, density, and distribution vary by season (Nysewander et al., 2005; Falxa et al., 2008). Murrelets use the marine environment for courtship, loafing, and foraging (USFWS, 2010b). Habitat selection in the marine environment depends on both terrestrial and marine resources. During the breeding season, nearshore marine locations in proximity to nesting habitat with cool water temperatures are most likely to be occupied (Lorenz et al., 2016). Additionally, a lower human footprint—a factor that combines fishing activity, pollution, shipping traffic, human population density, light pollution, transportation infrastructure, and other variables—was also predictive of marbled murrelet use of marine habitats.

During the breeding season (April 1 through September 23), marbled murrelets tend to forage in well-defined areas along the shoreline in relatively shallow marine waters. Prey species in Washington coastal and inland waters have not been well documented, but include sand lance, anchovy, immature Pacific herring, shiner perch, and small crustaceans (especially euphausiids) (review by Burkett, 1995).

During the pre-basic (post-breeding season) molt, murrelets are essentially flightless and must select foraging sites that provide adequate prey resources within swimming distance (Carter, 1984; Carter & Stein, 1995). During the non-breeding season, murrelets typically disperse and are found farther from shore (Strachan et al., 1995).

Marbled murrelets have been documented in the nearshore and deeper waters adjacent to NAVBASE Kitsap Bangor since 2001 (Kitsap Audubon Society, 2008; Agness and Tannenbaum, 2009b; Navy, 2009; Tannenbaum et al., 2009b, 2011a; Hart Crowser, 2013a; Pearson & Lance, 2013, 2014, 2015, 2016). Their abundance in the project area is expected to be greatest in fall and winter months (Falxa et al., 2015; Pearson & Lance, 2016).



**Table 3.2-5. Marine Bird Groupings and Families of Puget Sound**

<i>Marine Bird Grouping</i>	<i>Marine Bird Families</i>	<i>Season(s) of Occurrence</i>	<i>Preferred Habitats</i>	<i>Preferred Prey</i>
Shorebirds and Wading Birds	<ul style="list-style-type: none"> <li>• Plovers, sanderlings, dowitchers, sandpipers, yellowlegs, and phalaropes</li> <li>• Great blue heron</li> </ul>	<ul style="list-style-type: none"> <li>• Killdeer: year round</li> <li>• Spotted sandpiper: summer</li> <li>• Phalaropes: during migration</li> <li>• Great blue heron: year round</li> <li>• All other species: winter and during spring and/or fall migration</li> </ul>	<ul style="list-style-type: none"> <li>• Shorebirds: intertidal zone, mudflats, beaches</li> <li>• Great blue heron: shoreline, shallow marine and freshwater</li> </ul>	<ul style="list-style-type: none"> <li>• Shorebirds: marine worms, insect larvae, aquatic insects</li> <li>• Great blue heron: crustaceans, small fish</li> </ul>
Marine Waterfowl	<ul style="list-style-type: none"> <li>• Diving ducks (goldeneye, scoters, bufflehead), mergansers, dabbling ducks (mallard, wigeon), and geese</li> <li>• Grebes, loons</li> </ul>	<ul style="list-style-type: none"> <li>• Canada goose, red-necked and hooded mergansers, and some dabbling ducks: year round</li> <li>• Surf and white-winged scoters: primarily winter and in non-breeding flocks during summer</li> <li>• All other species: winter and/or during migration (spring and/or fall migration)</li> </ul>	<ul style="list-style-type: none"> <li>• Canada goose, mergansers, dabbling ducks: marine and freshwater shorelines, eelgrass beds, and shallow water</li> <li>• Scoters, goldeneyes: marine nearshore and deeper water, near piles</li> <li>• Grebes, loons: marine nearshore and deeper water</li> </ul>	<ul style="list-style-type: none"> <li>• Canada goose: vegetation</li> <li>• Mergansers: small fishes</li> <li>• Dabbling ducks: marine and freshwater vegetation, freshwater and marine larvae, aquatic and terrestrial insects</li> <li>• Scoters, goldeneyes: molluscs, barnacles, crustaceans, other invertebrates, small fishes</li> <li>• Grebes, loons: small fishes</li> </ul>
Seabirds	<ul style="list-style-type: none"> <li>• Pursuit divers: auklets, murrelets, murrelets, guillemots, and cormorants</li> <li>• Surface feeders: gulls and terns</li> </ul>	<ul style="list-style-type: none"> <li>• Gulls: glaucous-winged gulls: year round; ring-billed gull: year round; mew gull: winter, migrant; Bonaparte's gull: fall and spring migrant; other species: winter</li> <li>• Terns: Caspian terns: summer; common tern: fall migrant</li> <li>• All other species: year round</li> </ul>	<ul style="list-style-type: none"> <li>• Pursuit divers: marine nearshore and deeper water</li> <li>• Surface feeders (gulls, terns): shoreline, marine nearshore, and deeper water</li> </ul>	<ul style="list-style-type: none"> <li>• Pursuit divers: small fishes, invertebrates, zooplankton</li> <li>• Surface feeders: small fishes, molluscs, crustaceans, garbage, carrion</li> </ul>

Sources: Smith et al., 1997; Opperman, 2003; Larsen et al., 2004; Wahl et al., 2005; WDFW, 2005

Marbled murrelets nest solitarily on large branches of trees (nest platforms) with features typical of coniferous old-growth (stand age from 200- to 250-year-old trees with multi-layered canopy). Although old-growth forest is the preferred habitat for nesting, this species also is known to nest in mature second-growth forest with trees as young as 180 years old (Hamer & Nelson, 1995). The WDFW Priority Habitat and Species Maps interactive website does not indicate the presence of marbled murrelet nests in the upland areas including and adjacent to NAVBASE Kitsap Bangor (WDFW, 2017). Although forest stand inventories on NAVBASE Kitsap Bangor indicate that stands are typically less than 110 years old, some relict old-growth trees can be found near Devil's Hole, and a small old-growth stand is present at the northern portion of the base (International Forestry Consultants, 2001; Jones, 2010).

The Navy and USFWS identified potential marbled murrelet nesting habitat, defined by the presence of suitable nest platforms, in the conifer forest stand that extends upland from Carderock Pier. Eight trees with a total of 10 platforms appear to be marginally suitable for nesting within this stand (Harke, 2013). The Navy initiated occupancy surveys per the protocols of the Pacific Seabird Group (Evans Mack, 2003) in the same conifer forest stand, extending coverage from Sea Lion Road eastward to Guitaro Road, and from Sturgeon Street at the south end to the north end of Devil's Hole. Occupancy surveys were conducted in 2016, 2017, and 2018 (Hamer, 2016, 2017, 2019). Surveys conducted in 2016 did not fully follow the protocol, but 2017 and 2018 surveys did follow the protocol. One marbled murrelet was detected flying over this upland site in 2016 (Hamer, 2016), but none were detected during surveys in 2017 and 2018 (Hamer, 2017, 2019).

#### **3.2.2.4.2 Shorebirds**

Shorebirds likely to occur within the project area are mainly present during winter and/or migration periods, depending on species life history. Exceptions include the killdeer, which is present year round, and the spotted sandpiper, a summer resident and potential breeder at the TPP project locations. Shorebirds primarily rely on resources in the study area for foraging during the non-breeding season when overwintering or as a stopover during spring and fall migrations (Buchanan, 2004). Both the killdeer and spotted sandpiper may nest close to water (Opperman, 2003). Many shorebirds such as plovers, sandpipers, sanderlings, and dowitchers forage on larvae and aquatic insects (Buchanan, 2004). Other food sources include amphipods, copepods, crustaceans, and molluscs. Some roosting habitats used by shorebirds include salt flats or grassy areas adjacent to intertidal foraging areas, higher elevation sand beaches, log rafts, piles, and other floating structures, particularly when natural roost sites are limited (Buchanan, 2004).

#### **3.2.2.4.3 Waterfowl**

Most marine waterfowl species occur during the winter in the TPP project area and migrate north during their breeding season. However, common and hooded mergansers, Canada geese, and some dabbling duck species can be observed year round. Marine waterfowl primarily forage in the nearshore environment, including near man-made structures, but are also found in deeper marine waters. The primary forage resources of marine waterfowl include molluscs, crustaceans, and plant material. Other secondary food sources in the nearshore environment are aquatic larvae and invertebrates. In the Puget Sound, eelgrass beds are important foraging zones for dabbling ducks (Lovvorn & Baldwin, 1996). Mergansers, such as the common merganser, nest close to water in rock crevices, tree cavities, or under tree roots (Opperman, 2003) and may nest along shoreline habitat during summer. Marine waterfowl also rest on shore and in the intertidal zone.

#### **3.2.2.4.4 Seabirds**

Two primary guilds of seabirds occur in the vicinity of NAVBASE Kitsap Bangor: surface feeders and pursuit divers. Depending on individual species life history, surface-feeding seabirds occur in the study area during different seasons. Gulls and terns forage on small schooling fish (e.g., Pacific herring, Pacific sand lance, and juvenile salmonids) visible from the water surface in the nearshore and deeper marine waters. Additional forage resources taken opportunistically by gulls include objects gleaned on the water's surface, garbage on shore or inland, scavenged carrion, and small birds and eggs. Gulls can also forage in the intertidal zone. For example, some species feed on molluscs by dropping them from the air to break them on a hard surface on the ground.

Pursuit-diving seabirds can occur year round in the vicinity of NAVBASE Kitsap Bangor; however, numbers of some species are greater during winter months (e.g., pelagic cormorants, common murre, and pigeon guillemots). Cormorants, such as the double-crested cormorant, primarily nest in colonies along the outer coast of Washington, while non-breeding cormorants are found year round in the Puget Sound. Cormorants roost on buoys and other structures on the Bangor waterfront. Pursuit-diving seabirds are found in nearshore and deeper marine waters where they capture prey underwater and also near man-made structures where algal and invertebrate communities have become established on underwater piles. Similar to surface feeders, the primary forage resources of the pursuit divers' includes small schooling fish such as Pacific sand lance and Pacific herring. Pigeon guillemots forage more opportunistically on epibenthic fish and invertebrates (Vermeer et al., 1987).

#### **3.2.2.5 Terrestrial Resources**

##### **3.2.2.5.1 Vegetation Communities**

The upland area at K/B Spit is disturbed and supports little natural vegetation. The proposed diesel marine fuel storage site, located on the east side of Sea Lion Road at K/B Spit, is in a coniferous forest stand dominated by Douglas fir, western red cedar, and western hemlock in the canopy and an understory comprised of salal, Oregon grape, and sword fern. Canopy closure in this coniferous forest stands averages 70 to 100 percent. Like most forest stands on NAVBASE Kitsap Bangor, this stand is second growth, that is, a stand that has regrown following a major disturbance, most commonly timber harvest prior to Navy acquisition of the lands.

The VMF and project laydown/parking area site would be adjacent to Sturgeon Street (Figure 2-4). This 5.7-acre site currently supports coniferous forest vegetation, except for 0.5 acre that was cleared in 2018 for the Service Pier Electrical Upgrade project.

There are no wetlands or streams in the proposed construction sites for either alternative. A small, isolated wetland is located adjacent to the area on Sturgeon Street that would be cleared for the VMF and project laydown and parking areas. This wetland is outside of the proposed construction zone and would be protected by a 30-foot buffer zone and BMPs such as a silt fence to prevent runoff and debris from the construction site.

Based on a review of the USFWS Endangered Species Program list, no federally listed threatened, endangered, or candidate plant or animal species has been identified or is likely to occur in terrestrial habitats on NAVBASE Kitsap Bangor (USFWS IPaC Report, 2019). One potential exception, the marbled murrelet, was the subject of nesting occupancy surveys in the vicinity of the TPP project site (see Section 3.2.2.4.1 above). Nesting by this species is not known to occur in the vicinity of the TPP project site.

**3.2.2.5.2 Wildlife**

Terrestrial wildlife resources in the vicinity of some of the TPP construction areas (staging area, VMF site, and diesel marine fuel storage site) include the mammals, birds, amphibians, and reptiles that occupy the conifer forest stand described above. The upland portion of K/B Spit does not provide wildlife habitat because the area has been developed and cleared of vegetation. Terrestrial wildlife (game species, non-game mammals, birds, amphibians, and reptiles) in the vicinity of the TPP project areas are typical of forest-dwelling species that occur on NAVBASE Kitsap Bangor as a whole (Table 3.2-6). Most bird species are protected under the MBTA; bald eagles are protected under MBTA and the Bald and Golden Eagle Protection Act (see Section 3.2.1).

**Table 3.2-6. Wildlife Groupings and Representative Species on NAVBASE Kitsap Bangor**

<i>Wildlife Group</i>	<i>Representative Species</i>	<i>Season(s) of Occurrence</i>
Game Species	<ul style="list-style-type: none"> <li>Black-tailed deer, black bear, cougar, and game birds (i.e., grouse and quail species)</li> </ul>	Year round
Non-Game Mammals	<ul style="list-style-type: none"> <li>Carnivores: river otter, mink, weasel species, coyote, raccoon, red fox, bobcat</li> <li>Small mammals: shrews, moles, mice, squirrels, rats, mountain beavers, beavers, rabbits</li> <li>Bats: <i>Myotis</i> species, big brown bat</li> </ul>	Year round
Non-Game Birds	<ul style="list-style-type: none"> <li>Raptors: osprey, bald eagle, red-tailed hawk, owls, accipiters, peregrine falcon</li> <li>Woodpeckers: pileated woodpecker, downy woodpecker, red-breasted sapsucker</li> <li>Songbirds: sparrows, swallows, warblers, kinglets, chickadees, finches, wrens, jays, crows, flycatchers</li> <li>Wading birds and waterfowl: great blue heron, Canada goose</li> </ul>	<ul style="list-style-type: none"> <li>Year round: great blue heron, bald eagle, accipiters, owls, woodpeckers, finches, chickadees, red-tailed hawk, crows, jays, sparrows, kinglets, wrens, Canada goose</li> <li>Migrants: most waterfowl, osprey, swallows, warblers, flycatchers,)</li> </ul>
Amphibians	<ul style="list-style-type: none"> <li>Red-legged frog, Pacific tree frog, salamander species</li> <li>Introduced: bullfrog</li> </ul>	Year round
Reptiles	<ul style="list-style-type: none"> <li>Northwestern and common garter snakes and northern alligator lizard</li> </ul>	Year round

**Bald Eagles**

Bald eagles in the Pacific Northwest include resident birds (i.e., individuals that breed in the Pacific Northwest including Washington and may be present year round) and winter migrants that breed farther north. Migration patterns in general are timed to track the availability of spawning salmonids (Buehler, 2000). Many resident eagles in the Pacific Northwest migrate in late summer to meet salmon runs in Alaska. At the end of these salmon runs in late fall, Alaskan and Pacific Northwest eagles move south, again following salmon runs (Watson & Pierce, 1998). Washington’s wintering eagles begin to arrive in October from northern breeding territories in Alaska and Canada. Eagles that breed in more

northern latitudes return to their breeding grounds during spring migration from January to March, depending on food resources and weather conditions. The last comprehensive survey of eagle territories was performed in 2005, when 1,125 bald eagle territories in Washington were identified. Seventy-five percent of the territories were occupied (WDFW, 2007; Kalasz & Buchanan, 2016). As of 2015, the total number of known territories in the state was 1,334. However, WDFW notes that given the lack of recent comprehensive survey effort, it is likely other currently active territories have not yet been identified (Kalasz & Buchanan, 2016).

An active bald eagle nest was located south of Devil's Hole near the K/B Spit; this nest produced two eaglets in 2013 but was damaged later in the year (Navy, 2016e). A new nest was built nearby close to the proposed project site in 2014; bald eagles were observed at this nest in following years and two chicks fledged from this nest in 2017 (Navy, 2018c). Two chicks were produced in 2018 and two chicks were observed in 2019 (Selbig, 2019). Bald eagles have been observed perching and foraging at various locations on the Bangor shoreline year round (Agness & Tannenbaum, 2009b; Tannenbaum et al., 2009b). Bald eagles nest along the shoreline of Dabob Bay on the Bolton Peninsula and along the shoreline of Quilcene Bay, west of Dabob Bay in the Hood Canal.

### **3.2.3 Environmental Consequences**

This analysis focuses on wildlife or vegetation types that are important to the function of the ecosystem or are protected under federal or state law or statute. The evaluation of impacts on biological resources considers whether there would be loss or degradation of biological resources, including marine vegetation, benthic invertebrates, marine fish, marine mammals, marine birds, or terrestrial resources. Construction or operational activities that significantly degrade or eliminate biological habitats or communities would be considered a direct impact on biological resources.

#### **3.2.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to biological resources. Therefore, no significant impacts to biological resources would occur with implementation of the No Action Alternative.

#### **3.2.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

The study area for the analysis of effects to biological resources associated with Alternative 1 includes the proposed marine and terrestrial construction sites as well as adjacent areas that could be affected by the project. Both resident and highly mobile species that could occur in these areas are evaluated.

##### **3.2.3.2.1 Marine Vegetation and Benthic Communities**

###### **Marine Vegetation**

Marine vegetation is present in the project area, including eelgrass and various species of algae. A large and continuous patch of native eelgrass was observed in the area of the Alternative 1 work zone from an approximate depth range of 0 to 10 feet below MLLW to the north of the proposed trestle. A small patch (approximately 20 sq ft) of eelgrass in the Alternative 1 work zone would be within the footprint of the temporary work trestle. No eelgrass was observed within the footprint of the permanent structure. Installation of piles would permanently displace approximately 177 sq ft of seafloor shallower than 30 feet (Table 3.2-7), some of which would be in the area characterized by macroalgae (Figure 3.2-1).

Relocation of buoy-associated PSB anchors, would not affect marine vegetation due to their placement depths of 80 feet or greater. Impacts from sediment turbidity during pile driving and shading from construction barges could occur but would be temporary. Avoidance and minimization measures, identified in Section 2.6, would be implemented to avoid directly damaging or to minimize impacts on marine vegetation during construction. For example, a mooring and anchoring plan would be employed to limit vessel movements; and barge and other large construction vessels would be limited to an area 100 feet to the west of the proposed pier.

**Table 3.2-7. Alternative 1 Marine Vegetation and Benthic Impacts (sq ft)**

<i>Impact</i>	<i>Deep Water</i> <sup>1</sup>	<i>Nearshore</i> <sup>1</sup>	<i>Total</i>
Area of seafloor in temporary work zone <sup>2</sup>	78,047	13,166	91,213
Total overwater coverage <sup>3</sup>	39,507	8,080	47,587
– Area of grated structures <sup>4</sup>	1,901	0	1,901
Eelgrass in permanent structure footprint	0	0	0
Eelgrass in temporary work zone <sup>5</sup>	0	20	20
Macroalgae in permanent structure footprint	212	5,195	5,407
Macroalgae in temporary work zone	0	7,007	7,007
Pile footprints – permanent	1,190.3	176.7	1,367
Pile footprints – temporary	141.4	424.1	565.5
PSB anchor footprints – permanent <sup>5</sup>	706.5	0	706.5

**Key:** PSB = port security barrier; sq ft = square feet

**Notes:**

1. Deep water is defined as deeper than 30 feet below mean lower low water; nearshore is defined as shallower than 30 feet below mean lower low water.
2. During in-water construction, vessel movements outside of the proposed structures would be restricted to the work zone shown in Figure 3.2-1.
3. Total overwater coverage is comprised of all permanent structures.
4. Overwater area of structures comprised of grated materials (the camels, camel brows, and platforms) that would permit light to pass through; this area is a subset of the total overwater coverage.
5. Port security barrier anchors would be moved but no new anchors added, so there would be no net loss of bottom habitat.

After construction, the new pier and other structures would create approximately 45,700 sq ft of overwater shading. Overwater coverage reduces light penetration and leads to a reduction in vegetation, although macroalgae are generally less sensitive to the effects of shading due to lower light requirements (Frankenstein, 2000; Nightingale & Simenstad, 2001a). As described above, the marine vegetation at NAVBASE Kitsap Bangor is most prevalent in nearshore waters, and only 8,080 sq ft of the new shading would be over these shallow waters and potentially result in reduced viability and abundance of marine vegetation. Further, an under-trestle lighting system would be installed that would mimic natural light conditions and thereby minimizing shading in nearshore waters (see Section 2.6.1, Design Avoidance and Minimization Measures). Therefore, the new shading would not significantly reduce marine vegetative communities within the project area. No eelgrass occurs in the areas that would be shaded by the permanent structures. The small patch of eelgrass in the footprint of the temporary work trestle would be shaded. However, construction of the temporary trestle is expected to commence in October, well after the peak period of eelgrass growth, and the trestle would be removed during the second in-water work season. With implementation of the proposed avoidance and minimization measures identified in Section 2.6, no significant impacts on marine vegetation would result with implementation of Alternative 1. The Navy would fully mitigate for the loss of aquatic

vegetation, including eelgrass, through the purchase of In-Lieu Fee credits from the Hood Canal Coordinating Council.

### **Benthic Communities**

Construction of the temporary work trestle, permanent trestle, and pier would impact benthic communities through the disruption of the sediment surface and subsurface during the driving and removing piles, moving barge anchors, and relocating PSB anchors. Depending upon the species, impacts to individual benthic organisms could range from temporary disturbance to mortality. Some benthic organisms would be physically crushed and lost within the footprints of the piles (approximately 1,932.5 sq ft combined permanent and temporary footprints, Table 3.2-7), and barge and PSB anchors. Avoidance and minimization measures (Section 2.6) would be implemented to avoid directly damaging or to minimize impacts on benthic communities during construction:

- Barges and other large construction would be restricted to an area 100 feet to the west from the proposed pier to protect the seafloor in shallow areas.
- To provide access for construction workers, small skiffs would operate in a narrow band east and north of the proposed pier.
- No large construction vessels would be allowed to operate east or north of the proposed pier to reduce potential temporary impacts to the marine environment.
- A mooring and anchoring plan would be developed and implemented to minimize vessel movement.

Indirect impacts to habitat and benthic organisms are likely to result from increases in turbidity caused by driving and removing piles, moving barge anchors, and relocating PSB anchors. The areas near the pile footprints would have higher levels of turbidity. Disturbed sediments would eventually redeposit on the existing benthic community. Impacts from increased turbidity levels would likely result in short-term loss of localized areas of the benthic community but would not extend as far as the shellfish harvest area, the nearest edge of which is approximately 200 feet to the east of the proposed project. Most affected areas would experience some reduction in diversity and abundance of benthic species. However, benthic organisms, particularly annelids, are very resilient to habitat disturbance and are likely to recover to pre-disturbance levels within two years (CH2M Hill, 1995; Parametrix, 1994, 1999; Romberg et al., 1995; Anchor Environmental, 2002).

Dredging and placement of clean sediment caps at contaminated sites provide extreme examples of benthic recovery from disturbance, demonstrating how benthic organisms have the capability to recover from habitat perturbations and recolonize disturbed areas over time. Many mobile benthic species such as crabs, and short-lived species such as polychaetes, lost due to turbidity and bottom disturbances by barges, tugboats, and anchors, would recolonize the construction areas quickly and become reestablished over a two-year period after sediment disturbance at the sites has ceased. Less mobile, longer-lived benthic species such as clams can take two to three years to reach sexual maturity (Chew & Ma, 1987; Goodwin & Pease, 1989) and may require five years to recover from disturbance such as smothering by sediment (study discussed in Chew & Ma, 1987). Therefore, shellfish beds impacted by the TPP Pier construction would be expected to recover within approximately five years after construction. Although ecological productivity would be temporarily reduced, it would be spatially limited to areas around the piles and anchors and benthic productivity would recover.

In the long term, as described in Section 3.1.2.3, Marine Sediments, the pier is not expected to change the trends in net sediment transport direction as compared to existing conditions. Minor, localized effects are expected, however, including accretion of up to 10 feet of sediments around the tip of K/B Spit over a period of 5 to 10 years (1 foot per year). With this slow rate of accretion, benthic organisms including shellfish in these areas are expected to be able to maintain their position within the sediment bed. Therefore, little mortality due to smothering or burial is expected. Farther to the east, transport and overall sediment supply to the adjacent beaches would not be significantly affected by the presence of the proposed pier. This is because eroding feeder bluffs and fronting beaches to the east of the K/B Spit appear to be the primary sources of the sediment supply to the shellfish beds at the Devil's Hole Beach (Figure 3.1-1). Following construction of the proposed TPP Pier, the feeder bluffs would continue to erode as they have in the past and provide sediment to adjacent beaches, including the shellfish harvest area. With implementation of the proposed avoidance and minimization measures identified in Section 2.6, no significant impacts on benthic communities would result with implementation of Alternative 1.

#### **3.2.3.2.2 Marine Fish**

The discussion of potential impacts to marine fish, and those habitats upon which they are dependent, is separated into classifications of *Non ESA-Listed Fish Species*, *ESA-listed Fish Species and Critical Habitat*, and *Essential Fish Habitat*. The evaluation of project-related effects on marine fish considers construction and operational impacts on potentially occurring marine fish species and those marine habitats on which they depend for some portion of their life history, including foraging, migration, and reproduction. These habitats are addressed using the following categories: *Water and Sediment Quality*; *Physical Habitat*, *Nearshore Barriers*, and *Overwater Shade*; *Biological Habitat*; and *Underwater Noise*. Due to similar nearshore marine habitat use, impact analyses for non ESA-listed salmonids and forage fish are considered similar to those detailed for ESA-listed salmonids. ESA-listed rockfish generally use different habitat types than salmonids and are discussed separately.

#### **Non-ESA-Listed Fish Species**

##### **Water and Sediment Quality**

Resident marine fish, adult salmonids, non-listed rockfish species, as well as all life stages of forage fish are expected to be present within the project area and are likely to occur during the in-water work window established for juvenile salmonid avoidance. To complete construction associated with Alternative 1, two in-water work seasons (total of 150 days) would be required (Table 2-1). In-water work associated with construction, including vessel operations, pile driving, removal of temporary piles, and anchor relocation could produce measurable, temporary increases in turbidity (Section 3.1.3.2, Water Quality and Sediments) potentially causing fish to temporarily avoid the areas near active construction. However, construction activities would result in intermittent rather than persistent increases in turbidity levels and would otherwise not cause changes that would violate water quality standards because processes that generate suspended sediments, which result in turbid conditions, would be short-term and localized and would disperse and/or settle rapidly (within a period of minutes to hours after construction activities cease). As a result, potential increases in turbidity during construction of the TPP Pier are unlikely to result in gill irritation or tissue damage for potentially occurring marine fish. The localized disturbance would not impact documented forage fish spawning areas due to the strong nearshore currents and nearshore wind waves and the distances between these



habitats and pile-driving activities (an estimated 190 feet to the nearest sand lance spawning habitat). Because concentrations of organic matter in NAVBASE Kitsap Bangor sediments are low, resuspension of these sediments is not expected to alter or depress DO below levels required by water quality standards (Section 3.1.3.2, Water Quality and Sediments).

Fish occurring in the project area during the two-year in-water construction period would not experience degraded sediment conditions because construction of the TPP Pier would not alter the chemical composition of bottom sediments and would not result in the discharge of contaminants that would have the potential to affect sediment quality or violate state standards (Section 3.1.3.2, Water Quality and Sediments, and associated references).

Operation of the pier by Navy vessels would not impact DO because construction activities would not discharge wastewaters other than stormwater runoff, in accordance with the SWPPP. In the absence of project-related discharges, construction of the TPP Pier would not alter DO concentrations in Hood Canal. As a result, no corresponding changes in fish occurrence, distribution, and habitat utilization in the project area based on water quality are anticipated. Although some sediment accretion would occur at the tip of K/B Spit due to the presence of the pier and trestle piles, little or no change to sediment supply or distribution south of the pier is expected (Section 3.1.3.2, Water Quality and Sediments). In the immediate vicinity of piles, localized changes in sediment grain size and accretion of shells and barnacles is anticipated. These changes would be limited in scale and would not result in overall changes to sediment quality, supply or transport processes, or alter fish occurrence, distribution, and habitat utilization. Localized sediment accretion is not anticipated to affect sand lance spawning habitat located south of K/B Spit or to the northeast of the project site. As a result, the construction and operation of the TPP Pier would not result in violations of water or sediment quality standards, including for DO, or result in long-term effects to these resources that would impact fish health in the immediate project vicinity.

With implementation of BMPs and impact minimization measures (Section 2.6), no significant impacts to non ESA-listed marine fish from potential impacts to water and sediment quality (including potential resuspension of sediments) are anticipated to result from Alternative 1.

### **Physical Habitat, Nearshore Barriers, Overwater Shade**

Various in-water and overwater aspects of the project have the potential to affect fish movement and habitat use in the immediate project vicinity. Within the project area, nearshore construction activity potentially resulting in migration barrier impacts on nearshore-migrating fish would include pile-driving activities, lighting of the construction area and construction platforms, vessel shading, anchor placement, underwater noise, and localized, temporary plumes of increased suspended solids produced during pile driving and anchoring activities. These impacts would be greater on nearshore migrating fish, such as forage fish and juvenile salmonids. Construction would adhere to the in-water work window when juvenile salmonids are least abundant to minimize potential effects. Larger fish, including adult salmonids, have much greater mobility, and are unlikely to experience the same shallow-water barrier effect as nearshore-dependent migrating fish. In general, adult salmonids would likely migrate around nearshore construction activity, with little or no overall delay in their movements.

Once construction is complete, long-term barriers to nearshore-migrating fish could include vessel activity, overwater lighting, the physical presence of the piles, and overwater shade. Vessel activity at the pier would be similar to existing waterfront activities along the waterfront, and would typically occur

in deeper waters, with little or no impacts to benthic habitats. Kahler et al. (2000) found that pier lighting may increase nocturnal predation on juvenile Chinook and coho salmon by visual predators such as other fish and fish-eating birds, potentially increasing nighttime predation of smaller fish, including juvenile salmonids and forage fish. Nighttime lighting options proposed for the pier minimize lighting at the water level, with illumination levels at the surface not exceeding 30 foot-candles (fc) at 30 feet, 10 fc at 50 feet, and 5 fc at 100 feet (Section 2.3.2). The trestle-supporting piles would occur across the nearshore migratory pathway, but would be spaced at intervals of 23 to 27 feet, depending on the pier section, and thereby would minimize the effect as a physical barrier. In addition, a lighting system would be installed under the trestle that would mimic natural light conditions, minimizing shading in nearshore waters (see Section 2.6, Best Management Practices and Impact Minimization Measures).

The project would result in an increase of overwater structures, including waters shallower than 30 feet below MLLW (Section 2.3.2) (Table 2-1). Shadows cast by overwater structures, such as the trestle, create a light/dark interface that allows ambush predators to remain in darkened areas to wait for prey (Helfman, 1981). Therefore, fish prey may become more susceptible to predation when moving around the structure if they are unable to detect the predator. Further, shadows from large overwater structures built within nearshore environments can disrupt nearshore migratory behavior. A study conducted at ferry terminals found that juvenile salmon (predominantly pink salmon [*O. gorbuscha*]) would avoid swimming under docks and shaded areas, causing delay in migration by several hours during the daytime at high tide periods and on sunny days (Ono et al., 2010).

The elevation of the bottom of the trestle and pier would be 3.5 feet above MHHW, although only a small portion would occur in water shallower than 30 feet below MLLW. At lower tides, the trestle would cast minimal shadow across the nearshore migratory pathway and have a corresponding minimally low barrier effect on fish movement. At higher tides a smaller height-over-water distance would cast a 39-foot-wide shadow across these habitats, resulting in insignificant delays in nearshore fish migration through the shaded environment. These potential impacts would be localized to 8,080 sq ft within the nearshore areas shallower than 30 feet below MLLW and would be minimized by the under-trestle lighting system (Table 2-1).

The portions of the trestle that would occur overwater in the nearshore environment could potentially affect the nearshore migratory behavior of forage fish and juvenile salmonids. The under-trestle lighting system would minimize impacts due to shading. Further, the pier itself would occur in water with a minimum depth of 35 feet and is anticipated to have little or no effect on nearshore forage fish or juvenile salmonid migration or adult salmonid migration. For larger fish that occur offshore in deeper water, including adult salmonids, it is possible that they would avoid migrating directly under the pier, where waters would be shaded. These larger fish have much greater mobility and would likely migrate around the structure with little or no overall delay in their movements.

With implementation of BMPs and impact minimization measures (Section 2.6), construction-related migrational barrier impacts to non-ESA listed marine fish, including forage fish, would be minimized and limited to two in-water work seasons. Conducting in-water work within the approved in-water work window would minimize impacts to juvenile salmon. No impacts to documented forage fish spawning habitats are anticipated due to the distance from these habitats to the project footprint (estimated at 190 feet). Based on a project design that would minimize the number of in-water structures in nearshore habitats, elevated trestle decking, and bent-pile spacing, little or no long-term barrier effects to nearshore migration or habitat use are expected to result from Alternative 1.

## Biological Habitat

Because intertidal and subtidal areas with extensive areas of eelgrass and other marine vegetation provide habitat for amphipods, copepods, and other aquatic invertebrates (Mumford, 2007) used by juvenile salmonids, forage fish, and other marine fish as food resources, potential impacts to these resources is a key concern (Simenstad et al., 1999; Nightingale & Simenstad, 2001a, 2001b; Redman et al., 2005). Various macroalgae species are considered important foraging and refuge habitat for many species of fish, including forage fish, juvenile salmonids, and recruitment habitat for rockfish (Palsson et al., 2009; 79 FR 68041). However, canopy-forming macroalgae is relatively absent in the immediate project vicinity, with marine vegetation largely limited to the green alga *Ulva* and brown algae *Saccharina latissima* and non-native *Sargassum muticum* (Section 3.2.2.1, Marine Vegetation and Benthic Communities baseline).

Construction of the TPP Pier would result in localized and temporary reductions of the marine vegetation and benthic community during pile placement and other construction-related disturbances (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). Temporary piles would impact both offshore and nearshore habitats (Table 2-1). Placement of the piles would cause a permanent loss of marine vegetation and benthic prey within the pile footprint (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). Other impacts from construction activities (benthic disturbance from construction support vessels and construction barges) would be short-term, localized, and limited to 150 days of in-water construction activities over two seasons. Marine fish, including forage fish, could experience minor loss of available benthic prey in the immediate project vicinity due to disturbances from pile installation and removal, relocation of PSBs, and barge anchors. Benthic organisms that are disturbed during in-water construction would be expected to be reestablished within a three-year period (CH2M Hill, 1995; Romberg et al., 1995; Parametrix, 1994, 1999; Anchor Environmental, 2002; Vivan et al., 2009). Total anticipated benthic impacts would last five years (two construction years, three years for reestablishment) to up to seven years for long-lived species (two construction years, five years for reestablishment), but would be limited to the immediate vicinity around the piles and anchors.

Once the TPP Pier is completed, the trestle component would create permanent overwater shade within nearshore areas shallower than 30 feet below MLLW where marine vegetation and benthic communities occur (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). Direct displacement due to the presence of the piles would reduce the productivity of the benthic community (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). With the operation of the under-trestle lighting system, the addition of the trestle is not expected to reduce the productivity of nearshore vegetation and benthic habitats utilized by demersal and migrating fish. Therefore, the use of vegetated habitats by marine fish in the project footprint is not expected to significantly decrease. The increase in complex structures (piles, floating camels) may increase the prevalence of some structure-associated fish species (e.g., Cottidae, Embiotocidae, Hexagrammidae) relative to existing conditions. However, it is likely that for other species, such as forage fish and juvenile salmonids, site use likely would continue to be minimal and transitory in nature although the under-trestle lighting would minimize the barrier effect to these species.

## Underwater Noise

This section summarizes the potential effects to fish from underwater noise associated with construction under Alternative 1. For a more detailed discussion of source levels and methodology used to model noise propagation, noise evaluation criteria for marine fish, marine birds, and marine

mammals as well as physiological and behavioral responses to airborne and underwater noise, please refer to Appendix A.

Construction activity associated with Alternative 1 would result in increased underwater noise levels. Noise would be generated from support vessels, small boat traffic, and barge-mounted equipment, such as generators, and pile installation. Noise levels from all activities except pile driving would typically not exceed underwater sound levels resulting from existing routine waterfront operations along the NAVBASE Kitsap Bangor waterfront. The greatest impacts during construction would occur during impact driving of steel piles. The currently accepted criteria for pile driving were developed by Popper et al. (2014) based on a review of available data on physiological responses of fish species to pile-driving noise. Impact pile driving would exceed the accepted underwater noise thresholds for fish injury in close proximity to the driven pile (Table 3.2-8), or temporary loss of hearing for some species (temporary threshold shift), resulting in the greatest potential construction-related impact to fish. There are no threshold criteria for noise effects on fish due to vibratory pile driving (Popper et al., 2014), and review of the literature did not reveal cases where exposure to continuous sound resulted in mortal injury (Hawkins et al., 2015).

In order to estimate the distance at which a particular underwater sound level may be exceeded during impact pile driving, underwater noise models use noise generation data, i.e., the amplitude of the sound resulting from striking a pile or vibrating it into the substrate, from studies of past pile-driving projects as reference. For underwater sound modeling, these reference noise generation data are called proxy source levels (additional detail provided in Appendix A). For underwater noise modeling of pile-driving activities, proxy source levels are used for vibratory installation of 24-inch, 30-inch, and 36-inch diameter steel pile, and impact installation of 36-inch steel pile.

Noise models for impact pile driving have been developed to estimate the amplitude of in-water sound generated from a single strike of a pile driver on a given pile (known as peak pressure). By using comparable source level reference data and inputting the size and type of pile into the model, the model predicts the distance over which a particular peak threshold value of interest will be exceeded (i.e., thresholds would not be exceeded beyond these distances). The peak threshold value is only used for determining over what distance an organism (e.g., a fish) would be exposed to underwater sound above an established noise threshold for a single pile strike. As pile driving typically requires multiple strikes, noise models for impact pile driving also investigate the accumulated exposure of an organism to sound over time (the cumulative sound exposure level [SEL]). This metric is used for an organism (e.g., a fish) that may occur in the area for an extended amount of time and be exposed to underwater sound generated from multiple pile strikes. Therefore, determining the cumulative SEL requires an estimate of the maximum number of pile strikes in a given day (detailed discussion in Appendix A).

To reduce potential impacts to ESA-listed fish species, the majority of steel pile driving would be conducted using a vibratory pile driver, with the exception of 36-inch steel deck and trestle support piles. As noted above, there are no threshold criteria for vibratory pile driving (Popper et al., 2014) and a review of the literature did not reveal cases where exposure to continuous sound resulted in mortal injury (Hawkins et al., 2015).

Impact pile driving for the TPP pier and trestle support piles is estimated to last a maximum duration of 45 minutes per day. Because a bubble curtain or other attenuation device would be used to minimize the noise generated by driving steel piles, an expected attenuation of 8 decibels (dB) sound pressure level (SPL) for 36-inch diameter steel piles was first subtracted from the source levels.

As shown in Table 3.2-8, the maximum distance to the mortal injury threshold is calculated to be 7 meters or less and results from the SEL<sub>CUM</sub> criterion for a maximum of 1,600 pile strikes per day. The recoverable injury threshold is calculated to 14 meters or less. In all cases, because the cumulative SEL formula takes into account all impact pile strikes within a 24-hour period, the sizes of the injury zones are presented as they have increased to their maximum extent through the course of a pile-driving day. As a result, during the early portion of the construction day, the injury zone would be smaller and only gradually increase out to a maximum extent as calculated in Table 3.2-8, after all strikes have been completed. Further, the formula assumes fish are remaining within the effect range during the entirety of active impact pile driving. In other words, an individual fish would have to be constantly within the calculated range during all impact pile driving in order to accumulate energy from every impact strike. Thus, calculated distances to thresholds for the full set of potential daily pile strikes are conservative, and actual distances would probably be less.

**Table 3.2-8. Calculated Distance(s) to Underwater Pile-Driving Noise Thresholds for Fish with Swim Bladder Involved in Hearing<sup>1</sup>**

<i>Pile Type</i>	<i>Mortality and Potential Mortal Injury (&gt;207 dB Peak or 207 dB SEL<sub>CUM</sub>)<sup>2</sup></i>	<i>Recoverable Injury (&gt;207 dB Peak or 203 dB SEL<sub>CUM</sub>)<sup>2</sup></i>	<i>Temporary Threshold Shift (186 dB SEL<sub>CUM</sub>)<sup>2</sup></i>
<b>Impact Pile Driving</b>			
36-in steel pipe	7 m <sup>3</sup>	14 m <sup>3</sup>	186 m <sup>3</sup>
<b>Vibratory Pile Driving</b>			
24-in steel pipe	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>
30-in steel pipe	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>
36-in steel pipe	N/A <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>

**Key:** > = greater than; dB = decibel; N/A = not applicable; m = meters; SEL<sub>CUM</sub> = cumulative sound exposure level over 24 hours; TTS = temporary threshold shift

**Notes:** Peak levels are relative to 1 μPa and cumulative SEL levels are relative to 1 μPa<sup>2</sup>-sec. Practical spreading loss model (15 log R, or 4.5 dB per doubling of distance) used for calculations. Assumes 8 dB attenuation for 36-inch steel piles with use of a bubble curtain.

1. Criteria for fish with swim bladder involved in hearing are more conservative than criteria for fish without a swim bladder or whose swim bladder is not involved in hearing; that is, the noise thresholds are lower for species with a swim bladder involved in hearing. Therefore, threshold distances are presented for species with swim bladder involved in hearing as a “worst-case” for exposure to noise.
2. Cumulative SEL calculated as Single Strike SEL + 10 \* log (# of pile strikes), assumes up 1,600 pile strikes/day for steel piles.
3. Distance listed is the greater of the two criteria (i.e., distance to peak vs distance to SEL<sub>CUM</sub>)
4. Vibratory installation of 24, 30, or 36-inch pile is not expected to result in injury or TTS in fish.

All life stages of forage fish are expected to be present within the Action Area and are likely to occur during the in-water work windows established for juvenile salmonid avoidance. Noise generated from pile-driving activities would reach levels that could injure or disturb forage fish that are present within the threshold zones indicated in Table 3.2-8. It should be noted that Halvorsen et al. (2012) determined that fish such as sand lance that do not have swim bladders may be less susceptible to injury from simulated impact pile-driving noise. In general, fish are likely to move away from a sound source that is too loud before physiological damage is of concern (Dahl et al., 2015). This behavioral response can result in fish leaving breeding or feeding sites. Impact driving of 36-inch steel piles would not exceed the injury criteria in Popper et al. (2014) at the documented sand lance spawning habitats located

approximately 250 feet south and 190 feet northeast of the immediate project area (Table 3.2-8). Recent surveys did not detect use by sand lance of potential spawning habitat south of K/B Dock, and it is unlikely that sand lance would use this habitat during active pile driving due to underwater noise. Therefore, potential impacts to forage fish should be limited to the potential avoidance of the immediate vicinity of the project construction area as well as avoidance of the K/B Dock sand lance spawning site during the two in-water work seasons. Effects from noise are not expected to measurably reduce forage fish populations.

To minimize exposure of ESA-listed fish to construction noise above the injurious thresholds, pile driving would:

- Occur during the in-water work window when juvenile salmonids are least likely to be present (July 16 through January 15)<sup>2</sup>;
- Be minimized by primarily using vibratory pile-driving methods;
- Limit impact pile driving to a maximum of 45 minutes per day;
- Require use of a noise attenuation device during impact pile driving; and
- Implement a soft-start approach, allowing organisms to move away from the sound source.

Following the construction associated with Alternative 1, operational noise from support vessels, small boat traffic, and other equipment, such as generators, would be consistent with existing routine waterfront operations along the NAVBASE Kitsap Bangor waterfront and are not expected to exceed underwater sound threshold levels established for fish.

### **ESA-Listed Fish and Critical Habitat**

#### **ESA-Listed Salmonids**

Many of the impacts described above for non-ESA-listed fish species would also apply to the ESA-listed Puget Sound ESU Chinook, Hood Canal summer-run ESU chum salmon, Puget Sound DPS steelhead, and bull trout.

Water quality impacts would be limited to increased turbidity during in-water construction, but would return to normal conditions once construction is complete. Impacts to sediment would be minimal, with no long-term adverse impacts to sediment quality. Some localized changes in sediment accretion would occur, but not adversely affect juvenile salmonid habitat use or migration. Alternative 1 would result in an increase of overwater shade over offshore and nearshore habitats. Permanent impacts from pile footprints would occur within nearshore habitats (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). These features of the project would reduce the productivity of marine vegetation and benthic communities potentially utilized by juvenile ESA-listed salmonids during their outmigration.

Impact pile driving would generate underwater noise levels above established thresholds for fish. Approximately 150 days of pile driving would occur during two in-water work window seasons when juvenile salmonids are least likely to be present. As discussed in Section 3.2.2.2.2 (ESA-Listed Fish Species and Critical Habitat), even though only small numbers of juvenile Chinook salmon have been

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<sup>2</sup> The in-water construction start date is modified by restrictions for the protection of nesting bald eagles to July 22 through January 15.

documented in the area through early July (Frierson et al., 2017), some juveniles could still potentially be exposed to effects of underwater sound despite adherence to the work windows. Resident and returning adult Chinook, returning summer-run chum, and steelhead could also be present during the period of in-water construction and would be exposed to elevated underwater sound levels during impact pile driving. The majority of these fish would be larger in size than juveniles, would not be nearshore-dependent, and would not be expected to remain in the work area for an extended period of time. Nevertheless, these fish would still be exposed, temporarily, to elevated levels of underwater sound from impact pile driving and could display either a startle or behavioral response such as avoidance of noise-affected areas. Because noise at levels exceeding injury and temporary threshold shift criteria would not reach habitats in Hood Canal where bull trout are anticipated to occur, impacts on bull trout from in-water construction are expected to be insignificant.

The TPP Pier would result in the addition of overwater and in-water features with the potential to affect ESA-listed salmon migration and habitat use. As described above for non-ESA-listed species, pier lighting could potentially increase nighttime predation of smaller fish, including juvenile salmonids and forage fish; shading could decrease habitat value and create barriers to migration; and in-water structures could create barriers to migration. However, design elements would substantially reduce the potential physical barrier effect and minimize overwater shade in habitats utilized by juvenile ESA-listed salmon for foraging, refuge, and migration (Section 2.6). These potential impacts would be localized to 8,080 sq ft within the nearshore areas shallower than 30 feet below MLLW (Table 2-1) and would not significantly reduce available habitat for juvenile ESA-listed salmonids in the overall project area.

#### *Critical Habitat*

Puget Sound Chinook and Hood Canal summer-run chum salmon have designated nearshore and offshore marine area critical habitat within northern Hood Canal. Since DoD installations with current INRMPs are exempt from critical habitat designation, no critical habitat is designated at NAVBASE Kitsap Bangor. Elevated underwater noise would not extend beyond the naval base's exempt area (i.e., the Naval Restricted Areas) into designated salmonid critical habitat (PCEs: Estuarine Areas and Nearshore Marine Areas). Puget Sound steelhead and bull trout critical habitat does not occur within the project area. Operation of the Proposed Action would not affect salmonid critical habitat outside the base boundary. Therefore, the Proposed Action would not affect critical habitat for any of the listed salmonids.

#### *Effect Determination*

Based on the analysis noted above for Alternative 1, the effect determination for Puget Sound Chinook, Hood Canal summer-run chum, Puget Sound steelhead, and bull trout is "may affect, not likely to adversely affect." The effect determination for Puget Sound Chinook, Hood Canal summer-run salmon critical habitat is "no effect" because stressors such as elevated pile-driving noise would not extend into critical habitat.

#### **ESA-Listed Rockfish**

As described for ESA-listed salmonids, the majority of impacts described above for non-ESA-listed fish species would also apply to the ESA-listed Puget Sound/Georgia Basin DPSs of yelloweye rockfish and bocaccio. In-water work would produce minor, temporary, and localized effects on water quality (notably small increases in turbidity) during construction, but would not decrease DO concentrations or

violate water quality standards. Adult life stages of bocaccio and yelloweye rockfish, and juvenile yelloweye rockfish, if present, would occur farther offshore and beyond any impacts associated with suspended sediment and turbidity during in-water construction.

Pile-driving noise would exceed injury noise thresholds during impact pile driving in the project area (Table 3.2-8). However, adult bocaccio rockfish and adult and juvenile yelloweye rockfish are not expected to be exposed to injurious noise levels because they occur in deeper water than where the noise would exceed the peak injury threshold; thus impacts would be discountable. Juvenile bocaccio may potentially rear within the project area because some kelp habitats occur along the waterfront, and could be exposed to noise above the fish injury thresholds during impact pile driving. In addition, larval rockfish are often observed under free-floating marine vegetation and thus may occupy the full water column. As these floating vegetated mats can be broadly dispersed, there is the potential for this type of habitat to occur in the project area during construction. As a result, although larval bocaccio rockfish and yelloweye rockfish prevalence in the project area is expected to be extremely low, if they did occur, larval rockfish could be exposed to noise above the fish injury thresholds during impact pile driving.

Nearshore marine vegetated and benthic habitats would be impacted during pile placement and other construction-related disturbances (i.e., support vessels, pile installation and removal, relocation of PSBs, and barge anchors) (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). The long-term presence of the pier would cause a permanent loss of marine vegetation and benthic prey within the pile footprint; the under-trestle lighting would minimize impacts where nearshore benthic habitats are shaded by overwater structures.

Peak rockfish larvae (including bocaccio) occurrence in Hood Canal occurs outside the in-water work window in April to May, with small presence during the early part of the work window and absence from surface waters by November (Green & Godersky, 2012). Juvenile bocaccio recruiting to demersal habitats in the spring have the potential to utilize the nearshore aquatic vegetation (including eelgrass and kelp) as rearing habitat. However, only a small patch of eelgrass occurs in the construction zone and canopy kelp habitats, utilized as preferred recruitment habitat, are not present within the project footprint; therefore, little or no impact to these habitats is expected. Brown algae also serve as potential recruitment and juvenile rearing habitat, does occur within the project footprint, and would be impacted due to construction and operation of the project. Because brown algae occur within the footprint, the long-term presence of the pier would result in some loss of brown algae habitat (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities) potentially utilized by bocaccio. Nonetheless, bocaccio have not been documented along the waterfront in numerous nearshore surveys (Schreiner et al., 1977; Salo et al., 1980; Bax, 1983; SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2016, 2017; Pacunski, 2017); thus, impacts to brown algae in the project footprint would be discountable to the overall availability of juvenile bocaccio settlement habitat.

#### *Critical Habitat*

Puget Sound/Georgia Basin DPSs of yelloweye rockfish and bocaccio have designated nearshore and offshore marine area critical habitat within northern Hood Canal. Since DoD installations with current INRMPs are exempt from critical habitat designation, no critical habitat is designated at NAVBASE Kitsap Bangor. Elevated underwater noise would not extend beyond the naval base's excluded area into designated rockfish critical habitat. Operation of the Proposed Action would not affect rockfish critical



habitats outside the base boundary. Therefore, the Proposed Action would not affect critical habitat for listed rockfish.

#### *Effect Determination*

Based on the analysis noted above for Alternative 1, the effect determination for bocaccio and yelloweye rockfish is “may affect, likely to adversely affect.” The effect determination for critical habitat is “no effect” because stressors such as elevated pile-driving noise would not extend into designated critical habitat.

#### **Essential Fish Habitat**

For the purposes of determining effects on EFH from Alternative 1, the EFH Final Rule (67 FR 2376) and 50 CFR section 600.910(a) were used as guidance. Findings pertaining to EFH habitats and federally managed species occurrence in waters within the Alternative 1 site are based on site-specific fish surveys, review of the life histories, habitat requirements, and potential conservation measures from the FMPs. Effects on EFH would include the same habitat effects as those described above for non-listed and listed fish species with the potential to occur in the nearshore and marine areas. The primary construction-related impacts of concern for EFH include underwater noise generated from pile driving, marine benthic and vegetation community disturbance, substrate disruption and turbidity from pile driving, barge anchoring, and water column and substrate shading from construction barges and structures (detailed in Section 3.2.3.2.1, Marine Vegetation and Benthic Communities). Underwater noise would create short-term disturbances (impact hammers would be utilized a maximum of 45 minutes per day for up to 150 days over 2 years) in habitats used by EFH species. Pile driving during construction would result in significant increases in the project area where the threshold for injury would be exceeded, leading to potential injury or mortality. Primary use of a vibratory pile driver, use of an attenuation device during impact pile driving, and conducting pile driving during the in-water work window would avoid most effects on migrating Pacific Coast salmon EFH species. However, ensonification of (i.e., noise within) the water column as a result of the pile-driving activities would have temporary adverse impacts on EFH.

Long-term impacts on physical habitats and barriers would include an increase in overwater and in-water structures. Shading can affect marine vegetation and benthic habitats, which provide suitable prey and refugia habitat areas for various life stages of some EFH species, but the impacts would be minimized in the nearshore by the under-trestle lighting. Nearshore marine habitat and habitats in deep water would potentially be disturbed during construction of the TPP Pier (Section 3.2.3.2.1, Marine Vegetation and Benthic Communities).

Although eelgrass does not occur within the permanent project footprint, brown algae occur within the nearshore and would be lost within the footprint of the trestle. As a result, some EFH species may experience a reduction in vegetation, prey, and refugia. Nearshore habitats would experience an increase in artificial nighttime lighting, potentially reducing the quality and function of these habitats for nearshore fish that utilize these habitats for refuge, foraging, and migration. However, nighttime overwater lighting would be designed to minimize intensity at the water surface. While some EFH fish species (e.g., starry flounder and English sole) would experience a reduction in flat benthic habitat, others (e.g., greenling and cabezon) may benefit from an increase in high-relief habitat (e.g., vertical piles) more suitable for their life history. Due to the broad bent spacing, the addition of in-water piles structures in nearshore habitats would not represent a substantial barrier to juvenile salmonids.

Similarly, the height-over-water (+3.5 feet MHHW) and the under-trestle lighting system would minimize shade cast in the same nearshore footprint. Groundfish species would experience no restrictions on movements between habitats.

The increase of in-water structures in nearshore environments would represent a long-term impact. All other adverse effects would be short-term, lasting only during the period of construction, and would cease upon completion of construction activities associated with Alternative 1. The Navy concludes that Alternative 1 may adversely affect Pacific coast groundfish, coastal pelagic, and Pacific Coast salmon EFH. However, implementation of BMPs and impact minimization measures (Section 2.6) would avoid or minimize adverse effects on EFH to the extent practicable.

### **3.2.3.2.3 Marine Mammals**

Construction of the TPP Pier and support facilities under Alternative 1 would result in temporarily increased human activity levels, including vessel movements, changes in prey availability, and increased underwater and airborne noise levels. This portion of the Bangor shoreline currently has relatively high levels of human activity under daily operations, and prey availability changes would be short-term and highly localized. Because vessels involved in construction would be operating at slow speeds, no vessel strikes would be expected. Therefore, there would be no significant impact to marine mammals due to increased human activity levels, changes in prey availability, or the potential for vessel strikes during construction.

However, underwater pile-driving noise during the construction period has the potential to disrupt marine mammal foraging, resting, and transit in the vicinity of the project site. The zones of impact due to construction noise are described in following sections. Pile driving would exceed some of the underwater noise thresholds for marine mammals established by NMFS for behavioral harassment and injury and result in the greatest potential for adverse impacts on marine mammals. Construction noise impacts on marine mammals are anticipated to be temporary and highly localized to the construction area, as discussed below in detail, with the exception of impacts due to vibratory pile-driving noise, which would extend over a large area.

Long-term operation of the TPP Pier would include the presence of new in-water barriers (piles) and over-water coverage (the pier and trestle) in an area that currently does not have features. Marine mammals are highly mobile and would be able to swim around these barriers. These barriers may affect the migratory pathways and distribution of some fish populations that are preyed upon by marine mammals, but these indirect impacts would be highly localized and would not significantly alter prey availability to marine mammals in Hood Canal.

#### **Effects of Elevated Noise Levels on Marine Mammals**

A general discussion of estimating the spread of noise produced by construction is presented in Section 3.2.3.2.2, Marine Fish: Underwater Noise, including a discussion of the Peak and SEL<sub>CUM</sub> criteria as applied to fish. These measurements of underwater noise are used to define noise exposure criteria for marine mammals exposed to impact pile driving as well. In addition, the root mean square (RMS) measurement of sound is used for marine mammal exposure criteria. RMS is a measure of the amount of energy produced by an action divided by a defined time period. This metric allows the models to measure the average amount of energy that occurs within the sound waves produced by an underwater noise source. Also, since this metric is not dependent on measuring the peak pressure of a sound wave

by a strike on the pile, it can be used for both impact and vibratory pile driving. A more detailed discussion is presented in Appendix A (Noise Methodology and Calculations).

For vibratory pile driving, the type of sound produced is much different than for impact pile driving. Vibratory pile driving does not produce high peak amplitudes (elevated peak pressures) with fast rise times typical of steel pile driving. As a result, no peak pressure injury criterion is associated with vibratory driving. Further, the pile is not being “struck” repeatedly, resulting in cumulative impacts from each strike, so the SEL criteria do not apply to vibratory pile driving. Instead, noise models for vibratory pile driving use RMS as the unit to determine how much noise is generated and at what distances this energy exceeds the threshold for affecting marine mammal behavior. Underwater and airborne noise generated during pile installation and removal has the potential to disrupt the behavior of marine mammals that may be traveling through, foraging, or resting in the vicinity of the project area. The Navy estimates potential impacts to marine mammals by considering the likelihood that each species may be present at the location during pile driving, determining the sound levels generated by various pile types and installation methods, and applying acoustic threshold criteria (expressed in decibels, dB) established by NMFS for evaluating the potential for injury due to auditory injury or behavioral impacts. A detailed explanation of the analytical methods is presented in Appendix A, with the following sections summarizing results of the underwater noise analysis.

Under Alternative 1, there would be 28 steel piles that are 24 inches in diameter, 10 steel piles that are 30 inches in diameter, and 254 steel piles that are 36 inches in diameter installed in the water over two in-water construction seasons. An estimated 150 days would be required over the two construction seasons to complete pile installation. The highest underwater source levels for pile driving would result from impact driving of 36-inch steel piles. As detailed in Appendix A, the Navy estimated the distances to the various NMFS underwater noise thresholds for injurious and behavioral effects on marine mammals due to impact pile driving (Table 3.2-9). These distances were estimated by taking into account the sound source levels for impact and vibratory pile driving of piles at NAVBASE Kitsap Bangor, sound propagation over distance from the driven pile, and acoustic impacts thresholds for the various species groups.

Threshold distances for injury due to single-strike peak noise levels were also calculated and are presented in Appendix A, but the resulting distances are smaller than the cumulative strike distances presented in Table 3.2-9 and would be encompassed by thresholds for cumulative strikes. Therefore, calculated distances to injury thresholds for single-strike peak noise are not presented here.

The area encompassed by the threshold values decreases as pile driving gets closer to shore and is truncated where shallow water and land masses block noise transmission. Since estimates of the distances to injury thresholds involve the cumulative energy of all impact strikes over a 24-hour period, the affected area represents the maximum extent of potential injury effects. The injury zone would be smaller earlier in the construction day and would only reach the maximum extent after all the pile strikes have been completed.

**Table 3.2-9. Calculated Distance(s) to Underwater Marine Mammal Impact Pile-Driving Noise Thresholds and Areas Encompassed Within Threshold Distance – SEL<sub>CUM</sub> and RMS Thresholds<sup>1</sup>**

Pile Size and Type	Threshold						
	Injury (PTS Onset) Level A Pinnipeds <sup>2</sup>		Injury (PTS Onset) Level A Cetaceans <sup>2</sup>			Behavioral Disturbance Level B (160 dB RMS) <sup>3</sup>	
	PW	OW	LF	MF	HF	Radial Distance to Threshold	Area Encompassed by Threshold <sup>4</sup>
36-in steel <sup>5</sup>	156 m	12 m	294 m	10.5 m	351 m	541 m	0.83 sq km

**Key:** HF = high frequency cetacean; in = inch; km = kilometer; LF = low frequency cetacean; m = meter; MF = mid-frequency cetacean; No BC = no bubble curtain; OW= otariid (sea lion); PTS = permanent threshold shift; PW = phocid (harbor seal); sq = square

**Notes:**

1. Calculations based on threshold criteria and source levels shown in Appendix A (Table A-12 and Table A-3, respectively).
2. Distances to injury (PTS) onset thresholds calculated using the NMFS Companion User spreadsheet (NMFS, 2018b) with default Weighting Factor Adjustment of 2.0.).
3. Distances to behavioral disturbance thresholds calculated using practical spreading loss model.
4. Areas were adjusted wherever land masses are encountered prior to reaching the full extent of the radius around the driven pile.
5. Assumes 1,600 strikes/day. Bubble curtain will be used for 36-in steel piles, with 8 decibel (dB) attenuation provided by a bubble curtain.

The greatest distances of potentially injurious noise from impact pile driving is expected to be no larger than 294 meters for low frequency cetaceans such as humpback whale and 351 meters for high-frequency cetaceans, such as the harbor porpoise, with the use of a noise attenuation device. The likelihood of injury due to pile-driving noise is discountable for any cetacean at the TPP Pier site for several reasons. Cetaceans are unlikely to be present in the areas affected by injurious noise levels, as their movements would be in the open channel of Hood Canal far from the Bangor shoreline. Affected areas will be fully monitored by marine mammal observers during pile driving. Pile driving will cease if monitors detect a marine mammal approaching or entering the injury zone. In addition, most steel piles would be installed with a vibratory driver, which affects a smaller area with injurious noise levels than impact pile driving (Appendix A). Where impact pile driving of steel pile is required, use of a noise attenuation device such as a bubble curtain would reduce source noise levels and the area affected by potentially injurious noise levels.

Distances to injury thresholds for Steller sea lions and California sea lions would be very small (12 meters) and easily monitored to avoid exposure to injurious noise levels. The exception to the no-injurious-impact conclusion for marine mammals is the harbor seal. The presence of existing structures on the Bangor waterfront at K/B Spit and the TPP Pier, as construction progresses, may interfere with monitors' ability to visualize the entire injury zone, which would be 156 meters for this species. Marine mammal monitoring will be conducted and pile driving will be shut down in the event that harbor seals are detected within the injury zone. Nonetheless, because visibility may be obstructed during pile driving, some individual harbor seals may inadvertently be exposed to injurious noise levels.

Additionally, the Navy calculated distances to injury and behavioral disturbance thresholds and areas encompassed within threshold distances for vibratory pile-driving noise (Table 3.2-10). Similar to calculations for impact pile-driving noise, these distances were estimated by taking into account the sound source levels for vibratory pile driving at NAVBASE Kitsap Bangor, sound propagation over distance from the driven pile, and acoustic impacts thresholds for the various species groups.

**Table 3.2-10. Calculated Radial Distance(s) to Underwater Marine Mammal Vibratory Pile-Driving Noise Thresholds and Areas Encompassed Within Threshold Distance<sup>1</sup>**

Pile Size and Type	Threshold						
	Injury (PTS Onset) Level A Pinnipeds <sup>2</sup>		Injury (PTS Onset) Level A Cetaceans <sup>2</sup>			Behavioral Disturbance Level B (120 dB RMS) <sup>3</sup> All Species	
	PW	OW	LF	MF	HF	Radial Distance to Threshold	Area Encompassed by Threshold <sup>4</sup>
24-in steel	12 m	1 m	20 m	2 m	30 m	5.4 km	26.13 sq km
30-in steel	26 m	2 m	43 m	4 m	64 m	11.7 km	50.49 sq km
36-in steel	26 m	2 m	43 m	4 m	64 m	11.7 km	50.49 sq km

**Key:** dB = decibel; HF = high frequency cetacean; in = inch; km = kilometer; LF = low frequency cetacean; m = meter; MF = mid-frequency cetacean, OW= otariid (sea lion); PTS = permanent threshold shift; PW = phocid (harbor seal); RMS = root mean square; sq km = square kilometer

**Notes:**

1. Calculations based on threshold criteria and source levels shown in Appendix A (Table A-11 and Table A-3).
2. Distances to the injury (PTS onset) thresholds calculated using National Marine Fisheries Service (NMFS) calculator with default Weighting Factor Adjustment of 2.5 (NMFS, 2016d; <http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm>).
3. Distances to the behavioral disturbance thresholds calculated using practical spreading loss model.
4. Areas were adjusted wherever land masses are encountered prior to reaching the full extent of the radius around the driven pile.
5. Assumes up to 4 piles installed per day, 1 hour of vibratory driving per pile.

Vibratory pile-driving distances to injury thresholds for marine mammal groups are smaller (up to 64 meters for 36-inch steel pile for high-frequency cetaceans) than for impact pile driving and will be fully monitored by marine mammal observers. No injury is anticipated to any marine mammal species due to vibratory pile driving because pile driving will shut down in the event that any marine mammal approaches or enters the injury zone.

Pile driving would produce noise above the underwater behavioral harassment threshold during impact and vibratory pile driving. The loudest impact pile-driving noise for Alternative 1, resulting from installation of 36-inch steel piles with a noise attenuation device, is estimated to affect an area up to 541 meters from the driven pile.

However, installation of steel piles will utilize a vibratory pile driver to the extent practicable in order to reduce injury to fish species and marine mammals due to impact pile driving. The areas within behavioral disturbance thresholds due to vibratory pile driving would be much larger than the area affected by impact pile installation (due to the low behavioral harassment threshold for continuous sound [120 dB RMS versus 160 dB RMS for impulsive sound from impact pile driving]) (Tables 3.2-9 and 3.2-10). The affected areas during vibratory pile installation would be too large to be fully monitored by marine mammal observers. For Alternative 1, the affected area could extend up to 11.7 km from 36-inch steel piles installed at the TPP Pier site.

To assess the potential exposure of marine mammals to above-threshold noise levels during in-water work windows during construction of the TPP Pier, the likelihood of occurrence of each species was considered along with the number of pile-driving days. The Navy used one of three methods for species at this location, depending on (1) whether site-specific abundance was known, (2) regional densities were known, or (3) the species is so infrequently encountered that densities cannot be determined and other reasoning must be applied. Potential exposures of Steller sea lions, California sea lions, and harbor

seals were estimated based on known abundances determined by on-site monitoring; exposures of harbor porpoises were estimated based on regional density data (Navy, 2015d, Marine Species Density Database); and exposures of transient killer whales were estimated through analysis of historical occurrence. Details of the exposure analysis are presented in Appendix A, and results are summarized in Table A-19.

The Navy would implement a variety of BMPs and mitigation measures, including noise attenuation devices and marine mammal observers that are expected to reduce the estimated impacts. These measures are summarized in Table 3.9-2.

Individual responses of marine mammals to pile-driving noise are expected to be variable. Some individuals may occupy the project area during pile driving without apparent effect, but others may be displaced with undetermined effects. In general, cetaceans like harbor porpoise infrequently transit the waters in close proximity of NAVBASE Kitsap Bangor, and they do not tend to remain there. If they encounter pile-driving noise, they would likely avoid affected areas. Avoidance of the affected area during pile-driving operations would potentially reduce access to foraging areas and inhibit movement through the area. The likelihood of exposure to behavioral disturbance due to pile-driving noise would be limited by the infrequent occurrence of cetacean species in the vicinity, as well as monitoring and shutdown of pile driving if monitors detect cetaceans.

Acoustic exposure estimates from pile-driving operations summarized in Appendix A and Table A-19 indicate there is the potential for Level A injury through hearing loss (referred to as permanent threshold shift, or PTS) of harbor seals and Level B harassment, which has the potential to disrupt animal behavior, of harbor seals and other species as defined by the MMPA. Other construction activities not associated with pile installation and removal would not result in Level A or B harassment under the MMPA. The Navy received Incidental Harassment Authorizations for the exposures, one for each year of in-water construction, from NMFS on August 25, 2020 in compliance with the MMPA. NMFS published a Final Rule in the Federal Register on October 28, 2020. The exposures are only expected to result in behavioral impacts on an intermittent basis for most marine mammal species, and long-term or permanent impacts potentially may affect a small number of harbor seals.

The analysis presented above indicates that TPP Pier construction may impact individual marine mammals, but any impacts observed at the population, stock, or species level would be negligible. Therefore, there would be no significant impact to marine mammal populations.

### **ESA Effect Determinations**

Based on the low likelihood of occurrence of ESA-listed species in Table 3.2-1 and the use of BMPs and mitigation measures that are likely to reduce potential impacts (Section 2.6 and Section 3.9), the Navy concludes that the Proposed Action at NAVBASE Kitsap, Bangor:

- "May affect, and are not likely to adversely affect" SRKW. Because SRKW do not occur in Hood Canal, no direct effects are expected to result from TPP Pier construction and operation. With regard to indirect effects related to prey availability, temporal limitations during TPP Pier construction would result in a discountable effect. Long-term effects of pier operation on prey species would be reduced to an insignificant level with implementation of design elements described in Section 2.6. TPP Pier construction and operation are expected to have no effect on designated critical habitat.

- “May affect, and are not likely to adversely affect” humpback whales. This species is considered rare in the Hood Canal; therefore, no direct effects are expected to result from TPP Pier construction and operation.

#### **3.2.3.2.4 Marine Birds**

Construction of the TPP Pier and support facilities associated with Alternative 1 would affect resident and migrant marine birds through increased human activity levels on the waterfront, changes in prey availability, and intermittently elevated underwater and airborne noise. Marine birds that rest and forage in the vicinity would be likely to avoid the area during periods of high activity. However, the activity would be highly localized. The Bangor waterfront in the vicinity of K/B Spit generally has high levels of ongoing human activity, and marine birds alter their foraging and resting sites according to their level of tolerance to disturbance. There would be no significant impact to marine bird populations in Hood Canal due to increased human activity overall because increased construction activity would be localized and intermittent.

As discussed in Sections 3.2.3.2.1 and 3.2.3.2.2 above, in-water work could temporarily affect the availability of benthic invertebrates and forage fish, which are the prey base of many marine birds, in a limited area. Turbidity effects and potential resuspension of contaminated sediments are not expected to affect the prey base since these changes would be short-term and small scale during construction. Therefore, there would be no significant impact to marine birds due to prey availability. As described in Section 3.2.2.4.1, marbled murrelet occupancy surveys in 2016, 2017, and 2018 have not detected nesting activity in potential nesting habitat in the vicinity of the TPP project. Thus, the TPP would have no impact on nesting activity.

#### **Effects of Elevated Noise Levels on Marine Birds**

Construction associated with Alternative 1 would result in increased underwater and airborne noise levels. Noise would be generated from small vessels and barge-mounted equipment such as generators, and pile extraction and installation. Noise levels from all activities except pile driving would typically not exceed underwater sound levels resulting from existing routine waterfront operations along the Bangor waterfront. The most significant underwater noise source would be impact pile driving of steel piles. Impacts of elevated noise levels due to pile driving were evaluated in the context of established criteria for ESA consultation with the USFWS on the threatened marbled murrelet. No criteria have been established for determining impacts of elevated noise levels on other marine bird species, some of which forage underwater like the marbled murrelet, and general conclusions about impacts on marbled murrelets were applied to other species.

Pursuit-diving birds (i.e., birds that pursue and capture their prey underwater using their wings to swim) include cormorants, grebes, and alcids (murrelets, and pigeon guillemots). While actively foraging, they dive repeatedly into waters of various depths and would potentially be exposed to elevated underwater noise during pile driving. When startled by loud sounds, their foraging patterns may be altered, and birds may flush or dive and swim away underwater. While underwater, they would be susceptible to injury or behavioral disturbance due to elevated sound pressure waves generated by pile driving. Dabbling and diving ducks may also be susceptible to elevated underwater sound. Birds that feed on the surface such as gulls, shorebirds, and wading birds are unlikely to be affected by elevated underwater sound.

Actively foraging marbled murrelets dive repeatedly into waters ranging up to approximately 160 feet in depth for periods ranging up to 60 seconds (Nelson et al., 2006). Foraging bouts typically last over a period of 27 to 33 minutes, with approximately 50 percent of the time spent underwater (Jodice & Collopy, 1999). When startled by loud sounds, the foraging pattern may be altered, and birds may flush or dive and swim away underwater. While underwater, they would be susceptible to injury or behavioral disturbance due to elevated sound pressure waves generated by pile driving.

As described in detail in Appendix A, the USFWS uses underwater noise thresholds developed by the Marbled Murrelet Hydroacoustic Science Panel (SAIC, 2011) to determine the zones around a driven pile in which two general forms of injury might occur to diving marbled murrelets: (1) auditory injury (generally damage to sensory cells of the ear) and (2) non-auditory injury (trauma to non-auditory body tissues/organs). Since the underwater criterion for auditory injury was the lower of the two thresholds, this was the criterion used for assessing injurious impacts to the marbled murrelet in this analysis. Currently there are no thresholds or guidelines for installation of piles with a vibratory driver. Because the sound levels generated by vibratory drivers are typically 20 to 30 dB lower than impact pile driving and do not produce waveforms with sharp rise times like impact pile driving, the affected areas would be discountably small and potential impacts on marbled murrelets would be discountable.

Under Alternative 1, the number of piles installed during two in-water construction seasons would be 28 for 24-inch steel piles, 10 for 30-inch steel piles, and 254 for 36-inch steel piles. The highest underwater source levels for pile driving would result from impact driving of 36-inch steel piles. Marbled murrelets would be potentially exposed to injurious noise levels due to impact pile driving within 16 meters of the driven pile. Since estimates of the distances to thresholds involve the cumulative energy of all impact strikes over a 24-hour period, the affected area represents the maximum extent of potential auditory injury effects. The injury zone would be smaller earlier in the construction day and would only reach the maximum extent after all the pile strikes have been completed.

Airborne noise levels from pile driving are not expected to be injurious to birds within the study area because the source levels for airborne noise from pile driving are well below those known to cause injury to birds in laboratory situations (Dooling & Popper, 2007). However, the USFWS (2013) has determined that airborne noise due to impact pile driving may behaviorally affect foraging marbled murrelets, based on the findings of the Marbled Murrelet Hydroacoustic Science Panel regarding non-injurious thresholds for pile-driving noise (SAIC, 2012). Marbled murrelets typically perform foraging dives in pairs and are highly vocal when they are above the surface (Strachan et al., 1995). On the water's surface, birds typically stay within 100 feet of their partners during foraging bouts. This behavior is thought to play a role in foraging efficiency; therefore, airborne noise that masks their vocalizations has the potential to affect foraging success (Carter & Sealy, 1990; Strachan et al., 1995). Unlike other noise effects criteria established for injury, the distance from a pile-driving source within which communications will be masked is dependent upon ambient noise levels and, therefore, is site-specific. Masking effects cease immediately when the masking noise stops.

Under typical conditions on the waterfront, communication between foraging murrelets would be compromised by pile-driving noise within 42 meters of the murrelets. This is based on noise produced by impact pile driving smaller than 36-inch steel piles (USFWS, 2013). Acoustic monitoring during construction at NAVBASE Kitsap Bangor (Illingworth & Rodkin, 2013) indicated that average airborne source levels during impact driving of 36-inch steel piles were the same as, and in some cases lower than, 24-inch steel piles. Therefore, the masking distance for 24-inch steel piles was applied to all steel pile sizes.



The USFWS (2013) has provided guidance on evaluating the significance of airborne masking effects for pile-driving projects. “Typical” pile-driving projects involve:

- Installation of 24-inch or 36-inch steel piles
- Use of vibratory pile drivers for most piles
- Use of impact pile drivers for proofing only
- Adherence to a 2-hour timing restriction (i.e., no pile driving within 2 hours after sunrise and within 2 hours before sunset during the breeding season)

Typical pile-driving projects do not result in measurable effects on marbled murrelets because the use of impact hammers is intermittent and of short duration, the 2-hour timing restriction protects murrelets during their most active foraging periods, and murrelet vocalizations are adapted to overcome the effects of ambient noise (USFWS, 2013).

Steel pile driving during TPP Pier construction under Alternative 1 would be “typical” because all piles would be 36 inches or less, vibratory drivers would be used to install the piles, with limited proofing, and the timing restrictions would be observed.

To prevent exposure to injurious or masking noise levels in the vicinity of the TPP Pier site, the Navy will implement the mitigation measures described in Section 3.9. The Navy will actively monitor the underwater auditory injury zone and the 42-meter masking zone during impact pile driving. The likelihood of marbled murrelet exposure to injurious or masking noise from impact pile driving is discountable because these zones are small and can be effectively monitored during pile driving, and pile driving will cease if monitors detect marbled murrelets within the threshold distance.

With the implementation of minimization measures and monitoring actions (Section 2.6 and Section 3.9), the Navy has determined the Proposed Action “may affect, but is not likely to adversely affect” ESA-listed marbled murrelets due to temporarily elevated underwater and airborne sound levels resulting from impact or vibratory pile driving of all pile types. Similarly, TPP activities are not expected to have significant impacts due to elevated noise levels on other marine bird species.

### **Critical Habitat**

Because the closest marbled murrelet designated critical habitat to NAVBASE Kitsap Bangor is about 7 miles to the west, no noise resulting from the TPP activities would reach it. Therefore, a “no effect” determination was made for designated critical habitat in the vicinity of NAVBASE Kitsap Bangor.

### **3.2.3.2.5 Terrestrial Resources**

#### **Vegetation Communities**

Construction of the TPP support facilities under Alternative 1 would affect terrestrial vegetation communities, as follows. The area disturbed by construction in the upland area would total approximately 33,250 sq ft (Figure 2-2), of which 25,600 sq ft would be located west of Sea Lion Road in an already-developed waterfront site. The impact of removing the mostly non-native grass/herbaceous vegetation would be negligible. Native vegetation would be removed at the proposed diesel marine fuel storage site, located on the east side of Sea Lion Road at K/B Spit (Figure 2-3). Construction of this element of the project would require removal of approximately 15,960 sq ft of coniferous forest. Following construction, 3,200 sq ft of this area would be revegetated with native forest species.

The VMF would be located in a forested site adjacent to Sturgeon Street approximately 4,500 feet south of the proposed pier site (Figure 2-4). The construction laydown and parking area for the project would also be located along Sturgeon Street, adjacent to the VMF site (Figure 2-4). Construction of these facilities would require removal of 5.2 acres of coniferous forest. An additional 0.5 acre within the VMF site was cleared previously for an earlier project. Upon completion, the VMF would occupy 3.1 acres and the 2.6-acre laydown and parking area, which would be kept gravel-covered, would occupy the remainder of the site. Thus, slightly more than 5 acres of second-growth forest would be permanently removed from a much larger continuous forest stand for construction of the VMF and retention of the gravel-covered laydown and parking area, resulting in a loss of habitat for upland wildlife species that nest, shelter, and forage in this portion of the stand. The impact of this loss of forest habitat is lessened by its location at the edge of the stand along the road. The area was included in surveys for marbled murrelet nesting occupancy from 2016 through 2018, with no evidence of nesting activity (Navy, 2016e, 2018c; Selbig, 2019).

### **Wildlife**

The upland portion of K/B Spit adjacent to the proposed pier and waterfront operations facility area does not offer wildlife habitat because the area is already developed and cleared of vegetation. No impacts to terrestrial wildlife species are anticipated in this area. Terrestrial wildlife species would lose forested habitat that currently exists on the diesel marine fuel storage site, as described above in this Section 3.2.3.2.5. The impact of clearing this forested area would be small, given its small area (approximately 0.4 acre), its location along Sea Lion Road, and proximity to the developed facilities at K/B Spit. Permanent removal of forest in the VMF site would result in a 5.2 acre loss of habitat for terrestrial wildlife at the edge of a larger significant stand of coniferous forest.

Terrestrial wildlife species could be disturbed by elevated noise levels during construction, but there are no current established thresholds for airborne noise-related disturbance. Typical ambient daytime noise levels on the waterfront average 64 A-weighted decibels (dBA) although intermittent peak noise can be greater (Section 3.3.2, Noise, Affected Environment). Under Alternative 1, the loudest construction noise (impact pile driving) would produce 110 dBA at 50 feet from the source (Table 3.3-2, Noise Propagation Distance to Ambient Conditions, Pile Driving for Alternative 1). This noise would attenuate more rapidly in the presence of vegetation than it would over water. Based on information presented in Section 3.3.3.2, pile-driving noise would attenuate to 64 dBA within less than 2,000 feet from an impact driver. Pile driving would be intermittent and performed largely with a vibratory driver, which produces lower noise levels. The most conservative estimated duration of impact proofing would range up to 45 minutes; actual impact proofing may take less time or not be required on an active driving day. Thus, under the worst-case scenario, forest-dwelling terrestrial wildlife in the vicinity of the TPP project site would experience elevated noise levels due to pile driving for only a portion of the day. Heavy equipment operating in upland sites would contribute to visual and noise disturbance of terrestrial wildlife.

A bald eagle nest is present in the TPP project vicinity (Navy, 2018c; Selbig, 2019), and this pair likely forages for prey on the nearby shoreline (Figure 2-1). Available data from nests at NAVBASE Kitsap Bangor indicates that young eagles fledge from the nest by July 21 (Navy, 2010b, 2011, 2012). To avoid disturbing nesting bald eagles, the USFWS *National Bald Eagle Management Guidelines* (USFWS, 2007) recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. Recommended distance buffers include a

330-foot or 660-foot buffer zone around the nest, depending on the type of activity, whether the activity will be visible from the nest, and whether there is similar activity within 1 mile of the nest. It is anticipated that construction of the TPP trestle, pier, and upland elements at the adjacent Waterfront Operations Facility (Figure 2-1); and the diesel marine fuel system (Figure 2-3) would occur outside the nesting season (January 1 through August 31) within the 660-foot buffer distance. This buffer distance is appropriate for the TPP project because most of the construction activity would be visible from the existing bald eagle nest. Although the nest site is exposed to some human activity at the existing facility within the recommended buffer zones, TPP construction would increase the level of human activity due to movements of construction equipment, increased numbers of workers present on the site, and also noise levels due to upland construction and in-water pile driving. The resident bald eagle pair may respond by failing to initiate nesting or abandoning nesting efforts in mid-breeding season during the project construction period, depending on the timing of construction and the eagles' sensitivity to disturbance. Therefore, the Navy has requested an incidental take permit as described in the USFWS guidelines.

The impacts of construction on other upland wildlife species depend largely on the habitat uses of these animals within the probable zone of disturbance, especially during their breeding seasons, typically from late February through August, depending on the species. Highly mobile species including game species, non-game birds, and small carnivores are expected to avoid areas around the construction sites during periods of high noise levels and human activity, which would be limited to daylight hours during the construction periods. Less mobile species such as small mammals, amphibians, and reptiles may be adversely impacted by vegetation removal equipment, high noise levels, and human activity. Although some individual disturbance may occur, population-level impacts are not expected because species known to occur in the relatively small affected areas are widespread elsewhere at NAVBASE Kitsap Bangor.

### **3.2.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative) Potential Impacts**

The study area for the analysis of effects to biological resources associated with Alternative 2 includes the proposed marine and terrestrial construction sites as well as adjacent areas that could be affected by the project. Both resident and highly mobile species that could occur in these areas are evaluated.

#### **3.2.3.3.1 Marine Vegetation and Benthic Communities**

##### **Marine Vegetation**

As noted above, marine vegetation in the project area consists of eelgrass and various species of algae. There is approximately 309 sq ft of eelgrass in the proposed pier footprint; an approximately 20 sq ft small patch of eelgrass in the footprint of the temporary trestle; and approximately 1,681 sq ft of eelgrass in the work zone for Alternative 2. Installation of piles would permanently displace approximately 760 sq ft of seafloor shallower than 30 feet; much of this area supports algae. Impacts from sediment turbidity during pile driving and shading from construction vessels could occur but would be temporary. Avoidance and minimization measures would be implemented to minimize impacts on marine vegetation during construction. For example, a mooring and anchoring plan would be employed to limit vessel movements and barge and other large construction vessels would be limited to an area 100 feet to the west from the proposed pier.

Overwater shading in nearshore waters from the new pier and other structures of Alternative 2 would be approximately 16,672 sq ft more than for Alternative 1 (24,752 versus 8,080 sq ft) (Table 3.2-11). Approximately 23,246 sq ft of the seafloor in the overwater footprint is vegetated, primarily with macroalgae. The edge of the eelgrass bed would be under the pier and could die back. However, shading impacts to marine vegetation would be minimized by implementation of the proposed avoidance and minimization measures identified in Section 2.6. In particular, the under-pier/trestle lighting system would mimic natural daylight under these structures in the nearshore. Any loss of eelgrass would be over a small area compared to the total acreage of eelgrass habitat that occurs along NAVBASE Kitsap Bangor and in Hood Canal as a whole. Therefore, no significant impacts on marine vegetation would result with implementation of Alternative 2.

**Table 3.2-11. Alternative 2 Marine Vegetation and Benthic Impacts (sq ft)**

<i>Impact</i>	<i>Deep Water<sup>1</sup></i>	<i>Nearshore<sup>1</sup></i>	<i>Total</i>
Area of seafloor in temporary work zone <sup>2</sup>	40,056	24,787	64,843
Total overwater coverage <sup>3</sup>	2,069	26,017	29,451
– Area of grated structures <sup>4</sup>	1,013	1,493	2,506
Eelgrass in permanent structure footprint	0	309	309
Eelgrass in temporary work zone <sup>5</sup>	0	1,701	1,701
Macroalgae in permanent structure footprint	0	23,246	23,246
Macroalgae in temporary work zone	2,318	17,534	19,852
Pile footprints – permanent	27.7	759.7	787
Pile footprints – temporary	0	396	424

**Key:** sq ft = square feet

**Notes:**

1. Deep water is defined as deeper than 30 feet below mean lower low water; nearshore is defined as shallower than 30 feet below mean lower low water.
2. During in-water construction, vessel movements outside of the proposed structures would be restricted to the work zone shown in Figure 3.2-2.
3. Nearshore shading would be functionally reduced by the lighting system installed under the trestle.
4. Overwater area of structures comprised of grated materials (the camels, camel brows and platforms, and dolphin brows) that would permit light to pass through; this area is a subset of the total overwater coverage.
5. This total includes a small 20 sq ft patch of eelgrass under the temporary work trestle.

The Navy would fully mitigate for the loss of aquatic vegetation, including eelgrass, through the purchase of In-Lieu Fee credits from the Hood Canal Coordinating Council.

**Benthic Communities**

As described under Alternative 1, construction of the trestle and pier would impact benthic communities through the disruption of the sediment surface and subsurface during the installation and removal of piles, and from barge and PSB anchors. There would be fewer piles installed under this alternative and, therefore, correspondingly less benthic disturbance (784.7 sq ft of permanent displacement compared to 1,367 sq ft for Alternative 1). Depending on the species, impacts to individual benthic organisms could range from temporary disturbance to mortality. Some benthic organisms would be physically crushed and lost within the footprint of the piles, as well as from barge anchors.

As with Alternative 1, indirect impacts to habitat and benthic organisms are likely to result from turbidity during construction. Benthic organisms, particularly annelids, are very resilient to habitat disturbance and

are likely to recover to pre-disturbance levels within two years. Less mobile, longer-lived benthic species such as clams can take two to three years to reach sexual maturity and may require five years to recover from disturbance. Although ecological productivity would be temporarily reduced, it would be spatially limited to areas around the piles and anchors and benthic productivity would recover. Therefore, construction and operations associated with Alternative 2 would have no significant impacts on benthic invertebrates.

### **3.2.3.3.2 Marine Fish**

#### **Non-ESA Listed Marine Fish**

Many of the potential impacts on marine fish under Alternative 2 would be similar to those previously described under Alternative 1. The dimensions for the pier and trestle would be different, as would the number of piles and total over-water area of the structures and the proportion of the structure in nearshore versus deeper waters (Table 2-1). The pier and trestle under Alternative 2 would be primarily located in nearshore waters, resulting in a potential barrier to fish passage, as discussed below.

Fewer piles would be required for the pier and trestle for Alternative 2, resulting in an estimated 90 pile-driving days over two in-water seasons, compared to 150 pile-driving days for Alternative 1. The differences in size, number of piles, and other features are provided in Table 2-1.

#### **Water and Sediment Quality**

Resident marine fish as well as all life stages of forage fish are expected to be present within the vicinity of the project area during construction and are likely to occur during the in-water work window established for ESA-listed juvenile salmonid avoidance. The types and scale of impacts to marine water quality from construction and operation of Alternative 2 would be the same as those associated with Alternative 1 (Section 3.1.3.2, Water Quality and Sediments). Both alternatives would adhere to the in-water work window to minimize impacts on juvenile salmonids, and require two in-water seasons to complete construction. However, Alternative 2 would entail a maximum of 90 pile-driving days compared to 150 days under Alternative 1. This reduction would reduce the duration of marine fish exposure to increases in turbidity.

As with Alternative 1, the localized disturbance of sediment during construction would not impact documented forage fish spawning habitat due to their distances (an estimated 190 feet and 250 feet) from the immediate project area. Therefore, no construction-related impacts from turbidity on forage fish spawning habitats are anticipated.

Impacts to marine sediment quality, including sediment transport, from operation of Alternative 2 would be similar to those described for Alternative 1. As a result, impacts to marine sediment quality from Alternative 2 would be less than significant (Section 3.1.3.3, Water Quality and Sediments), and would have little or no effect on marine fish.

#### **Physical Habitat, Nearshore Barriers, Overwater Shade**

The relevant differences between Alternative 2 and Alternative 1 are that the pier under Alternative 2 would entail fewer piles and pile-driving days, and the majority of the overwater structure (trestle and pier) would lie in water shallower than 30 feet below MLLW (Table 2-1). As a result, marine fish, including forage fish and juvenile salmonids that prefer to migrate in nearshore waters, are anticipated to experience a reduced duration of in-water disturbance from pile-driving activities but would

encounter more physical structures, nighttime lighting, and shading in nearshore (shallower than 30 feet below MLLW) habitats. As discussed for Alternative 1, construction associated with Alternative 2 would adhere to the in-water work window when juvenile salmonids are least abundant to minimize potential effects. Larger fish, including adult salmonids, have much greater mobility and are likely to migrate around nearshore construction activity, with little or no overall delay in their movements.

Once constructed, the Alternative 2 pier would have fewer in-water piles overall, and would create approximately 45 percent less total overwater coverage than Alternative 1. However, since most of the over-water structure for Alternative 2 would lie in shallower water, nearshore overwater coverage would be greater for Alternative 2 by approximately 16,672 sq ft. The elevation of the bottom of the trestle and pier under Alternative 2 would be 4 feet 9 inches and 4 feet 2 inches above MHHW, respectively. At lower tides, the trestle and pier would cast minimal shadow across the nearshore migratory pathway and have a corresponding minimally low barrier effect on fish movement. At higher tides a smaller height-over-water distance would cast a 39-foot-wide shadow across these habitats, which could result in delays in nearshore fish migration through the shaded environment. Artificial nighttime lighting could result in increased nighttime predation of smaller fish, including juvenile salmonids and forage fish. These potential impacts would be localized to 24,752 sq ft within the nearshore areas shallower than 30 feet below MLLW (Table 2-1). The under-trestle/pier lighting system would reduce shading impacts by mimicking natural daylight under these structures and illuminating the area between 0 feet to 30 feet below MLLW, but may not completely eliminate the shading barrier to juvenile salmonids and forage fish. Similar to Alternative 1, the resulting shading would have little impact on adult salmonids because adult salmonids have greater mobility and are unlikely to experience the same shallow-water barrier effect as nearshore-dependent migrating fish.

With implementation of BMPs and impact minimization measures (Section 2.6), construction-related migrational barrier impacts to non-ESA listed marine fish, including forage fish, would be minimized and limited to 90 days over two in-water work seasons. No impacts to documented forage fish spawning habitats are anticipated, given their distances from the project site. Although project design elements would reduce the shade cast by in-water structures in nearshore habitats, because the structures would lie almost entirely in nearshore waters, long-term, project-related barrier effects to nearshore migration or habitat use from in-water structures and nighttime lighting would be anticipated to result from Alternative 2.

### **Biological Habitat**

Impacts to marine vegetation and benthic communities would be different for the two alternatives. The overall benthic habitat displacement from permanent piles would be less under Alternative 2 than Alternative 1, while permanent displacement in nearshore waters would be much greater under Alternative 2 (Table 2-1). The addition of the pier and trestle would reduce the productivity of the benthic habitats utilized by demersal and migrating fish. Although the increase in complex structures (piles and floating camels) may increase the prevalence of some structure-associated fish species (e.g., Cottidae, Embiotocidae, Hexagrammidae) relative to existing conditions, it is likely that for other species, such as forage fish and juvenile salmonids, site use would likely be transitory in nature.

### **Underwater Noise**

Regarding underwater noise, the main differences between the two alternatives is that Alternative 2 would entail fewer piles and piles driving days than Alternative 1. The same pile types would be used for

Alternative 2 (i.e., 24-inch steel, 30-inch steel, and 36-inch steel), and vibratory pile driving would be the primary installation method, as for Alternative 1. Only 36-inch steel piles would be impact-driven. Noise impacts from sources other than pile driving would be the same for both alternatives. The most significant underwater noise potentially affecting fish would be from impact pile driving of steel piles. As shown in Table 3.2-8 and Appendix A, impact pile driving of steel piles under both alternatives would create underwater noise that could expose fish to injurious levels above the peak threshold as well as the cumulative SEL thresholds. The analysis of distances to thresholds for mortal injury, recoverable injury, and TTS indicates the same results for both TPP alternatives.

Impacts to forage fish spawning habitat would be the same as those of Alternative 1. As discussed above for all marine fish, differences would include fewer days of in-water work. Besides reduced duration, noise impacts to forage fish spawning habitat would be the same as those of Alternative 1.

### **ESA-Listed Fish and Critical Habitat**

#### **ESA-Listed Salmonids**

Impacts described above for non ESA-listed fish species would similarly apply to the ESA-listed salmonids. Water quality impacts, limited to increased turbidity during construction, would occur over two in-water work seasons for Alternative 2 and would return to normal once construction is complete. Impacts to sediment would be minimal, with no long-term adverse impacts to sediment quality. As discussed above under Underwater Noise, distances over which underwater noise levels would exceed established injury thresholds for fish during impact pile-driving activities would be the same under Alternatives 1 and 2, but total duration of pile-driving activities would be shorter under Alternative 2 than Alternative 1.

The nearshore aspects of Alternative 2 would be as described for non-ESA listed fish. As a result, impacts on the nearshore environment for ESA-listed salmonids would be similar, with some loss of function and productivity of marine vegetation and benthic habitats and impacts to nearshore juvenile salmonid migrations. Once constructed, the Alternative 2 pier would have fewer in-water piles, and would produce approximately 45 percent less total overwater shade than Alternative 1. However, since most of the over-water structure for Alternative 2 would lie in shallower water, nearshore over-water shading would be greater for Alternative 2 by approximately 16,672 sq ft. Alternative 2 would present a greater barrier to migrating juvenile salmonids than Alternative 1, having 114 permanent piles in the nearshore compared to 25 piles for Alternative 1, and proportionally more nighttime lighting in the nearshore. As described for non-ESA-listed fish, nearshore shading at higher tides could result in delays in nearshore fish migration through the shaded environment and increased artificial nighttime lighting could result in increased predation of juvenile fish. The under-pier/trestle lighting system would reduce the barrier effect caused by shading and shading impacts to nearshore habitats, but may not completely eliminate the shading barrier to juvenile salmonids.

Alternative 2 would result in additional overwater and in-water features with the potential to affect ESA-listed salmon migration and habitat use. Potential impacts would occur over approximately 24,752 sq ft within nearshore areas shallower than 30 feet below MLLW (Table 2-1), thereby reducing available habitat for juvenile ESA-listed salmonids in the overall project area. Similar to non-ESA fish, the resulting shading would have little impact on adult salmonids, which typically occur in deeper water.

### *Critical Habitat*

Puget Sound Chinook and Hood Canal summer-run chum salmon have designated nearshore and offshore marine area critical habitat within northern Hood Canal. Since DoD installations with current INRMPs are exempt from critical habitat designation, no critical habitat is designated at NAVBASE Kitsap Bangor. Elevated underwater noise would not extend beyond the naval base's exempt area into designated salmonid critical habitat (PCEs: Estuarine Areas and Nearshore Marine Areas). Bull trout and Puget Sound steelhead critical habitat does not occur within the project area. Operation of the Proposed Action would not affect salmonid critical habitat outside the base boundary. Therefore, the Proposed Action would not affect critical habitat for listed salmonids.

### *Effect Determination*

Based on the analysis noted above for Alternative 2, the effect determination for Puget Sound Chinook, Hood Canal summer-run chum, and Puget Sound steelhead is "likely to adversely affect." The effect determination for bull trout is "may affect, not likely to adversely affect" because this species is highly unlikely to occur in the vicinity of NAVBASE Kitsap Bangor and stressors such as elevated pile-driving noise would not reach habitats in Hood Canal where bull trout are anticipated to occur. The effect determination for Puget Sound Chinook and Hood Canal summer-run chum critical habitat is "no effect" because stressors such as elevated pile-driving noise would not extend into critical habitat.

### **ESA-Listed Rockfish**

As described for ESA-listed salmonids, the majority of impacts described above for non-ESA-listed fish species would also apply to the ESA-listed Puget Sound/Georgia Basin DPSs of yelloweye rockfish and bocaccio. Adult life stages of bocaccio and yelloweye rockfish, and juvenile yelloweye rockfish, if present, would occur farther offshore and beyond any impacts associated with suspended sediment and turbidity during in-water construction. Pile-driving noise would exceed the TTS and injury thresholds during impact pile driving of 36-inch piles in the project area (Table 3.2-8).

The duration of other in-water construction-related disturbances (i.e., support vessels, pile installation and removal, relocation of barge anchors) would be less under Alternative 2 (up to 90 days of in-water pile driving) than Alternative 1 (up to 150 days of in-water pile driving). Distances at which underwater noise levels would exceed established noise thresholds for fish during pile-driving activities would be the same under Alternative 2 as under Alternative 1 (maximum 186 meters for TTS). As noted above under Alternative 1, although larval bocaccio rockfish and yelloweye rockfish prevalence in the project area is expected to be extremely low, if they did occur, larval rockfish could be exposed to noise above the fish injury thresholds during impact pile driving. In addition, juvenile bocaccio have the potential to rear within the Action Area because some kelp habitats occur along the waterfront and could be exposed to noise above the fish injury thresholds during impact pile driving.

Permanent impacts to nearshore marine vegetated and benthic habitats from pile placement would be greater under Alternative 2 (759.7 sq ft) than Alternative 1 (176.7 sq ft) (Section 3.2.3.3.1, Marine Vegetation and Benthic Communities). Approximately 309 sq ft of eelgrass occurs in the proposed pier footprint under Alternative 2, including some small, isolated patches and the edge of a larger bed. Therefore impacts to this habitat would be expected but the impacts would be minimized by the under-trestle/pier lighting system that would mimic natural daylight. Potential juvenile bocaccio recruitment and rearing habitat may be affected due to impacts to brown algae in the project footprint (Section



3.2.3.3.1, Marine Vegetation and Benthic Communities). However, as with eelgrass, impacts to brown algae would be minimized by the design elements that would minimize shading. In addition, bocaccio have not been documented along the waterfront (Schreiner et al., 1977; Salo et al., 1980; Bax, 1983; SAIC, 2006; Bhuthimethee et al., 2009; Frierson et al., 2016, 2017; Pacunski, 2017).

#### *Critical Habitat*

As indicated for Alternative 1, critical habitat is designated within the project area, but outside NAVBASE Kitsap boundaries. Elevated underwater noise would not extend beyond the naval base's excluded area into designated rockfish critical habitat. Operation of the Proposed Action would not affect rockfish critical habitat outside the base boundary. Therefore, the Proposed Action would not affect critical habitat for listed rockfish.

#### *Effect Determination*

Based on the analysis noted above for Alternative 2, the effect determination for bocaccio and yelloweye rockfish is "may affect, likely to adversely affect." The effect determination for critical habitat is "no effect" because stressors such as elevated pile-driving noise would not extend into critical habitat.

#### **Essential Fish Habitat**

Effects on EFH from Alternative 2 would be similar to those described for Alternative 1. The duration of in-water work, notably pile driving, for the construction associated with Alternative 2 would require 60 fewer days than for Alternative 1, thereby reducing the duration of exposure of EFH habitats to underwater noise exceeding thresholds for injury and TTS.

Long-term impacts on physical habitat and barriers would include an increase in overwater and in-water structures. The overwater coverage within the nearshore areas shallower than 30 feet below MLLW would be much greater under Alternative 2, creating permanent shade over existing marine vegetation (HAPC for Pacific Coast salmon and Pacific Coast groundfish). Overwater shading effects would potentially lead to a reduction in vegetation, prey, and refugia. Nearshore marine habitat and habitats in deep water would be disturbed during construction associated with Alternative 2 (Section 3.2.3.3.1, Marine Vegetation and Benthic Communities). Design features including the under-pier/trestle lighting system would reduce, but not fully eliminate shading impacts due to the pier and trestle location and alignment in nearshore waters.

The increase of in-water structures in nearshore environments and permanent shading from the proposed trestle and pier would represent long-term impacts. All other adverse effects would be short-term, lasting only during the period of construction, and would cease upon completion of construction activities associated with Alternative 2. The Navy concludes that Alternative 2 may adversely affect Pacific coast groundfish, coastal pelagic, and Pacific Coast salmon EFH. However, implementation of BMPs and impact minimization measures (Section 2.6) would avoid and minimize adverse effects on EFH to the extent practicable.

#### **3.2.3.3.3 Marine Mammals**

Construction of the TPP Pier and support facilities under Alternative 2 would have impacts on marine mammals similar to those described for Alternative 1 (Section 3.2.3.2.3), with the exception of impacts resulting from elevated noise levels during pile driving. A detailed discussion of the analysis of noise

effects on marine mammals is provided in Appendix A. In contrast to pile-driving requirements for Alternative 1 (summarized in Table 2-1 and discussed in the context of marine mammals in Section 3.2.3.2.3), Alternative 2 would require fewer pile-driving days and fewer total piles. The predicted number of marine mammal exposures to elevated noise levels would be less for Alternative 2 than for Alternative 1 (Appendix A, Table A-16) because fewer pile-driving days would be required for Alternative 2.

There is the potential for Level A injury through hearing loss (referred to as permanent threshold shift or PTS) of harbor seals and Level B harassment, which has the potential to disrupt animal behavior, of harbor seals and other species as defined by the MMPA. The exposures are only expected to result in behavioral impacts on an intermittent basis for most marine mammal species, and long-term or permanent impacts potentially may affect a small number of harbor seals.

Construction associated with Alternative 2 may impact individual marine mammals, but any impacts observed at the population, stock, or species level would be negligible. Therefore, there would be no significant impact to marine mammal populations.

Similar to Alternative 1, the Navy would implement a variety of BMPs and mitigation measures, including noise attenuation devices and marine mammal observers that are expected to reduce the estimated impacts. These measures are fully described in Table 3.9-2 and summarized in Section 2.6.

#### **ESA Effect Determinations**

ESA effects determinations for the SRKW and humpback whale are substantially the same as those discussed for Alternative 1.

#### **3.2.3.3.4 Marine Birds**

Construction of the TPP Pier and support facilities associated with Alternative 2 would have impacts on marine birds similar to those described for Alternative 1 (Section 3.2.3.2.4), with the exception of impacts resulting from elevated noise levels during pile driving. A detailed discussion of the analysis of noise effects on marbled murrelets (and by extension, marine birds in general) is provided in Appendix A. Distances to underwater auditory injury zones and airborne masking zones are similar for 36-inch steel piles, but Alternative 2 would require fewer pile-driving days and fewer total piles than Alternative 1 (Table 2-1). As a result, the overall level of noise disturbance due to pile driving would be less with Alternative 2.

#### **3.2.3.3.5 Terrestrial Resources**

Upland construction for Alternative 2 would be the same as for Alternative 1, therefore, impacts of Alternative 2 would be the same as described for Alternative 1 above in Section 3.2.3.2.5.

### 3.3 Noise

Noise is defined as unwanted sound or, more specifically, as any sound that (1) is undesirable because it interferes with communication, (2) is intense enough to damage hearing, or (3) is otherwise annoying. Human and wildlife response to sound varies according to the type and characteristics of the noise source, distance between the noise source and the receptor, sensitivity of the receptor, local environmental or atmospheric conditions, and time of day. Sound levels are typically measured in decibels (dB). When discussing noise and humans, noise levels are expressed in terms of A-weighted decibel (dBA), which is a measure of sound energy adjusted for the sensitivities of human hearing, as discussed below. Noise impacts (e.g., pile driving on land and in water) to biological resources are addressed in Section 3.2, Biological Resources.

#### 3.3.1 Regulatory Setting

Section 4(b) of the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.) directs federal agencies to comply with applicable federal, state, and local noise requirements with respect to the control and abatement of environmental noise. Washington State has standards and regulations to control and abate environmental noise. WAC Chapter 173-60 sets the requirements for Maximum Environmental Noise Levels. WAC 173-60 sets maximum permissible noise levels based on the type of environmental designation for noise abatement (EDNA). There are three classes of EDNA:

- Class A: Lands where human beings reside and sleep.
- Class B: Lands involving uses requiring protection against noise interference with speech. Includes but is not limited to retail services, banks and office buildings, community services, and dining establishments.
- Class C: Lands involving economic activities of such a nature that higher noise levels are anticipated. Worker safety is protected under the Department of Labor and Industries health and safety programs. Includes but is not limited to warehouses, distribution facilities, industrial facilities, and agriculture.

The maximum permissible daytime noise levels listed in WAC 173-60 are shown below in Table 3.3-1. WAC 173-60-050 exempts sounds originating from temporary construction sites as a result of construction activity, provided the sound-generating activity occurs between the hours of 7:00 a.m. and 10:00 p.m.

**Table 3.3-1. Washington Maximum Permissible Environmental Noise Levels (dBA)**

Noise Source	Receiving Property		
	A – Residential (Day/Night)	B – Commercial	C – Industrial
A – Residential	55/45	57	60
B – Commercial	57/47	60	65
C – Industrial	60/50	65	70

Source: WAC 197-60-040

Washington noise regulations (WAC 173-60-040) limit the noise levels from a Class C noise source that affect a Class A receiving property to 60 dBA (daytime) and 50 dBA (nighttime). Under the WAC, daytime

hours are 7:00 a.m. to 10:00 p.m. and nighttime hours are 10:00 p.m. to 7:00 a.m. Certain activities are exempt from these noise limitations:

- Sounds created by motor vehicles on public roads are exempt at all times, except for individual vehicle noise, which must meet noise performance standards set by WAC 173-60-050.
- Sounds created by motor vehicles off public roads, except when such sounds are received in residential areas.
- Sounds originating from temporary construction activities during all hours when received by industrial or commercial zones and during daytime hours when received in residential zones.
- Sounds caused by natural phenomena and unamplified human voices.

Kitsap County follows a designation of EDNAs very similar to WAC 173-60 and has identical Maximum Permissible Environmental Noise Levels. Kitsap County Code also exempts sounds originating from temporary construction sites as a result of construction activity from complying with the Maximum Permissible Environmental Noise Levels between the hours of 7:00 a.m. and 10:00 p.m.

### **3.3.2 Affected Environment**

The TPP Pier project would be located on K/B Spit adjacent to the K/B Dock, an active pier where Navy vessels of various types are moored and maintained. Airborne sound measurements were taken at Delta Pier within the waterfront industrial area at NAVBASE Kitsap Bangor during a 2-day period in October 2010. During this period, daytime sound levels ranged from 60 to 104 dBA, with average values of approximately 64 dBA. Evening and nighttime levels ranged from 64 to 96 dBA, with an average level of approximately 64 dBA. Thus, daytime maximum levels were higher than nighttime maximum levels, but average nighttime and daytime levels were similar (Navy, 2010c). More recent measurements, taken during the Navy's Test Pile Program located near EHW-1 at NAVBASE Kitsap Bangor, indicated an average airborne ambient sound level of 55 dBA (Illingworth & Rodkin, 2012). Maximum sound levels from the 2010 recordings were produced by a combination of sources including heavy trucks, forklifts, cranes, marine vessels, mechanized tools and equipment, and other sound-generating industrial/military activities. Maximum sound levels were intermittent in nature and not present at all times. Based on the sound levels measured at the highly industrial location at Delta Pier, the Navy estimated that maximum airborne sound levels at other Bangor pier locations with a high level of industrial activity may reach as high as 104 dBA due to trucks, forklifts, cranes, and other industrial activities. Sound levels will vary by time and location, but average background sound levels are expected to range from approximately 55 dBA (average from Test Pile Program at NAVBASE Kitsap Bangor) to 64 dBA (average levels measured at Delta Pier at NAVBASE Kitsap Bangor) (Navy, 2010b; Illingworth & Rodkin, 2012). These sound levels are expected to be typical of those at the TPP Pier site, which is located within the industrial waterfront area of NAVBASE Kitsap Bangor.

### **3.3.3 Environmental Consequences**

Analysis of potential noise impacts includes estimating likely noise levels from the Proposed Action and determining potential effects to sensitive receptor sites.

### 3.3.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to baseline noise levels. Therefore, no significant impacts to the noise environment would occur with implementation of the No Action Alternative.

### 3.3.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts

Under Alternative 1, maximum noise levels would be produced during pile driving as discussed below. Other construction noise sources would include dump truck traffic that would increase traffic noise transiting from the project site on the Lower Base to the Upper Base and to local roadways. This noise would not be particularly disruptive to human receptors, due in part to the existing truck traffic on the base and moving in and out of the base. Equipment such as dump trucks, front-end loaders, bulldozers, backhoes, cranes, auger drill rig, and concrete saws or jackhammers are expected to be used during construction at the upland sites. Use of tugs and work skiffs also is anticipated to support in-water work, and in addition, barge-mounted equipment would be used to install pier components. In the absence of pile-driving activity, maximum noise levels produced by construction equipment that might typically be used at the project site are 90 dBA (WSDOT, 2019). Presuming multiple sources of noise may be present at one time, maximum combined levels may be as high as 94 dBA. This assumes that multiple, co-located sources combined together would increase noise levels as much as 3 to 4 dB over the level of a single piece of equipment by itself. These maximum noise levels would be intermittent in nature and not present at all times. Average ambient noise levels are expected to be in the 60 to 68 dBA range, consistent with urbanized or industrial environments where equipment is operating, and similar to the range of noise measured in-situ on Delta Pier in October 2010 (Navy, 2010b).

Pile driving would be accomplished using barge-mounted cranes and pile-driving equipment. Most pile driving would occur with a vibratory driver. An impact driver would be used occasionally to proof piles to ensure they are able to bear the design loads. There would be a maximum of 150 pile-driving days. Noise propagation was modeled based on three physical environment conditions:

- (1) Over water, using a 6 dB loss factor per doubling of distance
- (2) Over a soft site (e.g., unpaved land), using a 7.5 dB loss factor per doubling of distance
- (3) Over a soft site with dense vegetation, using a 7.5 dB loss factor with a 10 dB reduction

Generally accepted noise source levels for pile driving are provided in *Noise Impact Assessment and Noise Reduction Strategies, Biological Assessment Preparation for Transportation Projects Advanced Training Manual* (WSDOT, 2019). The source levels provided for driving of steel piles are 110 dBA  $L_{max}$  for impact driving and 101 dBA  $L_{max}$  for vibratory driving (units of dBA are appropriate for analyzing impacts to humans).  $L_{max}$  is the highest A-weighted integrated noise level occurring during a specific, usually very short, period of time. Therefore, using  $L_{max}$  source levels in the present analysis is a very conservative approach, but there is little source level information available for pile driving in other units. These source levels are based primarily on studies of 36-inch steel piles and are considered appropriate for all pile sizes.

Pile-driving noise from both impact and vibratory pile driving could exceed allowable noise limits for the Occupational Safety and Health Administration (90 dBA) and Navy Occupational Safety and Health (84 dBA) for an 8-hour period. Personal protective equipment would be required for personnel working in these areas, including personnel working on the water. Personal protective equipment must be

capable of reducing the noise exposure to less than 84 dBA, 8-hour time weighted average, and less than 140 dB PEAK SPL for impact or impulse noise.

Although temporary construction noise is exempt from enforcement of noise standards in Washington State, 60 dBA can be used as an indicator of adverse noise effects from industrial activities on residential areas during daytime (Table 3.3-1). Areas expected to experience noise levels above 60 dBA during pile driving are shown in Figure 3.3-1. On-base residential areas would not be affected by pile-driving noise due to the intervening distance (4 miles), terrain, and vegetation (although pile driving may at times be audible above background noise levels). Recreational boaters and kayakers in Hood Canal adjacent to the project site could be affected by pile-driving noise above 60 dBA, although the floating security barrier would prevent recreational users from getting close enough to the pile driver to receive potentially harmful noise levels (84 dBA for 8 hours).

Waterfront residences on the western shore south of Squamish Harbor, including those along Thorndyke Bay, would receive maximum noise levels less than 60 dBA during impact driving. Residents at Olympic View, south of the base boundary, would have marginal line of sight to the project site but would not be expected to experience noise levels above 60 dBA considering the distance of 1.3 miles and intervening topography and vegetation. Residents at Vinland, just north of the base boundary, may be able to hear impact noise during pile driving, but levels received would be below the expected background noise level of a quiet, residential neighborhood of 50 dBA due to interposing vegetation and terrain.

Most pile-driving activity would occur with a vibratory driver. Properties with a direct line of sight of a vibratory pile driver may hear vibratory pile-driving noise above the background noise on a quiet day. However, at no time would vibratory pile-driving noise exceed 60 dBA (the maximum daytime allowable noise level specified in WAC 173-60-040) at any off-base location, including Olympic View, Vinland, local schools, or local residents on the western shore of Hood Canal. Kayakers or boaters located in Hood Canal would receive noise levels above 60 dBA, but would not receive noise levels sufficient to cause injury (84 dBA for 8 hours).

Construction of the VMF would generate typical construction noise (dump trucks, bulldozers, front-end loaders, etc.) as described above. Considering the location of the site in a forested area and the intervening distance from the sites to residential or public areas, noise levels in these areas during construction would not exceed 60 dBA. This site is located too far (4,500 feet) from the TPP Pier site to result in additive noise levels with pier construction noise.

Noise resulting from pier operations would be similar to current levels at K/B Spit because most of the TPP vessels are currently moored at K/B Dock. The blocking vessels are currently moored at various locations at NAVBASE Kitsap Bangor and would move to the new TPP Pier under the Proposed Action. Therefore, noise associated with these vessels would move from those locations to K/B Spit, but overall noise levels at the NAVBASE Kitsap waterfront would not change. Noise levels at K/B Spit would continue to be typical of existing noise levels along the waterfront.

Based on the above analysis, applicable noise guidelines would not be exceeded at any residential or school locations. In addition, temporary construction noise is exempt from the WAC noise guideline. Boaters on Hood Canal would be exposed to audible but not harmful levels of construction noise. There would be no substantive change in operational noise levels at the new pier site. Therefore, implementation of Alternative 1 would not result in significant impacts to the noise environment.

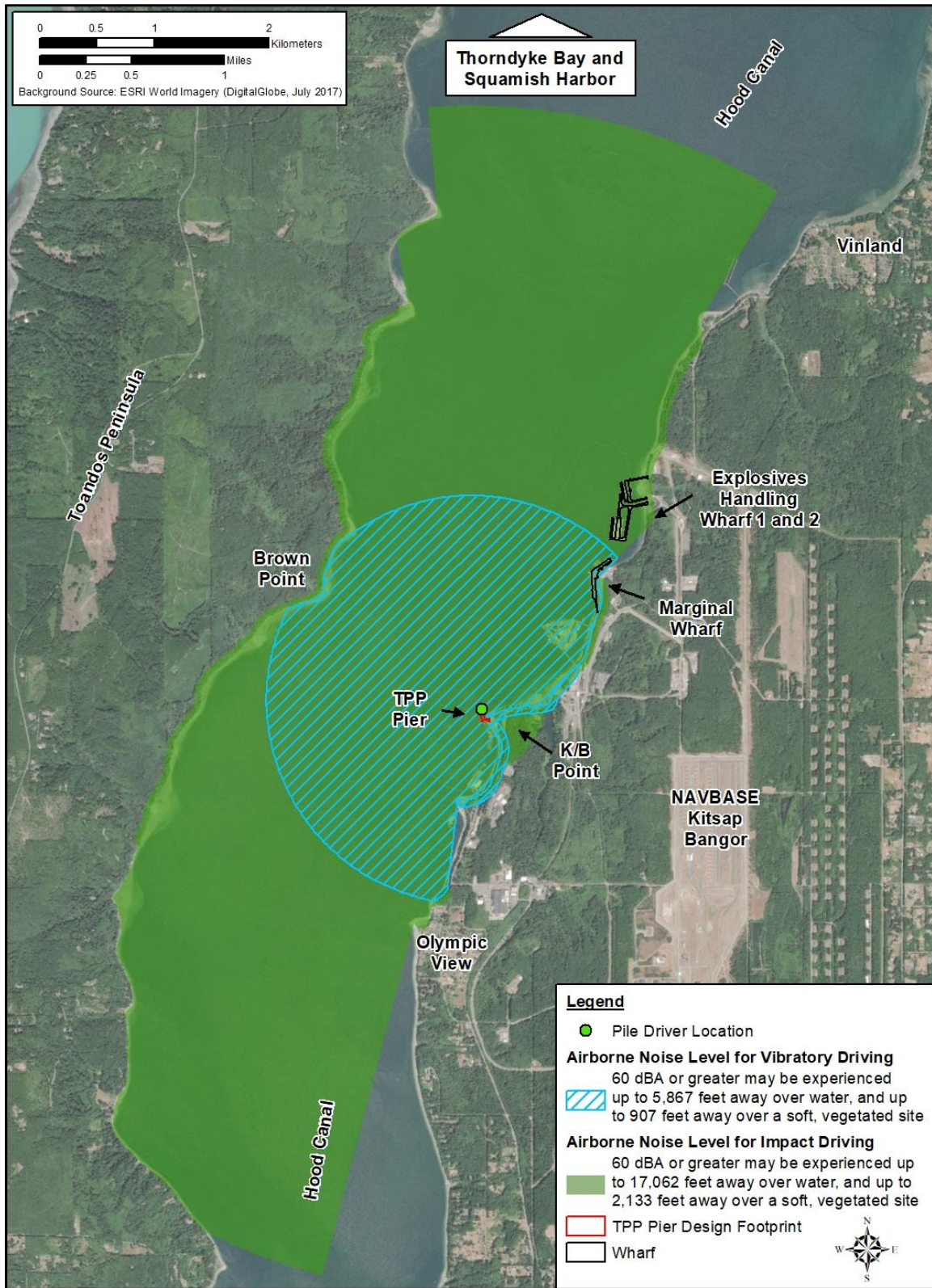


Figure 3.3-1. Areas Experiencing Noise Levels of 60 dBA or Greater During Pile Driving

**3.3.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative)  
Potential Impacts**

Construction noise for Alternative 2 would be the same as noise for Alternative 1 except that there would be up to 90 days of pile driving compared to 150 days for Alternative 1. Noise generated by all other aspects of construction and operation, including for the VMF, would be the same for both alternatives. Therefore, implementation of Alternative 2 would not result in significant impacts to the noise environment.



### 3.4 Cultural Resources

This discussion of historic properties and cultural resources includes prehistoric (precontact) and historic archaeological sites; historic buildings, structures, and districts; and physical entities and human-made or natural features important to a culture, a subculture, or a community for traditional, religious, or other reasons. Cultural resources can be divided into three major categories:

- Archaeological resources (precontact and historic) are locations where human activity measurably altered the earth or left deposits of physical remains.
- Architectural resources include standing buildings, structures, districts, landscapes, and other built-environment resources of historic or aesthetic significance.
- Traditional cultural properties are properties that are eligible for inclusion in the National Register of Historic Places (NRHP) based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.

#### 3.4.1 Regulatory Setting

Cultural resources are governed by several federal laws and regulations, including the National Historic Preservation Act (NHPA), Archeological and Historic Preservation Act, American Indian Religious Freedom Act, Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. Federal agencies' responsibility for protecting historic properties is defined primarily by Sections 106 and 110 of the NHPA. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties. Section 110 of the NHPA requires federal agencies to establish—in conjunction with the Secretary of the Interior—historic preservation programs for the identification, evaluation, and protection of historic properties. The NHPA places the responsibility for property owners to evaluate cultural resources and determine eligibility for inclusion in the NRHP.

The Navy initiated consultation with the State Historic Preservation Office (SHPO) at the Washington Department of Archaeology and Historic Preservation (DAHP) under Section 106 of the NHPA, and requested concurrence with the Navy's definition of the area of potential effect (APE) (letter to SHPO dated April 13, 2017) (Appendix B, National Historic Preservation Act Section 106 Documentation). SHPO concurred with the APE in a letter dated April 17, 2017. The Navy continued consultation with the SHPO in a letter dated August 1, 2019, in which the Navy described a reduced APE to account for design modifications to the proposed alternatives and requested concurrence with the Navy's determination that the proposed project will have No Effect on historic resources. SHPO concurred with the Navy's determination of effect in a letter dated August 5, 2019.

The Navy also initiated Section 106 consultation with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes, including a request for concurrence with the APE (letters to tribes, dated April 13, 2017) and a request for concurrence with the revised APE and No Effect Determination (letters dated August 12, 2019). The Jamestown S'Klallam Tribe concurred with the original APE (letter dated May 1, 2017) and with the revised APE and No Effect Determination (letter dated September 19, 2019). The Suquamish Tribe's Tribal Historic Preservation Officer concurred with the revised APE and the Navy's determination of effect (letter dated August 13, 2019). The Lower Elwha Klallam Tribe responded on May 9, 2017, and August 14, 2019, deferring to the Port Gamble S'Klallam

Tribe. The Skokomish Tribe concurred with the revised APE and No Effect Determination (letter dated November 23, 2020).

The Port Gamble S'Klallam Tribe responded on January 6, 2020, and November 6, 2020, indicating they did not concur with the Navy's revised APE and No Effect Determination. The Navy discussed the Port Gamble S'Klallam's concerns over several meetings and in a letter dated January 21, 2021 (included in Appendix B). The SHPO sent a letter to the Navy on March 29, 2021, expressing concerns about the Navy's Section 106 consultation with the Port Gamble S'Klallam Tribe. In this letter, the SHPO notified the Navy that they had been contacted by the Port Gamble S'Klallam Tribe and expressed concern regarding the apparent inability to reach agreement with the tribe on the APE, identification of historic properties, and Determination of Effect. The Navy sent a response letter to the SHPO regarding the Port Gamble S'Klallam Tribe's disagreement (May 5, 2021). The Navy sent a final Finding of Effects letter to SHPO and provided copies to the Tribes (letter dated June 30, 2021), and based on research, analysis, consultations, and in careful consideration of information received during Section 106 tribal consultation, the Navy reaffirmed its determination of No Historic Properties Affected for the undertaking, consistent with 36 CFR Section 800.4(d)(1). Washington SHPO did not respond within 30 days of receipt of the June 30, 2021, final Finding of Effects letter, and in accordance with Section 800.3(c)(4) and Section 800.(d)(4)(1)(i), the Navy proceeded with the next step in the process and fulfilled the requirements of Section 106.

In a letter dated October 3, 2022, the Jamestown S'Klallam Tribe withdrew their concurrence "with the Navy's determination of No Historic Properties Affected for the project."

### **3.4.2 Affected Environment**

Cultural resources that are listed in the NRHP or eligible for listing in the NRHP are "historic properties" as defined by the NHPA. The list was established under the NHPA and is administered by the Keeper of the National Register of Historic Places (Keeper), who is employed by the National Park Service, on behalf of the Secretary of the Interior. The NRHP includes properties on public and private land. Properties can be determined eligible for listing in the NRHP by the Keeper or by a federal agency official with concurrence from the applicable SHPO. An NRHP-eligible property has the same protections as a property listed in the NRHP. The historic properties include archaeological and architectural resources that are sites, buildings, structures, objects, or districts, as defined by the NHPA.

The APE for cultural resources is the geographic area or areas within which an undertaking (project, activity, program, or practice) may cause changes in the character or use of any historic properties present. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For this Proposed Action, the Navy determined that the APE includes all construction locations shown on Figure 2-1 and briefly described here. The locations consist of a combined total of approximately 8.5 acres for both alternatives. The APE is defined as the project areas where ground-disturbing activities would occur, including the in-water portion of both alternatives; the on-shore parking lot and Marine Diesel Fuel Storage area located just inland from the piers; the VMF location, which includes an area larger than the facility itself and which was partially disturbed earlier for another project; all laydown areas; and areas for the construction vehicles to maneuver.

The Navy has conducted cultural resources surveys at NAVBASE Kitsap Bangor to identify historic properties that are listed or potentially eligible for listing in the NRHP. A record search conducted for this Proposed Action identified 18 previous cultural resources studies within 1 mile of the APE (Historical

Research Associates [HRA], 2017). Nine of these included all or part of the APE, including portions of the construction staging areas for both Alternatives 1 and 2. The results of these surveys are presented in the following Sections 3.4.2.1, 3.4.2.2, and 3.4.2.3. The in-water portions of Alternative 1 and Alternative 2 have not previously been surveyed for cultural resources.

### 3.4.2.1 Archaeological Resources

Fifteen archaeological sites were recorded within 1 mile of the APE (HRA, 2017). These include precontact (45KP108), historic-period (a small section of 45KP209, plus 45KP211, 45KP247, 45KP250, 45KP259, 45KP260, 45KP261, 45KP263, 45KP264, 45KP265, 45KP266, and 45KP267), and multicomponent (45KP212, 45KP262) sites. Only one previously recorded site, dating to the historic-period (45KP267), is partially within the VMF APE on Sturgeon Street. This site was recommended not eligible for the NRHP (Leidos et al., 2014). As a result, the Navy determined the site not eligible for listing in the NRHP. The Navy's determination was included in a request for SHPO concurrence under the project submitted on September 11, 2015. Following receipt of the SHPO's concurrence with the Navy's Determination of No Adverse Effect on October 7, 2015, Site 45KP267 was later demolished/removed as part of the upland portion of the Service Pier Extension project. No other sites have been recorded within the APE.

Site 45KP108, called the Carlson Spit Shell Midden, has been excavated and shown to be a summer seasonal fishing and shellfish-processing camp with radiocarbon dates placing it in the Anno Domini 820 period (HRA, 2017). It was a well-stratified shell midden deposit that extended across a 60 by 20-meter area. Four cultural strata were defined, all containing varying amounts of organic midden. The site also included lithic and bone tools, and shellfish remains. The excavators recommended it as eligible for listing in the NRHP, but to date the site has not been formally evaluated.

Site 45KP209 consists of fragments of a disused portion of Shelton-Bangor Railroad (Barr Williams, 2010). However, only a small fragment of the resource was recorded as an archaeological site. The fragment of Site 45KP209 recorded as an archaeological site was approximately 1,700 ft east of the nearest APE project element, the diesel fuel marine tanks. Materials consisted of abandoned railroad ties, line, and hardware on a densely vegetated, artificially leveled and graded area, east of Devil's Hole (Barr Williams, 2010). The Navy determined the site not eligible for listing in the NRHP and SHPO concurred on April 13, 2010. The portion recorded as an archaeological resource was later demolished and removed as part of the Waterfront Enclave Project. Other portions of the Shelton-Bangor Railroad that have been evaluated as architectural resources are addressed in Section 3.4.2.2.

Except for a section of railroad associated with establishment of the base (45KP209), the historic-period sites, including the one partially within the APE, are all structural remains and historic debris associated with homesteads, orchards, and residences that existed at this location prior to installation of the Naval base (i.e., prior to 1944). The abundance of structural remains and historic debris argues for a sizable pre-base occupation by homesteaders within what are now the boundaries of the base (HRA, 2017). Also partially located within the VMF APE, adjacent to the VMF facility construction area, a historic-period fruit orchard associated with sites 45KP266 and 45KP267 has been recorded and evaluated for NRHP eligibility. The orchard is not eligible for listing in the NRHP under Criteria A, B, C, or D due to a lack of integrity (Leidos et al., 2014).

One of the multicomponent sites, Site 45KP212, was primarily a historic foundation and historic-period artifact scatter; however, some precontact cobble chopping tools were also recorded. The other, Site

45KP262, was discovered in shovel probes and included a cobble fire-modified rock cooking feature at 40 centimeters below the ground surface, as well as twentieth-century building debris.

### **3.4.2.2 Architectural Resources**

No architectural resources determined eligible for or listed in the NRHP are located inside the APE boundaries. In 2022, the Navy determined the nearby Shelton-Bangor Railroad Corridor Historic District eligible for listing in the NRHP. However, the boundary of the historic district is located outside all APE locations. The closest proximity from the APE to the linear historic district is approximately 1,700 feet for the proposed VMF building. There are no direct sight lines from the historic district to any APE locations.

One building within the VMF APE on Sturgeon Street is over 50 years old and has been recorded on a Historic Property Inventory form. This is Building #7050, a Sewer Pump/Lift Station building, a poured concrete rectangular structure. On October 7, 2015, DAHP agreed with the Navy's determination that this resource is not eligible for listing in the NRHP (HRA, 2017). At the time of writing, no other architectural resources have been recorded within the APE. The historic orchard adjacent to the VMF location is discussed in Section 3.4.2.1.

### **3.4.2.3 Submerged Cultural Resources**

NOAA nautical charts show no submerged ships, shipwrecks, or other noted obstructions in the vicinity of NAVBASE Kitsap Bangor (NOAA, 2018, 2019). A search of recorded archaeological sites on the Washington Information System for Architectural and Archaeological Records Data conducted for the Land-Water Interface EIS showed no submerged resources within a 1-mile search radius of the shoreline at that project site, which included K/B Spit (HRA, 2013). Due to the amount of development along the Bangor shoreline, it is unlikely that there are undocumented historic-period resources present. There is a low likelihood that intact precontact archaeological deposits or features are present along the submerged shoreline due to Holocene sea level changes and associated erosion of the Hood Canal coastline (HRA, 2013). During past Navy surveys for environmental and planning purposes, divers or remote sensors identified no visible historic properties such as shipwrecks, submerged aircraft, or precontact or historic-period features extending above the seafloor (e.g., SAIC, 2009).

### **3.4.2.4 Traditional Cultural Properties**

The Navy recognizes that tribes possess special expertise in assessing the eligibility of properties of traditional, religious, and cultural significance to their communities. Accordingly, the Navy requested input from federally recognized tribes regarding properties to which they ascribe traditional, religious, and cultural significance within the APE.

The Port Gamble S'Klallam Tribe identified locations along the Hood Canal as properties of traditional, religious, or cultural significance near the APE. The Port Gamble S'Klallam Tribe is preparing a report identifying a Traditional Cultural Landscape near the APE and planned to provide the final report to the Navy in late 2022. The Jamestown S'Klallam Tribe identified locations along the Hood Canal as properties of traditional, religious, or cultural significance in or near the APE in a letter to the Navy dated October 3, 2022. K/B Spit was one of the areas of significance identified by the Tribe in their letter. At this time, there is insufficient information from the Port Gamble S'Klallam Tribe and Jamestown S'Klallam Tribe to delineate and evaluate a Traditional Cultural Landscape or Traditional Cultural

Property as defined by the National Register Criteria for Evaluation (36 CFR Part 60) as listed in National Register Bulletin 38.

### **3.4.3 Environmental Consequences**

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual, atmospheric, or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed. For archaeological historic properties, even temporary disturbance has an effect on the resource. Once the location of in-ground resources is disturbed, the archaeological site loses a key element of its integrity.

#### **3.4.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to cultural resources, and no historic properties affected. Therefore, no significant impacts to historic properties or cultural resources would occur with implementation of the No Action Alternative.

#### **3.4.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

Alternative 1 includes actions that could affect cultural resources, if present. Elements of this alternative would include: in-water installation of pier and piles, on-shore construction of trestle, utility improvements, and ground disturbance at the pier site and the VMF and laydown areas sites along Sturgeon Street.

There are no known NRHP-eligible architectural or archaeological historic properties within the Alternative 1 locations. One archaeological resource (45KP267), a historic-period fruit orchard located within the VMF APE, is not considered eligible for listing in the NRHP. No submerged archaeological sites are expected and no submerged resources have been identified in the APE as addressed in Section 3.4.2.3. Because of the extent and nature of modern marine activity, it is unlikely that unrecorded submerged historic resources exist along the shoreline. Operation of Alternative 1 would not change the determination of no historic properties affected for construction. No other cultural resources would be affected by operation of the pier.

All sections of the APE are in an area with “Very High Risk” of encountering archaeological materials, according to DAHP’s predictive model. Pursuant to the implementing regulations of Section 106 of the NHPA, other applicable federal laws, and DoD and Navy regulations, the “inadvertent discovery” of potentially significant archaeological resources would compel the Navy to stop work in the immediate area and then follow the Section 106 process for discoveries documented in the NAVBASE Kitsap Inadvertent Discovery Plan. This includes evaluating the effects to such resources through consultation with the SHPO, affected American Indian tribes, and other interested parties. Similarly, if Native American human remains, funerary items, sacred objects, or items of cultural patrimony are encountered, the Navy must comply with the NAGPRA. As described in Section 3.4.1, the Navy has determined that the Proposed Action would have no effect on historic properties and has consulted with the Washington SHPO and local Tribes as required by Section 106 of the NHPA. Therefore, the Navy determined that Alternative 1 would not result in significant impacts to historic properties or cultural

resources. However, the Port Gamble S’Klallam and Jamestown S’Klallam Tribes still maintain that there would be impacts to cultural resources.

### **3.4.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative) Potential Impacts**

Elements of Alternative 2 that could affect cultural resources are the same as for Alternative 1, and would include: in-water work, utility improvements, and ground disturbance at the pier site and VMF and laydown area sites.

As with Alternative 1, no historic properties would be affected by construction or operation of Alternative 2. Elements of Alternative 2 are located in an area with a “Very High Risk” of encountering archaeological materials. However, the likelihood of encounter is low because of previous disturbance and activity in the APE. Consequently, the Navy would follow Section 106 and NAGPRA processes and consultation, as required, and as described in Section 3.4.3.2. Therefore, implementation of Alternative 2 would not result in significant impacts to historic properties or cultural resources. However, the Port Gamble S’Klallam and Jamestown S’Klallam Tribes still maintain that there would be impacts to cultural resources.

### **3.5 American Indian Traditional Resources**

#### **3.5.1 Regulatory Setting**

##### **3.5.1.1 DoD Policy and SECNAVINST**

On October 21, 1998, the DoD promulgated its Native American and Alaska Native Policy, emphasizing the importance of respecting and consulting with tribal governments on a government-to-government basis (explanatory text was added on November 21, 1999). The policy requires an assessment, through consultation, of the effects of proposed DoD actions that may have the potential to significantly affect protected tribal resources (including traditional subsistence resources such as shellfish and fisheries), tribal rights (such as access to fisheries), and American Indian lands before decisions are made by the services.

In 2005, the Navy updated its policy for consultation with federally recognized Indian tribes. Secretary of the Navy Instruction (SECNAVINST) 11010.14B, Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes, implements DoD policy within the Navy and encourages ongoing consultation. Subsequent updates to SECNAVINST 5090.8B (Policy for Environmental Protection, Natural Resources, and Cultural Resources Programs 2018) also mandate American Indian consultation.

##### **3.5.1.2 Laws, Executive Orders, and Memoranda Mandating Consultation**

In addition to the specific policy and SECNAVINST cited above, other federal laws, executive orders, and memoranda include policies requiring consultation with American Indians regarding concerns specific to native interests. These include the following: NHPA, American Indian Religious Freedom Act, the Archaeological Resources Protection Act, NAGPRA, EO 12898 Environmental Justice, EO 13007 Indian Sacred Sites, EO 13175 Consultation and Coordination with Indian Tribal Governments, Presidential Memorandum dated November 5, 2009 (emphasizing agencies' need to comply with EO 13175), the Presidential Memorandum dated April 29, 1994, Government-to-Government Relations with Native American Governments, Presidential Memorandum dated January 26, 2021, Tribal Consultation and Strengthening Nation-to-Nation Relationship, Memorandum of Understanding Regarding Interagency Coordination and Collaboration for the Protection of Tribal Treaty and Reserved Rights dated November 2021, and Presidential Memorandum dated November 30, 2022, Uniform Standards for Tribal Consultation.

##### **3.5.1.3 Government-to-Government Consultation**

In accordance with DoD policy and Navy instructions, the Navy invited the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes to initiate government-to-government consultation on the Proposed Action (letters dated April 10, 2017; see Appendix C, Tribal Government-to-Government Documentation). The Navy met with Tribes in 22 staff-level and 14 formal Government-to-Government meetings, as well as 8 other tribal engagements from 2017 to 2022. The Navy has met numerous times with Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam tribal staff and leadership to address their concerns and discuss acceptable tribal treaty mitigation measures. However, the Tribes have not expressed a desire to discuss mitigation. The Navy will continue to work through the Government-to-Government process to resolve issues concerning

tribal rights and resources, identify adequate treaty mitigation measures, and increase tribal involvement in the Navy's early project planning.

The Navy and Skokomish Tribe signed a Memorandum of Agreement (MOA) for the project on March 3, 2021. The mitigation measures in the MOA include funding to implement one or more elements of the Skokomish River Basin Restoration Plan (an ecosystem restoration plan). The terms and conditions of the MOA are only triggered upon the Navy's commencement of in-water work.

### **3.5.2 Affected Environment**

NAVBASE Kitsap Bangor property and the controlled waterfront Naval Restricted Area are co-located in the adjudicated Usual and Accustomed (U&A) fishing grounds and stations of the Skokomish Indian Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, and Suquamish Tribe. The Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes are signatories to the Treaty of Point No Point, signed on January 26, 1855. The U&A fishing grounds and stations for the Point No Point signatories encompass the co-use waterways and shorelines of Hood Canal and its tributaries, which include NAVBASE Kitsap Bangor (Point No Point Treaty Council, 2010). The Suquamish Tribe is a signatory to the 1855 Treaty of Point Elliot, and its adjudicated U&A fishing grounds and stations include waters in Hood Canal. As a result of the 1985 ruling by the Ninth Circuit Court of Appeals in *United States v. Skokomish Indian Tribe*, 764 F.2d 670, (9th Cir. 1985), the Skokomish Tribe retains primary tribal control over access to the entire Hood Canal south of the Hood Canal Bridge. Per the 1982 Hood Canal Agreement, the Skokomish Tribe has agreed to not assert their primacy with the Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes in Hood Canal north of Ayock Point. The Hood Canal Agreement was adopted by the court in 1983, and in 1984, a subsequent judicial determination of the primary right of the Skokomish Tribe in Hood Canal was issued. The Suquamish Tribe, who has secondary access rights, must receive permission from the Skokomish Tribe to shellfish and finfish within Hood Canal. Since the court decision, the Skokomish Tribe as precluded Suquamish Tribe access for shellfishing and finfishing from Hood Canal.

Pursuant to a 1997 Cooperative Agreement between the Navy and the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes, the tribes manage and harvest shellfish at the Devil's Hole Beach, on NAVBASE Kitsap Bangor, south of Delta Pier and north of the proposed project area. Per the Agreement, the tribes are entitled to 100 percent of the shellfish resources at the Devil's Hole Beach, which is the tribes' 50 percent share of the NAVBASE Kitsap Bangor shellfish resources. The project area is within the Naval Restricted Area; finfishing is not allowed within the Naval Restricted Area (Figure 1-2) without permission of the Commanding Officer, Naval Base Kitsap or authorized representative.

Protected tribal resources, as defined in DoD Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes* (U.S. Department of Defense, 2018), are "those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by or reserved by or for Indian tribes through treaties, statutes, judicial decisions, or E.O.s, including Tribal trust resources." Tribal trust resources are Indian lands or rights to certain resources. These resources include plants, animals, and locations associated with hunting, fishing, and gathering activities for subsistence or ceremonial use. For the purposes of this section, the term "traditional resources" is used to encompass protected tribal resources. American Indian historic properties of traditional religious and cultural importance to Tribes (i.e., cultural resources eligible for listing in the National Register of



Historic Places under the National Historic Preservation Act) are discussed in Section 3.4 (Cultural Resources).

### **3.5.3 Environmental Consequences**

The evaluation of impacts on traditional resources considers whether the resource itself is affected or if there is a change in access to the resource. Impacts may be clearly identified, as when a known traditional resource is directly affected or access is changed. Consultation with potentially affected tribal governments of federally recognized American Indian tribes is required so the Navy can carefully consider and evaluate the extent of any potential effects and reach agreement on appropriate projects and/or measures to mitigate impacts to tribal rights and resources.

#### **3.5.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to American Indian traditional resources. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

#### **3.5.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

With implementation of activities associated with construction and operation of Alternative 1, there would be no changes to the status quo regarding tribal access to traditional resources, including in upland areas. Additionally, implementation of activities associated with construction and operations of Alternative 1 will not significantly impact traditional resources, including in the upland area. The operational impacts of the transiting TPP escort vessels and submarines on access to American Indian traditional resources are addressed in the Northwest Testing and Training Final EIS (FEIS) (Navy, 2015a).

Shellfish beds associated with the intertidal portions of the Devil's Hole Beach are accessed by tribes for clam and oyster harvesting. Access to the tribal shellfish harvest beach for tribal harvesters would continue during and following implementation of the Proposed Action. There would be a small and temporary increase in the volume of barge traffic during construction of the pier. However, the increase in barge traffic generated by the construction activities would be negligible when compared to existing marine traffic in Hood Canal and at NAVBASE Kitsap Bangor, and would minimally affect tribal access to traditional resources including finfishing. However, there could be shellfish harvest restrictions imposed by the WA DOH near the sanitary sewage connection point on the pier. The Navy will work with the WA DOH and the affected Tribes to assess the potential effects a restriction would have on tribal access to tribal traditional resources. Although WA DOH has not made a final determination regarding the maximum extent of a potential closure zone, it is anticipated that such a closure zone would be approximately 200 feet, which would not extend to the Devil's Hole Beach.

The sediment transport study (ESA, 2019) concluded that overall sediment supply to adjacent beaches would not be significantly affected by the presence of the proposed pier and the feeder bluffs located east of the project site would continue to erode as they have in the past and provide sediment to adjacent beaches, including the shellfish harvesting area. There would be minimal loss of benthic invertebrates at the TPP Pier site, but not at the Devil's Hole Beach (Section 3.2.3.2). Additionally, the in-water work window for each construction year would minimize impacts to all juvenile salmonid species, and the under-trestle lighting would mimic natural light so the trestle would not cast a shadow to interfere with juvenile migration.

Construction and operation of diesel marine fueling storage site, fuel lines, vessel maintenance facility (VMF) and parking as well as associated utilities would not affect traditional resources. The fueling facility would be constructed on an undeveloped forested site. Section 3.1.3.2.2 sets forth current practices and BMPs that would be implemented to reduce the potential for spills during construction and operation of the upland fueling facility. The Navy would construct a diesel marine fueling storage site, fuel lines, VMF with parking as well as associated utilities in upland areas. The VMF would be constructed on a partially forested site.

Impacts to protected Tribal resources could occur if forested areas are among those that are accessed by Tribes for harvesting plant materials. However, these impacts are not expected to be significant. In addition, construction and operation of the proposed diesel tanks, fuel lines, VMF and parking would not significantly impact access to traditional resources due to the availability of these resources throughout NAVBASE Kitsap Bangor.

Therefore, implementation of the diesel marine fueling storage site, fuel lines, VMF with parking as well as associated utilities in Alternative 1 would not result in significant environmental impacts to tribal traditional resources or tribal access to traditional resources. Based on the research and analyses for the project, the Navy concluded there will be some environmental impacts to tribal traditional resources, however, it would not rise to the level of significance.

The Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes still maintain that there would be impacts to tribal rights and resources. The Navy continues to consult with federally recognized tribes, as required by DoD policy, Navy instructions, and EO 13175 to reach agreement on mitigation measures to resolve impacts to tribal rights and resources.

### **3.5.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred) Potential Impacts**

Impacts to tribal access for traditional resources would be the same for Alternative 2 as for Alternative 1, including upland areas, except that Alternative 2 would present more of a barrier to migrating juvenile salmonids for the in-water aspect of the action, having 114 permanent nearshore piles compared to 25 for Alternative 1. In addition, although WA DOH has not made a final determination regarding the maximum extent of a potential closure zone, it is anticipated that such a closure zone would only affect a small portion at the southern end of Devil's Hole Beach.

Therefore, implementation of the diesel marine fueling storage site, fuel lines, VMF with parking as well as associated utilities in Alternative 2 would not result in significant environmental impacts to tribal traditional resources. Based on the research and analyses for the project, the Navy concluded there will be some environmental impacts to tribal traditional resources from construction and operation of the diesel marine fueling storage site, fuel lines, VMF with parking as well as associated utilities in, however, they would not rise to the level of significance. However, the Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes still maintain that there would be impacts to tribal rights and resources. The Navy continues to consult with federally recognized tribes, as required by DoD policy, Navy instructions, and EO 13175, to reach agreement on mitigation measures to resolve impacts to tribal rights and resources.

### 3.6 Socioeconomics

This section discusses population demographics, employment characteristics, schools, and housing occupancy status data that provide key insights into the socioeconomic conditions that might be affected by a proposed action.

#### 3.6.1 Regulatory Setting

There are no governing regulations with regard to socioeconomics. No consultations or permits are required. Socioeconomic data shown in this section are presented at the U.S. Census Bureau (USCB) county, metropolitan statistical area, state, and national levels to characterize baseline socioeconomic conditions in the context of regional, state, and national trends. A metropolitan statistical area is a geographic entity defined for use by federal statistical agencies based on the concept of a core urban area with a high degree of economic and social integration with surrounding communities. Data have been collected from previously published documents issued by federal, state, and local agencies and from state and national databases (e.g., U.S. Bureau of Economic Analysis' Regional Economic Information System).

#### 3.6.2 Affected Environment

The affected environment for socioeconomic resources includes the county where the action alternatives would take place. The action alternatives would take place at NAVBASE Kitsap Bangor located in Kitsap County, Washington.

##### 3.6.2.1 Population

NAVBASE Kitsap Bangor is located on the Kitsap Peninsula in Kitsap County, Washington. Kitsap County comprises the Bremerton-Silverdale, WA metropolitan statistical area. Bremerton is the largest city in the county with a population of 43,505 (USCB, 2020). The city comprises approximately 15.8 percent of the total county population estimated at 275,611 (USCB, 2020). Between 2010 and 2020, the population in Kitsap County increased at an average annual growth rate of 0.9 percent, which is less than the state average but more than the national average (Table 3.6-1).

**Table 3.6-1. Population in the Affected Environment**

<b>Geographic Area</b>	<b>2010 Census Population</b>	<b>2020 Census Population</b>	<b>Average Annual Growth Rate</b>
Kitsap County	251,133	275,611	0.9%
Washington	6,724,540	7,705,281	1.3%
United States	308,745,538	326,569,308	0.5%

Source: USCB, 2010a, 2020

##### 3.6.2.2 Employment Characteristics

Total employment in Kitsap County is 128,823 jobs (USBEA, 2021). As shown in Table 3.6-2, the largest industry in terms of employment is the government and government enterprise industry (30.45 percent), followed by health care and social assistance (10.95 percent) and retail trade (10.67 percent) (USBEA, 2021). There are approximately 7,198 construction jobs representing 5.59 percent of the total full-time and part-time employment in Kitsap County (Table 3.6-2).

DoD is an important economic generator in Kitsap County. The annual economic impact associated with NAVBASE Kitsap was estimated to total \$4.0 billion in Fiscal Year 2017 (KEDA, 2022a). NAVBASE Kitsap (a conglomerate of installations at Bangor, Bremerton, Jackson Park, Keyport, and Manchester) is the largest employer in Kitsap County (KEDA, 2022a). There are approximately 11,220 active duty military, 19,922 civilians, and 313 contract employees based in NAVBASE Kitsap (KEDA, 2022b).

**Table 3.6-2. Employment (number of jobs) by Industry, Kitsap County, 2021**

<i>Industry</i>	<i>Number of Jobs</i>	<i>Percent of Total</i>
Total employment	128,823	100.0%
Forestry, fishing, and related activities	NA	NA
Mining, quarrying, and oil and gas extraction	NA	NA
Utilities	182	0.14%
Construction	7,198	5.59%
Manufacturing	3,303	2.56%
Wholesale trade	1,758	1.36%
Retail trade	13,739	10.67%
Transportation and warehousing	3,159	2.45%
Information	1,101	0.85%
Finance and Insurance	4,312	3.35%
Real estate and rental and leasing	6,078	4.72%
Professional, scientific, and technical services	9,709	7.54%
Management of companies and enterprises	403	0.31%
Administrative and support and waste management	5,001	3.88%
Educational services	1,738	1.35%
Health care and social assistance	14,112	10.95%
Arts, entertainment, and recreation	2,932	2.28%
Accommodation and food services	8,410	6.53%
Other services	6,462	5.02%
Government and government enterprises	39,226	30.45%

Source: USBEA, 2021

Key: NA=not available

Based on the most recent labor force data from the Bureau of Labor Statistics, Kitsap County had an average annual unemployment rate of 5.0 percent, representing a decline of 3.6 percent since 2010 when the unemployment rate was estimated at 8.6 percent (Bureau of Labor Statistics, 2021a). This rate was lower than the national average of 5.3 percent and the state average of 5.2 percent (Bureau of Labor Statistics, 2021b).

### 3.6.2.3 Schools

There are several school districts throughout the county. There are no primary or secondary schools on NAVBASE Kitsap Bangor; therefore, school-aged dependents attend schools consistent with where the family resides. The Central Kitsap School District and the North Kitsap School District serve the educational needs of the region's youth, including military dependents associated with NAVBASE Kitsap Bangor. There are 19 schools in the Central Kitsap School District, which includes 12 elementary schools, 3 middle schools, 2 high schools, 1 secondary school, and 1 kindergarten through 12<sup>th</sup> grade community school (CKSD, 2022). There are approximately 11,400 students enrolled in the district and 650 classroom

teachers, representing a student-to-teacher ratio of approximately 18:1. Nearly half of the student body is in families economically tied to the military sector in Kitsap County (CKSD, 2022).

The North Kitsap School District includes 6 elementary schools, 2 middle schools, and 2 high schools. There are approximately 5,700 students enrolled in grades K through 12 throughout the district (NKSD, 2022).

### 3.6.2.4 Housing

There are approximately 114,777 housing units in Kitsap County (USCB, 2021), representing an increase of 3,577 units since 2010. Approximately 7.3 percent (8,378 units) of the housing units in the county are vacant. The homeowner vacancy rate in the county is 0.7 percent, down from 2.2 percent in 2010. The rental vacancy rate has also dropped since 2010 from 8.6 percent to 6.0 percent (Table 3.6-3). In 2021, there were 2,285 housing unit building permits issued for Kitsap County. The majority of new housing unit permits were for multi-family units (51.3 percent) compared to single family homes (48.7 percent) (HUD, 2021).

**Table 3.6-3. Housing in the Affected Environment**

<i>Geographic Area</i>	<i>Housing Units</i>	<i>Occupied Units</i>	<i>Vacant Units</i>	<i>Homeowner Vacancy Rate</i>	<i>Rental Vacancy Rate</i>
Kitsap County	114,777	106,399	8,378	0.7	5.4
Washington	3,257,140	3,022,255	234,885	0.6	4.0
United States	142,148,050	127,544,730	14,603,320	0.9	5.2

Source: USCB, 2021

### 3.6.3 Environmental Consequences

Analysis of impacts to socioeconomics is focused on issues associated with effects of the alternatives on population, employment, commercial and recreational fishing, schools, and housing.

#### 3.6.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to the socioeconomics of the local area or region. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

#### 3.6.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts

The study area for socioeconomic analyses for Alternative 1 is defined as Kitsap County, Washington.

Under this alternative, the costs associated with construction of the extended pier, new facilities, and roadway and utility improvements would total approximately \$70.6 million (Table 3.6-4). The direct, indirect, and induced effects of the construction expenditures were assessed using the Impact Analysis for Planning (IMPLAN) model. As shown in Table 3.6-4, the IMPLAN model estimates<sup>1</sup> the total number

<sup>1</sup> The IMPLAN model used in the 2019 Draft EA to estimate socioeconomic impacts of project construction was based on Kitsap County economic data from 2017. The most recent data available for the county was released in 2021, which was a year impacted by the global COVID-19 pandemic. The analysis has not been revised with 2021 data as it is expected that the difference in results would be negligible and would not affect the outcome of the determination that the socioeconomic impacts of the Proposed Action would be beneficial.

of jobs generated from \$70.6 million in construction expenditures would be 696 jobs. This includes 501 direct jobs, 81 indirect jobs, and 114 induced jobs. Direct jobs include occupations that would work directly on the project, such as project planners, designers, engineers, and construction workers. Of the 501 direct jobs generated, the Navy has estimated that 100 of these positions would be associated with workers who are anticipated to drive to the project site and be present on the project site at any given time. Not all persons associated with the direct jobs created would be required to be present on the project site each day. Additionally, the 81 indirect jobs (e.g., suppliers of materials for the project) and the 114 induced jobs (i.e., jobs created as a result of increased labor income from the direct and induced jobs such as service industry jobs), would be anticipated to occur throughout the ROI and would not be required to travel to or be present on the construction site. Based on the IMPLAN model, approximately \$31.974 million in wages, \$93.344 million in output, \$3.6 million in state and local taxes, and \$7.2 million in federal taxes would be generated from construction costs (IMPLAN, 2017).

Based on the number of jobs in the construction industry within the county (7,198 jobs) and considering the most recent annual average unemployment rate of 5.0 percent, it is anticipated that the majority of construction jobs would be filled from the local workforce and would not be associated with any permanent in-migration of workers. However, in the event that all 696 jobs would be filled by an in-migration of people, the population in Kitsap County would increase by less than 0.1 percent, which is less than the average annual population growth of 0.9 percent. Based on the number of vacant housing units available in the county (8,378 units), it would be anticipated that there would be more than enough housing to support an in-migration of workers. School-aged dependents of workers would likely be of various ages and attend one of the 29 schools throughout the two public school districts serving the area. An influx of students of a certain age or to a certain school or district would put significant additional demands on school capacity and resources.

No significant adverse impacts to population, housing, or schools would be anticipated from construction activities. Construction activities associated with this alternative would provide direct, indirect, and induced benefits from the use of local labor and supplies for the duration of the activities.

**Table 3.6-4. Construction Impacts for the Extended Pier and VMF Alternative**

Construction Cost (\$ million)	Employment	Wages (\$ million)	Output (\$ million)	State and Local Tax Impact (\$ million)	Federal Tax Impact (\$ million)
\$70,646,577	696	\$31.974	\$93.355	\$3.608	\$7.201

Source: IMPLAN, 2017

During operations, there would be no personnel changes or in-migration or out-migration anticipated as a result of Alternative 1. Therefore, no impacts to population, housing and schools would result from operation of Alternative 1. Any annual operation and maintenance costs associated with the pier and supporting facilities would contribute directly and indirectly to the economy.

As discussed in Section 3.5.3, neither construction nor operation of the TPP Pier would affect the tribal shellfish beach at Devil’s Hole, nor tribal access to that site, with the exception of the anticipated exclusion zone that could be imposed by WA DOH around the sanitary sewer connection point on the pier. Although WA DOH has not made a final determination regarding the maximum extent of a potential closure zone, it is anticipated that such a closure zone would be approximately 200 feet, which would not extend to the Devil’s Hole Beach. As discussed in Section 3.5.3, TPP Pier construction vessel

traffic would not be sufficient to affect tribal fishing vessels in Hood Canal or access to traditional resources. Therefore, there would be no significant socioeconomic impacts on American Indian Tribes.

The government and government enterprises industry represent a large proportion of employment and earnings in the area and would continue to do so under this alternative. Therefore, implementation of Alternative 1 would not result in significant impacts to the socioeconomics of the local area or region.

**3.6.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative)  
Potential Impacts**

The study area for socioeconomics analysis for Alternative 2 is defined as Kitsap County, Washington.

Under this alternative, the costs associated with construction of the shortened pier, new facilities, and utility improvements would be less than those associated with Alternative 1 and, therefore, the potential impacts to socioeconomic resources would be less under this alternative. Under Alternative 2, the total estimated costs of construction would be \$52.6 million (Table 3.6-5). The direct, indirect, and induced effects of the construction expenditures were assessed using the IMPLAN model. As shown in Table 3.6-5, the IMPLAN model estimates that the total number of jobs generated from \$52.6 million in construction expenditures would total 518 jobs. This includes 373 direct jobs, 60 indirect jobs, and 85 induced jobs. Direct jobs include occupations that would work directly on the project, such as project planners, designers, engineers, and construction workers. Similar to Alternative 1, not all direct jobs created would be required to be present on the project site each day. Of the 373 direct jobs generated, the Navy has estimated that 100 of these positions would be associated with workers who are anticipated to drive to the project site and be present at any given time. Not all persons associated with the direct jobs created would be required to be present on the project site each day. Additionally, the 60 indirect jobs (e.g., suppliers of materials for the project) and the 85 induced jobs (i.e., jobs created as a result of increased labor income from the direct and induced jobs such as service industry jobs), would be anticipated to occur throughout the ROI and would not be required to travel to or be present on the construction site.

Based on the IMPLAN model, approximately \$23.8 million in wages, \$69.5 million in output, \$2.7 million in state and local taxes, and \$5.4 million in federal taxes would be generated from construction costs under this alternative (IMPLAN, 2017). The majority of indirect and induced employment and earnings would be in the real estate, architectural, engineering, and related services, wholesale trade, and retail industries.

**Table 3.6-5. Construction Impacts for the Shortened Pier and VMF Alternative**

Construction Cost (\$ million)	Employment	Wages (\$ million)	Output (\$ million)	State and Local Tax Impact (\$ million)	Federal Tax Impact (\$ million)
\$52,621,616	518	\$23.816	\$69.536	\$2.687	\$5.364

Source: IMPLAN, 2017

Socioeconomic impacts associated with operation of Alternative 2 would be similar to those described under Alternative 1, with the exception of the WA DOH shellfish harvest closure zone. Although WA DOH has not made a final determination regarding the maximum extent of a potential closure zone, it is anticipated that such a closure zone would only affect a small portion at the southern end of Devil’s

Hole Beach. Therefore, implementation of Alternative 2 would not result in significant impacts to the socioeconomics of the local area or region.



### **3.7 Traffic/Transportation**

Transportation resources include roads, public transit, railroads, waterways, and non-motorized travel. The transportation setting for ground transportation includes those streets and intersections that would be used by both automobile and truck traffic to gain access to and from a project site, as well as those streets that would be used by construction traffic (i.e., equipment and commuting workers). The marine vessel setting includes the waterways (e.g., Hood Canal and Puget Sound) that would provide access to the project site.

#### **3.7.1 Regulatory Setting**

##### **3.7.1.1 Vehicle Traffic**

The Military Surface Deployment and Distribution Command Transportation Engineering Agency provides the DoD with transportation engineering, policy guidance, research, and analytical expertise. Several DoD directives apply to transportation planning and implementation at military bases, including the following:

- DoD Directive 4500.9 Transportation and Traffic Management
- DoD Directive 4510.11 Transportation Engineering

These directives apply policies to proposed transportation improvements, travel, traffic management, and traffic safety.

EO 13693 encourages government entities to improve building efficiency, performance, and management by including in the planning for new buildings or leases, cost-effective strategies to optimize sustainable space usage and consideration of existing community transportation planning and infrastructure, including access to public transit. This EO encourages the coordination of federal real property discussions with local communities in an effort to encourage planned transportation investments that aim to support public transit access.

##### **3.7.1.2 Marine Traffic**

For vessel traffic, the Protection of Naval Vessels rule (33 CFR section 165.2010) issued under the authority in 14 U.S.C. section 91 provides protective measures for both vessels and bases. This regulation establishes Naval Vessel Protection Zones surrounding U.S. Naval vessels in navigable waters of the U.S. Within a Naval Vessel Protection Zone, no vessel or person is allowed within 100 yards of a U.S. Naval vessel unless authorized by the U.S. Coast Guard (USCG) or senior Naval officer in command. As discussed in Section 1.3, Location, there are two Naval Restricted Areas in Hood Canal associated with NAVBASE Kitsap Bangor (Figure 1-2).

No consultations or permits related to traffic and transportation are required.

#### **3.7.2 Affected Environment**

The area to be evaluated includes the road network within NAVBASE Kitsap Bangor and main access road routes to and from the base and marine waterways, such as Hood Canal and Puget Sound. The project is not anticipated to use rail service. Therefore, rail traffic is not discussed further.

### 3.7.2.1 Vehicle Traffic

Primary transport is by automobile, although bus service to the base is available from some parts of Kitsap County, as well as taxi service. The major population centers within Kitsap County, which are Silverdale, Poulsbo, Bremerton, Port Orchard, and Bainbridge Island, are all between a 10- and 40-minute drive from NAVBASE Kitsap Bangor.

#### 3.7.2.1.1 Roadway Characteristics

The primary access to NAVBASE Kitsap Bangor is State Route (SR)-3, which is the major roadway serving Bremerton, Poulsbo, Silverdale, and the Hood Canal Bridge. SR-3 has a posted speed limit of 60 miles per hour (mph) and is a controlled access, four-lane, north-south highway located 1/3 mile east of the base. SR-3 connects with SR-305 near Poulsbo providing access from NAVBASE Kitsap Bangor to Bainbridge Island and the Seattle ferry. Travel time is approximately 1 hour and 15 minutes from Seattle. Travel time by highway from Tacoma is less than 1 hour.

There are two entrance routes to NAVBASE Kitsap Bangor from SR-3, either NW Trigger Avenue or NW Luoto Road (referred to as Trident Boulevard inside of base boundaries) (Figure 3.7-1). Trident Avenue/Luoto Road has six 12-foot travel lanes with 6-foot paved shoulders extending from the main gate to SR-3. Trigger Avenue has five 12-foot travel lanes with 6-foot paved shoulders. Both roads are posted for speeds up to 40 mph.

The internal NAVBASE Kitsap Bangor road system is composed of two- and four-lane paved roads that provide access to Naval and commercial facilities, housing, and the waterfront area. Roads in the vicinity of the waterfront are two-lane roads. Generally, travel lanes are from 10 to 12 feet in width with wide paved shoulders ranging from 5 to 10 feet or gravel shoulders from 2 to 5 feet in width. Speed limits on the base range from 20 to 45 mph. Traffic lights and signals have been installed where needed near the commercial area and main gates. Other intersections are controlled by four-way or two-way stop signs.

Internal roads are improved and maintained by the Navy. The key access streets serving the project site are Trigger Avenue, Trident Boulevard, Escolar Road, Greenling Road, Archerfish Road, and Flier Road. The Operational Area (OA) Gate on Trigger Avenue separates the upper base, which includes administrative, commercial and residential areas, from the lower base, which includes various industrial and “mission” areas including the waterfront area. Traffic delays occur at this gate during morning and afternoon peak hours.

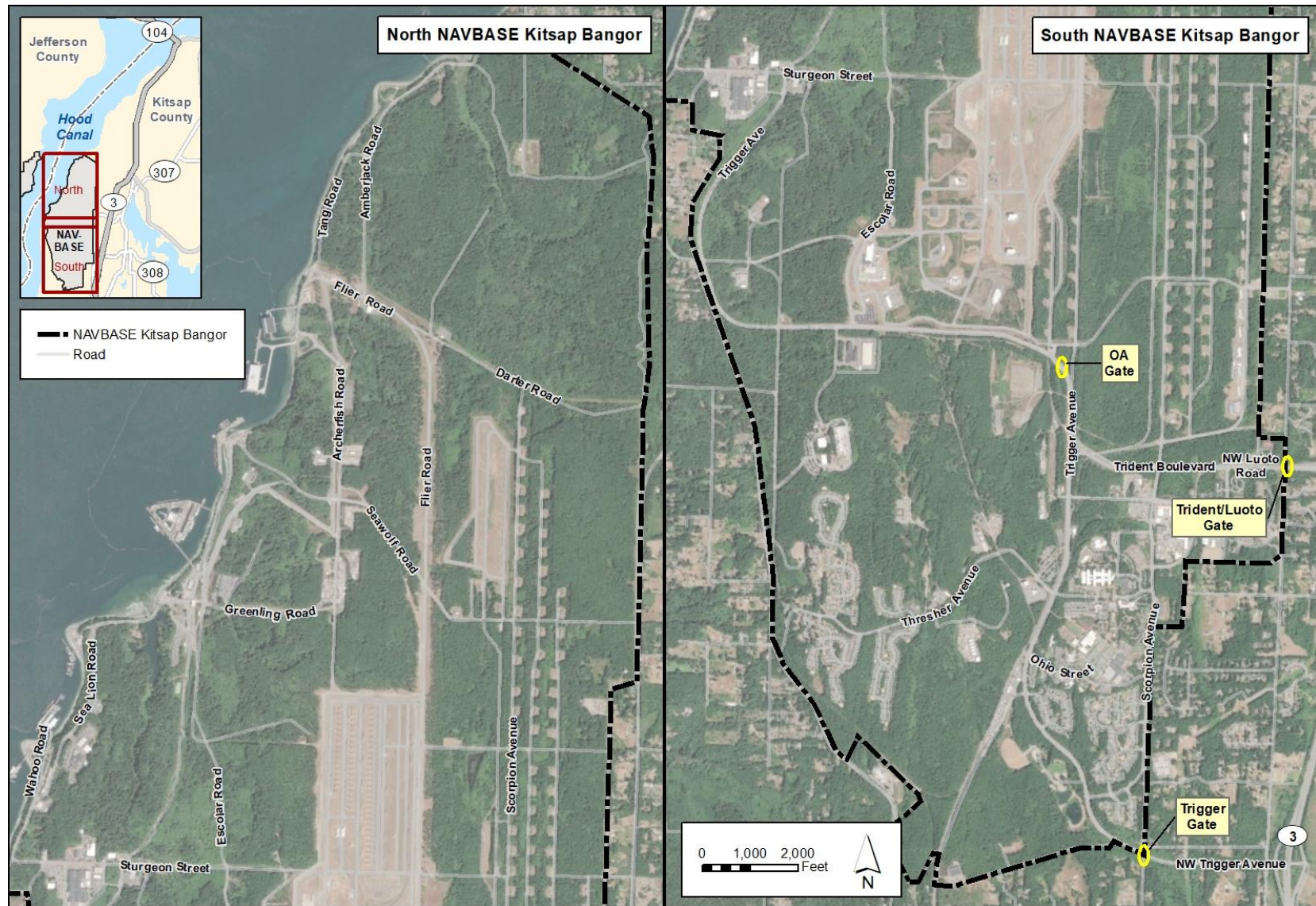


Figure 3.7-1. Roads on NAVBASE Kitsap Bangor

**3.7.2.1.2 Traffic Volumes**

Existing average daily traffic volumes were obtained for internal base roadways that would be used during construction activities associated with the TPP Pier project (Table 3.7-1). In addition to traffic counts, travel lane configuration, roadway grade, and types of traffic controls were verified and documented. The following roadways were selected because they are key access routes to and from the TPP Pier project sites:

- Trigger Avenue south of Trident Boulevard
- Trident Boulevard east of Trigger Avenue
- Sturgeon Street west of Trigger Avenue
- Sea Lion Road north of Sturgeon Street

**Table 3.7-1. Average Daily Traffic Volumes — NAVBASE Kitsap Bangor Roadways**

<i>Location</i>	<i>Cars</i>	<i>Trucks/Buses</i>	<i>Total</i>
Trigger Avenue north of Thresher Avenue	6,854	266	7,120
Trident Boulevard east of Scorpion Avenue	10,830	751	11,581
Sturgeon Street west of Trigger Avenue	N/A	N/A	3,220
Sea Lion Road north of Sturgeon Street	N/A	N/A	2,100

**Source:** Parametrix, 2011; All Traffic Data Services, Inc., 2012

**Note:** On Sturgeon Street and Sea Lion Road, counts did not distinguish between cars and trucks/buses.

Existing average morning and evening peak hour intersection turning movement volumes were obtained at intersections that would be used during construction activities associated with the TPP Pier project within the study area (Table 3.7-2). Specifically, traffic counts were gathered during peak periods of 6:00 a.m. to 8:00 a.m. and 2:30 p.m. to 4:30 p.m. on a typical weekday at the following intersections:

- Trigger Avenue and Ohio Street
- Trigger Avenue and Trident Boulevard
- Trigger Avenue and Sturgeon Street

**Table 3.7-2. Average Peak Hour Volumes — NAVBASE Kitsap Bangor Intersections**

<i>Location</i>	<i>Peak (a.m.)</i>	<i>Peak (p.m.)</i>
Trigger Avenue/Ohio Street	1,267	1,424
Trigger Avenue/Trident Boulevard	1,693	1,512
Trigger Avenue/Sturgeon Street	313	415

**Source:** Parametrix, 2011; All Traffic Data Services, Inc., 2012

**3.7.2.1.3 Level of Service**

Level of service (LOS) is a measure of roadway operation, which uses a qualitative grading scale from A to F. LOS A represents the best traffic operations and LOS F represents the worst traffic operations. LOS can be used to characterize the overall traffic operations along a roadway. The minimum standard for road operations in Kitsap County is LOS D. Parametrix (2011) and All Traffic Data Services (2012)

conducted surveys of LOS on NAVBASE Kitsap Bangor roadways and intersections that would be used by TPP construction and operational traffic. LOS was determined to be generally A or B, except for the two-lane roadways which were LOS C, indicating no significant congestion.

### **3.7.2.2 Marine Traffic**

The Sector Puget Sound Vessel Traffic Service, part of USCG and based in Seattle, monitors approximately 250,000 vessel movements in the sound annually. These movements are composed of tankers, cargo ships, ferries, and tug boats with tows (USCG, 2004).

Naval ships and support vessels access the base via the Strait of Juan de Fuca, Puget Sound, and Hood Canal. The Navy utilizes Hood Canal for navigational means to and from NAVBASE Kitsap Bangor and therefore contributes to the overall quantities of vessel traffic in Hood Canal. Since Hood Canal is not a deep draft vessel operating area, this area is infrequently transited by commercial vessels, and vessel traffic data are not available for Hood Canal (Venture, 2010). Larger vessels (i.e., vertical clearance greater than 50 feet) transiting Hood Canal require opening of the Hood Canal Bridge. Typical bridge openings take approximately 30 minutes (WSDOT, 2010). As bridge openings are not scheduled in advance, vehicles traveling along SR-104 (Hood Canal Bridge) are subject to unexpected delays.

### **3.7.3 Environmental Consequences**

Impacts to ground traffic and transportation are analyzed by considering the possible changes to existing traffic conditions and the capacity of area roadways from proposed increases in commuter and construction traffic. Impacts to vessel traffic are analyzed by considering the potential for traffic generated by the Proposed Action to interfere with general vessel traffic in the waterways serving the site of the Proposed Action.

#### **3.7.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to traffic/transportation. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

#### **3.7.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

##### **3.7.3.2.1 Vehicle Traffic**

Construction traffic accessing the TPP Pier project sites would enter at the Trident/Luoto or Trigger gates, and continue along Trigger Avenue west of Escolar Road to access the construction sites via Sturgeon Street and Sea Lion Road (Figure 3.7-1). Construction truck trips generated by the TPP Pier project would follow Trigger Avenue to Sturgeon Street to Sea Lion Road. The staging area would be located along Sturgeon Street adjacent to the site for the VMF. The staging area would accommodate construction worker parking, temporary material storage, and assembly. The staging area would generate traffic by supporting material deliveries, removal of debris, and distribution of construction personnel from a designated parking area to the staging area.

Truck traffic would be generated by the need to deliver construction materials and remove construction debris from the construction sites, as well as to remove excavated soil and bring in fill material. Construction debris would be hauled off site to an approved disposal location. Because road

configurations constrict truck access to K/B Spit, most construction materials would be brought to the pier site and construction debris removed by barge. This would reduce construction vehicle traffic compared to what might otherwise occur. Over the duration of upland construction (16 months), a maximum of 100 workers are conservatively assumed to drive to and from the construction site daily.

Navy experience with recent major construction projects at NAVBASE Kitsap Bangor (EHW-2 and Waterfront Security Enclave) indicated that construction traffic did not result in adverse impacts to traffic flow on public roadways near the base, including SR-3, or significantly exacerbate peak hour congestion at base gates (Gibson, 2017). Construction traffic for these projects also did not have adverse effects to traffic flow on base roads or result in shortages of parking for base employees. Similarly, the expectation for the TPP project also would be no adverse impacts to traffic for on-base roadways or public roadways near the base. This would be due in part to the current acceptable LOS on the base roadways that would be used by TPP-generated traffic (Section 3.7.2.1).

Regarding operational impacts, the two blocking vessels that would be moored at the TPP Pier are currently moored elsewhere on the NAVBASE Kitsap Bangor waterfront on a space-available basis. Traffic associated with operation of these vessels would shift to the K/B Spit site and represent a minor, localized traffic shift within the waterfront area that would not affect traffic on the base in general.

In summary, roadways and intersections within the base are not generally congested. Therefore, the addition of construction traffic associated with the TPP project is not expected to result in adverse conditions on base roadways. Operational traffic would experience only minor changes. Therefore, Alternative 1 would not result in significant impacts to vehicular traffic.

#### **3.7.3.2.2 Marine Traffic**

Proposed in-water construction activities would require use of marine-based construction equipment (e.g., pile-driving rigs, support barges, tugboat, and work skiffs) to support construction of the TPP and transport materials to and from the project sites. Construction materials would remain on barges until used for construction. It is anticipated that up to two construction barges, each up to 200 feet long and 70 feet wide, would be moored at the construction site for the entire project duration, including during times when the in-water work window is closed.

An average of six barge round trips (12 openings) per month would be required to support construction activities during the in-water work season from July 16 to January 15. Outside of this period, an average of two barge round trips (4 openings) per month would be required. Barges are expected to transit from various locations in Central Puget Sound to the construction site via Admiralty Inlet to Hood Canal. This level of vessel traffic is not expected to adversely impact vessel transit routes or normal navigational activities in Hood Canal or Puget Sound since the number of additional vessels would be small in comparison to overall vessel traffic conditions. Barges would be anchored only within the Naval Restricted Areas, away from the Devil's Hole Beach, and therefore would not affect tribal or general vessel traffic in Hood Canal. Therefore, no significant impacts on marine vessel traffic during construction are expected.

Standard USCG safety precautions would be used by all contractors. Within the NAVBASE Kitsap Bangor restricted areas, marine-based construction equipment would be highly visible, well-marked, and would be relatively stationary. Movement of construction vessels within the restricted areas would be coordinated with NAVBASE Kitsap Bangor Port Operations to ensure no interference with other Navy vessel movements.

Construction vessels would require openings of the Hood Canal Bridge to access the project site. Each barge round trip and associated two bridge openings would result in delays (on average 30 minutes per opening for a total of 60 minutes per round trip) for motorists traveling on SR-104. The average of six round trips (12 bridge openings) per month during the in-water work season (July 16 to January 15) would result in total delays on SR-104 of approximately 360 minutes (6 hours) per month. The projected two round trips (4 bridge openings) per month outside the in-water work season (January 16 to July 15) would result in total delays on SR-104 of approximately 120 minutes (2 hours) per month. Based on a review of data on Hood Canal Bridge openings, the bridge typically opens 400 to 450 times per year for an average opening of just over once per day. June through October represents the period with the majority of openings due to an increase in pleasure boat traffic (Crawford, 2010). Impacts on motorists would be minimized by avoiding barge trips through the Hood Canal Bridge opening during peak commute hours of 6:00 a.m. to 8:30 a.m. and 3:30 p.m. to 6:00 p.m., Monday through Friday.

The two blocking vessels would moor at the new pier after it is constructed. This would add a small amount of marine vessel traffic in the vicinity of K/B Dock, but would not increase the quantity of vessel traffic on the NAVBASE Kitsap Bangor waterfront.

Therefore, implementation of Alternative 1 would not result in significant impacts to marine traffic/transportation.

### **3.7.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative) Potential Impacts**

Impacts to vehicular traffic would be the same as those for Alternative 1 because the upland construction components would be the same. Impacts to marine vessel traffic would be similar to those for Alternative 1, although of lesser magnitude due to the shorter duration of in-water construction for Alternative 2. Therefore, implementation of Alternative 2 would not result in significant impacts to traffic/transportation.

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### 3.8 Visual Resources

The discussion of visual resources includes the natural and built features of the landscape visible from public views that contribute to an area's visual quality. Visual perception is an important component of environmental quality that can be impacted through changes created by various projects. Visual impacts occur as a result of the relationship between people and the physical environment.

#### 3.8.1 Regulatory Setting

There are no specific laws and regulations for aesthetic resources, although the Naval Base Kitsap *Installation Appearance Plan* contains guidelines that relate to visual resources (Navy, 2007). The plan appearance and design of buildings, site features, and landscaping on Naval Base Kitsap. The goal of this plan is to shape the appearance of Naval Base Kitsap for the next twenty years.

#### 3.8.2 Affected Environment

The area to be evaluated includes on-base and off-base locations with views of the proposed project site, including views from both on-land locations and on-water locations (Hood Canal). The aesthetics on NAVBASE Kitsap Bangor are typical of facilities and structures used to support military operations. For views of NAVBASE Kitsap Bangor from off-base locations, the base blends well with the surrounding area because much of it is forested and hidden from view and is compatible with the surrounding rural landscape. The prevalent view of NAVBASE Kitsap Bangor is from the west looking east across Hood Canal to the wharves and piers of the waterfront. Views from NAVBASE Kitsap Bangor depend upon location, but include the Olympic Mountains, Hood Canal, and the various facilities on the base.

NAVBASE Kitsap Bangor is an active military base located on the eastern shoreline of Hood Canal. The base topography is characterized by flat-topped ridges on the eastern, northern, and southern portions of the base. The shoreline of Hood Canal lies adjacent to steep ravines and hillsides leading to the upper portions of the base. The Olympic Mountains lie to the west and provide a scenic backdrop for the base.

Much of NAVBASE Kitsap Bangor is undeveloped with large stands of coniferous trees. Many of the views within the base are of forested areas with adjacent development. The aesthetics within the base are typical of office buildings, residences, industrial facilities, and other structures used to support military operations. A military security buffer zone (closed to public access) is located across Hood Canal on Toandos Peninsula (Figure 3.3-1). Views to the east are largely obscured by forest and the 400-foot ridge of the Kitsap Peninsula.

Development along the waterfront is centered on support structures for naval vessels. The waterfront area of the base includes structural facilities, such as piers, wharves, and cranes. In addition, military submarines and other support craft traversing Hood Canal use these piers and wharves for berthing.

Although physical access to the base and associated facilities is restricted from the general public, the public has visual access to a large area along the waterfront from a distance. The view of the Bangor waterfront from the water where the public can see the base consists of open water in the foreground, industrial waterfront-type facilities such as piers and wharves in the middle ground, and forested hillsides in the background (e.g., Figure 3.8-1 which shows the TPP Pier project site). Recreational boaters are allowed to pass by the base, but are not allowed to stop or slow down. Yellow buoy markers about 0.5 mile offshore have been installed to define military water boundaries. Views from the waterside include naval vessels that traverse the area and other commercial vessels and private boats.



*Source: WDOE Coastal Atlas Shoreline Photos (2006)*

**Figure 3.8-1. View of the TPP Pier Project Site**

The TPP Pier project site is within a portion of the NAVBASE Kitsap Bangor waterfront that is enclosed within a PSB consisting of metal pontoons spaced approximately 18 feet apart, topped by a metal mesh screen extending approximately 14 feet above the water surface. This barrier affects the appearance of the open-water areas along the base shoreline as seen from the base or waters of Hood Canal. The Bangor waterfront operates during the evening hours, and the wharves, piers, and related upland facilities are lighted. The lighting, while there for workers, is also an important security feature and would be on regardless of work activity. Thus, the light from the waterfront area is visible from a distance at night, such as from locations on the Toandos Peninsula, approximately 1.5 miles away.

### **3.8.3 Environmental Consequences**

The evaluation of visual resources in the context of environmental analysis typically addresses the contrast between visible landscape elements. Collectively, these elements comprise the aesthetic environment, or landscape character. The landscape character is compared to the Proposed Action's visual qualities to determine the compatibility or contrast resulting from the buildout and demolition activities associated with the Proposed Action.

### **3.8.3.1 No Action Alternative**

Under the No Action Alternative, the Proposed Action would not occur and there would be no change to visual resources. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

### **3.8.3.2 Alternative 1: Extended Pier and Vessel Maintenance Facility Potential Impacts**

The site proposed for Alternative 1 and adjacent lands define the study area for visual resources analyses.

Construction and related activities tend to cause visual disturbance to the landscape because of the changing nature of the views as construction proceeds. Visual effects would be caused by heavy construction equipment such as barges, cranes (including up to 150 days of pile driving), backhoes, and stockpiled materials, which may be moved around a construction site. However, these activities would be temporary, and impacts on visual character would also be temporary, lasting only for the duration of construction (up to 3 years for Alternative 1).

The project site along the waterfront is mostly shielded from onshore, close-in views by topography and to the east by the base itself. To the west, the Naval Restricted Area creates a buffer and separates viewers from the base waterfront by at least a half mile, which would reduce the apparent visual scale of the construction sites. The closest off-base viewing locations on land are to the west along the Toandos Peninsula in Jefferson County, just over 1 mile from the project site. The closest populated area is Thorndyke Bay, approximately 4.6 miles northwest of the TPP Pier project site. There are no publicly accessible places on land from which to view the project sites close up. Facilities under construction and construction equipment would be visible from a distance, resulting in a minor, temporary impact on visual character at those distant viewing locations. In the longer term, the project would add an industrial pier and upland facilities including large fuel tanks to the Bangor waterfront, but would also be consistent with the existing appearance of the waterfront which supports eight other industrial piers, some much larger than the TPP Pier, as well as multiple industrial buildings and other facilities such as the floating Port Security Barrier System that encloses much of the waterfront. The TPP Pier would add marginally to the industrialized appearance of the Bangor waterfront.

The VMF site is located in a forested area away from the base boundary and Hood Canal shoreline. As a result, the facilities constructed at this site would not be visible from off-base locations.

In summary, the TPP Pier and VMF would add to but be consistent with the existing industrialized appearance of the NAVBASE Kitsap waterfront. Therefore, implementation of Alternative 1 would not result in significant impacts to visual resources.

### **3.8.3.3 Alternative 2: Shortened Pier and Vessel Maintenance Facility (Preferred Alternative) Potential Impacts**

Impacts to visual resources from Alternative 2 would be similar to those of Alternative 1 since visual access is limited, and would have little impact on the visual context outside of NAVBASE Kitsap Bangor during construction or operation. Alternative 2 would differ from Alternative 1 in that the overall size of the pier structure would be considerably smaller, including the visual profile. The Alternative 2 pier and trestle would be approximately 350 feet and 100 feet shorter, respectively, than for Alternative 1. In addition, during construction, cranes and other pile-driving equipment would be on site for up to 90 days compared to 150 days for Alternative 1. Upland facilities at the pier site would be the same as

for Alternative 1, with the same visual impacts. The VMF site would be the same as described for Alternative 1 and located away from the base boundary and the immediate Hood Canal shoreline. Therefore, the facility and its construction would not be visible from off-base locations.

Therefore, implementation of Alternative 2 would not result in significant impacts to visual resources.

### **3.9 Summary of the Impacts of the Alternatives**

A summary of the potential environmental impacts of the alternatives and impact avoidance and minimization measures are presented in Tables 3.9-1 and 3.9-2. None of the alternatives would result in significant impacts to the environment. Table 3.9-2 provides a comprehensive list of all mitigation requirements associated with the Proposed Action.

**Table 3.9-1. Summary of Impacts of Alternatives**

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Extended Pier and Vessel Maintenance Facility</i>	<i>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</i>
<b>Water Quality and Sediments</b>			
Construction Impacts	Under the No Action Alternative, the TPP pier would not be constructed and there would be no construction-generated impacts to water quality and sediments.	Impacts to upland surface water and groundwater from construction-related erosion and stormwater runoff would be avoided by implementing a construction SWPPP and BMPs. Minor changes to marine water resources could occur throughout the in-water construction phase of the project due to disturbances to bottom sediments. Changes to water quality conditions likely would persist for minutes to hours following disturbances, whereas changes to sediment conditions would persist for days to months. Construction-related changes would not be expected to exceed water quality criteria or occur beyond the immediate project site.	Construction-related impacts to water quality and sediments would be very similar to Alternative 1.
Operation Impacts	Under the No Action Alternative, the TPP pier would not be constructed and there would be no operation-generated impacts to water quality and sediments.	Potential impacts on water and sediment resources from long-term operations would be minimal. Project operations would not involve discharges of waste or other materials with the potential for impacting water or sediment quality. Small-scale changes in flow patterns could result in localized scouring or accumulation of sediments in the immediate vicinity of the support piles. The presence of the fixed pier structure would result in marginal changes in current velocity, but would not substantially affect sediment deposition/erosion patterns or longshore sediment transport processes within the project area overall. There would be minor sediment accretion (up to 10 feet laterally) seaward along the tip of K/B Spit over a period of five to ten years.	Operation-related impacts to water quality and sediments would be very similar to Alternative 1.

**Table 3.9-1. Summary of Impacts of Alternatives (continued)**

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Extended Pier and Vessel Maintenance Facility</i>	<i>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</i>
<b>Biological Resources</b>			
Construction Impacts	Under the No Action Alternative, the TPP pier would not be constructed and there would be no construction-generated impacts to biological resources.	<p><u>Marine Vegetation and Benthic Community</u> Pier construction would displace 1,367 square feet (sq ft) of seafloor habitat and cause turbidity that would affect vegetation and invertebrates on a temporary and localized basis.</p> <p><u>Fish</u> Construction of the pier would increase localized turbidity, and physically disturb 1,367 sq ft of forage, refuge, and migration habitats used by fish, but not physically affect documented forage fish spawning habitats. Pile driving would occur over approximately 150 days during two seasons, would produce noise above the fish recoverable injury threshold out to a distance of 14 meters and temporary threshold shift (TSS) threshold out to a distance of 186 meters. Construction would occur during the in-water work window at a time when ESA-listed fish are least abundant.</p> <p><u>Marine Mammals</u> Pile driving would temporarily produce noise above marine mammal behavioral and auditory injury thresholds (with injury to a small number of harbor seals only). Pile driving would occur over approximately 150 days during two seasons and would produce noise above marine mammal injury thresholds to a distance up to 351 meters, depending on species and pile size. Noise above marine mammal behavioral disturbance thresholds would extend up to 11.7 km, depending on pile size.</p>	<p><u>Marine Vegetation and Benthic Community</u> Pier construction would displace 787 sq ft of seafloor habitat and cause turbidity that would affect vegetation and invertebrates on a temporary and localized basis.</p> <p><u>Fish</u> Physical impacts to habitats used by fish would be less than Alternative 1 (787 sq ft compared to 1,367 sq ft). Pile driving noise exceeding fish injury and TTS thresholds would occur up to 90 days compared to 150 days under Alternative 1. Injury and TTS thresholds due to impact pile driving would be the same as Alternative 1.</p> <p><u>Marine Mammals</u> Pile-driving noise exceeding injury and behavioral thresholds would occur up to 90 days compared to 150 days under Alternative 1. Exceedance of injury and behavioral thresholds due to impact and vibratory pile driving would be the same as Alternative 1.</p>

**Table 3.9-1. Summary of Impacts of Alternatives (continued)**

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Extended Pier and Vessel Maintenance Facility</i>	<i>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</i>
		<p><u>Marine Birds</u> Pile driving would temporarily produce noise above marbled murrelet behavioral thresholds within 42 meters of pile driving and above the injury threshold up to 16 meters over up to 150 days during two seasons. Prey availability would be temporarily affected in a very localized area centered on driven piles.</p> <p><u>Terrestrial Resources</u> 1.1 acres of native and non-native vegetation at the pier site and fuel tank(s) site would be permanently disturbed by upland construction and 0.07 acre would be disturbed and revegetated following construction. 5.2 acres of native vegetation would be permanently removed at the VMF/laydown site. Terrestrial wildlife species would be temporarily exposed to disturbance due to elevated construction noise and human activity levels.</p>	<p><u>Marine Birds</u> Pile-driving noise would exceed marbled murrelet injury and behavioral thresholds at the same distances as for Alternative 1. However, Alternative 2 would require half the number of pile-driving days (90 days) and fewer total piles.</p> <p><u>Terrestrial Resources</u> Similar to Alternative 1 except with respect to disturbance from pile-driving noise from pier construction, which would last up to 90 days compared to 150 days.</p>
Operation Impacts	Under the No Action Alternative, the TPP project would not be implemented and there would be no operations-generated impacts to biological resources.	<p><u>Marine Vegetation and Benthic Community</u> The new pier and trestle would shade 8,080 sq ft of shallow habitat with impacts to vegetation and invertebrates.</p> <p><u>Fish</u> Impacts to aquatic vegetation and benthic communities would decrease habitat for fish foraging, refuge and migration in the footprint of the pier trestle. The addition of in-water piles, overwater shade, and nighttime lighting across the juvenile migratory pathway may result in short-term delays in nearshore migration. No impacts to forage fish spawning habitats are expected. Underwater noise would be similar to existing</p>	<p><u>Aquatic Resources (Marine Vegetation, Benthic Community, Fish, Marine Mammals, Marine Birds)</u> Impacts to aquatic resources would be similar to those of Alternative 1 except that impacts in the nearshore including overwater shading and the number of in-water piles would be greater under Alternative 2 (24,752 sq ft compared to 8,080 sq ft).</p> <p><u>Terrestrial Resources</u> Impacts to terrestrial resources would be the same as for Alternative 1.</p>



**Table 3.9-1. Summary of Impacts of Alternatives (continued)**

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Extended Pier and Vessel Maintenance Facility</i>	<i>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</i>
		<p>conditions, and would not affect fish behavior, including migration.</p> <p><u>Marine Mammals and Birds</u> Underwater and airborne noise would be similar to existing conditions, and would not affect marine mammals or birds.</p> <p><u>Terrestrial Resources</u> A net loss of native and non-native vegetation would reduce available habitat for terrestrial wildlife species.</p>	
<b>Noise</b>			
Construction Impacts	Under the No Action Alternative, the TPP pier would not be constructed and there would be no construction-generated noise impacts.	The main source of construction noise would be pile driving (150 days). Under the worst-case scenario, which involves driving of 36-inch steel piles, on- and off-base residential and school areas would not experience noise above background levels of 60 A-weighted decibels (dBA). Boaters on Hood Canal would experience levels above 60 dBA. Noise impacts from vibratory pile driving and other construction sources would be significantly less.	Impacts would be similar to Alternative 1, except pile driving would occur up to 90 days compared to 150 days for Alternative 1.
Operation Impacts	Under the No Action Alternative, TPP vessel berthing would not change from existing conditions and there would be no resulting noise impacts.	There would be no increase in overall noise levels at the NAVBASE Kitsap Bangor waterfront. Noise associated with TPP vessel berthing would shift locations within the waterfront. There would be no off-base noise impacts.	Same as Alternative 1

**Table 3.9-1. Summary of Impacts of Alternatives (continued)**

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Extended Pier and Vessel Maintenance Facility</i>	<i>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</i>
<b>Cultural Resources</b>			
Construction Impacts	Under the No Action Alternative, there would be no ground disturbance associated with construction. Therefore, there would be no chance of locating previously unrecorded or unknown historic properties and no effect to historic properties.	There would be no historic properties affected by construction. Project elements are located in an area characterized as “Very High Risk” of encountering archaeological materials. In the case of “inadvertent discovery” of potentially significant archaeological resources in the course of construction, the Navy would stop work in the immediate area and follow the Section 106 process for inadvertent discovery, to evaluate the effects to such resources through consultation with the SHPO, affected American Indian tribes, and other interested parties.	Same as Alternative 1
Operation Impacts	Under the No Action Alternative, the TPP would not operate, and there would be no change in the audible or visual environment for historic properties, and no effect to historic properties.	Operation of Alternative 1 would have no effect on historic properties. No other cultural resources would be affected by operation of the pier.	Same as Alternative 1
<b>American Indian Traditional Resources</b>			
Construction Impacts	Under the No Action Alternative, there would be no change in access to traditional resources, nor would there be any change in conditions that could affect shellfish, fisheries or other traditional resources.	Construction would not result in loss of or access to tribal traditional resources. There would be no discharge to shellfish beds utilized for tribal-harvesting or effect on tribal access to treaty protected resources near the project site; there would be minimal loss of benthic invertebrates and their habitat as well as forest vegetation within the construction footprint.	Same as Alternative 1

**Table 3.9-1. Summary of Impacts of Alternatives (continued)**

<b>Resource Area</b>	<b>No Action Alternative</b>	<b>Alternative 1: Extended Pier and Vessel Maintenance Facility</b>	<b>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</b>
Operation Impacts	Under the No Action Alternative, there would be no change in access to traditional resources, nor would there be any change in conditions that could affect shellfish, fisheries or other traditional resources.	Operation of the Alternative 1 is not expected to result in loss of or access to tribal traditional resources. Operation of the proposed pier would not affect the clams or oysters, or interfere with sediment transport/supply processes that could affect shellfish habitat. Tribes and the Navy continue to consult on a government-to-government basis to ensure co-use of navigable waters to continue to meet both Tribal and Navy needs. Implementation of an element of the Skokomish River Basin Mason County, Washington Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (USACE, 2015).	Same as Alternative 1, however, due to the proximity of the sanitary sewer connection to Devil’s Hole Beach, there may be a requirement to restrict shellfish harvest. Navy will follow all administrative requirements, including the potential to restrict shellfish harvest near the sanitary sewage connection. The Navy will continue to work with the Tribes to address this issue.
<b>Socioeconomics</b>			
Construction Impacts	Under the No Action Alternative, the TPP pier would not be constructed and there would be no construction related benefits to the area economy.	Construction is expected to generate up to 501 construction jobs and an additional 195 indirect and induced jobs from the estimated \$70.6 million in construction expenditures. While some construction positions may be filled by people outside the local area, the majority would likely be filled from the local workforce and would not be associated with a permanent increase in population. Construction activities associated with this alternative would provide direct, indirect, and induced benefits from the use of local labor and supplies for the duration of the activities.	Under this alternative, construction activities are expected to generate up to 373 construction jobs and an additional 145 indirect and induced jobs from the estimated \$52.6 million in construction expenditures. Similar to Alternative 1, some construction positions may be filled by people outside the local area; however, the majority would likely be filled from the local workforce and would not be associated with a permanent increase in population. Construction activities associated with this alternative would provide direct, indirect, and induced benefits from the use of local labor and supplies for the duration of the activities.
Operation Impacts	Under the No Action Alternative, the TPP pier and support facilities would not be constructed and there would be no change	During operations, there would be no personnel changes anticipated. Therefore, no impacts to population, housing and schools would result from project operations. Any annual operation and maintenance costs associated with the pier and	Same as Alternative 1

**Table 3.9-1. Summary of Impacts of Alternatives (continued)**

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Extended Pier and Vessel Maintenance Facility</i>	<i>Alternative 2 (Preferred): Shortened Pier and Vessel Maintenance Facility</i>
	to the socioeconomics of the local area or region.	supporting facilities would contribute directly and indirectly to the economy.	
<b>Traffic and Transportation</b>			
Construction Impacts	Under the No Action Alternative, the TPP pier would not be built and there would be no construction-generated traffic.	Construction traffic would not create congestion on base roadways. Peak-hour congestion at base gates would increase but public roadways would not be affected. Construction vessels would increase openings of the Hood Canal Bridge by an average of 12 openings per month during the in-water work seasons (July 22 to January 15) and 4 openings per month outside of this period.	Same as Alternative 1
Operation Impacts	Under the No Action Alternative, TPP vessel berthing would not change from existing conditions and there would be no resulting changes in traffic, onshore or marine.	Onshore and marine traffic related to TPP vessel berthing would shift locations within the NAVBASE Kitsap Bangor waterfront; no congestion would result. Traffic elsewhere on the base and on public roadways would not be affected. Hood Canal Bridge openings would not change.	Same as Alternative 1
<b>Visual Resources</b>			
Construction Impacts	Under the No Action Alternative, the TPP pier would not be constructed and there would be no visual impacts.	Construction activities would be compatible with the existing industrial pier and wharves at the waterfront. Construction activities for the VMF would not be visible from Hood Canal or land areas outside of NAVBASE Kitsap Bangor. The visual impacts would be minimal.	Same as Alternative 1
Operation Impacts	No impacts	This alternative would add a new pier to the NAVBASE Kitsap Waterfront, which would be visually compatible with the existing industrial piers and wharves at the waterfront. The visual impacts would be minimal.	Same as Alternative 1

**Key:** BMP = best management practice; dBA = A-weighted decibels; ESA = Endangered Species Act; km = kilometers; NAVBASE = Naval Base; sq ft = square feet; SWPPP = Stormwater Pollution Prevention Plan; TPP = Transit Protection Program; VMF = Vessel Maintenance Facility

**Table 3.9-2. Mitigation Measures**

<i>Measure</i>	<i>Anticipated Benefit / Evaluating Effectiveness</i>	<i>Implementing and Monitoring</i>	<i>Responsibility</i>	<i>Estimated Completion Date</i>
Construction in the upper intertidal zone will be conducted at low tide (“in the dry”).	Construction in the dry will minimize impacts to marine water quality and underwater noise.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.
Pile driving of steel piles using vibratory rather than impact methods whenever feasible.	Use of vibratory driver will reduce noise levels by approximately 20 decibels root mean square at (dB RMS) 33 feet (10 meters) from the source when compared to impact pile driving. Impacts to marine biota will be correspondingly reduced.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.
Bubble curtains used around steel piles being driven by impact methods.	Bubble curtains attenuate in-water sound pressure of the pile-driving activity by an average of 8 dB RMS, reducing noise impacts to marine biota.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.
Soft-start approach used during impact pile driving. This soft-start approach requires contractors to operate impact hammers at reduced energy, followed by a waiting period.	The soft-start approach will be used to induce marine mammals to leave the immediate area, thus reducing the potential for impacts.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.
The Navy will use a vibratory driver model appropriate for the geologic conditions at the project location, and perform soft starts if the hammer is equipped to conduct them safely.	The soft-start approach is used to induce marine mammals to leave the immediate area. Due to mechanical limitations, soft starts for vibratory driving will be conducted only with drivers equipped with variable moment features. Typically, this feature is not available on larger, high power drivers.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.

**Table 3.9-2. Mitigation Measures (continued)**

<i>Measure</i>	<i>Anticipated Benefit / Evaluating Effectiveness</i>	<i>Implementing and Monitoring</i>	<i>Responsibility</i>	<i>Estimated Completion Date</i>
Construction activities will not be conducted between the hours of 10:00 p.m. and 7:00 a.m. Between July 22 and September 23, impact pile driving will only occur between 2 hours after sunrise and 2 hours before sunset. Between September 24 and January 15, in-water construction activities will occur during daylight hours (sunrise to sunset).	This timing measure will protect bald eagles and foraging marbled murrelets during the breeding season.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.
Monitoring of shutdown and buffer zones around in-water pile-driving locations. Pile driving will be stopped whenever a protected animal enters the shutdown zone. Detailed marine mammal and marbled murrelet monitoring plans will be developed and implemented in consultation with NMFS and USFWS.	Monitoring will be conducted to avoid noise impacts to marine mammals protected by ESA and Marine Mammal Protection Act and marine birds protected by ESA. Documentation will be submitted by the Navy to NMFS and USFWS.	Contract terms and conditions	The Navy will be responsible for ensuring trained monitors conduct real-time monitoring for sensitive species and for monitoring and enforcing this measure. The contractor will be responsible for suspending pile-driving operations until notified by the trained monitors that the zones are clear of sensitive species.	Estimated construction completion date is 2025.
Vegetation clearing will not occur during the breeding season (April – July) for most migratory bird species.	This measure will avoid impacts to breeding migratory birds.	Contract terms and conditions	Navy oversight of contractor	Estimated construction completion date is 2025.

**Table 3.9-2. Mitigation Measures (continued)**

<i>Measure</i>	<i>Anticipated Benefit / Evaluating Effectiveness</i>	<i>Implementing and Monitoring</i>	<i>Responsibility</i>	<i>Estimated Completion Date</i>
A Revegetation Plan will be developed and implemented.	Native vegetation will be restored to the areas temporarily cleared during installation of the diesel tank(s) and construction of new roads.	Contract terms and conditions	Navy oversight of contractor	A monitoring and maintenance program will be implemented until the native plants are sufficiently established to minimize invasion by noxious weeds.
The Navy will purchase credits from the Hood Canal Coordinating Council (HCCC) In-Lieu Fee (ILF) Program	HCCC ILF Program would implement appropriate mitigation actions in Hood Canal to mitigate for the Proposed Action's impacts to aquatic resources.	HCCC ILF Program will implement mitigation actions. USACE and WDOE will monitor ILF Program performance.	Navy will purchase credits; HCCC ILF Program will implement mitigation actions.	Credits will be purchased prior to in-water habitat impacts.
Treaty mitigation will be determined through ongoing government-to-government consultations.	TBD	Treaty mitigation will be performed in accordance with an MOA executed by the Navy and affected tribes	Navy and Tribes	TBD

**Key:** db RMS = decibels root mean square; ESA = Endangered Species Act; HCCC = Hood Canal Coordinating Council; ILF = In Lieu Fee; MOA = Memorandum of Agreement; NMFS = National Marine Fisheries Service; TBD = to be determined; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service; WDOE = Washington Department of Ecology

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## 4 Cumulative Impacts

This section (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 the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations 1500-1508), and CEQ guidance. The CEQ regulations define a cumulative impact as “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” (40 Code of Federal Regulations section 1508.7).

CEQ and U.S. Environmental Protection Agency (USEPA) have published guidance for conducting and reviewing cumulative impact assessments, including *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ, 1997), *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (USEPA, 1999), and *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ, 2005).

CEQ (1997) provides a process for conducting cumulative impact assessments that can be applied to any proposed action. A basic concept of this process is that the direct and indirect impacts of a proposed action, added to the direct and indirect impacts of other past, present, and reasonably foreseeable future actions, result in a cumulative impact. Therefore, if a proposed action would not cause a direct or indirect impact on a resource, it cannot contribute to a cumulative impact on that resource. A second principle is that cumulative impacts are assessed on a “specific resource, ecosystem, or human community” (CEQ, 1997). In other words, cumulative impact assessment is conducted on a resource-by-resource basis just as with direct and indirect impact assessments.

Cumulative impact assessment focuses on the condition or status of a resource and its vulnerabilities to environmental stressors. The process (1) characterizes the present, or baseline, condition of the resource as described in the Affected Environment section; (2) briefly examines past actions and trends that have shaped the resource over time and led to its present condition (CEQ, 2005); and (3) identifies present (ongoing) actions influencing the resource today and reasonably foreseeable future actions likely to affect the resource in the future. The process then adds the predicted direct and indirect impacts of the proposed action as described in the Environmental Consequences section, and assesses the likely future condition of the resource in response to all of these impacts together and its projected trend toward improvement or decline. Some of the impacts may be additive, others may interact in synergistic ways, and some impacts may offset the effects of others.

The process allows an assessment of the degree to which the direct and indirect impacts of the proposed action will incrementally contribute to the cumulative impact. This is usually a qualitative judgment based on reasoning and evidence, but if feasible, the contribution of the proposed action can be expressed as a measured or estimated percentage. Because cumulative impact assessment is

conducted on a resource-by-resource basis, the same significance criteria applied to direct and indirect impacts on the resource apply to the cumulative impact on that resource.

## 4.2 Scope of Cumulative Impacts Analysis

The scope of the cumulative impact assessment involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. The geographic boundaries are likely to extend beyond the study area boundaries defined for direct and indirect impacts and may also vary from one resource to another. The guiding principle is that the boundaries should be based on the resource. CEQ (1997) guidance states that “The boundaries for evaluating cumulative effects should be expanded to the point at which the resource is no longer affected or the effects are no longer of interest to affected parties.”

The time frame for the cumulative impact assessment is usually applied consistently to all of the resources and typically starts at a point in the past at which the original landscape begins to be altered by modern human settlement (USEPA, 1999). It can also start at a more recent point in time selected for a specific stated reason, for example, the end of World War II and the start of accelerated economic development and population growth in the United States. The future boundary of the time frame can be the design life of the proposed action, but the CEQ (1997) guidance points out that “Cumulative effects may last for many years beyond the life of the action that caused the effects,” and this consideration must be taken into account. Examples are acid mine drainage, radioactive waste contamination, long-term changes in a biological population, and potential species extinctions.

The Hood Canal region has been occupied by Native American inhabitants since prehistoric times (Section 3.4.2). For the Proposed Action addressed in this Environmental Assessment (EA), the time frame for the cumulative impact assessment starts in the mid-1850s with the start of settlement by non-indigenous people and the resulting gradual transformation of the Hood Canal region to its present condition. Another key date is 1944, when the U.S. Government acquired the property now supporting Naval Base (NAVBASE) Kitsap Bangor, with the resulting development of the installation to the present time. These time frames are taken into account as appropriate in the resource-specific cumulative impact analyses included in this chapter. For purposes of impact analysis, actions older than 5 years are combined (Table 4-1).

## 4.3 Other Past, Present, and Reasonably Foreseeable Future Actions

CEQ (1997) and USEPA guidance (1999) emphasizes the need to identify other past, present, and reasonably foreseeable future actions that contribute to cumulative effects on resources of concern, and for cumulative impact analyses to include the use of trends to indicate how other actions have influenced the condition of the resource from the past to the present and may continue to influence the resource in the future. Past actions are relevant to the analysis of cumulative effects if their residual impacts persist in the present and appear likely to continue to affect the resource in the future. CEQ guidance (2005) emphasizes that past actions should be included in the analysis only if they meet this criterion, that they can be concisely summarized, and that the CEQ regulations “do not require agencies to catalogue or exhaustively list and analyze all individual past actions.”

As other past, present, and reasonably foreseeable future actions relevant to a particular resource are identified, it is necessary to explain how their impacts would add to and interact with the direct and

**Table 4-1. Other Past, Present, and Reasonably Foreseeable Future Actions in Hood Canal**

<i>Project</i>	<i>Project Description</i>	<i>Project Timeframe</i>		
		<i>Past</i>	<i>Present</i>	<i>Future</i>
<b>Belfair Sewer Line</b>	Mason County constructed a sewer line in the Belfair area (extreme south end of Hood Canal, approximately 25 miles south of NAVBASE Kitsap Bangor, and not shown in Figure 4-1) to replace aging and failing septic systems with a sanitary sewer system. The project was developed as part of the Mason County Facilities Plan approved in 2002. The sewer line was not located directly adjacent to Hood Canal, so construction would have had little potential for marine impacts. The wastewater treatment and reclamation plant began operating in July 2012. One purpose of the project is to reduce the impact of failing septic systems to water quality in Hood Canal. The Belfair Sewer Line would help to decrease water quality impacts on Hood Canal by eliminating inadequate septic systems.	X	X	
<b>NAVBASE Kitsap Bangor Waterfront Operations</b>	Waterfront operations include the overall integration of all port operations along the NAVBASE Kitsap Bangor waterfront. Activities include vessel traffic movement and management, personnel clearance and tracking, and ingress/egress within the restricted areas.	X	X	X
<b>NAVBASE Kitsap Bangor Waterfront Facilities Maintenance</b>	Common maintenance activities include pressure washing of waterfront piers to remove bird fecal material, marine fouling organisms (e.g., mussels, algae) and foreign materials (e.g., dirt). Maintenance area includes walkways and approaches to the piers. Other maintenance activities may involve repair and replacement of structures or facilities as needed. Recently completed maintenance actions included pile driving for K/B Dock repair (five piles replaced in 2015).	X	X	X
<b>Mission Support Facilities</b>	Mission support facilities may include activities or projects such as the addition of power booms, captivated camels, and piles for support or attachment; installation of emergency power generation capability; and other activities to support facilities or operations.	X	X	X
<b>Olympic View Marina</b>	Olympic View Marina, LLC, replaced the abandoned Seabeck Marina on Seabeck Bay approximately 7 miles south of NAVBASE Kitsap Bangor on the east side of Hood Canal. The original construction plan included installation of 72,510 square feet of piers, floats, and gangways for the moorage of approximately 200 boats and a 600-foot breakwater but the replacement was smaller than originally designed. This project would have resulted in short-term water quality and noise impacts during construction, created long-term shading under the new overwater structures, and resulted in loss of marine habitats from installation of the breakwater and pier piles. Upland vegetation was cleared for the on-land structures. In January 2010, workers began installing piles for the docks. Removal of concrete debris from the beach was completed in October 2010. The breakwater was installed in 2014. There is moorage for approximately 40 boats. Additional moorage slips may be added as demand increases.	X	X	X

**Table 4-1. Other Past, Present, and Reasonably Foreseeable Future Actions in Hood Canal**

<i>Project</i>	<i>Project Description</i>	<i>Project Timeframe</i>		
		<i>Past</i>	<i>Present</i>	<i>Future</i>
<b>Pleasant Harbor Marina and Golf Resort</b>	The Statesman Group of Companies proposed a new master-planned development at Pleasant Harbor south of Brinnon. The project locale is on the west side of Hood Canal approximately 9 miles southwest of NAVBASE Kitsap Bangor. The development includes refurbishment of an existing 300-slip marina, resort housing, a hotel, a restaurant, a spa, a clubhouse, a 9-hole golf course and 3-hole practice course, and other resort-type facilities. Replacement of the marina docks was completed in early 2013. A restaurant, office space, and infrastructure improvements including roads have been constructed. Project construction would likely result in short-term water quality and noise impacts and some loss of nearshore marine benthic habitat in the immediate project vicinity. The golf course and upland facilities would require considerable clearing of upland vegetation (estimated at 128 acres), with a potential for erosion and water quality impacts. Impervious surfaces are predicted to be approximately 12 percent of the total area, or approximately 28 acres. A Supplemental EIS was published in December 2015 (the original EIS was published in November 2007 and a Draft Supplemental EIS was published in November 2014).	X	X	X
<b>TRIDENT EHW-2</b>	This project includes a new EHW, upland road, an abutment where the trestles connect to the shore, and an upland construction staging area. Four new buildings constructed to house the functions of some of the buildings to be demolished or vacated. Approximately 6 acres of overwater area created. The primary impacts during project construction include pile-driving noise and its effects on marine biota, turbidity, and air pollutant emissions. Upland construction would result in permanent and temporary vegetation disturbance, loss of 0.20 acre of wetland, and wildlife harassment (primarily from construction noise). Long-term impacts will include loss and shading of marine habitat, including eelgrass, macroalgae, and the benthic community, and interference with migration of juvenile salmon, some species of which are protected by ESA. Construction over 4 years, with in-water work subject to timing restrictions. During construction, measures and BMPs implemented to avoid or minimize potential impacts on species, marine and upland habitats, cultural resources, land use, recreation, and traffic. A Final EIS was completed and a Record of Decision was signed in 2012. Construction was completed in 2016.	X		

**Table 4-1. Other Past, Present, and Reasonably Foreseeable Future Actions in Hood Canal**

<i>Project</i>	<i>Project Description</i>	<i>Project Timeframe</i>		
		<i>Past</i>	<i>Present</i>	<i>Future</i>
<b>EHW-2 Mitigation</b>	To compensate for unavoidable impacts on aquatic resources and ensure no net loss of these resources, the Navy purchased credits from the Hood Canal in-Lieu Fee Program. To restore temporarily disturbed construction areas, the Navy will implement a revegetation plan for construction laydown areas and temporarily disturbed areas. To improve scientific understanding of marine species, the Navy will fund research studies on: (1) ocean acidification and (2) Hood Canal chum salmon. To improve salmon production and harvest opportunities in Hood Canal, the Navy will fund improvements at three existing fish hatcheries on Hood Canal and replacement of one finfish spawning facility on Hood Canal. To improve shellfish production and harvest opportunities, the Navy will fund: (1) improvements to beach substrate and 3 years of shellfish seeding on 24 acres of beach; (2) 5 years of shellfish seeding on priority shellfish enhancement areas in Hood Canal and adjacent Admiralty Inlet; (3) construction of a shellfish wet lab, education, and training building at Port Gamble; (4) construction of a floating shellfish nursery; and (5) geoduck surveys and a geoduck pilot research study.	X	X	X
<b>Electromagnetic Measurement Ranging System</b>	The proposed Electromagnetic Measurement Ranging System (EMMR) project includes installation of sensor equipment, including an underwater instrument array, data/power cables, a pile-supported platform, an upland navigation aid, and an upland monitoring system on NAVBASE Kitsap Bangor. Resources potentially affected by the project include marine species and shellfish beds. The Draft EA was published in June 2020. The Navy continues to work on environmental approvals for EMMR. Construction would begin once all approvals are obtained.			X
<b>Electromagnetic Measurement Ranging System Treaty Mitigation</b>	Skokomish River Restoration and additional mitigation for the S’Klallam Tribes not yet agreed upon.			X

**Table 4-1. Other Past, Present, and Reasonably Foreseeable Future Actions in Hood Canal**

<i>Project</i>	<i>Project Description</i>	<i>Project Timeframe</i>		
		<i>Past</i>	<i>Present</i>	<i>Future</i>
<b>Northwest Testing and Training (NWTT)</b>	The Navy's Proposed Action is to conduct training and testing activities primarily within existing range complexes, operating areas, testing ranges, and select Navy pier side locations in the Pacific Northwest. The Proposed Action includes pier side sonar testing conducted as part of overhaul, modernization, maintenance, and repair activities at NAVBASE Kitsap Bangor. The EIS includes ranges covered by the Northwest Training Range Complex (NWTRC) and Naval Undersea Warfare Center (NUWC) Keyport; adds the other Research, Development, Test and Evaluation (RDT&E) conducted in the Pacific Northwest and pier side maintenance at Puget Sound Naval Shipyard, NAVSTA Everett, and NAVBASE Kitsap Bangor waterfront. The project includes pier side sonar testing conducted as part of overhaul, modernization, maintenance, and repair activities at Puget Sound Naval Shipyard in Bremerton, Naval Base Kitsap at Bangor, and Naval Station Everett. The Navy proposes to adjust training and testing activities from current levels to the level needed to support Navy requirements beginning October 2015 through 2020. A Final EIS was completed and a Record of Decision signed in 2016. A Draft Supplemental EIS-Overseas EIS was completed in March 2019. The Supplemental evaluates the potential environmental impacts of conducting training and testing activities after November 2020. The ROD was signed September 22, 2021.	X	X	X
<b>Hood Canal Restrictive Easements</b>	The Navy and Washington State Department of Natural Resources signed a restrictive easement on July 7, 2014 that precludes construction in the easement area along the western shore of Hood Canal covering 4,804 acres of aquatic land, extending from the Hood Canal Bridge to just south of the Hamma Hamma River Delta, from 18 feet below MLLW down to 70 feet below MLLW. On August 22, 2018, the Navy and Washington State Department of Natural Resources signed a restrictive easement along 32 miles of Hood Canal's eastern shore. The easement covers 2,481 acres of aquatic bedlands. The easement extends from the Hood Canal Bridge to south of Chinom Point, from 18 feet below MLLW to 70 feet below MLLW.	X	X	X
<b>Marine Structure Maintenance and Pile Replacement Program</b>	Programmatic EA to cover marine structure maintenance and pile replacement projects at six Navy Region Northwest installations for 2019–2024. Resources potentially affected by the project include marine water and sediments, benthic communities, marine fish, marine mammals, and marine birds. The EA was completed in 2019. Projects implemented to date at NAVBASE Kitsap Bangor include a pile replacement at Service Pier and two phases at EHW-1. Another phase will be conducted at EHW-1 starting in summer 2023. The Navy is in preliminary planning for Phase 2 of the Marine Structure Maintenance and Pile Replacement Program, which will cover 2025–2029.	X	X	X

**Table 4-1. Other Past, Present, and Reasonably Foreseeable Future Actions in Hood Canal**

<i>Project</i>	<i>Project Description</i>	<i>Project Timeframe</i>		
		<i>Past</i>	<i>Present</i>	<i>Future</i>
<b>Service Pier Electrical Upgrade</b>	This project corrected existing power and communications deficiencies, expand power and communications distribution from Substations #4 and #5 to the existing Service Pier, and installed a multi-phased emergency industrial power generator to support multiple Command Tenants on NAVBASE Kitsap Bangor. Site preparation included removal of overhead power lines and communication lines, site clearing and grubbing, installation of erosion controls, grading, excavation, and preparation for construction. A Final EA was completed and a Finding of No Significant Impact signed in 2017. Construction was completed in April 2019.	X		
<b>Land-Water Interface</b>	This project entailed constructing two Land-Water Interface barriers, which connect both ends of the onshore Restricted Area enclave to the existing floating barriers. The Land-Water Interface barriers extend from the high water mark to the terminations of the Port Security Barriers. Resources potentially affected by the project included marine water and sediments, benthic communities, marine fish, marine mammals, and marine birds. A Final EIS was completed and a Record of Decision signed in 2016. Construction was completed in March 2020.	X		
<b>Land-Water Interface Treaty Mitigation</b>	Skokomish River restoration; shellfish seeding within the Usual and Accustomed fishing grounds and stations of the S’Klallam/Klallam Tribes; financial contribution toward the Kilisut Harbor restoration project and a Management Plan for the startup and initial operation of a floating shellfish nursery.	X	X	X
<b>Service Pier Extension</b>	Construction of an extension to the Service Pier at (33,000 sq ft), a new Pier Services and Compressor Building (2,100 sq ft) on the existing pier, upland Maintenance Support Facility (50,000 sq ft), and an approximately 420-car parking lot with associated outdoor storage (4,000 sq ft). Resources potentially affected by the project included marine water and sediments, benthic communities, marine fish, marine mammals, marine birds, and terrestrial habitat and species. The FEIS was published in July 2016, a Draft Supplemental EIS was published in August 2017, and a Final Supplemental EIS was published in November 2018. Construction began in March 2020 and was completed in October 2022.	X		
<b>Service Pier Extension Treaty Mitigation</b>	Skokomish River restoration; shellfish seeding within the Usual and Accustomed fishing grounds and stations of the S’Klallam/Klallam Tribes; and replacement of the culvert at Shipbuilder’s Creek on the Port Gamble S’Klallam Tribal reservation.			X
<b>Bangor Boat Ramp</b>	This project is to widen and lengthen the existing boat ramp at Carlson Spit to improve safety. The existing ramp will be widened by 4 feet and extended waterward 30 feet. The ramp will be widened using cast-in-place concrete and lengthened by the use of pre-cast concrete panels. BMPs will be implemented to minimize impacts to the habitat. Appropriate mitigation will be determined through the permitting process. Construction is currently planned for 2024.			X

**Table 4-1. Other Past, Present, and Reasonably Foreseeable Future Actions in Hood Canal**

<i>Project</i>	<i>Project Description</i>	<i>Project Timeframe</i>		
		<i>Past</i>	<i>Present</i>	<i>Future</i>
<b>Carderock Parking Extension</b>	The project installed a temporary facility and constructed additional parking for the Naval Surface Warfare Center, Carderock Division, Detachment Puget Sound located adjacent to building 7131. A temporary building and a construction laydown area was sited on an existing parking lot. The project is located in an upland area and did not involve in-water work; however, some trees were removed to accommodate the construction. Construction was completed in April 2020.	X		
<b>Regional Ship Maintenance Facility</b>	This project included the demolition of an existing building, 10 temporary trailers, and three shipping containers. The new building was constructed where a paved parking lot was located immediately south of Building B7201. No in-water work was associated with this project. All work was performed within areas that were previously disturbed. Construction was completed in July 2021.	X		
<b>Delta Pier Ship Maintenance Facility</b>	This Puget Sound Naval Shipyard & Intermediate Maintenance Facilities project constructs a 22,800 sq ft low rise, steel-framed, blast-hardened reinforced concrete waterfront support facility with deep foundations into the existing Delta Pier (B-7400) cofferdam within the Waterfront Restricted Area at NAVBASE Kitsap Bangor. This mission critical facility will consolidate several existing drydock functions into one structure, including but not limited to, kitting, storage, light industrial shop areas, personnel support, muster/classroom, and administrative office areas. Additionally, this project constructs an unoccupied General Purpose Storage facility adjacent to the Delta Pier north trestle on the upland waterfront within the Waterfront Restricted Area. No in-water work will be associated with this project. All work will be performed within areas that have been previously disturbed. Construction is estimated to be completed in 2023.		X	X

**Key:** BMP = best management practice; EA = Environmental Assessment; EHW = Explosives Handling Wharf; EIS = environmental impact statement; ESA = Endangered Species Act; K/B = Keyport/Bangor; NAVSTA = Naval Station; NEPA = National Environmental Policy Act; NUWC = Naval Undersea Warfare Center; NWTRC = Northwest Training Range Complex; NWTT = Northwest Testing and Training; ROD = Record of Decision; sq ft = square feet/foot; U.S. = United States



indirect effects of the Proposed Action to produce a future cumulative effect. Other relevant past, present, and reasonably foreseeable future actions are identified and described in Table 4-1. Past actions within the last 5 years are listed individually in the table. Older actions are considered in the aggregate in the analysis. Regional Navy and non-Navy actions are shown in Figure 4-1. Navy actions at NAVBASE Kitsap Bangor are shown in Figure 4-2.

At the time of the Navy's 1944 purchase of the 7,676-acre tract on which NAVBASE Kitsap Bangor is located, the land had been commercially clear cut and homesteaded. During the establishment and expansion of the base with multiple missions during the intervening 73 years, about 48 percent of the land area has regenerated through natural plant succession to second-growth western hemlock climax forest, with the average of forest trees in the 70–80 year range (T. Jones, U.S. Navy Forester, 10 February 2017). At the same time, approximately 1,100 acres of forested or previously forested areas have been cleared for construction of various facilities. Since the 1960s, approximately 1,000 acres have been replanted with native species. Since the base was established, seven piers and wharves have been constructed along the NAVBASE Kitsap Bangor waterfront. These structures have created a total of approximately 25 acres of overwater area within the 1,088-acre Naval Restricted Area.

#### **4.4 Cumulative Impact Analysis**

Where feasible, the cumulative impacts were assessed using quantifiable data; however, for many of the resources included for analysis, quantifiable data are not available and a qualitative analysis was undertaken. In addition, where an analysis of potential environmental effects for future actions has not been completed, assumptions were made based on known impacts of comparable actions on specific resources. The analytic methods presented in Chapter 3, which were used to determine potential direct and indirect impacts on the resources analyzed in this document, were also used to determine cumulative impacts.

##### **4.4.1 Water Quality and Sediments**

###### **4.4.1.1 Description of Geographic Study Area**

The geographic study area for cumulative impact to water quality and sediments comprises Hood Canal and its watershed. Based on the available information on management of water quality, planning, recovery efforts, and trend data, this area is large enough to capture projects contributing to water quality impacts and also has available water quality management plans and data. Watershed drainage represents an important source for freshwater and sediments, as well as human-derived pollutants associated with the watershed runoff that contributes to contaminant loading of Hood Canal. Hydrographic processes in Hood Canal mix, disperse, and redistribute the watershed loadings such that marine water conditions at different locations within the canal reflect the magnitude and relative contributions of inputs from multiple sources within the Region of Influence (ROI).

###### **4.4.1.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

All of the identified cumulative projects listed in Table 4-1, with the exception of the Northwest Training Range Complex (NWTRC) EIS, Pacific Ocean, have the potential to contribute an impact to water quality and/or sediments.

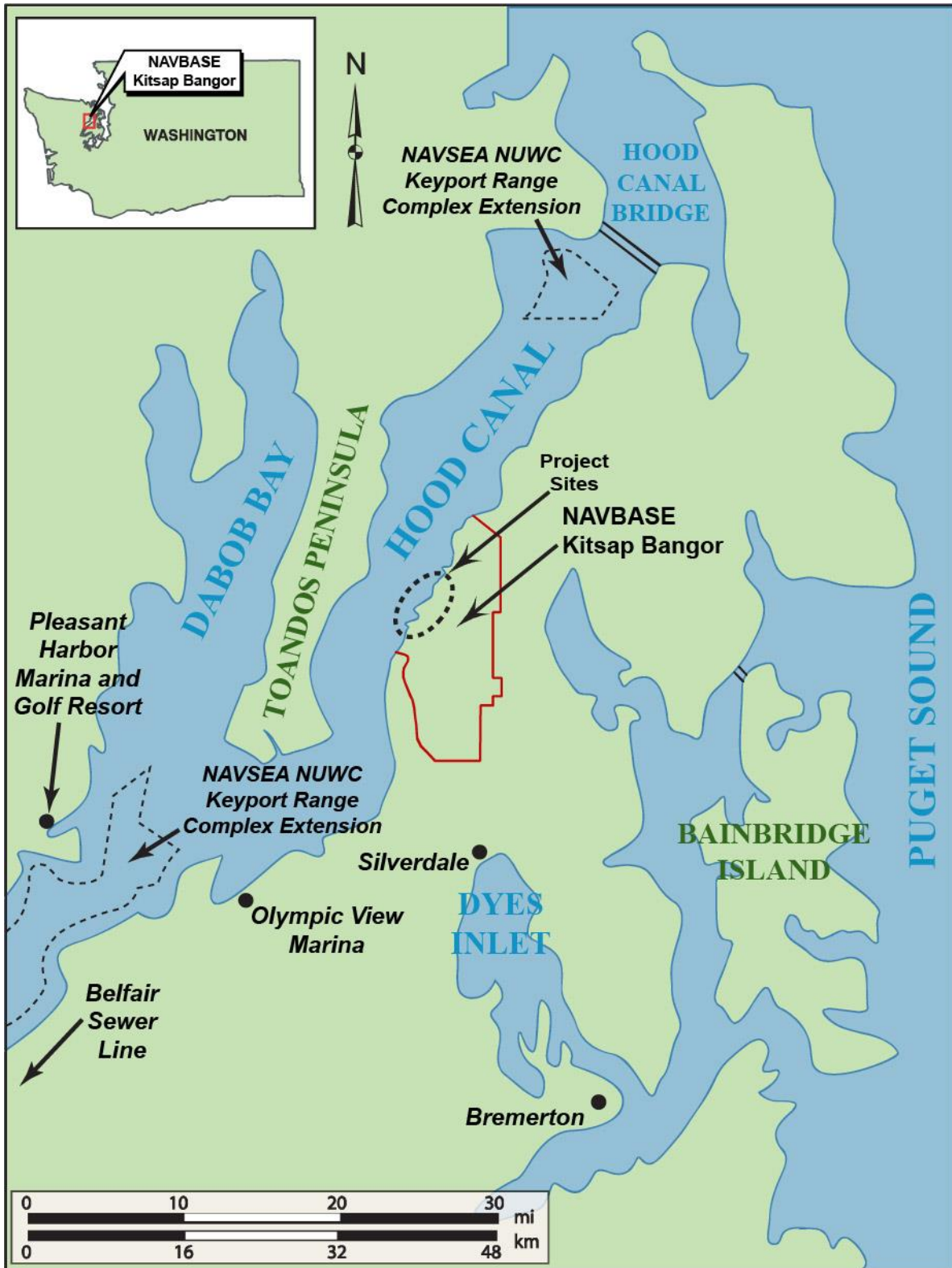


Figure 4-1. Locations of Future Non-Navy Actions and NAVSEA NUWC Keyport Range Complex Extension

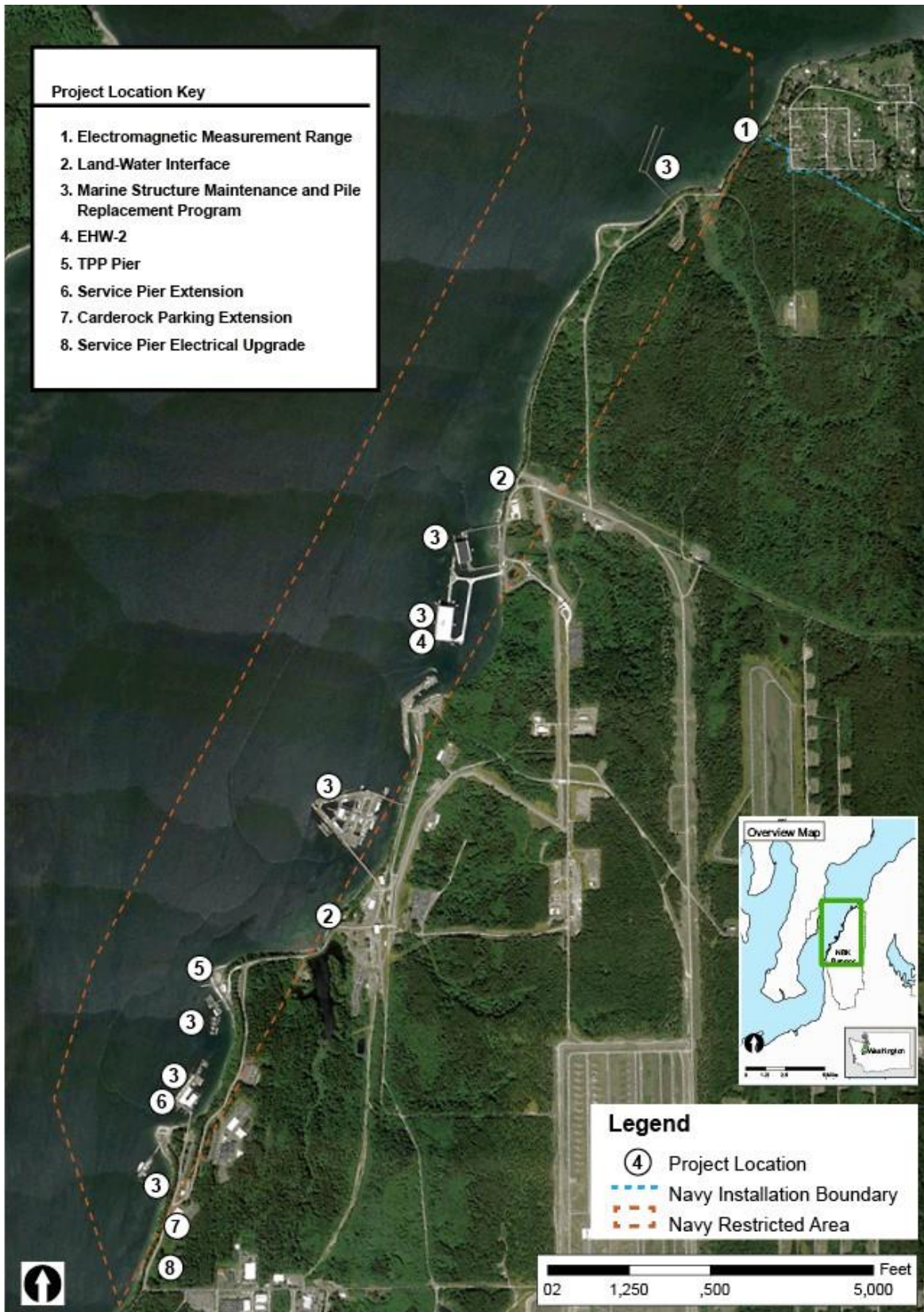


Figure 4-2. Locations of Past, Present, and Future Navy Actions

#### 4.4.1.3 Cumulative Impact Analysis

The potential direct and indirect impacts to water quality and sediments associated with the Proposed Action are described in Section 3.1.3.1. This section presents an assessment of the cumulative impacts to water quality and sediments of the Proposed Action when combined with past, present, and reasonably foreseeable actions. In addition to the past, present, and planned future projects listed in Table 4-1 other activities, such as shoreline development and improvement of environmental quality in Hood Canal, were considered in the cumulative impact analysis as described in the following sections. The purpose of this assessment is to identify and describe the context and intensity of impacts of the Proposed Action in combination with the impacts of other actions and trends.

##### Surface Water and Groundwater

Development in the region has created impervious surfaces, such as roads, buildings, and parking lots, and has impacted surface water and groundwater. Past, present, and future Navy actions and non-Navy actions have produced, are producing, or would produce impervious surfaces that impact surface water by increasing stormwater runoff and often concentrating runoff into peak discharges. The higher volumes of runoff entering surface water during storms can erode stream banks and channels, disturb fish habitat, and degrade water quality by increasing turbidity. Runoff from impervious surfaces can entrain and carry sediment and contaminants such as fuel or oil into receiving waters, where it adversely impacts water quality. Impervious surfaces also impact groundwater by limiting the rate of groundwater recharge, which is an important consideration for drinking water supplies that rely on groundwater.

Regionally, the amount of impervious surface has increased over time, and this trend is expected to continue. For example, between 1991 and 2001 there was an increase of 10.4 percent in the amount of impervious surface within the Puget Sound region, and by 2001 approximately 7.3 percent of the region below 1,000 feet of elevation was covered with impervious surfaces (Puget Sound Action Team [PSAT], 2007b). Between 2001 and 2006, developed lands increased by about 3 percent with nearly two-thirds of that increase being impervious surfaces (Puget Sound Partnership, 2010). According to the *State of the Sound Report*, there is a substantial decline in biological function when a watershed nears 10 percent impervious surface (PSAT, 2007b). While the trend is for the cumulative amount of impervious surface to increase, the rate at which this is occurring in Kitsap County is slower than in other counties in the Puget Sound region.

Past and future Navy and non-Navy actions have resulted or are resulting in creation of impervious surface. There is guidance (UFC 3-210-10N) for implementing Low Impact Development (LID) into the design and construction of Navy facilities to comply with stormwater requirements, as well as requirements for controlling runoff from impervious surfaces that include runoff detention and/or treatment measures. Projects in areas of aquifer recharge may also be required to implement measures to ensure that groundwater recharge is not adversely impacted. Thus, impervious surfaces created by future projects are less likely than past actions to adversely impact surface and groundwater.

The proposed Transit Protection Program (TPP) project would create 3.1 acres of impervious surface on the upland portion of the project site. Runoff from impervious paved surfaces subject to vehicular traffic would require basic treatment in accordance with Washington State Department of Ecology standards, as well as low impact measures. Use of pervious concrete pavement would be investigated during detailed design as an option to address stormwater runoff and meet LID goals. Where impervious pavement is used, runoff from the site would be surface drained or captured in catch basins with filter



cartridges and conveyed to a bio-retention cell for treatment and infiltration. Since stormwater runoff from uncovered areas would be controlled, the project would only contribute to additional treatment volumes but not to increased loadings of pollutants to the watershed. In terms of groundwater recharge loss, the impervious surface in upland areas would have a negligible impact on groundwater supply and quality because the proposed sites are in a groundwater discharge zone, which is not utilized as a water source. While the proposed project would add slightly to the total amount of impervious surface attributable to Navy and non-Navy actions, the cumulative impact on surface water would be negligible given additional measures to control and treat stormwater runoff. Therefore, no additional impacts on groundwater or surface water are expected from the TPP project.

### **Marine Water Quality**

Water quality in Hood Canal has been and is being impacted by past and present in-water and upland actions and would potentially be impacted by future actions. Specific impacts include: (1) stormwater and urban runoff; (2) nutrient and pollutant loadings from leaking or ineffective septic systems; (3) incidental spills associated with Navy and non-Navy boat or shoreside operations, such as fueling, or other activities conducted on piers, wharves, and floats; (4) sediment disturbance and turbidity from in-water construction activities; and (5) contaminant loadings attributable to the use over time of materials such as treated wood piles. These sources include inputs of pollutants to Hood Canal that are periodic (e.g., fuel, oil, and other contaminants) and continuous (e.g., leaching septic tanks and runoff), impacting water quality parameters such as turbidity, pH, dissolved oxygen (DO), nutrients, biochemical oxygen demand, and chemical contaminant and fecal bacteria levels.

Most development in the Hood Canal watershed (except NAVBASE Kitsap Bangor) uses septic systems, and many older systems have failed over time (Hood Canal Dissolved Oxygen Program [HCDOP], 2005). Fecal coliform bacteria sources include failing septic systems, inadequate livestock keeping practices, pet and wildlife waste, sewage spills, combined sewer overflows, and sewage discharges from boats (Kitsap Public Health District, 2016). Though fecal coliform bacteria are not directly harmful to humans, the presence of fecal coliform indicates the possible presence of pathogenic viruses or bacteria. Fecal coliform bacteria can also be absorbed and concentrated in shellfish making them unsuitable for human consumption.

Nutrients can be a larger problem because they can cause damaging algal blooms. When algal blooms occur, they cause DO to be rapidly used up during bacterial decomposition of decaying organic matter. A rapid loss of DO can result in fish kills. Marine water upwelling delivers most of the nitrogen to the surface waters in Hood Canal (Cope & Roberts, 2013). Animal wastes from hobby farms or sites where animals are bred are also a source of nutrients (HCDOP, 2005). Shoreline on-site sewage systems represent the dominant human source of nitrogen, although a recent joint assessment by USEPA and Washington State Department of Ecology determined that human nitrogen loadings are not contributing substantially to low DO levels in Hood Canal (Cope & Roberts, 2013). Efforts have been made to eliminate the use of septic systems or to repair failing systems to the extent possible, particularly in nearshore areas, and to control point sources such as hobby farms. However, in the Hood Canal watershed, some future development would continue to use septic systems because sewers are not available in many areas.

Most of the future actions would have no impact or variable (sometimes minimal) short-term impacts on marine water quality, and some future actions would be designed to minimize impacts and/or improve water quality. For example, all new piers, including the proposed TPP structures, would use

concrete or steel piles, which, unlike the creosote-treated piles used in the past, would not have the potential for leaching hydrocarbon compounds into the water. Several proposed projects (e.g., future phases of the Belfair Sewer Line) and actions (e.g., initiatives reflected in Hood Canal agency plans) would be implemented specifically to improve water quality in Hood Canal. Additionally, per Clean Water Act section 303(d), a Total Maximum Daily Load is expected to be implemented in the future to evaluate the sources contributing to low DO levels in the vicinity of NAVBASE Kitsap Bangor and potential loading allocations that would result in consistent compliance with state standards for DO.

Construction of the proposed TPP project would not contribute to or exacerbate cumulative water quality impacts because project-related changes would be localized and would not overlap in space with those of other cumulative projects. Even if the construction periods for the proposed TPP project and other in-water projects at NAVBASE Kitsap Bangor were to overlap in time, their water quality impacts would be temporary and localized, with little potential to overlap in space. Therefore, cumulative water quality impacts would not occur.

### **Sediment Quality**

Past, present, and future actions involving in-water construction, including associated pile driving and dredging, in Hood Canal have caused, are causing, or would cause short-term disturbances to sediment. Disturbed sediment creates plumes of turbid water that carry fine-grained material downcurrent from the disturbed area. Thus, it is likely that some very slight changes in the ratio of fine- to coarse-grained sediment have occurred within localized areas over time. Many of the future actions are in-water projects that will result in increased boat use in nearshore areas of Hood Canal. Boats that operate in shallow, nearshore areas have the potential to disturb sediments from propeller wash, which could result in slight changes in the ratio of fine- to coarse-grained sediment in localized areas. However, the cumulative impacts of in-water construction and propeller wash have been inconsequential when compared with movement of sediment by tides and currents.

Sediment quality has also been impacted by development over time. In some locations, chemicals discharged into Hood Canal via stormwater runoff, streams, and other sources have accumulated in sediments. In general, however, the organic content of Hood Canal sediments is low, and levels of measured contaminants, such as metals, butyltins, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and pesticides, are below thresholds specified in sediment quality standards. As discussed in Section 3.1.3.1, impacts on sediment quality from the construction and operational phases of the proposed TPP project would be limited to temporary and localized impacts from construction activities or accidental spills and are not expected to contribute to substantial cumulative impacts on sediment quality.

### **Sediment Transport**

The Puget Sound and Hood Canal shorelines are becoming progressively hardened (i.e., covered with artificial structures) to prevent erosion of the shoreline and protect upland infrastructure. Approximately 27 percent of the Hood Canal shoreline is modified with bulkheads, riprap, or other structures (Puget Sound Partnership, 2008); approximately 25 percent of the Kitsap County shoreline is modified (Judd, 2010). In comparison, 9 percent of the portion of the NAVBASE Kitsap Bangor shoreline that includes Keyport/Bangor (K/B) Spit (Drift Cell DC-19 [Central Bangor]) is armored (Kitsap County Department of Community Development, 2010). Shoreline modifications, including hardening, is believed to affect the natural coastal sediment supply and transport processes and potentially

contribute to beach narrowing, sediment coarsening, and loss of upper intertidal habitat (Ruggiero, 2010). Shoreline armoring also prevents the natural erosion of bluffs (“feeder bluffs”), which is considered an important source for the sediment supply to Puget Sound beaches (Johannessen, 2010).

Shoreline development at NAVBASE Kitsap Bangor includes these existing waterfront structures: Carderock Pier, K/B Dock, Delta Pier, Marginal Wharf, Explosives Handling Wharf (EHW)-1, EHW-2, Magnetic Silencing Facility, Land-Water Interface (LWI), and Service Pier (Table 4-1). Existing and planned structures are separated by expanses of uninterrupted shoreline and open water between them. Depending on the direction and intensity of the local winds, individual structures offer varying amounts of fetch for the generation of wind waves, as well as protection from the effects of those waves. In most cases, the pier facilities are constructed on a foundation of solid piles configured in a manner that serves to disrupt well-organized wave fields approaching the shoreline from open water. This reduces the amount of energy reaching shallow subtidal and intertidal zones adjacent to each pier facility and the capacity of the waves to re-suspend and transport unconsolidated seafloor sediments.

A sediment transport analysis found that the existing offshore structures at K/B Dock and Carderock Pier have the potential to alter sediment transport processes that, in turn, can alter the shoreline configuration (Environmental Science Associates, 2019). However, the study also noted that the shoreline at K/B Spit has been relatively stable, compared to adjacent spit features to the south, and thus not appreciably affected by the presence of shoreline structures. Evidence from bathymetric surveys and aerial photographs confirms the presence of sediment deposits along other portions of the shoreline, some of which are co-located with the pier facilities, suggesting that the piles in the pier foundations promote a depositional environment and the accretion of unconsolidated material in the form of shallow subtidal shoals and broadening intertidal beaches, on a localized basis (Morris et al., 2009). However, in some cases, the co-occurrence of shoreline structures and shoals may be coincidental. For example, an aerial photograph of EHW-1 taken shortly after the structure was constructed shows the presence of a shoal immediately inshore of the wharf, indicating that the shoal was present at the time the wharf was constructed (Prinslow et al., 1979, Plate 1). Other localized areas of shoaling, such as immediately north of K/B Spit, are related to sediment discharge from the adjacent wetland (Devil’s Hole) and the presence of headlands that deflect tidal currents and waves.

Shoreline development and placement of in-water structures, associated with future projects, would likely add to existing erosion and accretion of shoreline sediments within the region. The Kitsap County Nearshore Assessment, West Kitsap Addendum (Judd, 2010) determined that of the 35 littoral cells associated with the West Kitsap County shoreline, 20 (57 percent) had low impacts on shoreline processes while seven (20 percent) had high impacts. The NAVBASE Kitsap Bangor waterfront is ranked low for disturbance for dominant processes, which include sediment erosion and transport, but moderate to high disturbance for controlling factors including disturbance to wave energy, disturbance to slope, and frequency of disturbance. For the littoral cells adjacent to the NAVBASE Kitsap Bangor waterfront, scores for these controlling factors generally were above the mean value for West Kitsap County shoreline, indicating a higher level of disturbance.

Based on the results of the Environmental Science Associates (2019) study, the effects of in-water structures associated with the TPP project alone on sediment transport processes would be minor (as discussed in Section 3.1.3.1). However, the Environmental Science Associates (2019) study did not evaluate whether or to what extent the TPP project could contribute cumulatively to changes in sediment supply within Hood Canal. Conclusions from previous studies addressing the cumulative effect of existing in-water infrastructure at NAVBASE Kitsap Bangor on longshore sediment supply, based on

assessments of historical changes in the shoreline, are inconsistent. Golder Associates (2010) concluded that the sediment supply rate in the vicinity of the Bangor waterfront is low and the presence of existing pile-supported structures at the NAVBASE Kitsap Bangor waterfront has not caused appreciable changes in the morphology of the shoreline, except on a localized basis.

In contrast, MacLennan and Johannessen (2014) concluded that apparent changes in the NAVBASE Kitsap Bangor shoreline have been substantial and attributable to several factors, including northward shifts in the positions of spits due to the natural effects of prevailing winds and waves, erosion in areas of feeder bluffs, sediment accumulation near Devil's Hole, and inaccuracies in the historical mapping. However, Environmental Science Associates (2019) concluded that due to the proposed location of the TPP structure, changes to trends in net sediment transport direction as compared to existing conditions would not be expected, and overall sediment supply to beaches north and south of K/B Spit along the bluffs would be minor. Further, Environmental Science Associates (2019) noted that the TPP structure would not interfere with sediment supply, and feeder bluffs located east of the K/B Spit would continue to erode and provide sediment to adjacent beaches and offset the small changes in sediment transport. Therefore, the contribution of the TPP project to cumulative factors noted by MacLennan and Johannessen (2014) is expected to be minor.

Undoubtedly, past, present, and future shoreline development in Hood Canal, including waterfront structures at NAVBASE Kitsap Bangor, is contributing to cumulative, regional alterations of beach habitat and changes in sediment deposition and erosion patterns, similar to those noted by MacLennan and Johannessen (2014). While the Navy's current and future plans for NAVBASE Kitsap Bangor include additional waterfront development, the Navy has also initiated actions to preserve subtidal habitat in other portions of Hood Canal that could offset cumulative impacts from this shoreline development. For example, the Navy and Washington State Department of Natural Resources signed a restrictive easement on July 7, 2014, that precludes construction in the easement area covering 4,804 acres of aquatic land, extending from the Hood Canal Bridge to just south of the Hamma Hamma River Delta, from 18 feet below mean lower low water (MLLW) down to 70 feet below MLLW. All 4,804 acres overlay designated critical habitat for ESA-listed salmonid species.

The restrictive easement area also protects large tracts of wild stock geoduck and extensive eelgrass habitat. On August 22, 2018, the Navy and Washington State Department of Natural Resources signed a restrictive easement along 32 miles of Hood Canal's eastern shore. The easement covers 2,481 acres of aquatic bedlands. The easement extends from the Hood Canal Bridge to south of Chinom Point, from 18 feet below MLLW to 70 feet below MLLW. The duration of both easements is 55 years. Separately, in 2011 Washington State Parks completed naturalization of 1,000 feet of shoreline that had bulkheads at Kitsap Memorial Park, thereby reducing hard surfaces along the Hood Canal shoreline. Thus, while projects such as TPP may result in small localized changes in sediment transport and deposition along the NAVBASE Kitsap Bangor shoreline, the magnitude of these cumulative contributions may not be discernable from future changes related to a combination of human and natural processes outside of NAVBASE Kitsap Bangor.

#### **4.4.2 Biological Resources**

##### **4.4.2.1 Description of the Geographic Study Area**

The geographic study area for evaluating cumulative impacts on marine biological resources is defined as Hood Canal. For terrestrial biological resources, it is defined as the Hood Canal watershed.



#### 4.4.2.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions

All the identified cumulative projects listed in Table 4-1 have the potential to contribute an impact to biological resources.

#### 4.4.2.3 Cumulative Impact Analysis

The potential direct and indirect impacts to biological resources associated with the Proposed Action are described in Section 3.2.3.1. This section presents an assessment of the cumulative impacts to biological resources of the Proposed Action when combined with past, present, and reasonably foreseeable actions. The purpose of this assessment is to identify and describe the context and intensity of impacts of the Proposed Action that may be considered substantial in combination with the impacts of other actions and trends. In addition to the past, present, and planned future projects listed in Table 4-1 other activities, such as shoreline development and improvement of environmental quality in Hood Canal, were considered in the cumulative impact analysis as described in the following sections.

#### Marine Vegetation

Marine vegetation in Hood Canal has been, is being, or would be disturbed by past, present, and future placement of in-water structures such as piles and anchors, dredging, underwater fills, and construction of overwater structures. These impacts include temporary or permanent loss of vegetation, reduced productivity, and changes in the type or abundance of vegetation. Long-term surveys of eelgrass in Hood Canal found a strong population decline at multiple sites in 2009 (Gaeckle et al., 2011). However, after 2010 many sites throughout Hood Canal have had stable populations and several sites in southern Hood Canal showed a reversal (improvement) in trend after 2010 (Christaen et al., 2016).

Over 24 acres of overwater shading have been created by past actions on NAVBASE Kitsap Bangor. The overwater shading reduces the productivity of marine vegetation such as eelgrass and macroalgae. Information is not readily available to quantify the amount of shading and eelgrass loss attributable to all past and present non-Navy actions in Hood Canal, although that area is likely to be similar to or greater than the area affected by past and present Navy actions. Ongoing and future actions action for NAVBASE Kitsap Bangor would result in additional new shading and the loss of marine vegetation, although these actions have been designed to avoid eelgrass beds to the extent possible. The Navy used the Hood Canal In-Lieu Fee (ILF) Program to fully mitigate for the loss of aquatic resources from EHW-2, LWI, and SPE. The Navy also plans to utilize the ILF Program to offset impacts to aquatic resources from construction and operation of the Electromagnetic Measurement Range. Other future non-Navy actions involving the placement of piles and anchors and resultant shading would also reduce the amount of eelgrass and macroalgae.

Construction of Alternative 2 of the TPP Pier would have the potential to impact the edge of an eelgrass bed (Section 3.2) through physical disturbance; however, the potential cumulative impacts on marine vegetation would be related primarily to overwater nearshore shading from the proposed pier. The TPP Pier would result in nearshore overwater shading of 309 sq ft of eelgrass (Alternative 2 only) and 5,195 sq ft (Alternative 1) to 23,246 sq ft (Alternative 2) of macroalgae, and would contribute to adverse impacts on marine vegetation. However, actual shading impacts to marine vegetation would be minimized by the under-pier/trestle lighting system. This contribution would be approximately 1 percent of total shading resulting from past, present, and future actions at NAVBASE Kitsap Bangor, and likely would be a considerably smaller fraction of total shading resulting from all actions in Hood Canal.

Alternative 1 of the TPP project would not affect eelgrass beds and would not contribute to cumulative impacts to eelgrass. Alternative 2 has the potential to impact the edge of an eelgrass bed, but the impact would be minimized by design features, including the under-pier/trestle lighting system and the height of the trestle and pier above the water. Therefore, the TPP project would not result in significant cumulative impacts on marine vegetation when considered with past, present, and reasonably foreseeable future actions.

### **Benthic Communities**

Past, present, and future Navy and non-Navy actions, including marinas, residential docks, boat ramps, and piers involving placement of piles and anchors have resulted or would result in the direct loss of the benthic soft-bottom habitat. This habitat is replaced by hard surfaces represented by piles and anchors and, as a result, the types of benthic organisms have changed and are changing in these localized areas. Hard surfaces create sites for colonization by species adapted to these surfaces, such as mussels and sea anemones. Thus, the cumulative impact of in-water structures has been to replace native soft-bottom habitat with hard-surface habitat over time. This has adversely impacted some species (including prey species for juvenile salmonids) while benefiting others. It is estimated that approximately 2.6 acres of benthic soft-bottom habitat has been lost and converted to hard-surface habitat due to placement of in-water structures along the Bangor waterfront to date. Ongoing and future Navy actions are expected to convert an additional 0.5 acre, approximately. Future non-Navy actions are estimated to result in a loss of less than 0.01 acre of soft-bottom habitat, based on reviews of available information for those projects.

The overwater portion of structures has also increased shading and nighttime lighting impacts on the benthic community. Shading can impact the abundance of some benthic organisms and lighting can increase predation rates. Shading and loss/alteration of soft-bottom habitat has impacted the type and abundance of benthic organisms that occur in the vicinity of these structures. Design features of the proposed TPP pier and trestle would minimize both nighttime lighting and overwater shading.

The following actions are being conducted as part of mitigation for impacts of the EHW-2 project (see Table 4-1): improvements to beach substrates; shellfish seeding at multiple beaches; construction of a shellfish wet lab, education, and training building; construction of a floating shellfish nursery at Port Gamble; and geoduck surveys and a geoduck pilot research study. These activities will improve shellfish production in Hood Canal and adjacent waters.

Installation of piles for the TPP project would result in the permanent loss of up to 1,367 sq ft of soft-bottom habitat, and the pier would create between approximately 8,080 and 24,752 sq ft of nearshore shading that could affect benthic organisms. These areas would represent approximately 1 percent of the soft-bottom habitat loss and shading that has resulted or will result from Navy and non-Navy past, present, and future actions in Hood Canal. Actual shading of benthic habitats would be greatly reduced by the under-pier/trestle lighting system. Therefore, the TPP project would not result in significant impacts to the benthic community when considered with past, present, and reasonably foreseeable future actions.

### **Marine Fish**

The ROI for evaluating cumulative impacts on marine fish is defined as Hood Canal. Depending on the species, there is varying potential for actions elsewhere in Hood Canal to impact fish affected by the TPP

Pier. Resident Hood Canal fish species are unlikely to be affected by actions outside of Hood Canal, as their movements are more restricted. Migratory species that move beyond Hood Canal include salmonids. For example, juvenile salmonids originating from Hood Canal streams migrate northward along the shoreline. In general, on exiting Hood Canal these fish turn west toward the Strait of Juan de Fuca and the Pacific Ocean and do not enter the waters of Puget Sound proper. The potential for human actions to affect these fish as they move between the mouth of Hood Canal and the Pacific Ocean is considered low. The contribution of effects on fish occurring in the ocean to cumulative impacts of the projects cannot be determined based on existing data, but it is acknowledged there is a relationship.

### ***Salmonids***

The impacts of past and present actions on marine fish are described in Section 3.2.2.2 for existing conditions. Past actions have adversely impacted populations of salmonids (salmon, steelhead, and trout, including threatened and endangered species) in Hood Canal and tributaries through loss of foraging and refuge habitat in shallow areas, reduced function of migratory corridors, loss and degradation of spawning habitat in streams, interference with migration, adverse impacts on forage fish habitat and spawning, contamination of water and sediments, and depletion of DO. Another factor that has resulted in adverse impacts on salmonid abundance is the overharvest by fisheries. This impact has been greatest on native stocks. Practically all chum salmon and most Chinook salmon spawning in Hood Canal stream systems are derived from naturalized hatchery stock. Populations of pink salmon, coho salmon, bull trout, and steelhead are also in decline. The net result is that several Hood Canal salmonid species have been listed as threatened under the ESA. Existing Navy structures have affected salmonid and forage fish habitat, and similar to in-water structures throughout Puget Sound have probably impeded and continue to impede juvenile salmon migration to some degree (Salo et al., 1980; Simenstad et al., 1999; Nightingale & Simenstad, 2001a; and Southard et al., 2006) (as discussed in Section 3.2.3.1.2 for physical habitat and barriers during operations). Current and future waterfront projects along NAVBASE Kitsap Bangor would be designed and implemented to minimize impacts on salmonid habitat and migration and on forage fish. Design aspects include minimizing impacts to sensitive nearshore habitats, large spacing between piles (e.g., 20 feet or more for the larger piers), increased structure height-over-water in nearshore waters, adding under-pier/trestle lighting to the TPP, and, when possible, using building materials (e.g., grating) that allow for light transmission.

Hood Canal is one of three areas, also including the Puyallup Watershed and Whatcom County, where a series of pilot projects have been undertaken to better understand the health and environmental trends within these areas. Puget Sound Partnership (Hamel et al., 2015) states that *the objective of the new indicators is to better support the integration of human wellbeing in all levels of Puget Sound recovery planning and evaluation, from the watershed to the regional scale*. The 2007 *State of the Sound Report* (PSAT, 2007b) indicated that wild salmon stocks declined from 93 to 81 healthy stocks between 1992 and 2002, and 7 stocks became extinct during that same period. Spawning Chinook salmon declined in 13 populations from 2011–2013 compared to 2006–2010 (Hamel et al., 2015). During this same evaluation period, the abundance of six populations increased relative to baseline. However, in only one case was the increase statistically significant (mid-Hood Canal).

Commercial, tribal, and sport fishing generally contribute to impacts on fish stocks in Puget Sound (Hamel et al., 2015).

Future Navy and non-Navy actions could have some of the same impacts as described above for past actions, notably habitat loss or alteration and the decreased function of migratory corridors. However,

federal or federally funded actions that have occurred since legislation such as the ESA and NEPA was enacted have been considering and are required to (1) consider environmental impacts on threatened and endangered species, (2) prepare analysis (including a biological assessment), and (3) consult with federal regulatory agencies to minimize project impacts. Future actions are also required to go through this same process. Future actions on NAVBASE Kitsap Bangor will be designed and implemented to minimize impacts on salmonids. For the proposed projects, these measures include designs that minimize impacts on intertidal and shallow subtidal habitats to the maximum extent practicable, limiting in-water work to the maximum extent practicable, observing work windows (except for non-pile-driving work for the LWI project), taking measures to reduce construction-related noise, minimizing migration barriers by increasing pile spacing, reducing the intensity of overwater lighting, minimize shading by increasing minimum height-over water-design and adding under-pier/trestle lighting, minimizing shoreline armoring and nearshore construction, and implementing habitat mitigation. The above processes and actions will help to ensure that impacts of projects are below levels that would endanger the continued existence of these species.

Currently, efforts are being made to reverse the decline of fish populations by regulating development and restoring fish habitat. Numerous salmon preservation and restoration groups have proposed and constructed habitat restoration projects in Hood Canal. Most of these projects are on the east and south sides of the canal. The majority of Hood Canal salmonid-bearing river systems also occur in the southern portion of the canal. Efforts to reduce construction impacts to salmonids and other fish have resulted in a schedule of in-water work periods that all projects must adhere to, as authorized by state (Washington State Department of Fish and Wildlife [WDFW]) or federal (U.S. Army Corps of Engineers) regulatory authorities. The in-water work windows help minimize adverse impacts to sensitive life stages of ESA-listed fish. Further, Navy biologists, in coordination with WDFW biologists, have initiated a forage fish survey program at NAVBASE Kitsap Bangor to locate and monitor these sensitive habitats (Navy, 2016d).

As part of mitigation for impacts of the EHW-2 project, the Navy has provided funding for improvements to beach substrates and purchased credits from the Hood Canal ILF Program in an effort to meet the goal for no net loss of aquatic resource functions. To improve scientific understanding of marine species and for construction of EHW-2, research studies are being conducted on: (1) ocean acidification and (2) Hood Canal chum salmon. In addition, to improve salmon production and harvest opportunities in Hood Canal, improvements are being implemented at three existing fish hatcheries on Hood Canal and replacement of one finfish spawning facility on Hood Canal. In addition, the Navy used the Hood Canal ILF Program to fully mitigate for the loss of aquatic resources from LWI and SPE. The Navy also plans to utilize the Hood Canal ILF Program to offset impacts to aquatic resources from construction and operation of the Electromagnetic Measurement Range.

Past, present, and future development projects have had, continue to have, or would be expected to have the potential to result in many of the impacts described above for salmonids and add to declining population trends. Although there are ongoing and future actions and plans to improve conditions for salmonids in Hood Canal (described above), impacts of the TPP project would result in short-term increases in underwater noise and turbidity, long-term increases in nearshore migrational barriers, and degradation of some nearshore physical habitats and biological communities, thereby contributing to cumulative impacts on these species. The contribution of the TPP project to cumulative impacts on nearshore habitat would be compensated for by implementation of the mitigation measures described in Table 3.9-2.

Because the TPP Pier construction may overlap with construction of the Marine Structure Maintenance and Pile Replacement Program (MPR) and other projects at NAVBASE Kitsap Bangor, salmonids (which are migratory) would be exposed to pile-driving noise and increased turbidity levels during the in-water construction periods. Concurrent pile driving between TPP and other projects would result in 3 decibels (dB) higher noise levels in some locations (Appendix A). The greatest potential for higher cumulative noise levels would occur between the TPP and MPR, where the area in which cumulative impacts on salmonids could occur would be extended beyond that affected by the combined projects.

Observing the in-water work window would avoid construction-related impacts on 95 percent of juvenile salmonids, except for the impacts of non-pile-driving work. However, it is likely there would still be adverse impacts on salmonids from pile driving. As described in Appendix A, the main effect of concurrent pile driving would be to extend the area and time over which fish and other marine biota are exposed to pile-driving noise. Following the completion of construction activities, increased noise levels at a given location would generally not occur. If the actual construction schedules for these projects overlapped for less than two construction seasons, or did not overlap, cumulative impacts would be reduced accordingly.

### ***Rockfish***

Palsson et al. (2009) list 12 likely stressors of Puget Sound rockfish. For six of these stressors the extent is unknown. Of the remaining stressors, five are considered to be high in extent or relative risk, including: fishery removals, age truncation, derelict gear, hypoxia/nutrients, and food web interactions, with chemical contamination considered a medium to moderate risk. Future Navy and non-Navy actions, including the proposed TPP project would not affect fishery removals, age truncation, derelict gear, or hypoxia/nutrients. BMPs, considered an essential component of each Navy project, minimize exposing marine systems to chemical contaminants or increasing organic material that could contribute to hypoxia events.

Constructing in-water structures such as the TPP Pier falls into the stressor category of habitat disruption, which was stated to have an unknown risk extent. In-water structures produce artificial habitats at the cost of naturally-occurring habitats such as marine vegetation. These impacts can contribute to changes in food web interactions. For example, the introduction of an easily accessible floating structure may increase the presence of marine mammals (e.g., pinnipeds), increasing predation on rockfish. It is also possible that more in-water structures may attract predatory fish, such as lingcod. An increase in these predators has been indicated by Palsson et al. (2009) as potentially resulting in significant natural mortality of already-depleted rockfish stocks. However, the same in-water structures that have the potential to attract lingcod, also provide hard-structured habitat for rockfish. It is possible that manmade in-water structures may benefit some rockfish species relative to others, although competition for this type habitat is currently unknown. Many of the past, present, and foreseeable future projects listed in Table 4-1, include either an on-water or in-water component. While the new TPP Pier would contribute to cumulative impacts of in-water structures of the type discussed above, it is unknown whether the increase of in-water structured habitat would be a net benefit or detriment to rockfish.

### ***Other Marine Fish Species***

Prior to the 1980s, in-water construction of docks, piers, and boat ramps in Hood Canal impacted fish species presence and abundance (including threatened and endangered species). Navy and non-Navy actions involving placement of in-water structures have changed and would continue to change fish

habitat in and around these structures. In-water structures can impact fish in several ways: (1) increasing the presence of predators that prey on juvenile fish; (2) posing a barrier to fish movement, particularly juvenile fish; (3) causing direct loss of marine vegetation such as eelgrass, which is important habitat for forage fish and other species; and (4) creating shade that reduces the productivity of aquatic vegetation and benthic organisms, which are preyed on by fish. For nearshore-spawning species such as forage fish, nearshore construction may result in the direct loss or suitability of spawning habitats. While in-water work windows minimize adverse impacts on migrating juvenile salmonids and potential rockfish recruitment, many other marine fish species are likely to occur during construction, potentially adversely impacting the abundance and occurrence of some fish close to construction activities.

The impacts of future Navy and non-Navy actions described above for salmonids would also apply to other marine fish species. Past, present, and future development actions have had, continue to have, or would be expected to result in many of the impacts on marine fish described above for salmonids and thus to add to declining population trends. All construction-related actions on NAVBASE Kitsap Bangor are designed and implemented to minimize impacts on marine fish species to the maximum extent practicable, as described above. Although these actions do not necessarily mean that the TPP Pier and all future actions would have no impact on marine fish species, such actions would help to ensure that the impacts of projects were below levels that would endanger the continued existence of these species. Cumulative pile-driving noise impacts from a possible overlap between the construction periods for the TPP project and other projects would be similar to those described above for salmonids.

Aside from potential cumulative noise impacts from multiple projects at NAVBASE Kitsap Bangor, considering the insignificant impacts of the TPP project on marine fish and the proposed compensatory mitigation actions (Table 3.9-2), the TPP project would not contribute to cumulative impacts on marine fish.

### **Marine Mammals**

Marine mammals in Hood Canal have been, are being, or would be disturbed by past, present, and future construction in the marine environment, including pile driving and dredging that generate high noise levels, increased human activity and vessel traffic, and introduction of contaminants into marine waters and food chains. With the exception of resident harbor seals, marine mammals that may occur in Hood Canal are wide-ranging or migratory far beyond the geographic study area for cumulative impacts. The contribution of effects on marine mammals occurring in the ocean and inland waters outside of Hood Canal to cumulative impacts is difficult to define, but it is acknowledged that there is a relationship.

While noise-related impacts are most commonly associated with in-water construction and therefore are temporary, they may be of an intensity to cause injury or behavioral impacts on marine mammals. Elevated noise levels can constitute “take” of marine mammals under the ESA and Marine Mammal Protection Act (Sections 3.2.3.1.3 and 3.2.3.2.3). The greatest potential for cumulative impacts on marine mammals would be simultaneous exposure to pile-driving noise (underwater and airborne) from the Navy’s future waterfront construction projects at NAVBASE Kitsap Bangor (MPR and other projects; Table 4-1). The main effect of concurrent pile driving would be to extend the area and time over which wildlife species would be exposed to pile-driving noise. Noise levels at most locations would not generally increase; increases of up to 3 dB would occur only infrequently at a location equidistant between two construction sites (e.g., TPP and MPR) when pile driving at those sites was concurrent. The

overlap in construction is based on currently projected schedules for the multiple projects and is subject to change (likely resulting in a reduction in the period of overlap).

Because marine mammals are highly mobile, the noise impacts of the Proposed Action could be cumulative with noise impacts on marine mammals from other actions and activities in the Hood Canal region. However, the fact that the noise impacts would be temporary would reduce the magnitude of cumulative effects. Cumulative impacts would be reduced further through the implementation of impact minimization measures including soft starts and noise attenuating devices (e.g., bubble curtains) for pile driving, and implementation of marine mammal monitoring with shutdown zones to preclude injury (Section 3.9).

Future in-water projects by the Navy and non-Navy projects would increase the number of in-water structures, and increase human activity levels (e.g., visual disturbance from increased boat operations). Operations on the NAVBASE Kitsap Bangor waterfront, as well as non-Navy actions, have resulted in increased human presence, vessel traffic, and noise. In-water facilities themselves tend to have minimal impacts on marine mammals and may provide some benefits. Harbor seals, California sea lions, and Steller sea lions haul out on manmade structures on the Bangor waterfront, demonstrating their ability to habituate to current high levels of human activity. The net effect of increased human activity levels at the Bangor waterfront is expected to be minimal relative to the large range of these species within inland waters.

Development projects can contribute to increasing concentrations of contaminants in Hood Canal waters (PSAT, 2007a; Puget Sound Partnership, 2012) through pathways such as surface water runoff, aerial deposition, wastewater discharges, leaching from contaminated bottom sediments, direct spills into marine waters, and migrating biota such as salmon. The levels of contaminants in harbor seals have increased in recent years and may be affecting their health (PSAT, 2007a; Puget Sound Partnership, 2012). However, as discussed above in Section 4.4.1.3, construction of the proposed TPP project would not be expected to contribute to or exacerbate cumulative water quality impacts because the water quality impacts would be localized, with little potential to overlap in space. Because impacts on marine mammals from the Proposed Action and other projects are expected to be minimal, other cumulative impacts on marine mammals are considered unlikely.

### **Marine Birds**

Trend data for Puget Sound marine bird populations vary among recent surveys. WDFW's annual snapshot surveys indicate that the density of some species, including pursuit-diving species such as alcids and western grebes, has declined over the last two decades (Vilchis et al., 2014). Other long-term studies support the findings that some marine bird species (white-winged scoter, brant, and two grebe species) have been declining, whereas others are stable or increasing (Ward et al., 2015). Exact causes for the declines are mostly unknown, but possible reasons include increased predation, habitat loss, changing migration patterns, decreases in forage fish populations, hunting, and disturbance to breeding grounds in the Arctic (PSAT, 2007a; Vilchis et al., 2014). In Washington, the population of the ESA-listed marbled murrelet declined an average of 4.6 percent per year from 2000 to 2013 (Falxa & Raphael, 2016). The principal reason for the decline appears to be loss of nesting habitat (old-growth forest), but impacts on murrelet prey in marine environments near nesting habitat may also contribute (Falxa & Raphael, 2016; Lorenz et al., 2016). Past, present, and future development projects have had, continue to have, or would be expected to have many of the same impacts on marine birds described above and add to past or current declining population trends.

Marine birds in Hood Canal have been, are being, or would be disturbed by past, present, and future construction in the marine environment, including pile driving that generate high noise levels, increased human activity and vessel traffic, effects on prey availability, and introduction of contaminants into marine waters and food chains. Most marine birds that occur in Hood Canal are wide-ranging or migratory far beyond the geographic study area for cumulative impacts. Resident species are unlikely to be affected by actions outside Hood Canal. The contribution of effects on marine birds occurring in the ocean and inland waters outside of Hood Canal to cumulative impacts is difficult to define, but it is acknowledged that there is a relationship.

While noise-related impacts are most commonly associated with in-water construction and therefore are temporary, they may be of an intensity to cause injury or behavioral impacts on marine birds. Elevated noise levels can constitute “take” of marbled murrelets under the ESA (Section 3.2.3.1.3). The greatest potential for cumulative impacts on marine birds would be simultaneous exposure to pile-driving noise (underwater and airborne) from the Navy’s current and future waterfront construction projects. The main effect of concurrent pile driving would be to extend the area over which wildlife would be exposed to pile-driving noise. Noise levels at most locations would not generally increase, such as increases of up to 3 dB would occur only infrequently at a location equidistant between two construction sites (e.g., TPP and MPR) when pile driving at those sites was concurrent (Appendix A). The overlap in construction is based on currently projected schedules for the multiple projects and is subject to change, likely resulting in reduction in the period of overlap.

Because marine birds are highly mobile, noise impacts of the Proposed Action could be cumulative with noise impacts from other actions and activities in the Hood Canal region. However, the fact that the noise impacts would be temporary would reduce the magnitude of cumulative effects. Cumulative impacts would be reduced further through the implementation of impact minimization measures including soft starts and noise attenuating devices (e.g., bubble curtains) for pile driving, and implementation of marbled murrelet monitoring with shutdown zones to preclude injury or auditory masking. Because other impacts on marine birds from TPP and other projects are expected to be minimal (as described above and in Section 3.2.3.1.5), other cumulative impacts on marine birds are considered unlikely.

Future in-water Navy projects and non-Navy projects would increase the number of in-water structures, and increase human activity levels (e.g., visual disturbance from increased boat operations). In-water facilities themselves tend to have minimal impacts on marine birds and may provide some benefits, for example some marine birds rest on manmade structures or forage on benthic prey attached to piles along the Bangor waterfront. Marine birds that frequent the Bangor waterfront have demonstrated their ability to habituate to current high levels of human activity and the net effect is expected to be minimal relative to the large range of these species within inland waters. Therefore, cumulative impacts to marine birds are not expected to occur.

## **Terrestrial Resources**

### ***Terrestrial Vegetation***

Native upland vegetation communities in the vicinity of Hood Canal have decreased in extent due to shoreline and upland development, involving the conversion and fragmentation of native vegetation to residential, commercial, and agricultural uses. On NAVBASE Kitsap Bangor, past and present development has resulted or is resulting in the loss of approximately 1,100 acres of forested area to



development and 300 acres to grassland/shrubland habitat. Since the 1960s, approximately 1,000 acres on NAVBASE Kitsap Bangor have been replanted with native species.

Future Navy and non-Navy actions would also result in loss of vegetation. Based on review of information on other future Navy projects, and available information on past, present, and future non-Navy actions, it is estimated that future Navy and non-Navy actions would result in a loss of approximately 300 and 167 acres of vegetation, respectively. As mitigation under the EHW-2 project, approximately 6 acres disturbed by construction will be revegetated with the objective of restoring a coniferous forest overstory and native shrub understory, and there will be monitoring and removal of noxious weeds from these areas. Construction of the Carderock Parking Extension and Service Pier parking lot projects in the vicinity of the TPP VMF site have contributed to loss of the type of forest habitat that would be impacted by VMF construction (Figure 4-3). The contribution of the TPP project to loss of native vegetation would be relatively small, as construction of the TPP project would permanently remove up to approximately 6 acres of second-growth forest and native and invasive shrub habitat. A small portion of the disturbed area would be revegetated. Since there are no rare, threatened, or endangered plant species on NAVBASE Kitsap Bangor, there would be no cumulative impact from the Proposed Action on ESA-listed plant species.

The TPP project would at most contribute less than 0.01 percent to the total area of vegetation cleared on NAVBASE Kitsap Bangor by past, present, and future Navy actions. While the TPP project would cause some loss of vegetation, given the amount and location of loss there would be little impact on wildlife habitat or the vegetative community on NAVBASE Kitsap Bangor, and even less in the broader Hood Canal region. Therefore, the proposed project would make an insignificant contribution to cumulative impacts on vegetation.

### ***Wildlife***

Loss of native vegetation communities in the vicinity of Hood Canal due to past and present Navy and non-Navy actions has had an impact on wildlife populations resources present in native communities. Depending on the species, there is a varying potential for actions elsewhere in Hood Canal to affect wildlife species affected by the TPP project. Resident species are unlikely to be affected by actions outside Hood Canal, although migratory birds or other wide-ranging wildlife species may be affected by such actions. The contribution of effects on migratory or wide-ranging species to cumulative impacts is difficult to define, but it is acknowledged that there is a relationship.

Approximately 1,400 acres of forest and grassland/shrubland habitat have been or are being lost and/or impacted by past and present development on NAVBASE Kitsap Bangor. These projects and future projects such as the TPP (Table 4-1) have resulted in or would result in the removal of mostly second- and third-growth forested habitat; this forested area has been replaced by buildings, parking lots, or non-native vegetation cover that is not optimum wildlife habitat. Over time, the loss of wildlife habitat and increased human activity have resulted in fewer native species and occasional replacement by non-native wildlife species that are more adapted to an urban environment. In addition, forest fragmentation due to roads, buildings, fences, and other development can restrict wildlife movement within a contiguous habitat. Similar loss of wildlife habitat has occurred throughout the Hood Canal region due to past and present non-Navy development.

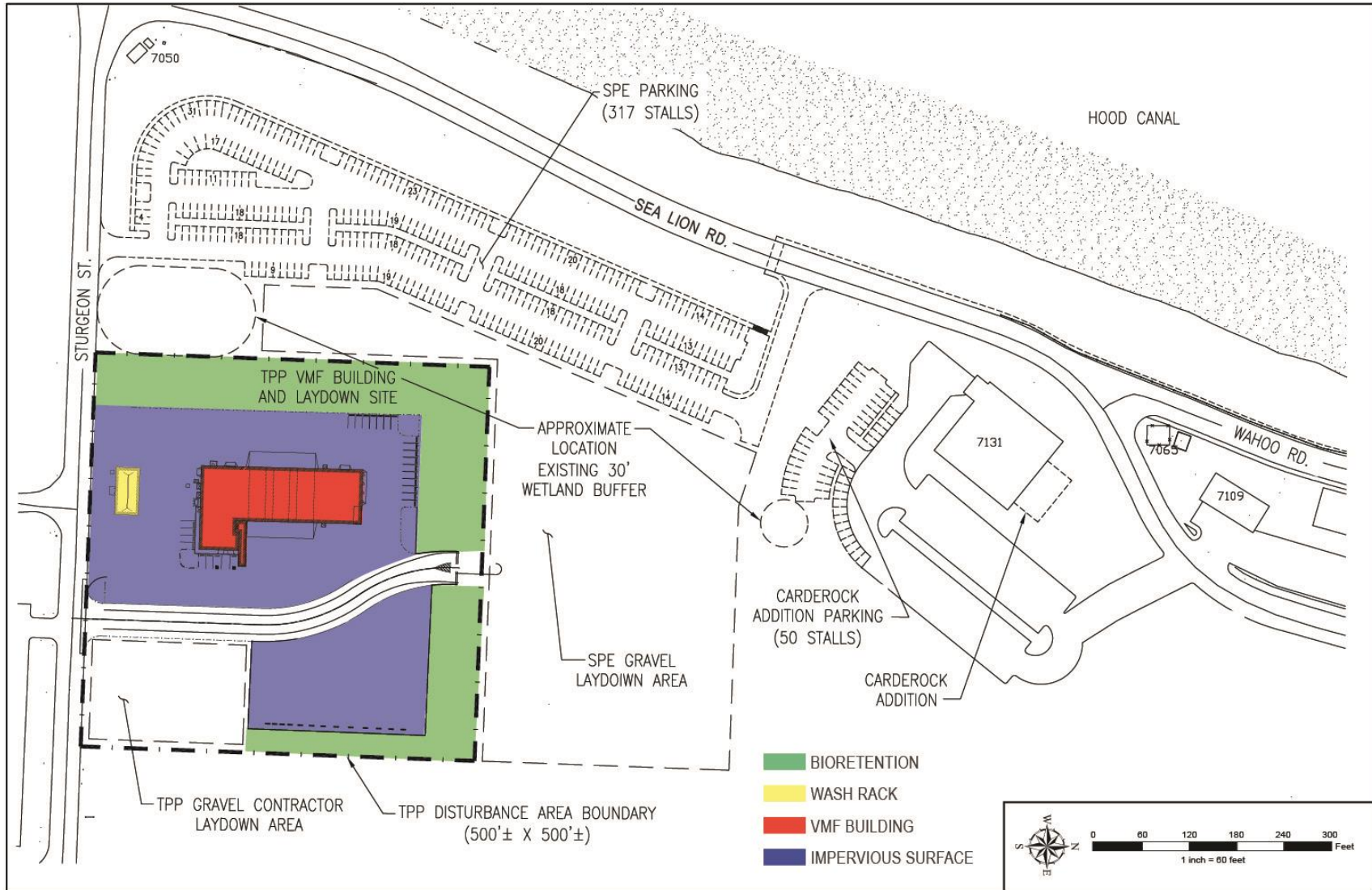


Figure 4-3. TPP Vessel Maintenance Facility and Laydown/Parking Area, with Adjacent Future Projects

There is a general trend toward loss or conversion of wildlife habitat due to development in the Hood Canal region, although most of the region remains less urbanized. There are large, rather undeveloped areas, such as NAVBASE Kitsap Bangor, outside the urban areas of Kitsap County, and development is on rather large lots (i.e., lots greater than 5 acres [2 hectares]). With future growth of developed areas in the region, more wildlife habitat is expected to be converted or lost. Approximately 300 acres and 167 acres of wildlife habitat would be lost due to future Navy and non-Navy actions, respectively. However, the proposed TPP project would contribute less than 0.01 percent to the area of wildlife habitat lost to development on NAVBASE Kitsap Bangor, and given the amount and location of this loss, would have little impact on wildlife habitat or movement. Therefore, the Proposed Action would make a minimal contribution to cumulative impacts on wildlife.

Upland wildlife would be exposed to construction noise from multiple projects on NAVBASE Kitsap Bangor. The most important example would be pile-driving noise from the TPP Pier, MPR, and Electromagnetic Measurement Range projects (Table 4-1). Pile driving for some of these projects may overlap for a presently unknown number of construction seasons. The main effect of concurrent pile driving would be to extend the area over which biota were exposed to pile-driving noise. Noise levels at a given location would not generally increase, such as increases of up to 3 dB would occur only infrequently at a location equidistant between two construction sites when pile driving at those sites was concurrent. This could affect sensitive wildlife receptors located along the eastern shore of Hood Canal. Future in-water and upland Navy operations and non-Navy projects would increase the number of upland structures and increase human activity levels (i.e., visual disturbance), affecting wildlife species that are sensitive to human presence and activities. Overall, the contribution of upland TPP facilities would not be great, relative to other past, present, and future development, due to their small size and locations in proximity to existing and planned development. Therefore, the TPP project would make a minimal contribution to cumulative impacts on terrestrial wildlife.

#### **4.4.3 Noise**

##### **4.4.3.1 Description of Geographic Study Area**

The ROI for evaluating cumulative impacts on human receptors includes the waterfront and woodland areas near the project site, extending to the Vinland neighborhood just north of the NAVBASE Kitsap Bangor northern property boundary, the Olympic View neighborhood just south of the southern base boundary, the waterfront industrial area encompassing Delta Pier and Marginal Wharf, the waters of Hood Canal, and shoreline properties on the west side of Hood Canal, west and northwest of the project sites.

##### **4.4.3.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

Most past, present, and future actions identified in Table 4-1 have generated, are generating, or would generate some type of noise, either from a facility itself, from vehicles traveling to and from a site, or from humans.

##### **4.4.3.3 Cumulative Impact Analysis**

Noise is typically a nuisance factor for sensitive receptors such as residences, hospitals, or parks, where quiet conditions are important. This is particularly true during evening hours. Close proximity to high sound levels can result in physiological problems or hearing damage to sensitive receptors. Over time

the trend has been for noise levels to increase as development has occurred, particularly during daytime hours when activity levels are highest. Noise levels tend to be fairly low outside the urban areas of Kitsap County due to development on large lots (greater than 5 acres) and a general lack of industrial activity. However, some industrial areas, such as the NAVBASE Kitsap Bangor waterfront, generate higher noise levels.

Future Navy and non-Navy actions would also generate noise. The type of noise and noise levels produced would be dependent on the specific project. The impact of these noise sources would depend on their location relative to sensitive receptors, but it is likely that some of these future actions would produce nuisance noise. There are requirements to limit the level of noise produced by residential, commercial, or industrial land uses. Thus, some future development would have requirements to provide soundproofing measures. The proposed project would generate noise from equipment, industrial activities, vessel movement, and human activities. The highest noise levels would be generated by pile driving during construction. Impact hammer pile driving would generate average (i.e., root mean square [RMS]) noise levels of 109 A-weighted decibels re 20  $\mu$ Pa at a distance of 50 feet, while vibratory pile driving would generate RMS noise levels of 95 A-weighted decibels re 20  $\mu$ Pa at 50 feet. Residential areas near Olympic View, Thorndyke Bay, and to a lesser extent Suquamish Harbor on the western shore of Hood Canal, would experience increased noise levels during pile driving, as would recreational users on Hood Canal or the western shores of Hood Canal.

TPP Pier construction activities may overlap with MPR and Electromagnetic Measurement Range projects (Table 4-1). As discussed in Appendix A, this could result in cumulative noise impacts during the period of overlap. One effect of this temporal overlap in pile driving would be to extend the area affected by individual projects. Noise level increases of up to 3 dB would occur only for the infrequent case of a location approximately equidistant between two construction sites when pile driving at those sites was concurrent. These areas would be along the NAVBASE Kitsap Bangor waterfront and would not affect off-base areas. In all other cases, noise levels at a given location would be predominated by the closer pile-driving activity. General construction noise for each project would also overlap, but these noise levels would be similar to existing levels along this industrial waterfront, and thus much lower than the levels from pile driving. Therefore, the resulting cumulative noise impacts from general construction are expected to be minimal.

Multiple Navy construction projects would also extend the time over which resulting noise impacts would occur. As discussed in Section 3.3.3, these impacts would be primarily to areas along the NAVBASE Kitsap Bangor waterfront, including the waters of Hood Canal. Combined noise impacts of multiple Navy projects on the communities of Olympic View and Vinland, and nearby schools are not expected to be significant due to the attenuating effects of intervening distance, topography, and vegetation. If the actual period of construction overlap for the TPP Pier and other projects is less than currently projected, resulting cumulative impacts would be reduced accordingly.

In the long term, noise produced by operation of the TPP Pier would not increase over what is currently generated by other industrial facilities on the Bangor waterfront and operational noise levels for the TPP Pier would be typical of the industrial NAVBASE Kitsap Bangor waterfront. Therefore, operations for the TPP Pier would not contribute to cumulative noise impacts.

Based on the above analysis, the TPP project would not have significant cumulative noise impacts when considered in conjunction with past, present, and reasonably foreseeable future actions.

#### **4.4.4 Cultural Resources**

##### **4.4.4.1 Description of Geographic Study Area**

The ROI for evaluating cumulative impacts on cultural resources is defined as NAVBASE Kitsap Bangor, including the Naval Restricted Area. Cultural resources are unique as well as finite in nature, so that an adverse impact on a single historic property could affect the complement of historic properties within the ROI.

##### **4.4.4.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

Future Navy or non-Navy actions described in Table 4-1 that involve earth disturbance have some potential for disturbing archaeological resources, and it is possible that such disturbance could go unrecognized and unrecorded. Future Navy actions that involve alterations to National Register of Historic Places (NRHP)-eligible buildings or structures, the construction of new buildings or structures, or square footage reductions all have the potential for direct or indirect impacts on historic properties.

##### **4.4.4.3 Cumulative Impact Analysis**

Other projects such as those along the waterfront, including the EHW-2 (Table 4-1), in conjunction with the proposed projects, could result in cumulative impacts on the historical integrity of the EHW-1 or the Delta Pier, although these impacts are unlikely to be significant and would not adversely affect the NRHP eligibility of either historic property. Otherwise, the TPP project would not result in cumulative impacts on other NRHP-eligible architectural or archaeological cultural resources. Other projects involving ground disturbance such as road improvements or building construction have the potential to encounter previously unknown archaeological resources. In all cases, the Navy would comply with Section 106 of the NHPA by identifying the presence of historic properties, evaluating their NRHP eligibility, assessing impacts, and consulting with the State Historic Preservation Officer and tribes on the mitigation of any adverse impacts, and would take the same action if any unanticipated archaeological resources are discovered, per the NAVBASE Kitsap Bangor Inadvertent Discovery Plan. With these procedures in place, the TPP project would not add to the cumulative impacts on archaeological or architectural resources.

#### **4.4.5 American Indian Traditional Resources**

##### **4.4.5.1 Description of Geographic Study Area**

The ROI for evaluating cumulative impacts on American Indian traditional resources is the Hood Canal and the waterfront along NAVBASE Kitsap Bangor.

##### **4.4.5.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

Relevant past, present, and reasonably foreseeable future actions related to the Proposed Action are described in Table 4-1. Future Navy or non-Navy actions that involve impacts to water or sediment quality, marine vegetation, and benthic communities in Hood Canal, either positive or negative, have some potential for affecting American Indian traditional resources including fish and shellfish.

##### **4.4.5.3 Cumulative Impact Analysis**

Impacts on traditional resources include loss of access to traditional use areas and reduction in the abundance of tribal resources for economic, subsistence, or ceremonial/religious uses. Ocean

acidification and resulting adverse effects on calcification will continue to be a cumulative stressor on shellfish populations in the area.

Past, present, and future activities have the potential to affect protected tribal traditional resources on Bangor. Some projects identified in Table 4-1 could have impacts on tribal traditional resources similar to those identified for the Proposed Action. The TPP project would not affect access to Usual and Accustomed (U&A) fishing grounds and stations and construction noise and visual effects would not impact these harvest sites. Interference with tribal fishing vessels can be avoided through coordination between construction contractors and tribal fishers. While the TPP could impact fisheries via habitat effects and barrier effects on juvenile and adult migratory fish, including salmon, these potential impacts and their contribution to cumulative impacts would be reduced to minimal through the application of Best Management Practices and Impact Minimization Measures (Section 2.6). The effects of all relevant projects could be further reduced through mitigation measures discussed in the following paragraph.

Impacts to traditional tribal resources could be offset through implementation of appropriate mitigation measures determined through ongoing consultations between the Navy and affected American Indian tribes. The Navy engaged in government-to-government consultation on the TPP Proposed Action with the Skokomish Indian Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, and Suquamish Tribe.

The Navy continues to consult with American Indian tribes to aid in the ongoing identification and preservation of resources.

#### **4.4.6 Socioeconomics**

##### **4.4.6.1 Description of Geographic Study Area**

The geographic study area is defined as Kitsap County since this is the area where the principal effects from employment and expenditures associated with the Proposed Action would be expected to occur.

##### **4.4.6.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

All of the identified cumulative projects described in Table 4-1 have the potential to contribute to a cumulative impact to socioeconomics.

##### **4.4.6.3 Cumulative Impact Analysis**

Socioeconomic conditions have been or are being substantially changed by past and present development. For example, NAVBASE Kitsap Bangor has become one of the primary employers in Kitsap County. Development of the TRIDENT base and other military installations has increased the population, long-term employment opportunities, and income of Kitsap County, as well as the demand for housing and various public services (e.g., police, fire, emergency and medical services, and schools). It is estimated that nearly 47,000 personnel (military personnel, civilians, and contractors) work for the military in Kitsap County.

Population, housing, and economic activity are increasing at a moderate rate in Kitsap County (Section 3.6.2). These changes are attributable to development, population in-migration, changes in economic conditions, and changes in social and political factors. Future Navy and non-Navy actions would generate employment and income. Projects that prompt in-migration (the TPP project would not prompt

in-migration; Section 3.6) would increase the demand for housing and public and social services. However, these conditions would vary over time based on the changing conditions discussed above.

Construction of the TPP project has the potential to overlap with construction of the MPR and Electromagnetic Measurement Range projects (Table 4-1). Construction of the TPP Pier would benefit the local and regional economy from employment and wages. Construction of the TPP Pier and associated facilities could result in approximately 518 to 696 direct, indirect, and induced jobs. Construction of the EMMR would result in less than 100 direct and indirect jobs for the duration of the construction period (Navy, 2020). Construction of the MPR, TPP Pier, and Electromagnetic Measurement Range projects would employ approximately 190 people. Any overlap of the construction period for the TPP Pier with construction of any of the other projects would result in benefits from an increased number of direct, indirect, and induced jobs and would provide a substantial benefit to the local and regional economy from employment and expenditures during the activities. The jobs created by the TPP project would not be expected to result in any permanent in-migration of workers (Section 3.6), so there would be no anticipated impacts to population, housing, or schools. In the long term, the TPP would not result in a change in staffing or employment. Therefore, the TPP project would not result in significant cumulative impacts to socioeconomic resources when considered with past, present, and reasonably foreseeable future actions.

#### **4.4.7 Transportation**

##### **4.4.7.1 Description of Geographic Study Area**

The ROI for vehicle traffic includes those streets and intersections that would be used by both automobile and truck traffic to gain access to and from the project sites, as well as those streets that would be used by construction traffic (e.g., transport of equipment and commuting workers). The streets most likely to be affected by cumulative project-related auto and truck traffic include NW Trigger Avenue and NW Luoto Road (referred to as Trident Avenue outside of base boundaries). The ROI for marine vessel traffic is defined as the NAVBASE Kitsap Bangor waterfront and Hood Canal, through which project construction vessels would pass.

##### **4.4.7.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

All of the identified cumulative projects described in Table 4-1 have the potential to contribute to a cumulative impact to transportation.

##### **4.4.7.3 Cumulative Impact Analysis**

Vehicle circulation patterns have changed and traffic volumes have increased in Kitsap County along with increases in population and increased employment for past and present actions (USBEA, 2015; USCB, 2017a), particularly projects on NAVBASE Kitsap Bangor and other Navy installations. Growth is inevitably accompanied by increased vehicle traffic and consequent impacts on road travel such as intersection delay, lowered levels of service, and decreased safety. The trend in Kitsap County, which parallels the national trend, is for people to own more vehicles and drive more vehicle miles. Recent increases in gas prices have caused some people to look for other transportation options (e.g., mass transit) or to alter their driving habits. Marine vessel traffic levels have increased throughout the years due to growth in the region.

Future Navy and non-Navy actions (Table 4-1) would generate additional traffic with impacts similar to those discussed above. Transportation agencies have attempted to keep up with increased traffic, but in many areas traffic volumes exceed the capacity of roads or intersections. Kitsap County has adequate capacity on most of its roads and intersections. However, in the more urbanized areas there are capacity problems on some road segments (Shea, 2017).

Construction of the TPP project has the potential to overlap with construction of the MPR and Electromagnetic Measurement Range projects (Table 4-1). Any overlap of the construction period for the TPP Pier with that for any of the other projects would tend to increase traffic impacts. However, considering the traffic expected to be generated by the TPP project and the lack of existing congestion on affected roadways it would still represent a minor contribution to cumulative traffic impacts both on and off base. The TPP project could contribute to cumulative impacts in terms of delays at base gates during peak traffic periods, but such delays would affect only Navy personnel and would not affect traffic on regional roadways.

Future Navy and non-Navy projects along the shoreline could increase marine vessel traffic levels within Hood Canal. As discussed above, construction of the TPP Pier would overlap with other Navy construction projects. During these periods of overlap, the frequency and duration of related openings of the Hood Canal Bridge would be greater than for the TPP project alone, which would contribute to a cumulative impact on vehicular traffic from bridge openings. Multiple Navy and non-Navy construction projects could also extend the time period over which increased number of bridge openings occur.

Operation of the TPP Pier would not notably increase vehicle or marine traffic and so would not contribute to cumulative impacts.

Therefore, the TPP project would not result in significant cumulative impacts to vehicle or marine traffic when considered with past, present, and reasonably foreseeable future actions.

#### **4.4.8 Visual Resources**

##### **4.4.8.1 Description of Geographic Study Area**

The ROI for evaluating cumulative impacts on aesthetics and visual quality is defined as the surrounding areas in which actions on NAVBASE Kitsap Bangor are most likely to contribute to cumulative visual impacts. This includes Hood Canal, portions of the residential areas on Kitsap Peninsula, and Jefferson County on the western shore of Hood Canal across from NAVBASE Kitsap Bangor.

##### **4.4.8.2 Relevant Past, Present, and Reasonably Foreseeable Future Actions**

All of the identified cumulative projects described in Table 4-1 have the potential to contribute to a cumulative impact to visual resources.

#### **4.4.9 Cumulative Impact Analysis**

Visual conditions have been or are being altered by past and present actions (Table 4-1) as development changes portions of the natural environment to a built environment. However, much of the area around Hood Canal has retained its natural and rural visual quality because of large-lot residential development, an abundance of forested land, and unobstructed views of Hood Canal and the Olympic Mountains.

Approximately 68 percent of NAVBASE Kitsap Bangor is forested, thereby helping to retain the natural visual quality at the base.



The trend is for development to continue, which would alter visual resources. Since development in the county tends to be slow and continues to occur on larger lots in many areas, visual resources will change, but at a slow pace. Distant views to the west would not likely be blocked by new development because of the height and proximity to the Olympic Mountains. Future Navy and non-Navy actions would continue the trend of converting land from natural or undeveloped conditions to built conditions. Thus, visual resources would change to more urbanized views. Navy policies (e.g., TRIDENT Joint Venture, 1975) recommend using existing developed areas and maintaining natural areas in their existing condition as much as is practicable, and would help minimize impacts on visual quality on NAVBASE Kitsap Bangor.

Construction of the TPP Pier could overlap in part with construction of the MPR and Electromagnetic Measurement Range projects (Table 4-1). During this period, a cumulative aesthetic impact on views from Hood Canal is possible, but the contribution of the TPP construction site to the existing industrial character of the NAVBASE Bangor waterfront would be minimal. Due to the intervening distance, a cumulative impact with construction projects outside of NAVBASE Kitsap Bangor would not occur.

In the long term, the TPP Pier would contribute to the ongoing trend of development at NAVBASE Kitsap Bangor and the region in general. However, the contribution to aesthetic conditions would be small considering that the TPP Pier would be one structure located in an industrial waterfront that includes many piers, wharves, buildings, and barriers. Due to the intervening distance, a cumulative visual impact with existing and future projects outside of NAVBASE Kitsap Bangor would be minimal.

Based on the above analysis, the TPP Pier would not have significant cumulative visual impacts when considered in conjunction with other past, present, and reasonably foreseeable future actions.

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## 5 Other Considerations Required by NEPA

### 5.1 Consistency with Other Federal, State, and Local Laws, 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, tribal, 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 compliance with these laws and regulations would be accomplished.

**Table 5-1. Summary of Regulatory Compliance for the Proposed Action**

<i>Law or Regulation</i>	<i>Responsible Agency</i>	<i>Compliance</i>
National Environmental Policy Act	Navy	This EA has been prepared in accordance with NEPA, CEQ regulations, and Navy NEPA regulations and procedures. Public participation and review was conducted in compliance with NEPA.
Federal Water Pollution Control Act (Clean Water Act)	USACE, USEPA, and WDOE	A permit under Section 404 of the CWA is required for the discharge of fill into Waters of the U.S. Through the JARPA process, the Navy applied to WDOE for a Section 401 Water Quality Certification and to USACE for a Section 404 Permit on June 9, 2020. In-water work will not begin until all CWA-related permits are received. Operational stormwater discharges would be covered by the NAVBASE Kitsap Bangor MSGP from the USEPA, Region 10.
Rivers and Harbors Act	USACE	A Rivers and Harbors Act Section 10 permit from the USACE is required for placement of new structures in navigable waters. The Navy applied for a Section 10 permit through the JARPA process.
Endangered Species Act	NMFS and USFWS	In accordance with ESA section 7 requirements, the Navy prepared a Biological Assessment (BA) that concludes that the Proposed Action is likely to adversely affect salmonid species, steelhead, and rockfish, and not likely to adversely affect bull trout, Southern Resident killer whales, humpback whales, or marbled murrelets. The Proposed Action would have no effect on critical habitat in the Action Area for listed species. The Navy submitted the BA to NMFS on January 15, 2020, and to USFWS on January 14, 2020. In a letter dated March 25, 2021, USFWS concurred with the Navy's determinations regarding bull trout and marbled murrelet. On April 27, 2021, NMFS concurred with the Navy's determinations regarding salmon species, steelhead, rockfish, Southern Resident killer whales, and humpback whales.
Marine Mammal Protection Act	NMFS	Based on potential impacts to marine mammals as defined by the MMPA, the Navy prepared a request for authorization for incidental harassment (IHA) for level "A" injury (to harbor seals only) and level "B" harassment (to harbor seals and other marine mammals). The Navy submitted the IHA to NMFS on January 14, 2020. NMFS published a Final Rule in the Federal Register on October 28, 2020. NMFS issued the final IHA October 7, 2021.

**Table 5-1. Summary of Regulatory Compliance for the TPP (continued)**

<b>Law or Regulation</b>	<b>Responsible Agency</b>	<b>Compliance</b>
Magnuson-Stevens Fishery Conservation and Management Act	NMFS	This EA analyzes potential effects on Essential Fish Habitat (EFH) protected under the MSA. The Proposed Action may adversely affect Pacific coast groundfish, coastal pelagic, and Pacific Coast salmon EFH. However, implementation of BMPs and impact minimization measures (Section 2.6) would avoid or minimize adverse effects on EFH to the extent practicable. The Navy consulted with NMFS under the MSA and submitted an EFH Assessment to NMFS on January 15, 2020. Consultation was concluded on April 27, 2021 .
Migratory Bird Treaty Act	USFWS	Exposure to underwater and airborne sound from pile driving could cause behavioral disturbance to migratory birds, but would not be anticipated to result in injury or mortality. Therefore, the Navy has determined that the Proposed Action would not adversely affect migratory birds under the MBTA.
Bald and Golden Eagle Protection Act	USFWS	Construction noise and disturbance could cause behavioral disturbance to nesting bald eagles. The Navy consulted with the USFWS and requested a permit on August 27, 2020. USFWS issued the permit on October 27, 2020.
Coastal Zone Management Act	NOAA and WDOE	The Navy determined that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of the Washington State Coastal Zone Management Program. The Navy submitted the Federal Consistency Determination to WDOE on June 8, 2020, for concurrence and concluded consultation on April 5, 2021.
Clean Air Act	USEPA	Kitsap County is in attainment for all NAAQS and no conformity determination is required.
National Historic Preservation Act	SHPO	The Navy concluded consultation with the SHPO under Section 106 of the NHPA. SHPO concurred with the Navy’s definition of the APE and finding of no adverse effect. The Navy also conducted Section 106 consultation with the affected tribes. The Suquamish Tribe concurred with the APE and the determination of effects. The Jamestown S’Klallam Tribe initially concurred with the project APE on May 1, 2017, and the Finding of Effect on September 19, 2019. The Lower Elwha Klallam Tribe deferred to the Port Gamble S’Klallam Tribe. The Port Gamble S’Klallam Tribe did not concur. The Skokomish Tribe did not respond to the Navy’s request for concurrence. The Navy sent a Final Finding of Effect to SHPO on June30, 2021, with copies to the tribes. SHPO did not respond. The Suquamish Tribe acknowledged receipt of the letter. The Jamestown S’Klallam withdrew (or rescinded) concurrence on October 3, 2022. The other tribes did not respond.
Executive Order 13175, Government-to-Government Consultation	Navy	The Navy sent an invitation to initiate government-to-government consultation with potentially affected American Indian tribes concerning potential effects of the Proposed Action on protected tribal resources and treaty rights. The Skokomish Tribe signed a Memorandum of agreement for the project on March 3 2021. Government-to-government consultation with the remaining affected tribes is ongoing.

<i>Law or Regulation</i>	<i>Responsible Agency</i>	<i>Compliance</i>
Native American Graves Protection and Repatriation Act	Navy and SHPO	If the Navy were to encounter human remains, funerary objects, sacred objects, or objects of cultural patrimony as defined by NAGPRA, the Navy would comply with NAGPRA and consult with the SHPO, affected American Indian tribes and other interested parties.
Executive Order 12898, Environmental Justice	Navy	Implementation of the Proposed Action would not result in any disproportionately high and adverse human health or environmental effects on minority or low-income populations.
Executive Order 13045, Children’s Health and Safety	Navy	There are no residences, schools, or other facilities used by children within the waterfront areas. The Proposed Action would not cause environmental health risks and safety risks, such as products and substances that children could come in contact with or ingest, that may disproportionately affect children.

CAA = Clean Air Act

CCD = Coastal Consistency Determination

CEQ = Council on Environmental Quality

CZMA = Coastal Zone Management Act

EA = Environmental Assessment

EFH = Essential Fish Habitat

ESA = Endangered Species Act

IHA = Incidental Harassment Authorization

JARPA = Joint Aquatic Resources Permit Application

MBTA = Migratory Bird Treaty Act

MMPA = Marine Mammal Protection Act

MSA = Magnuson-Stevens Fishery Conservation and Management Act

MSGP = Multi-Sector General Permit

NAAQS = National Ambient Air Quality Standards

NAGPRA = Native American Graves Protection and Repatriation Act

NAVBASE = Naval Base

NEPA = National Environmental Policy Act

NHPA = National Historic Preservation Act

NMFS = National Marine Fisheries Service

NOAA = National Oceanic and Atmospheric Administration

SHPO = State Historic Preservation Officer

U.S. = United States

USACE = U.S. Army Corps of Engineers

USEPA = U.S. Environmental Protection Agency

USFWS = U.S. Fish and Wildlife Service

WDOE = Washington State Department of Ecology

## 5.2 Irreversible and Irretrievable Commitments of Resources

Section 102(c)(v) of the National Environmental Policy Act (NEPA) requires that an Environmental Assessment (EA) identify “any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented.” Implementation of this action would involve commitment of a range of natural, physical, human, and fiscal resources.

Raw construction materials, such as cement, aggregate, wood, steel, water, and fossil fuel, and labor would be expended in constructing the Transit Protection Program (TPP) project. Natural resources and labor would also be used to fabricate material and equipment that would be used at the facility. These materials and labor, as well as the expenditure of funds, would be irreversibly committed to the project. However, these types of construction materials and labor are not in short supply and their continued use would not adversely impact the availability of these resources.

Resources would continue to be consumed during operation. The project would require expenditure of capital, energy, and natural resources, such as water. These resources once consumed are lost permanently.

### 5.3 Unavoidable Adverse Impacts

The analysis of the TPP project presented in this EA has identified the potential for adverse environmental impacts. Mitigation measures that would be implemented to either avoid or minimize these impacts have been identified. The adverse impacts that remain after implementing mitigation measures are considered to be unavoidable. These impacts include increased noise during construction and its effect on fish, wildlife, and humans; loss of marine habitat due to the placement of new in-water structures; and the loss of forest vegetation for roads and buildings (permanent) and for staging areas and utility work (temporary).

The TPP Proposed Action would cause short-term unavoidable impacts during construction, particularly with regard to pile-driving activities. Pile driving would generate high levels of underwater noise and vibration, as well as airborne noise. These high sound levels would adversely impact fish, marine mammals, and other wildlife and would be unavoidable. Pile-driving noise during construction would adversely impact recreational areas of Hood Canal. Pile driving would increase turbidity on a localized basis. There would also be adverse traffic impacts to travelers on State Route-104 due to delays caused by openings of the Hood Canal Bridge to accommodate construction vessel traffic.

The new in-water structures would create shade, although minimized by design elements including the installation of under-pier/trestle lighting, and nighttime lighting which would cause minor changes in habitat conditions for marine vegetation, fish, marine mammals, and other aquatic organisms. These changes would unavoidably impact the type, abundance, and/or behavior of some species in the vicinity of the in-water structures. The in-water structures proposed under Alternative 1 could alter the behavior of returning adult salmon, but are not expected to affect juvenile salmon migration in the long term. The in-water structures proposed under Alternative 2 would present a greater barrier to migrating juvenile salmonids. However, considering the full life history and all mortality sources for the affected salmonid species, the potential for impacts on tribal salmon fishery resources would be minimal. New structures would displace a maximum of approximately 6 acres of forest habitat.

There would be an unavoidable increase in noise associated with the use of utilities and energy to support the project, as well as increased traffic. In the long term, this impact would be negligible.

### 5.4 Relationship Between Short-Term Uses of the Human Environment and the Enhancement of 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 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. Construction and operation of the TPP under the Proposed Action would cause temporary and long-term impacts and use of natural resources. Construction impacts would include increased noise, air pollutant emissions, traffic, disturbance to marine vegetation, fish, and wildlife, and lost upland vegetation and soft-bottom habitat, as well as some project benefits such as increased employment and income. Ongoing impacts from operations would vary by alternative, but would include loss of marine habitat, increases in nighttime lighting, energy use, and traffic.

The Proposed Action would somewhat reduce the long-term productivity of resources in the project area. For example, the TPP project would cause loss and/or shading of marine habitats for the life of the facility, although shading would be minimized by design elements including under-pier/trestle lighting and would remove upland vegetation and reduce available wildlife habitat in the area. Proposed mitigations (see Table 3.9-2) would be implemented to compensate for the impacts of the selected alternative on marine habitats and species such that the Proposed Action would have no net contribution to cumulative impacts.

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