Draft Environmental Assessment

EHW-1 Pile Replacement and Maintenance
Naval Base Kitsap Bangor
Silverdale, Washington

October 2014

Naval Facilities Engineering Command Northwest
1101 Tautog Circle
Silverdale, WA 98315

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LEAD AGENCY:	United States Department of the Navy
FOR FURTHER INFORMATION CONTACT:	Mr. Benjamin Keasler NEPA Project Manager NAVFAC Northwest 1101 Tautog Circle, Suite 102 Silverdale, WA 98315

ABSTRACT:

This environmental assessment (EA) evaluates the potential environmental impacts associated with the United States (U.S.) Department of the Navy's (Navy's) proposed action to perform maintenance and restore the structural integrity of the Explosives Handling Wharf #1 (EHW-1) facility located at Naval Base (NAVBASE) Kitsap Bangor, WA. The Proposed Action includes demolishing four 24-inch hollow prestressed octagonal concrete piles and installing four 30-inch concrete filled steel piles adjacent to the demolished piles at Bent 27 of the outboard support of the EHW-1. Additionally, the project includes replacement of structural elements such as decking and pile caps, installation of cathodic protection, repair of a concrete wetwell, and recoating of the tops of fender piles and steel mooring fittings. As part of the Navy's mission, maintaining facilities and readiness is a priority. Since the action is to replace existing piles and conduct other maintenance, the only alternative would be to not perform maintenance and replace piles; therefore, no practical or feasible action alternatives were identified. This EA will analyze the Proposed Action and the No-Action alternative. The analysis addresses potential direct and indirect impacts on sediments, water quality, airborne noise, biological resources, cultural resources, American Indian traditional resources and cumulative impacts. There is no cooperating agency for this document.

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Table of Contents

1 PROPOSED ACTION, PURPOSE AND NEED 1-1
1.1 INTRODUCTION 1-1
1.2 LOCATION 1-1
1.3 PURPOSE AND NEED 1-2
1.4 SCOPE OF ENVIRONMENTAL ANALYSIS 1-2
1.5 RELEVANT LAWS AND REGULATIONS 1-4
1.6 PUBLIC INVOLVEMENT 1-5
2 PROPOSED ACTION AND ALTERNATIVES 2-1
2.1 PROPOSED ACTION 2-1
2.2 ALTERNATIVES 2-1
2.3 PILE REPLACEMENT AND MAINTENANCE CONSTRUCTION METHODS 2-2
2.3.1 Pile Removal 2-2
2.3.2 Pile Installation 2-2
2.3.3 Associated Marine Structure Repairs and Maintenance 2-3
2.3.4 Construction Access and Project Staging 2-4
2.3.5 Project Duration and Sequencing 2-4
2.4 BEST MANAGEMENT PRACTICES (BMPs) AND MINIMIZATION MEASURES 2-4
2.4.1 General 2-4
2.4.2 BMPs 2-5
2.4.3 Timing Restrictions 2-5
2.4.4 Sound Attenuation 2-6
2.4.5 Species Monitoring and Shutdown 2-6
2.4.6 Soft Start 2-6
3 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES 3-1
3.1 SEDIMENTS 3-1
3.1.1 Regulatory Overview 3-1
3.1.2 Affected Environment 3-1
3.1.3 Environmental Consequences 3-1
3.2 WATER QUALITY 3-2
3.2.1 Regulatory Overview 3-2
3.2.2 Affected Environment 3-3
3.2.3 Environmental Consequences 3-4
3.3 AIRBORNE NOISE 3-5
3.3.1 Regulatory Overview 3-6
3.3.2 Affected Environment 3-7
3.3.3 Environmental Consequences 3-8
3.4 BIOLOGICAL RESOURCES 3-10
3.4.1 Regulatory Overview 3-10
3.4.2 Affected Environment 3-12
3.4.3 Environmental Consequences 3-33
3.5 CULTURAL RESOURCES 3-52
3.5.1 Affected Environment 3-53
3.5.2 Environmental Consequences 3-54
3.6 AMERICAN INDIAN TRADITIONAL RESOURCES 3-55

3.6.1 Regulatory Overview 3-55
3.6.2 Affected Environment 3-55
3.6.3 Environmental Consequences 3-56
4 CUMULATIVE IMPACTS 4-1
4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE PROJECTS 4-1
4.2 ASSESSMENT OF CUMULATIVE IMPACTS BY RESOURCE 4-8
4.2.1 Sediment 4-8
4.2.2 Water Quality 4-8
4.2.3 Airborne Noise 4-8
4.2.4 Biological Resources 4-9
4.2.5 Cultural Resources 4-14
4.2.6 American Indian Traditional Resources 4-14
4.2.7 Greenhouse Gas (GHG) Cumulative Effects 4-15
5 **OTHER CONSIDERATIONS REQUIRED BY NEPA** 5-1
5.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF Natural or Depletable RESOURCES 5-3
5.2 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE ENHANCEMENT OF LONG-TERM PRODUCTIVITY 5-3
5.3 MEANS TO MITIGATE AND/OR MONITOR ADVERSE ENVIRONMENTAL IMPACTS (40 CFR SECTION 1502.16(H)) 5-4
5.4 ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED AND ARE NOT AMENABLE TO MITIGATION 5-4
6 **LIST OF REFERENCES** 6-1
7 **LIST OF PREPARERS** 7-1

Appendices

Appendix A Agency Correspondence
Appendix B Public Involvement
Appendix C Biological Assessment and Essential Fish Habitat Evaluation

List of Figures

Figure **Page**
Figure 1-1 NAVBASE Kitsap Bangor Vicinity Map 1-6
Figure 1-2 NAVBASE Kitsap Bangor 1-7
Figure 2-1 EHW-1 Project Work Area 2-8
Figure 2-2 EHW-1 Pile Replacement Layout 2-9
Figure 2-3 EHW-1 Pile Replacement Configuration 2-10
Figure 3-1 Distance to Underwater Sound Thresholds for Fish during Impact Pile Driving ... 3-41
Figure 3-2 Distance to Underwater Sound Threshold for Fish during Vibratory Pile Driving 3-42
Figure 3-3 Distance Masking Thresholds for Marbled Murrelet during Impact Pile Driving .. 3-46
Figure 3-4 Representative View of Affected Areas for Marine Mammals due to Underwater Pile Driving Noise 3-48

List of Tables

Table **Page**

Table 2-1 EHW-1 Proposed Pile Replacement and Maintenance Activities 2-1
Table 3-1 Hood Canal Water Quality Classification and Criteria 3-4
Table 3-2 WAC 173-60 Maximum Permissible Daytime[1] Environmental Noise Levels 3-6
Table 3-3 Maximum Noise Levels at 50 Feet for Common Construction Equipment 3-7
Table 3-4 Marine Mammals Potentially Present Within Hood Canal 3-12
Table 3-5 Marine Birds within Vicinity of Project Area (Mar-Sept) 3-13
Table 3-6 Benthic Invertebrates at NAVBASE Kitsap Bangor Waterfront 3-18
Table 3-7 ESA Species and Critical Habitat Potentially Present within Vicinity of Proposed Action 3-21
Table 3-8 Airborne and Underwater Noise Injury and Disturbance Thresholds for Marine Mammals, Fish, and Marbled Murrelets 3-35
Table 3-9 Distances From Piles Where Noise Exceeds Fish Thresholds and Guidance 3-40
Table 3-10 Calculated Radial Distance(s) to Underwater Marine Mammal Pile Driving Noise Thresholds and Area Encompassed within Threshold Distance 3-47
Table 3-11 Number of Potential Exposures of Marine Mammals to Behavioral Harassment Thresholds 3-49
Table 3-12 Calculated and Measured Distances to Pinniped Behavioral Airborne Noise Thresholds 3-50
Table 4-1 Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI 4-2
Table 5-1 Principal Federal Laws Applicable to the Proposed Action 5-1

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ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BACT	Best Available Control Technology
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
CAA	Clean Air Act
CAO	Critical Areas Ordinance
CCD	Coastal Consistency Determination
CDC	Child Development Center
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIA	Controlled Industrial Area
CISS	Cast-In-Steel-Shell
cm	Centimeter
CNRNW	Commander, Navy Region Northwest
CO_2	Carbon Dioxide
CSL	Cleanup Screening Levels
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DAHP	Department of Archaeological and Historic Preservation
dB	Decibel
dBA	Decibels Adjusted
DNL	Day-Night Average Sound Level
DO	Dissolved Oxygen
DoD	Department of Defense
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EHW	Explosives Handling Wharf
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	Feet
FY	Fiscal Year
GHG	Greenhouse Gases
HAP	Hazard Air Pollutants
HCCC	Hood Canal Coordinating Council
HDPE	High-Density Polyethylene

Hp	Horsepower
Hz	Hertz
IHA	Incidental Harassment Authorization
JARPA	Joint Aquatic Resources Permit Application
K/B	Keyport/Bangor
kHz	Kilohertz
km	Kilometer
lbs	Pounds
LOA	Letter of Authorization
m	Meter
MBTA	Migratory Bird Treaty Act
MILCON	Military Construction
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MOA	Military Operating Area
MSA	Magnuson-Stevens Fisheries Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Grave Protection and Repatriation Act
NAS	Naval Air Station
NAVBASE	Naval Base
NAVMAG	Naval Magazine
NAVSTA	Naval Station
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NSC	Naval Supply Center
NUWC	Naval Undersea Warfare Center
NWCAA	Northwest Clean Air Agency
OPNAVINST	Office of the Chief of Naval Operations Instruction
ORCAA	Olympic Region Clean Air Agency
OU	Operable Unit
Pa	Pascal
PCB	Polychlorinated Biphenyls
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns In Diameter
PM_{10}	Particulate Matter Less Than 10 Microns In Diameter
PSAMP	Puget Sound Ambient Monitoring Program
PSCAA	Puget Sound Clean Air Agency
PTRCI	Properties of Traditional Religious and Cultural Importance
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RMS	Root Mean Square
ROD	Record of Decision
SAV	Submerged Aquatic Vegetation

SECNAVINST	Secretary of the Navy Instruction
SED	Shoreline Environment Designations
SEL	Sound Exposure Level
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Officer
SMA	Shoreline Management Act
SMS	Sediment Management Standards
SO_2	Sulfur Dioxide
SPL	Sound Pressure Level
SQS	Sediment Quality Standards
SRKW	Southern Resident killer whale
STA	Sediment Trend Analysis
TMDL	total maximum daily load
TTS	Temporary Threshold Shift
U&A	Usual and Accustomed
USACE	United States Army Corps of Engineers
U.S.	United States
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WDOE	Washington Department of Ecology
WQA	Water Quality Assessment
WQC	Water Quality Certification
WSDOT	Washington State Department of Transportation
μPa	MicroPascal

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1 PROPOSED ACTION, PURPOSE AND NEED

1.1 INTRODUCTION

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [USC] §4321-4370h), as implemented by the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); Navy regulations for implementing NEPA (32 CFR Part 775); and Chief of Naval Operations Instruction (OPNAVINST) 5090.1D, Environmental Readiness Program.

The Navy proposes to perform maintenance and restore the structural integrity of the Explosives Handling Wharf #1 (EHW-1) facility located at Naval Base (NAVBASE) Kitsap Bangor, WA (Figure 1-1). EHW-1 is a U-shaped concrete structure built in 1978 for ordnance handling operations in support of the Trident Submarine squadron home ported at NAVBASE Kitsap Bangor. EHW-1 consists of two 100-foot (ft) (30 meters [m]) access trestles and a main pier deck which measures approximately 700 ft (213 m) in length and is approximately 500 ft (183 m) wide. The wharf is supported by both 16-inch and 24-inch hollow octagonal pre-cast concrete piles (approximately 130 ft [40 m] in length). Additionally, there are steel and timber fender piles on the outboard and inboard edges of the wharf.

The Proposed Action includes demolishing four 24-inch hollow prestressed octagonal concrete piles and installing four 30-inch concrete filled steel piles adjacent to the demolished piles at Bent 27 of the outboard support of the EHW-1. Additionally, the project includes replacement of structural elements such as decking and pile caps, installation of cathodic protection, repair of a concrete wetwell, and recoating of the tops of fender piles and steel mooring fittings.

Construction associated with the Proposed Action is expected to begin in July 2015 and to be completed in January 2016, to minimize impacts to endangered fish (discussed under Section 2.4.3). In-water work would be expected to take approximately 3 weeks to complete, while all repairs would be expected to be completed over a three month period. No work would begin on the Proposed Action until the Navy has received all required permits and approvals. Construction would occur when the wharf is not in operational use.

This EA will be reviewed by the Navy, who will make a determination regarding the Proposed Action and whether a finding of no significant impacts (FONSI) or an EIS is appropriate. There are no cooperating agencies for the Proposed Action.

1.2 LOCATION

NAVBASE Kitsap Bangor is located north of the community of Silverdale in Kitsap County on the eastern shoreline of northern Hood Canal (Figure 1-2). Hood Canal is a long, narrow fjord-like basin of western Puget Sound. Throughout its 67-mile length, the width of the canal varies from 1 to 2 miles and exhibits strong depth/elevation gradients and irregular seafloor topography in many areas. The width of the canal is approximately 1.5 miles at the project site, 2.2 miles at the northern end of NAVBASE Kitsap Bangor, and constricts to approximately 1.1 miles near the southern end near Hazel Point. Although no official boundaries exist along the waterway, the northeastern section of the canal extending from the mouth of the canal at Admiralty Inlet to the southern tip of Toandos Peninsula is referred to as northern Hood Canal.

Within northern Hood Canal, nearshore development is limited with NAVBASE Kitsap Bangor representing the largest industrial waterfront. There are many nearshore structures in the southern portion of Hood Canal, primarily smaller docks. A few docks and a small pier occur at Seabeck, more than 8 miles (13 kilometers) south, and the Hood Canal Bridge, approximately 7 miles (11 kilometers) north of installation. The remainder of the northern Hood Canal shoreline is generally undeveloped.

The NAVBASE Kitsap Bangor waterfront occupies approximately 4.3 miles (7 kilometers) of the approximately 67-mile (108-kilometer) long eastern shoreline of Hood Canal. The entirety of NAVBASE Kitsap Bangor waterfront is restricted from general public access (Naval Restricted Areas 1 and 2 [33 CFR 334.1220]). The project is located in the Washington Department of Ecology (WDOE) Water Resource Inventory Area 15 and U.S. Geological Service Hydrologic Unit Code 17110018, Hood Canal.

EHW-1 is located along the northern waterfront of NAVBASE Kitsap Bangor and is one of eight pile supported structures at the installation.

1.3 PURPOSE AND NEED

The purpose of the proposed action is to maintain the existing EHW-1 in-water structure in working condition and to restore its structural integrity. The need for the Proposed Action is to ensure that this in-water structure continues to meet mission requirements.

1.4 SCOPE OF ENVIRONMENTAL ANALYSIS

This EA includes an analysis of potential environmental impacts associated with the Proposed Action. The environmental resources areas analyzed in this EA include: sediments, water quality, airborne noise, biological resources, cultural resources, and American Indian traditional resources.

Because potential impacts were considered to be negligible or nonexistent, the following resources were not evaluated in this EA:

Land Use – Implementation of the Proposed Action would not alter existing land use on- or off-base. All project activities would be conducted in previously disturbed areas at or adjacent to existing structures. Implementation of the Proposed Action would have no impact to the quality of nearby residential areas, parklands, or prime farmlands. The Proposed Action would have no impact on local or regional development patterns.

Air Quality - Effects on air quality from the implementation of the Proposed Action would be negligible due to the classification of attributed air sources and the attainment designation of Kitsap County in relation to the National Ambient Air Quality Standards. As described in 40 CFR Part 51, Determining Conformity of General Federal Actions to State or Federal Implementation Plans (the "General Conformity Rule"), all federal actions occurring in air basins designated in nonattainment or in a maintenance area must conform to an applicable implementation plan. Since Kitsap County is designated an attainment area for all criteria pollutants, the General Conformity Rule does not apply. The activities associated with the Proposed Action are limited to mobile sources and sources excluded from Notice of Construction requirements per Puget Sound Clean Air Agency Regulation I Article 6.03; therefore, New Source Review and Prevention of Significant Deterioration requirements do not apply.

Visual Resources – Visual resources are the natural and man-made features that give a particular environment its aesthetic qualities. In developed areas, the natural landscape is more likely to provide a background for more obvious man-made features. The size, forms, materials, and functions of buildings, structures, roadways, and infrastructure would generally define the visual character of the built environment. These features form the overall impression that an observer receives of an area or its landscape character. Attributes used to describe the visual resource value of an area include landscape character, perceived aesthetic value, and uniqueness. The Proposed Action includes replacement of piles and maintenance of the wharf. The Proposed Action would not change the appearance of EHW-1; therefore, no impacts to visual resources would occur.

Recreational and Commercial Fishing – Proposed pile driving activities could have an impact on the behavior of fish species. Fish could flee the immediate construction areas as a result of the Proposed Action, but would be expected to return to the area after the pile driving activities were concluded. However, recreational and commercial fishing does not occur near the EHW-1 project site as this area is restricted from access by the general public per 33 CFR 334.1220. Therefore, the activities described under the Proposed Action would have no impact on recreational and commercial fishing or shellfish harvesting.

Terrestrial Wildlife – The Proposed Action would occur within the waters of Hood Canal and does not have a terrestrial component. Construction activities would not adversely impact terrestrial habitats, and sound associated with construction would not harm native terrestrial wildlife due to the distance (over 525 feet) from the nearest terrestrial habitats. Therefore, the activities described under the Proposed Action would have no impact on terrestrial wildlife.

Socioeconomics and Environmental Justice – Implementation of the Proposed Action would not result in displacement of people or businesses and would not change the economic character or stability of the installations or surrounding areas. Construction activities would be conducted by contractors. The socioeconomic impacts related to temporary construction employment, if needed, would occur over a six-month period. The Proposed Action may create a small number of temporary jobs and contribute minimally to local earnings spending. Any additional population associated with this temporary employment would not create undue demand on housing, schools, or other social services. As such, no socioeconomic impacts are anticipated as a result of the construction associated with the Proposed Action.

Environmental justice concerns related to construction activity typically include: exposure to noise, safety hazards, pollutants, and other hazardous materials. Although low income and minority populations are present in the surrounding areas, none reside near the project sites and, thus, would not be subject to any disproportionate adverse impacts. There would be no disproportionately high and adverse environmental, human health, and socioeconomic affects upon minority and low-income populations, or children.

Traffic and Transportation – The volume of traffic would temporarily increase during pile replacement and maintenance activities with the presence of contractor vehicles and marine vessels arriving and working on-site. The influx of vehicles and marine vessels would be negligible when compared to government vehicles or contractors arriving and leaving for other activities that are concurrently going on at the facility. Pile delivery and disposal would generally be conducted via barge.

Bathymetry – Changes to bathymetry (seafloor topography) would not occur as the Proposed Action is replacing existing piles in highly localized and disturbed areas. The project site has been substantially modified by construction and operation of the existing wharf. Any mounding and displacement or movement of sediments would be temporary because of the limited scope of the proposed action and natural processes that would occur following completion of the construction activity would return the seafloor to near its original profile over time without intervention.

Health and Safety – The waterfront area of NAVBASE Kitsap Bangor is restricted from public access. Construction contractors and Navy employees would adhere to all applicable regulations with respect to environmental and safety regulations. Children are restricted from access to the Waterfront Restricted Area. The replacement of piles and other maintenance activities at EHW-1 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. Therefore, the activities described under the Proposed Action would have a negligible impact on health and safety of the public, children, construction contractors, or Navy employees with adherence to construction safety standards.

1.5 RELEVANT LAWS AND REGULATIONS

In addition to NEPA, CEQ, and Navy regulations, the Navy has prepared this EA integrating federal laws, statutes, regulations, and policies that are pertinent to the implementation of the proposed action including, but not limited to:

- Clean Air Act (CAA) (42 USC 7401 *et seq*.);
- Endangered Species Act (ESA) (16 USC 1531 *et seq*.);
- Marine Mammal Protection Act (MMPA) (16 USC 1361 *et seq*.);
- Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1361-1421h, as amended);
- Migratory Bird Treaty Act (MBTA) (16 USC 703-712);
- Bald and Golden Eagle Protection Act (16 USC 668-668d);
- Clean Water Act (CWA) (33 USC 1251 *et seq*.);
- Rivers and Harbors Act (RHA) (33 U.S.C. 401 *et seq*.);
- Coastal Zone Management Act (CZMA) (16 USC 1451 *et seq*.);
- National Historic Preservation Act (NHPA) (16 USC 470 *et seq*.);
- Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;*
- EO 12088, *Federal Compliance with Pollution Control Standards*;
- EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-income Populations*; and
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks.*

A description of the proposed action's consistency with these policies and regulations, as well as regulatory agencies responsible for their implementation is presented in Chapter 5.0 (Table 5-1).

1.6 Public Involvement

Public Review of the Draft EA The Navy has made the Draft EA available for public review and comment from October XX, 2014 to October XX, 2014 with a notice of availability (NOA) published in the local newspaper (Kitsap Sun). The Draft EA was also posted on the internet for review and comment. A summary of comments received, as well as the Navy's responses, is provided in Appendix B of the Final EA.

Release of the Final EA and Decision Document. The Final EA and decision document will be made available to the public. The NOA will be published in local newspapers and the Final EA and decision document will be posted on the internet.

Figure 1-1. NAVBASE Kitsap Bangor Vicinity Map

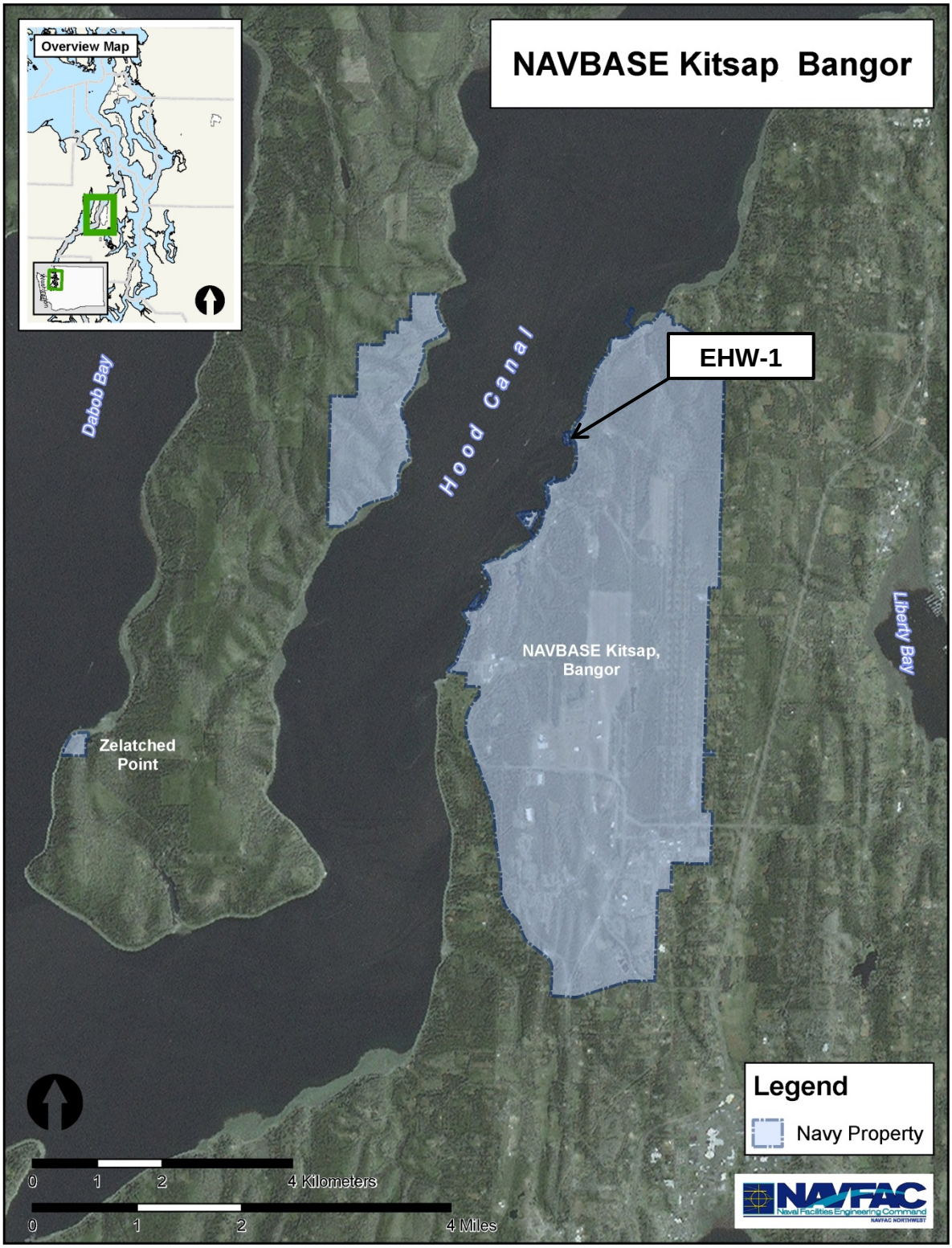

Figure 1-2. NAVBASE Kitsap Bangor

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2 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Navy proposes to perform maintenance and restore the structural integrity of the EHW-1 facility, including replacement of 4 structurally unsound piles. EHW-1 is a U-shaped concrete structure built in 1978 for ordnance handling operations in support of the Trident Submarine squadron home ported at NAVBASE Kitsap Bangor. EHW-1 consists of two 100-foot (ft) (30 meters [m]) access trestles and a main pier deck which measures approximately 700 ft (213 m) in length and is approximately 500 ft (183 m) wide. The wharf is supported by both 16-inch and 24-inch hollow octagonal pre-cast concrete piles (approximately 130 ft [40 m] in length). Additionally, there are steel and timber fender piles on the outboard and inboard edges of the wharf.

The project will include demolishing and replacing existing piles at Bent 27 of the outboard support of the EHW-1. Additionally, the project includes replacement of structural elements such as decking and pile caps, installation of cathodic protection, repair of a concrete wetwell (concrete encasement for a sanitary sewer lift station pump), and recoating of the tops of fender piles and steel mooring fittings (Figures 2-1 through 2-3). Table 2-1 provides a summary of the proposed maintenance and repair activities.

The Proposed Action includes best management practices (BMPs), and minimization measures that would be implemented to avoid or minimize potential environmental impacts as described in Section 2.4.

Table 2-1. EHW-1 Proposed Pile Replacement and Maintenance Activities

Demolish four existing 24-inch hollow prestressed octagonal concrete piles to the mudline.
Install four new 30-inch concrete filled steel pipe piles adjacent to the demolished piles.
Demolish and replace four 6'-0" by 4'-3" sections of deck in order to install new piles.
Install new concrete pile caps for the newly installed piles.
Install cathodic protection system for newly installed piles.
Repair deteriorated concrete of the wetwell on Wharf Apron.
Recoat top portion of 183 steel pipe fender piles.
Recoat 27 steel mooring fittings on the deck of the Wharf.

2.2 ALTERNATIVES

A reasonable range of alternatives to the Proposed Action must be considered in accordance with NEPA, CEQ regulations for implementing NEPA, and OPNAVINST 5090.1D (January 2014). However, only those alternatives determined to be reasonable relative to their ability to fulfill the purpose and need for the Proposed Action require detailed analysis. Since the action is to perform maintenance and replace piles at EHW-1, the only alternative would be to not perform maintenance and pile replacement; therefore, no practical or feasible action alternatives were

identified. Consequently, this EA will analyze the Proposed Action and the No-Action alternative.

Under the No-Action Alternative, maintenance and pile replacement would not occur at EHW-1 to restore structural integrity and mission readiness. The No-Action Alternative does not meet the purpose of and need for the Proposed Action, but represents the baseline condition against which potential consequences of the Proposed Action can be compared. As required by CEQ guidelines, the No-Action Alternative is carried forward for analysis in this EA.

2.3 PILE REPLACEMENT AND MAINTENANCE CONSTRUCTION METHODS

Sections 2.3.1 and 2.3.2 describe the planned methods that would be used to accomplish the pile removal and installation included as part of this Proposed Action. Other proposed maintenance and repairs at EHW-1 are described in Section 2.3.3.

2.3.1 Pile Removal

Four existing 24-inch hollow prestressed octagonal concrete piles located at Bent-27 would be removed with a pneumatic chipping hammer or another tool capable of cutting through concrete. If possible, piles would be first scored by a diver using a small pneumatic hammer. Each pile would be moved slightly back and forth to break at the score. Remaining pile parts would be chipped away with a pneumatic hammer. If there is not room to move a pile, the entire base of the pile would be chipped away with a pneumatic hammer for removal. A pneumatic chipping hammer is similar to an electric power tool and performs much like a smaller version of a jackhammer, but uses the energy of compressed air instead of electricity. The pneumatic chipping hammer consists of a steel piston that is reciprocated (moved backward and forward alternately) in a steel barrel by compressed air. On its forward stroke, the piston strikes the end of the chisel. The reciprocating motion of the piston occurs at such a rate that the chisel edge vibrates against the concrete with enough force to fragment or splinter the pile. Rebar strands in the piles would be torched to remove. Concrete debris would be captured as practicable using a debris curtains/sheeting and removed from the project area. Removed piles and/or pile pieces would be placed on a barge for upland disposal in accordance with federal and state requirements. The Navy would evaluate if it would be possible to reclaim or recycle the materials.

2.3.2 Pile Installation

To minimize potential impacts to fish and marine mammals due to underwater noise from impact pile driving, the Navy plans to utilize vibratory pile driving, to the maximum extent practicable, to install four 30-inch concrete filled steel piles adjacent to the demolished piles. The vibratory hammer would install the new piles to a point of refusal or within approximately 5 ft of the final tip elevation (approximately -110 ft MLLW). The vibratory hammer process for pile installation begins by placing a choker cable around a pile and lifting it into vertical position with a crane. The pile is then lowered into position and set in place at the mudline. The pile is held steady while the vibratory driver installs the pile to the required tip elevation. In some substrates, a vibratory driver may be unable to advance a pile until it reaches the required depth. In these cases, an impact hammer would be used to entirely advance the pile to the required depth. Based on the Navy's experience replacing piles during previous repair cycles at the EHW-1 facility, the Navy estimates that use of a vibratory hammer would be sufficient; the impact hammer has yet to be required to accomplish installation. Impact pile driving is anticipated to verify the load

bearing capacity (proofing[1]) of the new piles. An impact hammer is typically required to strike a pile a number of times the last few feet to ensure it has met load bearing specifications. To minimize noise levels, a bubble curtain or other noise attenuation device would be employed for all steel impact pile strikes, as described in section 2.4.4.

To provide a general estimate of daily steel pile impact driving durations, information from past projects using diesel hammers was used to estimate pile strikes and average strike rates needed to install 24- to 36-inch steel piles. For steel piles that are "proofed" an average of 400 strikes per pile were estimated. For piles that cannot be advanced with a vibratory driver and, therefore would be fully impact driven, 2,000 strikes per pile were estimated to fully drive a pile. This estimate assumes an average estimated strike rate of 44 strikes per minute (or almost a strike every second and a half) resulting in an estimate of approximately 9 minutes of impact driving for each pile proofed or approximately 45 minutes for each pile fully impact driven. Actual strike numbers and average strike rates would vary due to substrate conditions and the type and energy of impact hammers would likely vary. Past projects at EHW-1 have not required full impact driving. Therefore, steel impact pile driving is estimated to occur from approximately 36 minutes to a maximum of 3 hours to drive four piles.

2.3.3 Associated Marine Structure Repairs and Maintenance

Other marine structure repairs and maintenance include replacement of structural elements such as decking and pile caps, installation of cathodic protection, repair of a wetwell, and recoating of the tops of fender piles and steel mooring fittings. Each of these is described below.

- Demolish and replace four 6'-0" by 4'-3" sections of deck in order to install new piles. These deck structures would likely be removed by cutting the concrete into sections using a wire saw, or other equipment, and removed using a crane. The concrete debris would be captured using debris curtains/sheeting and removed from the project area. Concrete pieces would be hauled to a barge for upland disposal. New decking would likely be cast-in-place concrete. Concrete formwork would be located above Mean Higher High Water (MHHW). The visual character of the new decking would be similar to that of the old decking.
- Construction of cast-in-place concrete pile caps. The pile caps would be situated on the tops of the steel piles located directly beneath the structure and function as a load transfer mechanism between the superstructure and the piles. Concrete formwork may be located below MHHW. The concrete debris would be captured using debris curtains/sheeting and removed from the project area. The visual character of the new pile caps would be similar to that of the existing pile caps.
- Installation of four sled mounted passive cathodic protection systems. A passive cathodic protection system is a metallic rod or anode attached to a metal object to protect it from corrosion. A more active metal, which easily oxidizes, corrodes the anode first and protects the primary structure from corrosion damage. At the EHW-1 facility, the passive cathodic protection systems would be banded to the steel piles to prevent the metallic surfaces of the wharf from corroding due to the saline conditions in Hood Canal.
- Repair deteriorated concrete of the wetwell on Wharf Apron. A wetwell is a reinforced concrete encasement for a sanitary sewer lift station pump. Repairs would occur by

1 "Proofing" is driving the pile the last few feet into the substrate to determine the capacity of the pile. The capacity is established by measuring the resistance of the pile to a hammer that has a piston with a known weight and stroke (distance the hammer rises and falls) so that the energy on top of the pile can be calculated. The blow count in "blows per inch" is measured to verify resistance, and pile compression capacities are calculated.

removing failed and delaminated concrete. The reinforced steel substructure would then be repaired and new concrete applied. Large areas requiring concrete would be cast-in-place with formwork and smaller areas would be performed using hand trowels. The concrete debris would be captured using debris curtains/sheeting and removed from the project area.

- Recoat top portions of 183 steel pipe fender piles and 27 steel mooring fittings on the deck of the Wharf. Fender piles and mooring fittings would be cleaned prior to recoating. All coatings would be applied to dry surfaces and limited to areas above mean sea level (+6.5 ft MLLW). Coatings would be inorganic, non-toxic, and free of volatile organic compounds.

2.3.4 Construction Access and Project Staging

Barges would be used as platforms for conducting in-water work activities and to haul materials and equipment to and from the work site. Barges would be moored with spuds or anchors and not allowed to ground. No staging sites have been identified. If staging areas for equipment and materials are identified at a future date, they would occur in currently developed or disturbed areas.

2.3.5 Project Duration and Sequencing

No work would begin on the proposed action until the Navy has received all required permits and approvals. Construction would occur when the wharf is not in operational use. Construction associated with the Proposed Action is expected to begin on July 16, 2015 and to be completed no later than January 15, 2016, to minimize impacts to endangered fish (discussed below under Section 2.4.3). In-water work would be expected to take approximately 3 weeks to complete, while all repairs would be expected to be completed over a three month period.

While sequencing of all proposed repair work has not been scheduled, work would likely proceed with removal of deck segments occurring first, followed by installation of the new concrete filled steel piles and pile caps. Only after the new piles have been installed and the pile caps have fully cured and reached design compressive strength, would removal of the existing concrete piles begin.

2.4 BEST MANAGEMENT PRACTICES (BMPs) AND MINIMIZATION MEASURES

General BMPs, and minimization measures that would be implemented for all in-water repair and replacement activities are presented below. These BMPs are routinely used by the Navy during pile repair, replacement, and maintenance activities. BMPs are intended to avoid and minimize potential environmental impacts. Additional minimization measures, such as the use of noise attenuation devices during installation of steel piles with an impact hammer, have been added to protect ESA-listed species and designated critical habitats. Specific avoidance measures, such as species monitoring, would be applied as described in Section 3.4 of the EA, and as required by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS).

2.4.1 General

An Environmental Protection Plan (EPP) would be developed and implemented for the Proposed Action. The EPP would be completed prior to the commencement of any repair or replacement activities. The EPP would identify planning elements and recognize spill sources at the site. The EPP would outline BMPs, responsive actions in the event of a spill or release, and notification

and reporting procedures. The EPP would also outline contractor management elements such as personnel responsibilities, project site security, site inspections, and training.

2.4.2 BMPs

Other general BMPs incorporated in the EPP and implemented during project activities would include:

- No petroleum products, fresh cement, lime, fresh concrete, chemicals, or other toxic or harmful materials shall be allowed to enter surface waters.
- Washwater resulting from washdown of equipment or work areas shall be contained for proper disposal, and shall not be discharged unless authorized.
- Equipment that enters surface water shall be maintained to prevent any visible sheen from petroleum products.
- No oil, fuels, or chemicals shall be discharged to surface waters, or onto land. Fuel hoses, oil drums, oil or fuel transfer valves, fittings, etc. would be checked regularly for leaks and materials shall be maintained and stored properly to prevent spills.
- No cleaning solvents or chemicals used for tools or equipment cleaning shall be discharged to ground or surface waters.
- Oil-absorbent materials would be used in the event of a spill if any oil product is observed in the water.
- Waste materials would be disposed of in a state-approved landfill or recycled.
- Removed piles and associated sediments (if any) shall be contained on a barge or stored in a containment area on the pier.
- Construction materials would not be stored where high tides, wave action, or upland runoff could cause materials to enter surface waters.
- Hand tools would be used to excavate around piles to be replaced, if needed.
- The concrete debris would be captured using debris curtains/sheeting and removed from the project area.
- Any floating debris generated during installation would be retrieved. Any debris in the containment boom would be removed by the end of the work day or when the boom is removed, whichever occurs first.
- Barge operations would be restricted to tidal elevations adequate to prevent grounding of a barge.
- The tube used to fill steel piles with concrete would be placed inside and toward the bottom of the pile to prevent splashing and overflow.

2.4.3 Timing Restrictions

In-water work is planned to begin on July 16, 2015 and be completed by January 15, 2015. As such, in-water work would comply with the timing restrictions (or “fish windows”) developed through consultation with NMFS and USFWS to avoid conducting activities when bull trout and

juvenile salmon and steelhead are most likely to be present. The allowable time frame for in-water work at NAVBASE Kitsap Bangor is July 16 to February 15.

All in-water work would occur during daylight hours except from July 16 to September 23, when impact pile driving would only occur starting two hours after sunrise and ending two hours before sunset to protect foraging marbled murrelets during the nesting season (April 15 to September 23). Sunrise and sunset are based on the National Oceanic and Atmospheric Administration (NOAA) data.

To minimize noise impacts to surrounding residents, noise generating activities would not occur between the hours of 10:00 p.m. and 7:00 a.m.

2.4.4 Sound Attenuation

The Navy would use a bubble curtain or other noise attenuation device to minimize in-water sound during installation of steel piles with an impact driver. Confined and unconfined bubble curtains utilize air as a means of creating a barrier to sound propagation. Air is an effective means of attenuating sound due to the difference in density between air and water. A bubble curtain is usually a ring or series of stacked rings that are placed around a pile along the pile's entire length. The rings are made of tubing which has small holes through which compressed air is pumped. As compressed air is pumped through the tubing, bubbles are produced creating an air barrier which impedes the sound and pressure produced during pile driving from radiating away from the pile. In a confined system, the bubbles are confined to the area around the piles with a flexible material (plastic or cloth) or a rigid pipe.

2.4.5 Species Monitoring and Shutdown

The following measures would be implemented during pile driving to avoid marine mammal exposure to injurious noise levels generated from impact pile driving.

- Developed in coordination with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) and approved by these agencies prior to initiation of in-water work, a Marine Mammal Monitoring Plan and Marbled Murrelet Monitoring Plan would be prepared and finalized. Implementation of these plans would prevent exposure to potentially injurious noise levels.
- In accordance with the Plans, monitoring would occur within pre-determined shutdown zones for purposes of avoiding injurious effects. Marine mammal monitoring would take place from 15 minutes prior to initiation through 15 minutes post-completion of pile driving. Marbled Murrelet monitoring would take place from 30 minutes prior to initiation through 30 minutes post-completion of impact pile driving. Should a marine mammal or marbled murrelet enter the shutdown zone, pile driving would be immediately halted until the marine mammal or marbled murrelet has left the area.

2.4.6 Soft Start

The Navy would utilize a "soft-start" procedure to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to an impact driver operating at full capacity thereby, exposing fewer animals to loud underwater and airborne sounds. A soft start procedure would be used at the beginning of each day's in-water impact pile driving or any time impact pile driving has ceased for more than 30 minutes.

For impact pile driving, the following soft-start procedures would be conducted:

- The contractor would provide an initial set of strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent sets. (The reduced energy of an individual hammer cannot be quantified because they vary by individual drivers. Also, the number of strikes would vary at reduced energy because raising the hammer at less than full power and then releasing it results in the hammer "bouncing" as it strikes the pile resulting in multiple "strikes").

For vibratory pile driving, the following soft-start procedures would be conducted: [2]

- If a variable moment driver can be used, the contractor will initiate noise from vibratory drivers for 15 seconds at reduced energy followed by a 30-second waiting period. The procedure shall be repeated two additional times. If unsafe working conditions during soft starts are reported by the contractor and verified by an independent safety inspection, the Navy may elect to discontinue vibratory driver soft starts. The Navy will inform NFMS HQ if the soft start procedure is discontinued.
- If use of a variable moment driver is infeasible and the model of vibratory driver was not specifically designed for soft start procedures then the Navy will not employ vibratory soft start procedure due to historical personnel safety concerns.

[2] In 2013, vibratory pile driving during construction of a deep wharf, the Explosives Handling Wharf #2 (EHW-2) located at NAVBASE Kitsap Bangor, resulted in discontinuation of the soft-start procedure due to crane failure from excess wear due to the soft-start procedure. The Marine Mammal Commission has stated that the soft-start is a viable, effective component of a mitigation plan designed to effect the least practicable impact on marine mammals. In response to this concern, NMFS formed a working group with the Navy in April 2014 to address the soft-start procedures. At this time the EHW-2 project is the only project where the procedure has been waived.

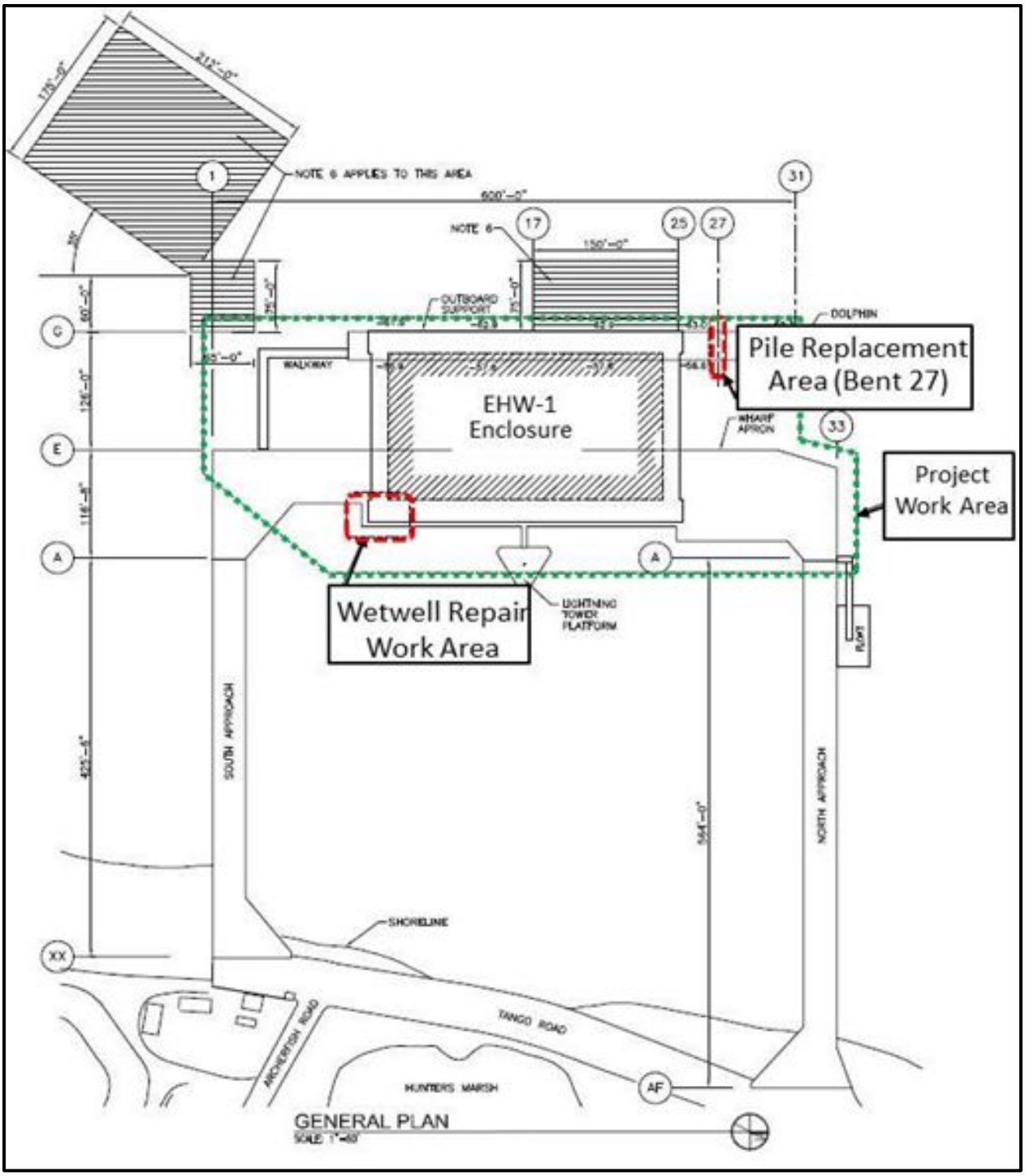

Figure 2-1. EHW-1 Project Work Area

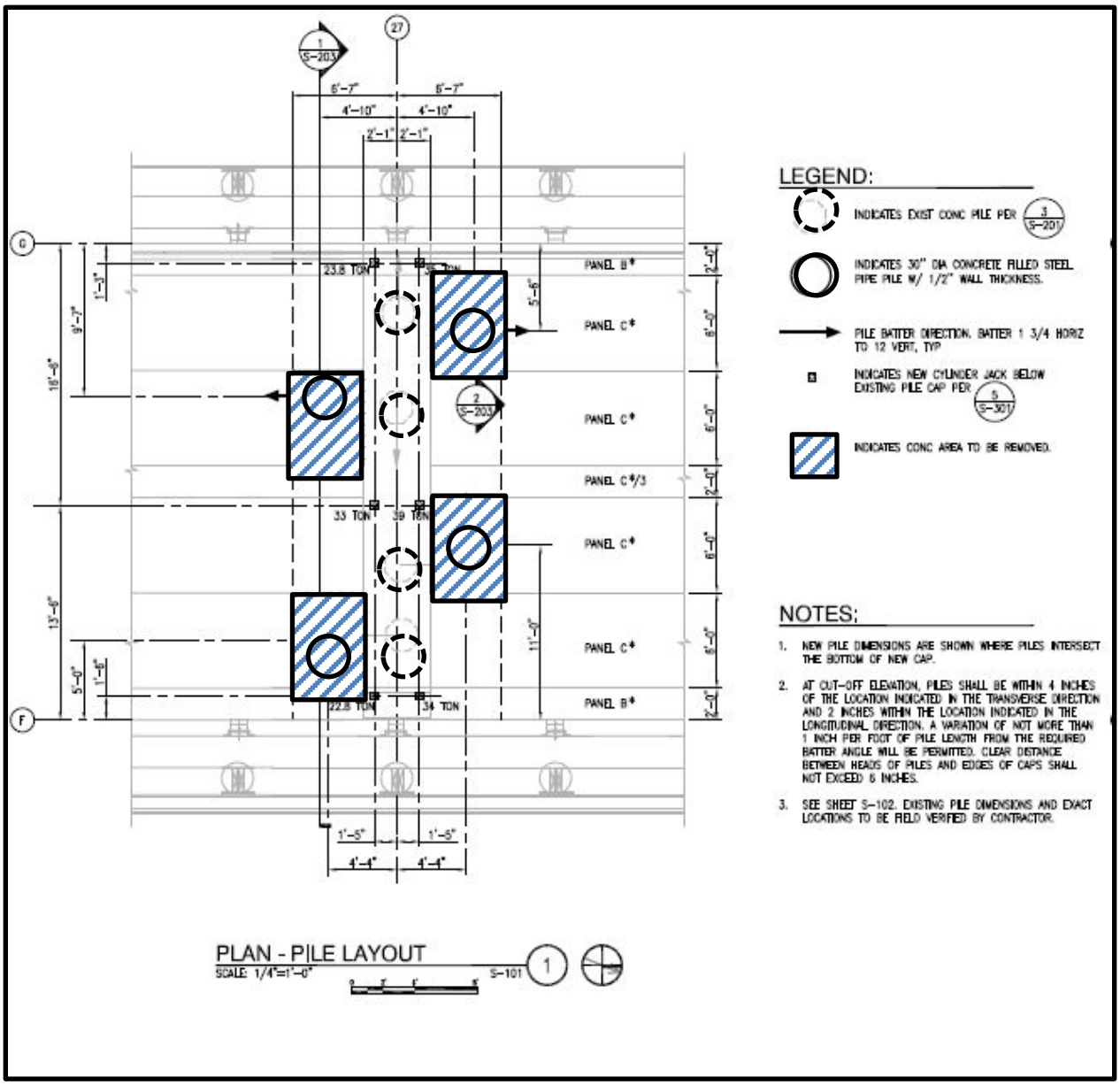

Figure 2-2. EHW-1 Pile Replacement Layout

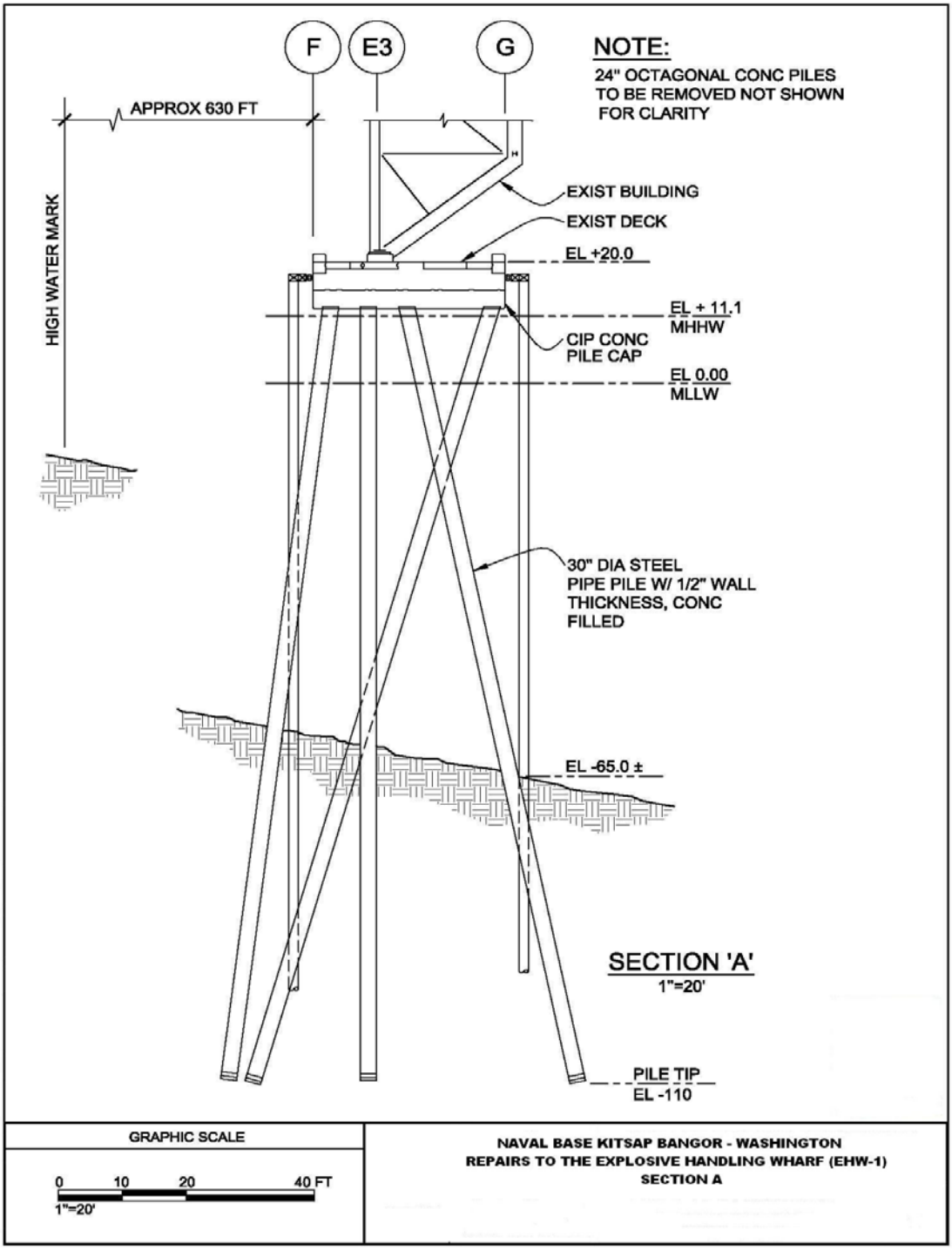

Figure 2-3. EHW-1 Pile Replacement Configuration

3 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This chapter presents baseline data for the affected environment and an assessment of the potential impacts, or environmental consequences that could result from implementation of the Proposed Action. The following resources are evaluated in this chapter: sediments, water quality, airborne noise, biological resources, cultural resources, and American Indian traditional resources.

3.1 SEDIMENTS

3.1.1 Regulatory Overview

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 would require further investigation to determine whether actual adverse impacts exist at the site due to contaminated sediments.

3.1.2 Affected Environment

Sediment found along the eastern shore of Hood Canal is primarily from natural erosion of bluffs (by wind or wave action). No rivers or large watersheds feed into Hood Canal along the east shore; however, numerous small drainages along the waterfront do feed Hood Canal, contributing to a secondary source of sedimentation.

Existing marine sediments at the proposed project sites 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 six feet (two meters) below mud line in the intertidal zone, increasing to over 10 feet (3 m) in the subtidal zone was found in subsurface coring studies performed in 1994 (URS, 1994). The composition of sediment samples from the EHW-1 project site ranged from 65 to 100 percent for sand, less than 1 to 7 percent for gravel, two to 32 percent silt, and 2 to 11 percent clay.

The Navy conducted sediment quality testing at the EHW-1 site in 2009. Testing included an analysis of Total Organic Carbon (TOC), metals and organic compounds. Analyses of samples collected determined that concentrations of contaminants were comparable to background levels for Puget Sound and below all applicable SQS and CSL values (Hammermeister and Hafner, 2009).

3.1.3 Environmental Consequences

The evaluation of impacts to marine sediments considers whether project-related activities would create conditions, such as sediment contamination or physical changes that violate state standards. Impacts would be considered significant if they violated state standards (Sediment Quality Standards, WAC 172-204-320).

3.1.3.1 Proposed Action

Under the proposed action, sediment would be disturbed and re-suspended in the water column during pile removal and pile driving activities. Such suspension would be localized to the immediate area of the pile being driven. Concrete sediment (anticipated to be sand-sized) resulting from cuts made with the chipping hammer is inert and would settle within hours onto the canal floor. These inert and dense particles would be incorporated into the sediments in the immediate area and would not contribute to any contamination. The use of the vibratory hammer and impact hammer for pile driving would cause the very fine soft sandy silt layers located above the hard glacial deposits to be susceptible to liquefaction and subsequent contraction. As a result, the sediments are expected to settle within hours to the bottom of the project area. The underlying glacial materials, although a coarse and cohesion-less granular material, would tend to collapse in on itself when drilled and removed (Hart Crowser, 2010). This action would have no effect on the subsurface slope stability within the project area. Setting spuds and anchors for the barges used for pile removal and installation could also cause disturbance of bottom sediments, but would not differ from day-to-day activities occurring in this waterfront area.

Impacts to sediment contamination levels would be negligible as no new sources of contaminants are proposed. Construction activities would not result in the discharge of wastes containing metals or otherwise alter the concentrations of trace metals in bottom sediments. Nor would construction activities result in the discharge of contaminants or otherwise alter the concentrations of organic contaminants in bottom sediments. However, because the magnitude of metal and organic compound concentrations in sediment can vary as a function of grain size (higher concentrations typically are associated with fine-grained sediments due to higher interior surface areas), small changes to grain size associated with construction-related disturbances to bottom sediments could result in minor changes in metal and organic compound concentrations. This would mainly occur in the removal of the piles. These changes are expected to be minimal and not cause chemical constituents to violate SQS due to the limited extent of pile removal (4 piles) and general lack of sediment contaminants in the project area.

Implementation of the Proposed Action would result in minor and localized impacts from resuspension of sediments but would not result in violation of Washington Sediment Quality Standards (WAC 172-204-320). Therefore, no significant impacts to sediments would occur with implementation of the Proposed Action.

3.1.3.2 No-Action Alternative

Under the No-Action Alternative, the proposed pile replacement and maintenance activities at EHW-1 would not occur and there would be no change to baseline sediment conditions due to the Proposed Action. Therefore, no significant impacts due to sediments would occur with implementation of the No-Action Alternative.

3.2 WATER QUALITY

3.2.1 Regulatory Overview

Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. Washington surface water quality standards contained in WAC-173-210A provide the basis for protecting and regulating the quality of surface waters in Washington State. The standards implement portions of the federal Clean Water Act (CWA) by specifying the designated and potential uses of waterbodies in the state. They 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.

The federal CWA requires that all states restore their waters to be "fishable and swimmable." Section 303(d) of the Clean Water Act established a process to identify and clean up polluted waters. Every two 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 available. WDOE compiles its own water quality data, and invites other groups to submit water quality data they have collected.

Waters whose beneficial uses – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants are placed in the "polluted water" category (Category 5) on the water quality assessment. Categories range from Category 1, waters that meet tested standards for clean waters, to Category 5, waters that fall short of state surface water quality standards and are not expected to improve within the next two years. The 303(d) list is comprised of those waters that have been designated as Category 5, impaired.

Waters placed on the 303(d) list require the preparation of a water cleanup plan, like a total maximum daily load (TMDL). The TMDL identifies how much pollution needs to be reduced or eliminated to achieve clean water. It identifies the maximum amount of a pollutant to be allowed to be released into a water body so that the beneficial uses of the water are not impaired.

The CWA contains the requirements to set water quality standards for all contaminants in surface waters. The U.S. Environmental Protection Agency (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, as well as other CWA requirements.

3.2.2 Affected Environment

NAVBASE Kitsap Bangor is located within an area of Hood Canal. Water quality classifications and applicable water quality criteria for the Hood Canal are listed in Table 3-1 (WAC 173-201A). Water quality in Hood Canal offshore of NAVBASE Kitsap Bangor is good and generally meets applicable water quality standards (Hafner and Dolan, 2009). However, dissolved oxygen (DO) levels within the Hood Canal are known to reach very low levels in the summer months and early fall months (a.k.a. hypoxia). This is especially true in the southern Hood Canal where natural and man-made environments combine to create conditions that can be potentially lethal to some underwater species. Water segments located south of the Service Pier, adjacent to Marginal Wharf, and just north of NAVBASE Kitsap Bangor are designated Category 5 water, impaired waters, for exceedances of dissolved oxygen (WDOE, 2014). 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.

Table 3-1. Hood Canal Water Quality Classification and Criteria

Water Quality Classification	***Water Quality Criteria***			
Aquatic Life	*Temperature*[1]	*Dissolved Oxygen*[2]	*Turbidity*[3]	*pH*[4]
Extraordinary Quality	13°C (55°F)	7.0 mg/L	+5 NTU or +10%	7.0 – 8.5
	Fecal Coliform			
Shellfish Harvesting	Geometric mean not to exceed 14 MPN/100 mL fecal coliforms[5]			
Recreation: Primary Contact	Geometric mean not to exceed 14 MPN/100 mL fecal coliforms[5]			

Notes:
°C - degrees Celsius, °F - degrees Fahrenheit, mg/L - milligrams per liter, mL – milliliters, NTU - nephelometric turbidity units

1. 1-day maximum (°C). 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. 1-day minimum (mg/L). When dissolved oxygen (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 ft from activity causing the exceedances. NTU over background when the background is 50 NTU or less; or 10% increase in turbidity when background turbidity is more than 50 NTU.
4. Human-caused variations within range must be less than 0.2 units.
5. No more than 10% of all samples used to calculate geometric mean may exceed 43 most probable number (MPN)/100 milliliters (mL); when averaging data, it is preferable to average by season and include five or more data collection events per period.

Source: WAC 173-201A as amended in November 2006.

The Navy has sampled the waters surrounding EHW-1 numerous times for water quality parameters (temperature, salinity, dissolved oxygen [DO], and turbidity) (Phillips et al., 2009 and Hafner and Dolan, 2009). This sampling has shown that the waters in the immediate vicinity of EHW-1 are consistently within the Washington State standards for extraordinary water quality for each of these parameters (Phillips et al., 2009 and Hafner and Dolan, 2009). An exception to these finding 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 the project site and further offshore showed similar results with the exception of DO, which typically ranged from excellent to extraordinary.

3.2.3 Environmental Consequences

Construction-related impacts to water quality with implementation of the Proposed Action would be short-term, temporary, and localized changes associated with re-suspension of bottom sediments from pile installation and tug operations, such as anchoring and propeller wash, as well as potential accidental losses or spills of construction materials or fuel into Hood Canal. These changes would be spatially limited to the construction area, including areas potentially impacted by anchor drag and areas immediately adjacent to the Wharf.

During the vibratory and impact pile driving activities, BMPs (See Section 2.4) would be used to avoid and minimize deleterious materials from entering the water. Accidental spills or discharges of deleterious materials would not be expected to significantly impact marine water.

Minor and localized sediment disturbance would occur and subsequently result in suspended sediments in the water column. The use of a vibratory hammer and impact hammer could cause the very fine, soft, sandy silt layers located above the hard glacial deposits to be susceptible to

disturbance and suspension. The cutting of the existing piles at the mud line with pneumatic hammer would generate only limited localized sedimentation and turbidity. Overall, the sediments generated from removing four 24-inch concrete piles and installing four 30-inch steel piles would be minimal and localized in the area of pile driving. Resuspended sediments would be expected settle back quickly to the bottom of the project area or be carried out with low-energy tidal flow and currents following conclusion of pile driving operations.

The proposed action would not discharge any waste containing materials with an oxygen demand into Hood Canal. Coatings applied to fender piles and mooring fittings would be inorganic, non-toxic, free of volatile organic compounds, and would not affect water quality. Pile installation would re-suspend bottom sediments, which may contain chemically reduced organic materials. Subsequent oxidation of sulfides, reduced iron, and organic matter associated with the suspended sediments 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). The impacts of sediment re-suspension from pile installation and removal on DO concentrations would be minimal and temporary.

Construction-related impacts would not increase pollution levels or violate applicable state or federal water quality standards, nor would they reduce the ability of Hood Canal to support its designated uses. BMPs would be implemented to prevent accidental losses or spills of construction debris and to minimize the impact of suspended sediments. Therefore, no significant impacts to water quality would occur with implementation of the Proposed Action.

3.2.3.1 No-Action Alternative

Under the No-Action Alternative, the proposed pile replacement and maintenance activities at EHW-1 would not occur and there would be no change to baseline water quality due to the Proposed Action. Therefore, no significant impacts to water quality would occur with implementation of the No-Action Alternative.

3.3 AIRBORNE 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 response to sound varies according to the type and characteristics of the noise source, distance between the noise source and the person, sensitivity of the person, and time of day.

A sensitive noise receptor is defined as a location or facility where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries.

Generally, noise is measured in units called decibels (dB); however, a number of factors affect how the human ear perceives sound: the actual level of noise, frequency, period of exposure, and fluctuations in noise levels during exposure. The dB system of measuring sound provides a simplified relationship between the physical intensity of sound and its perceived loudness to the human ear. The dB scale is logarithmic; therefore, sound intensity increases or decreases exponentially with each dB of change. For example, 10 dB yields a sound level 10 times more intense than 1 dB, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. Human speech is normally around the 60 dB level. Sound levels are typically used to assess

impacts to humans and thus are weighted (A-weighting) and expressed as dBA to correspond to the same frequency range that humans hear (approximately 20 hertz (Hz) to 20 kilohertz (kHz). A-weighting is typically applied to measuring noise for activities such as construction engine equipment and industrial ship yard activities. The perceived sound level changes as the subject's distance from the source increases. Therefore, the metrics are given in varying sound levels based on distance. Airborne noise levels are expressed in decibels relative to 20 micropascals and the units are listed as: (dB re 20 µPa).

3.3.1 Regulatory Overview

Section 4(b) of the Noise Control Act of 1972 (42 USC 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. Washington Administrative Code (WAC) Chapter 173-60 sets the requirements for Maximum Environmental Noise Levels. WAC 173-60 sets maximum permissible noise levels based on the type 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 3-2. WAC 173-60 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. to 10:00 p.m.

Kitsap County also has codes related to noise. Kitsap County Code Chapter 10.28, Noise, includes the codes related to noise control. Kitsap County follows a designation of EDNAs very similar to WAC 173-60 and has identical Maximum Permissible Environmental Noise Levels (see Table 3-2). 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.

Table 3-2. WAC 173-60 Maximum Permissible Daytime[1] Environmental Noise Levels

EDNA of Noise Source	***EDNA of Receiving Property***		
	Class A	**Class B**	**Class C**
Class A	55 dBA	57 dBA	60 dBA
Class B	57 dBA	60 dBA	65 dBA
Class C	60 dBA	65 dBA	70 dBA

1. WAC 173-60-040 defines daytime as the hours between 7:00 a.m. and 10:00 p.m.

Sound Environment

Ambient noise levels are made up of natural and man-made sounds. Natural sound sources include the wind, rain, thunder, water movement such as surf, and wildlife. The sound levels from these sources are typically low but can be pronounced during violent weather events. Ambient background noise in urbanized areas typically varies from 60 to 70 dBA. Cavanaugh and Tocci (1998) measured typical residential noise at 65 dBA. Depending on average daily traffic levels, traffic on roads could be expected to produce levels between 60 and 80 dBA during daytime hours.

Waterfront construction activities generate noise, with the greatest levels produced during pile driving operations. Airborne noise levels from impact pile driving are estimated at 110 dBA re 20 µPa at a distance of 50 feet (ft) from the pile, and 95 dBA re 20 µPa at 50 ft when using a vibratory driver (WSDOT, 2014, Illingworth and Rodkin, 2012). Table 3-3 outlines typical noise profiles of common construction equipment. Maximum noise levels produced by common construction equipment, including trucks, cranes, generators, pumps, and other equipment that might typically be employed are 90 dBA (WSDOT, 2014). 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 increase noise levels as much as 3 to 4 dB over the level of a single piece of equipment by itself (WSDOT, 2014). These maximum noise levels are intermittent in nature, and not present at all times.

Table 3-3. Maximum Noise Levels at 50 Feet for Common Construction Equipment

Equipment Type	Maximum Noise Level
Impact Pile Driver	110
Vibratory Pile Driver	95
Scraper	90
Backhoe	90
Crane	81
Pumps	81
Generator	81
Front Loader	79
Air Compressor	78

Sources: WSDOT, 2014, Illingworth and Rodkin, 2012
Maximum Sound Pressure Levels in dBA re 20µPa (A-weighted)

In general, sound pressure levels decrease as distance from the sound source increases (i.e., over a hard surface, such as water, doubling in distance results in a 6 dB reduction) (WSDOT, 2014). Two additional factors from natural conditions can further contribute to noise reduction between the source and the receptor. The first factor is a 1.5 dB reduction per doubling of distance in "soft-site" conditions, wherein normal, unpacked earth is the predominant soil condition. The second factor is a reduction of 10 dB for interposing dense vegetation (e.g., trees and brush) between the noise source and potential receptors (WSDOT, 2014).

3.3.2 Affected Environment

NAVBASE Kitsap Bangor is an active military base located adjacent to Hood Canal. The sound environment is influenced by the natural environment such as wind, surf, and marine traffic.

However, the primary source of sound in the environment is military activities such as waterfront operations, movement of people and military vehicles at the base, and the various industrial activities that occur at the shoreline facilities. The baseline airborne noise levels that occur at NAVBASE Kitsap Bangor on the waterfront range from 60 to 104 dBA, with an average of approximately 64 dBA (Navy, 2010). The majority of the daily ambient sound at the base that is considered noise is generated by human activities and is typical of an industrial area. The industrial area, including EHW-1, is considered an EDNA Class C. Activities include movement of marine vessels and heavy trucks, operation of equipment (such as cranes, forklifts, and other mechanized equipment), various industrial activities occurring at the shoreline and upland facilities, and general traffic. Evening and nighttime levels ranged from 64 to 96 dBA, with an average level of approximately 64 dBA (Navy, 2010). Measured levels were comparable to estimated noise levels from literature. Per published literature, presuming multiple sources of noise may be present at one time; maximum combined levels may be as high as 99 dBA. These maximum noise levels are intermittent in nature and not present at all times. Existing maximum baseline noise conditions at the waterfront during a typical work week are expected to be approximately 99 dBA due to typical truck, forklift, crane, and other industrial activities. Average baseline noise levels are expected to be in the 70-90 dBA range, consistent with urbanized or industrial environments where equipment is operating.

The closest EDNA Class A receptors (residences) are located just north of the northern property boundary, approximately 1.5 miles northeast of the project area. This residential area is buffered by dense vegetation, which extends from the residences to the shoreline adjacent to EHW-1. The project area is about 2.5 miles southwest of the nearest school and 13 miles north of the nearest hospital. Tribal shellfish harvesting is permitted approximately one mile south of the project area. The closest community west of the base (across Hood Canal) is approximately 4 miles away, and the closest on-base residence is 3.75 miles away. The portion of Hood Canal adjacent to the project area averages 1.5 miles in width and is bordered on the west by a 768-acre Navy-owned buffer strip on the Toandos Peninsula. This military buffer zone is restricted to the public and there is no recreational access. Areas surrounding the buffer area have rural and commercial forest land use designations by Jefferson County.

3.3.3 Environmental Consequences

The threshold of significance for noise impacts would be exceedances of an applicable noise threshold at a sensitive receptor (e.g., residential land uses, nursing homes, hospitals, etc.). Noise impacts to ESA-listed species, EFH, and marine mammals are discussed in Section 3.4.

3.3.3.1 Proposed Action

Noise generated from construction activities associated with the Proposed Action would include impact pile driving, vibratory pile driving, and a pneumatic chipping hammer to remove piles. Noise generated from impact pile driving would be expected to reach peaks of 110 dBA re 20µPa at a distance of 50 ft, while vibratory pile driving of piles would be expected to reach peaks of 95 dBA re 20µPa at a distance of 50 ft. A pneumatic chipping hammer utilized to remove 24 inch concrete piles would be estimated to produce peak noise levels of 90 dBA re 20µPa at 50 ft (WSDOT, 2014). Driving and extraction devices would not be used concurrently; rather, new steel piles would be installed one at a time, primarily by vibratory pile driving, followed by impact driving of the pile if required. Only after the four new piles have been installed would the pneumatic chipping hammer be used to cut the existing concrete piles for

removal. Other construction activities or equipment such as cranes, generators, and any other necessary equipment would also generate noise; however, this noise would be much lower in level compared to noise produced by the impact hammer (Table 3-3). In the absence of pile driving noise, the maximum construction noise from barges, tugboats, and equipment involved in deck and pile cap replacement, cathodic protection systems installation, and other maintenance work would be less than that of the vibratory hammer (WSDOT, 2014). All noise generating activities would be limited to the time between 7:00 a.m. and 10:00 p.m.

Sensitive receptors in residences located along the northern border of the Base would be expected to receive peak noise levels below 60 dBA during impact pile driving, which is within the regulatory limits for EDNA Class A receptors and below typical residential noise levels of 65 dBA as measured by Cavanaugh and Tocci (1998). This estimate is based on typical noise attenuation by distance (6 dBA for every doubling of distance over a distance of 1.5 miles) and 10dBA reduction attributed to the dense vegetation between the residential area and the location of the Proposed Action. Noise generated from vibratory pile driving and the pneumatic chipping hammer would also be below 60 dBA at these residences.

Sensitive receptors in the school located 2.5 miles northeast of the project site would be expected to receive to receive peak noise levels below 52 dBA. This estimate is based on typical noise attenuation of 6 dBA for every doubling of distance and a 10dBA reduction attributed to the dense vegetation between the school and the location of the Proposed Action.

Scuba divers diving in Hood Canal could experience underwater noise levels that could cause a behavioral response including increased breathing and elevated heart rate (154 dB re 1μPa) (Naval Submarine Medical Research Laboratory, 2002) within 40,000 feet of the construction site during pile driving activity but would not receive levels sufficient to cause injury (SPL of 200 dB re 1μPa). Other recreational users (i.e., boating, kayaking, fishing, etc.) in the vicinity could be exposed to noise levels. The sound levels would not be injurious but could result in a behavioral response such as avoiding the area around the installation. However, the waters adjacent to the Proposed Action are restricted for public access and the floating security barrier would prevent recreational users from getting close enough to the pile driver to receive injurious noise levels.

All noise resulting from the Proposed Action would be temporary construction-related noise occurring between the hours of 07:00 a.m. and 10:00 p.m. and therefore exempt from Washington State and Kitsap County noise codes. Based on the distance of the Proposed Action to sensitive receptors, and the vegetation and structures between the noise source and the receptors, noise generated during pile driving would attenuate to levels typically experienced in residential neighborhoods. Therefore, no significant impacts to the existing sound environment would result from implementation of the Proposed Action at NAVBASE Kitsap Bangor.

3.3.3.2 No-Action Alternative

Under the No-Action Alternative, the proposed pile replacement and maintenance activities would not occur and there would be no change to baseline noise levels due to the Proposed Action. Therefore, no significant impacts due to noise would occur with implementation of the No-Action Alternative.

3.4 Biological Resources

The study area for biological resources is specific to the nearshore marine environment of Hood Canal along NAVBASE Kitsap Bangor's waterfront. For aquatic mobile species, the study area extends further based on the extent of underwater noise generated under the Proposed Action. In this case, the area extends to Toandos Peninsula, encompassing approximately 32.4 square kilometers (km^2) of Hood Canal.

3.4.1 Regulatory Overview

The analysis of biological resources focuses on the potential impacts to fish and wildlife under the following regulatory laws:

- Migratory Bird Treaty Act (MBTA) (16 USC 703-712);
- Bald and Golden Eagle Protection Act (16 USC 668-668d)
- Endangered Species Act (ESA) (16 USC 1531 et seq.);
- Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1801-1882); and
- Marine Mammal Protection Act (MMPA) (16 USC 668-668c).

3.4.1.1 Migratory Bird Treaty Act

Migratory birds are any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual lifecycle. The MBTA was enacted in the United States in 1918 in order to establish federal protection for migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted. The list of bird species protected by the MBTA appears in 50 CFR 10.13. NAVBASE Kitsap Bangor is located in western Washington State which generally falls within the potential pathway of the Pacific Migratory flyway. Birds use this flyway primarily in fall and spring during their southward and northward migrations, respectively.

3.4.1.2 Bald and Golden Eagle Protection Act

The bald eagle is afforded continued federal protection by the Bald and Golden Eagle Protection Act even though it has been delisted from the ESA. This law prohibits anyone from taking, possessing, or transporting a bald eagle or golden eagle, or the parts, nests, or eggs of such birds without prior authorization. This includes inactive nests as well as active nests. "Take" means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, or disturb. "Disturb" is further defined as to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with the normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. Bald eagles regularly occur in Hood Canal.

3.4.1.3 Endangered Species Act

Federally threatened and endangered species are those listed for protection under the federal ESA. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) jointly administer the ESA and are also responsible for the listing of species (i.e., the listing of a species as either threatened or endangered). The USFWS has the primary

management responsibility for management of terrestrial and freshwater species, while NMFS has primary responsibility for marine species and anadromous fish species.

The ESA also allows the designation of geographic areas as critical habitat for threatened and endangered species. The final rule designating critical habitat for 12 evolutionarily significant units (ESUs)/distinct populations segments (DPS) of salmonids in Washington, Oregon, and Idaho was published on September 2, 2005 (70 Federal Register [FR] 52630). Under this rule, NMFS identified six primary constituent elements (PCEs) to be essential for the conservation of these listed salmonids (including Puget Sound Chinook and Hood Canal summer-run chum). All lands identified as essential and designated as critical habitat contain one or more of the PCEs (see Appendix C, Section 7.4 for complete list). Although critical habitat occurs in Hood Canal waters adjacent to the base, NAVBASE Kitsap Bangor is excluded from critical habitat designation for ESA-listed Puget Sound Chinook salmon and Hood Canal summer-run chum salmon by federal law (70 FR 52630). However, if federal activities could potentially affect ESA-listed species and/or their designated critical habitat, agencies are required to consult with USFWS and/or NMFS.

3.4.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires that the regional Fishery Management Councils (FMCs), through federal fishery management plans (FMPs), describe and identify Essential Fish Habitat (EFH) for each federally managed species; minimize, to the extent practicable, adverse effects on such habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitats. Congress defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (16 USC 1802[10]). The term “fish” is defined in the MSA as “finfish, mollusks, crustaceans, and all other forms of marine animals and plant life other than marine mammals and birds.” The regulations for implementing EFH clarify that “waters” include all aquatic areas and their biological, chemical, and physical properties, while “substrate” includes the associated biological communities that make these areas suitable fish habitats (50 CFR 600.10).

Authority to implement the MSA is given to the Secretary of Commerce through the NMFS. The MSA requires that EFH be identified and described for each federally managed species. The MSA also requires federal agencies to consult with the NMFS on activities that may adversely affect EFH or when the NMFS independently learns of a federal activity that may adversely affect EFH. The MSA defines an adverse effect as “any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR 600.810).

Pursuant to the MSA, the Pacific Fishery Management Council (PFMC) has designated EFH for federally managed species within the waters of Washington, Oregon, and California. The waters of the greater Puget Sound are designated EFH for coastal pelagic, Pacific salmon, and groundfish species (PFMC, 2011a, 2012, 2014).

3.4.1.5 Marine Mammal Protection Act

The MMPA of 1972 established, with limited exceptions, a moratorium on the "taking" of marine mammals in waters or on lands under United States jurisdiction. The term "take", as defined in Section 3 (16 USC 1362) of the MMPA, means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. "Harassment" was further defined in the 1994 amendments to the MMPA, which provided two levels of "harassment," Level A (potential injury) and Level B (potential disturbance).

Section 101(a) (5) of the MMPA directs the Secretary of the Department of Commerce (the Secretary) to allow, upon request, the incidental (but not intentional) taking of marine mammals by United States citizens who engage in a specified activity (exclusive of commercial fishing), if certain findings are made and regulations are issued. Permission will be granted by the Secretary for the incidental take of marine mammals if the taking will have a negligible impact on the species stock and will not have an immitigable adverse impact on the availability of such species or stock for taking for substance uses.

The Navy is applying for an incidental harassment authorization for potential behavioral harassment of marine mammals that could be exposed to project noise with the potential to result in Level B disturbance. Table 3-4 lists the species and stocks potentially present within Hood Canal during project construction.

Table 3-4. Marine Mammals Potentially Present within Hood Canal

Species and Stock	Endangered Species Act Status
Killer Whale (*Orcinus orca*) West Coast Transient	None
Harbor Porpoise *(Phocoena phocoena)* Washington Inland Waters	None
Steller Sea Lion (*Eumetopias jubatus*) Eastern United States/DPS	None
California Sea Lion (*Zalophus californianus*) United States	None
Harbor Seal (*Phoca vitulina*) Washington Inland Waters	None

3.4.2 Affected Environment

This section describes the terrestrial and aquatic species that occur within the location of the Proposed Action and in the study area where potential direct or indirect impacts to biological resources may occur. For the purposes of this EA, biological resources are divided into four major categories: terrestrial wildlife, aquatic species, special-status species, and EFH. Because the Proposed Action occurs in water, the discussion of terrestrial wildlife species is restricted to

birds (shorebirds, seabirds, and raptors). Aquatic species discussed include marine vegetation, benthic invertebrates, and marine fish. Special-status species include species listed as threatened or endangered by USFWS or NMFS under the ESA as well as species not listed but afforded federal protection under the MBTA, Bald and Golden Eagle Protection Act, or the MMPA. Lastly, EFH is summarized and analyzed as required under NEPA; however, a more detailed analysis, as required under the MSA, is included in Appendix C, *Biological Assessment and Essential Fish Habitat Assessment*.

3.4.2.1 Terrestrial Wildlife

A diverse population of birds composed of approximately 100 different species occurs at NAVBASE Kitsap Bangor. Resident and migratory birds are common within the EHW-1 waterfront and the adjacent upland forested areas (Navy, 2001). There are approximately 16 bird species comprising shorebirds, wading birds, waterfowl, seabirds/marine birds and raptors that were observed within or adjacent to the project area (Table 3-5). These are all protected under the MBTA. The bald eagle is afforded federal protection under the MBTA and Bald and Golden Eagle Protection Act and marbled murrelet is listed under the ESA. A more detailed discussion for these two species can be found in *Section 3.4.2.3, Special-Status Species*.

Surveys were conducted between March and September at NAVBASE Kitsap Bangor and therefore outside the wintering period of late fall and winter when species abundance is expected to be higher (Agnes and Tannenbaum, 2009a). The closest documented nests to the project area were three great blue heron nests, which were observed on a lighting tower at EHW-1 in 2008. At least two of these nests had chicks observed during summer 2008 marine wildlife surveys (Tannenbaum et al., 2009b). Subsequent surveys in the winter of 2009/2010 (non-nesting season) did not show the presence of any nesting materials at the tower, though these surveys occurred outside of the nesting season (Tannenbaum et al., 2011). It is expected, however, that future nesting in this location is unlikely since EHW-1 is a poor quality nesting location. While osprey have been observed flying, perching, and foraging at NAVBASE Kitsap Bangor (Agness and Tannenbaum, 2009b; Tannenbaum et al., 2009b), the nearest nest to the Proposed Action is located south of Cattail Lake (> 1 mile from EHW-1).

Table 3-5. Marine Birds within Vicinity of Project Area (Mar-Sept)

Species	*Months Sighted*
Great Blue Heron	April, May
Surf scoter	March, April
Common merganser	March, April
Common goldeneye	March, June
Barrow's goldeneye	March, April
Eared grebe	March, April, May
Canada goose	June
Common loon	March
Pelagic cormorant	March
Glaucous-winged gull	March, April, May, August
Caspian tern	August
Pigeon guillemot	March, April, May, August
Marbled murrelet	April, May

Species	***Months Sighted***
Bald eagle	June, August
Belted kingfisher	August
Killdeer	March, April

Source: Agnes and Tannenbaum, 2009a.

3.4.2.2 Aquatic Species

Marine Vegetation

The primary marine vegetation that occurs along the approximate 4.5 to 5 miles of NAVBASE Kitsap Bangor nearshore habitat includes eelgrass and macroalgae.

Eelgrass

Eelgrass (*Zostera marina*) is prevalent in low-energy areas, occurring in lower intertidal and nearshore marine subtidal zones that are abundant in organic matter and nutrients (Johnson and O'Neil, 2001). Eelgrass beds are habitat for fish and shellfish species by providing vital three-dimensional protective structures (Nightingale and Simenstad, 2001a). They are important in maintaining migratory corridors, and are used as foraging areas by juvenile salmonids, as well as other fish and invertebrates (Simenstad and Cordell, 2000). Along the shoreline adjacent to EHW-1, the native *Zostera marina* is the dominant eelgrass species and occurs along a narrow depth band roughly parallel to shore from 2 ft (0.6 m) below to 20 ft (6 m) below MLLW (Garono and Robinson, 2002; SAIC, 2009). A non-native eelgrass species, *Zostera japonica*, occurs in small patches between 2 ft (0.6m) above and below MLLW, which is also outside of the project area.

Macroalgae

Three types of macroalgae occur within the NAVBASE Kitsap Bangor nearshore marine environment. These include brown algae, red algae, and green algae with dominant growth occurring from April through August. Macroalgae provides food and shelter for many species of sea birds, fish, mollusks and crustaceans. The most dominant macroalgae species that occur within the project area include green (*Ulva*) and brown (*Laminaria* and *Gracilaria*). Dense coverage occurs within depths less than 15 ft below MLLW particularly within the vicinity of the pier structures (SAIC, 2009). These species play an important role in marine trophic systems, linking primary production to higher trophic levels (Mumford 20, 2007).

Red Algae. Red algae of the genera *Ceramium, Endocladia, Gracilaria, Mastocarpus, Mazzaella, Porphyra*, and other unidentified red algae are present along the NAVBASE Kitsap Bangor waterfront (Pentec, 2003). Red algae, particularly *Gracilaria*, are most abundant at water depths between 10 ft (3 m) and 25 ft (8 m) below MLLW. Red algae are typically found within the upper and lower intertidal zones, and are less abundant in the nearshore marine subtidal zone.

Green Algae. Among green algae, sea lettuce (*Ulva* spp.) is the predominant species along the NAVBASE Kitsap Bangor waterfront. Sea lettuce is found in sheltered or partially exposed lower-intertidal and nearshore marine subtidal zones from 2 ft (0.6 m) above MLLW to 20 ft (6 m) below MLLW (SAIC, 2009). Boulders in the nearshore zone off NAVBASE Kitsap Bangor are often encrusted with sea lettuce (Pentec, 2003). It has a high nutrient value and provides an important source of marine nitrogen after it dies and decomposes, supporting eelgrass growth (Kirby, 2001).

Brown Algae. Brown algae occur in a variety of forms along the NAVBASE Kitsap Bangor waterfront, including encrusting, branching, leafy, and filamentous, or hair-like, algae. Several leafy species (e.g., *Egregia* spp.) and branching species (e.g. *Fucus* spp.) are commonly found attached to rocks in the intertidal upper intertidal zone.

Several species of kelp, including flattened acid kelp (*Desmarestia ligulata*), witches hair (*D. aculeata*), and understory kelp (*Laminaria* spp.) are present near the project area. *Desmarestia* spp. are found in the nearshore marine subtidal and lower intertidal zones. Understory kelp provide a major source of decomposed nutrients to the seafloor, and are important vertical habitat for species in the subtidal zone (Mumford, 2007). A narrow band of understory kelp occurs approximately 394 ft (120 m) southeast of the project area. The band is approximately 1,600 ft (488 m) long and covers 2.3 acres (Morris et al., 2009). Canopy-forming kelp beds (e.g., bull kelp) do not occur near the project area (SAIC, 2009).

Benthic Invertebrates

Benthic invertebrates are comprised of bottom dwelling animals that live burrowing or buried in the soft sediments (infauna) and those that live attached to hard bottom substrates (epifauna). Four major groups (Phylum) are found in Hood Canal and in the project area: 1) marine worms (Annelids); 2) snails and bivalves (Molluscs); 3) crabs and other crustaceans (Arthropods); and, 4) sea stars and sea urchins (Echinoderms).

The types and numbers of benthic organisms are closely linked to sediment grain size (gravel, sand, silt, clay, etc.), levels of DO and the amount of total organic carbon (TOC). The organic

carbon content is itself strongly correlated with sediment grain size being higher in more fine-grained sediments than coarser ones.

Hood Canal has been divided into nine biotic subregions based on soft-bottom benthic community structure, dominant taxa, percent fines (i.e., the percent of silt or clay material), percent TOC, and depth (WDOE, 2007). NAVBASE Kitsap Bangor and the project area specifically, are within the north Hood Canal biotic subregion.

Sediments at the northern end of Hood Canal are primarily composed of relatively coarse sands near the entrance, on the sill, and in the shallows along the shorelines of both the main axis of the canal and the adjoining bays. Sediments south of the sill, down the central axis of the canal, at the greatest depths, and in portions of the terminal inlets are primarily finer-grained silts and clays. The composition of sediment samples from the project area ranged from 65 to 100 percent for sand, less than one to seven percent for gravel, two to 32 percent for silt, and two to 11 percent for clay (Hammermeister and Hafner, 2009).

Surveys of four different areas along the Bangor waterfront at NAVBASE Kitsap found consistently greater benthic community development in the subtidal zone compared to the intertidal zone and variable community development within and among survey areas (Weston, 2006). A mean total of two to 12 species with a mean total abundance of three to 67 individuals per square foot (0.10 m2) was observed in the intertidal zone. Subtidal values varied from a mean total of 36 to 77 species and a mean total abundance of 301 to 736 individuals per square foot (0.10 m2). Table 3-6 provides a list of some of the benthic invertebrates and shellfish occurring at NAVBASE Kitsap Bangor. The soft-bottom benthic community within the project area is dominated by marine worms, crustaceans, and molluscs across the tide zone, although in the intertidal zone other organisms also may be numerically abundant (Weston, 2006; WDOE, 2007).

Molluscs

Molluscs occurring within the project area include two major classes: gastropods (slugs and snails) and bivalves (having two-part shells, such as clams, oysters, and mussels). In contrast to mussels and oysters, which attach to hard substrate, clams live partially buried in the substrate and gastropods live on the substrate surface.

The gastropod snail *Alvania compacta* was a numerical dominant of shallow subtidal waters within the project area (Weston, 2006); it is commonly found in mixed sediments including fine gravels (Kozloff, 1983). Other snails are associated with eelgrass beds, and limpets occur intertidally on hard substrates such as docks, cobble, and rocks.

A variety of bivalves occur within the project area, ranging from intertidal to subtidal depths. Common intertidal species include Macoma clams, rough-sided littleneck clams, and robust mysella. The most abundant species in subtidal waters include silky axinopsid, various dwarf venus clams, fine-lined lucine, and robust mysella (Weston, 2006). Robust mysella live in semi-permanent burrows and can be an indicator of a more stable habitat (Ockelmann and Muus, 1978). Common species on hard substrates include multiple blue mussel species, jingle shell, rock scallop, Olympia oyster, and Pacific oyster (Navy, 2001; WDFW, 2007). An oyster bed is located parallel to the shore running near and under EHW-1. Bivalve siphons were detected throughout the project area during a 2007 survey in a wide range of depths. Siphon

characteristics indicated these were geoducks. These organisms tended to be more concentrated in the silty sand substrate present below 25 ft (8 m) water depth.

Arthropods

Arthropods (crustaceans) are associated with all soft-bottom and hard substrate habitats and also occur in the water column. The most abundant species in the 2005 benthic sediment sampling along the Bangor waterfront at NAVBASE Kitsap was the seed-shrimp (Weston, 2006). Seed-shrimp are minute crustaceans that are protected by a bivalve-like shell and typically feed on detritus in the subtidal nearshore marine habitats. Seed-shrimp comprised almost 30 percent of the individual organisms in the sandy deltaic subtidal zones along the waterfront (Weston, 2006). Larger crabs and shrimps, which are mobile and evasive during sampling, are not well quantified near the project area. Several species have been commonly observed (Weston, 2006).

Dungeness crabs range from intertidal to subtidal depths in sandy habitats and may use eelgrass beds as nursery areas (LFR, 2004). Hermit crabs, cancer crabs, kelp crabs, and shore crabs occur in rocky and/or vegetated habitats. European green crab and helmet crab also have been reported (Navy, 2001).

Annelids

Polychaetes, a type of marine worm, are a major component of the benthic community and occupy intertidal and subtidal soft- and hard-bottom habitats (Weston, 2006). Sessile polychaetes are often tube-building, while other species may be active burrowers (Kozloff, 1983). Polychaetes are typically more abundant in the nearshore subtidal zone than in the intertidal zone (Weston, 2006; WDOE, 2007). Several species of polychaetes live among fouling organisms on manmade structures. Suspension-deposit spionids, herbivorous nereids, predatory syllids, and scale worms were found during rapid assessment of several marinas in Puget Sound (Cohen et al., 1998).

Echinoderms

Echinoderms contributed up to six percent to the abundance of benthic organisms occurring in soft-substrate benthic sediment sampling conducted in 2005 along the waterfront but only two percent, at most, to the abundance of benthic organisms within the project area (Weston, 2006). These species included brittle stars and green sea urchins (Navy, 1988; Weston, 2006). However, sea stars have also been observed at many locations along the waterfront (Navy, 1988). Purple stars are found primarily in the lower-intertidal zone on pilings where they feed on mussels. Pink sea stars are often found in subtidal eelgrass beds (Pentec, 2003).

The red sea urchin has not been documented near the project area but typically lives in rocky areas, which have not been extensively surveyed at the waterfront. Red urchin habitat ranges from protected shallow subtidal to inland marine deeper water nearshore marine habitats.

Table 3-6. Benthic Invertebrates at NAVBASE Kitsap Bangor Waterfront

PHYLUM	MAJOR TAXA OF PHYLA	GENERA OR SPECIES	TYPICAL LOCATION	COMMON NAME OR DESCRIPTION
Mollusca	***Gastropod***	*Alvania compacta*	Sand, silt, clay or mixed substrate, vegetated shallow subtidal	Snail
		Lirularia acuticostata	Mixed substrate, intertidal-subtidal	Sharp-keeled lirularia, a snail,
	Bivalves	*Macoma* sp.	Mixed substrate, intertidal-subtidal	Clam
		Nutricola spp.	Sandy subtidal	Clam
		Saxidomus giganteus	Sandy subtidal	Butter Clam
		Panopea abrupta	Sandy intertidal-subtidal	Geoduck clam
		Rochefortia tumida	Sandy intertidal-subtidal	Robust mysella
		Axinopsida serricata	Sandy or mixed substrate with organic enrichment subtidal	Silky axinopsid
		Protothaca staminea	Sandy intertidal-subtidal	Native littleneck clam
		Tellina carpenteri	Sandy or mixed sand/silt intertidal-subtidal	Clam
		Parvilucina tenuisculpta	Sandy, silty, clay or mixed substrate in shallow subtidal	Fine-lined lucine
		Protothaca staminea	Sandy intertidal-subtidal	Rough-sided littleneck clam
		Mytilus spp.	Intertidal-subtidal, hard substrates	Blue mussel
		Pododesmus macroschisma	Hard substrates	Jingle shell
		Hinnites giganteus	Rocky substrates subtidal, rarely intertidal under boulders	Giant rock scallop
		Crassostrea gigas	Rocky substrates	Pacific oyster
		Ostrea lurida	Rocky substrates	Olympia oyster
Crustaceans	***Ostracod***	*Euphilomedes carcharodonta*	All soft substrates	Seed-shrimp
	Tanaid	*Leptochelia dubia*	Mixed substrate, vegetated habitat, manmade structures	Tanaid
	Barnacles	*Balanus* sp.	Rocky, manmade structures	Barnacle
	Amphipods	*Protomedeia* sp.	All soft substrates	Gammarid
		Aoroides spp.	Detritus, sand, vegetated habitats	Corophiid

Table 3-6. Benthic Invertebrates at NAVBASE Kitsap Bangor Waterfront (Continued)

PHYLUM	MAJOR TAXA OF PHYLA	GENERA OR SPECIES	TYPICAL LOCATION	COMMON NAME OR DESCRIPTION
		Rhepoxynius boreovariatus	Sandy subtidal	Gammarid
		Corophium and *Monocorophium* spp.	Sandy subtidal, manmade structures	Corophiid
	Crabs	*Pinnixa occidentalis*	Sand/silt/clay subtidal	Pea crab
		Hemigrapsus oregonsis	Quiet water, rocky habitats, gravel	Green Shore crab
		Pagurus granosimanus	Mixed substrate, eelgrass, subtidal	Hermit crab
		Pugettia spp.	Sand/silt/clay subtidal, eelgrass	Kelp crab
		Cancer gracilis	Intertidal and subtidal, eelgrass	Graceful crab
		Cancer magister	Intertidal and subtidal, eelgrass	Dungeness crab
		Cancer oregonensis	Rocky and manmade structures, intertidal-subtidal	Oregon Cancer crab
		Cancer productus	Sandy, protected rocky areas, eelgrass, intertidal-subtidal	Red Rock crab
		Carcinus maenas	Intertidal, mixed substrates	European green crab
		Telmessus cheiragonus	Eelgrass, kelp, sargassum	Helmet crab
		Pagurus granosimanus	Mixed substrate, eelgrass, subtidal	Hermit crab
	Shrimps	*Crangon* sp.	Shallow waters, sandy substrates	True shrimps
		Pandalus sp.	Mixed sand substrate intertidal and shallow subtidal	Spot shrimp
		Neotrypaea sp.	Mixed sand substrate intertidal and shallow subtidal	Ghost shrimp
Annelida	***Polychaetes***	*Platynereis bicanaliculata*	Mixed substrates, manmade structures, eelgrass	Nereidae
		Podarkeopsis glabra	Soft substrates	Hesionidae
		Pectinaria californiensis	Sandy, low intertidal and subtidal	Cone worm
		Owenia collaris	Sandy, intertidal-subtidal	Oweniidae
		Euclymeninae	Mixed substrates, subtidal	Maldanidae
Echinoderma	***Echinoderms***	*Pisaster brevispinus*	Subtidal eelgrass	Pink sea star
		Pisaster ochraceus	Lower intertidal, hard structures	Purple star

Table 3-6. Benthic Invertebrates at NAVBASE Kitsap Bangor Waterfront (Continued)

PHYLUM	MAJOR TAXA OF PHYLA	GENERA OR SPECIES	TYPICAL LOCATION	COMMON NAME OR DESCRIPTION
		Amphiodia urtica/periercta	Subtidal silty mud	Burrowing brittle star
		Pycnopedia helianthoides	Lower intertidal to subtidal soft substrates	Sunflower star
		Dendraster excentricus	Flat, sandy subtidal	Sand dollar
		Strongylocentrotus droebachiensis	Intertidal to subtidal soft substrates	Green sea urchin
Chordata	***Tunicates***	*Corella willmeriana*	Subtidal to deepwater	Transparent tunicate
		Distaplia occidentalis	Intertidal to subtidal	Mushroom compound tunicate

Sources: Abbott and Reish, 1980; Barnard et al., 1980; Lee and Miller, 1980; Kozloff, 1983; URS, 1994; WDOE, 1998; Pentec, 2003; Weston, 2006.

Non-ESA Listed Marine Fish

Pacific Herring, Surf Smelt, and Pacific Sand Lance

Pacific herring (*Clupea pallasii*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*) are small schooling fish that are an important food resource for other species in Puget Sound waters. Herring deposit their transparent eggs on intertidal and shallow subtidal eelgrass and marine algae. Although large spawning areas are found elsewhere in Hood Canal (Stick and Lindquist, 2009), there are no documented herring spawning grounds at NAVBASE Kitsap Bangor. At NAVBASE Kitsap Bangor, surveys have detected Pacific herring in small numbers during late winter months and larger numbers in early summer months (SAIC, 2006; Bhuthimethee et al., 2009a).

Surf smelt were also detected in NAVBASE Kitsap Bangor surveys and found they were most abundant at in late spring through summer (SAIC, 2006; Bhuthimethee et al., 2009a). Juvenile surf smelt rear in nearshore waters (Bargmann, 1998) and were detected along the shoreline near the EHW-1 from January through the mid-summer months (SAIC, 2006; Bhuthimethee et al., 2009). Surf smelt are expected to be present in the project area year round. Similar to juvenile surf smelt, juvenile sand lance have been detected near the project area from January through the mid-summer months (SAIC, 2006; Bhuthimethee et al., 2009a). Most of these juveniles were captured in sheltered cove-like areas of the nearshore and were in schools mixed with surf smelt and larval sand lance. Adult, juvenile, and larval sand lance are expected to be present in the project area throughout the year.

3.4.2.3 Special-Status Species

ESA-Listed Species and Critical Habitat

Nine ESA-listed species either occur or have the potential to occur in Hood Canal, within the vicinity of the NAVBASE Kitsap Bangor waterfront: seven fish species, one marine mammal species, and one marine bird species. Designated critical habitat occurs in Hood Canal waters, adjacent to the base, for ESA-listed Puget Sound Chinook salmon and Hood Canal summer-run chum salmon. However, NAVBASE Kitsap Bangor is excluded from critical habitat designation by federal law (70 FR 52630). The status of the species and presence of critical habitat (if designated) within the vicinity of the Proposed Action is provided in Table 3-7.

Table 3-7. ESA Species and Critical Habitat Potentially Present within Vicinity of Proposed Action

Common Name/ *Scientific Name*	***ESA Status (Source)***	***Presence in Hood Canal***	***Critical Habitat in Hood Canal***
Fish			
Puget Sound Chinook Salmon ESU/*Oncorhynchus tshawytscha*	T (NMFS, 2005a) CH (NMFS, 2005b)	Present	Designated along the shoreline to depth of -30 meters MLLW (-98 feet) except not along the NAVBASE Kitsap Bangor waterfront.
Puget Sound Steelhead DPS/ O. mykiss	T (NMFS, 2007)	Present	Proposed, but not in marine waters (NMFS, 2013).
Hood Canal Summer-run Chum Salmon ESU/*O. keta*	T (NMFS, 1999) CH (NMFS, 2005b)	Present	Designated along the shoreline to depth of -30 meters MLLW (-98 feet) except not along the NAVBASE Kitsap Bangor waterfront.
Bull Trout DPS/Salvelinus confluentus	T (USFWS, 1999) CH (USFWS, 2010)	Present in Hood Canal in the Skokomish River; Currently this population is not expected within marine waters.	Designated along the shoreline to depth of -10 meters MLLW (-33 feet). The closest critical habitat occurs along the western and northern shores of Dabob Bay beyond Hazel Point, at the southern tip of Toandos Peninsula, outside of the area affected by the Proposed Action.
Puget Sound/Georgia Basin Bocaccio Rockfish DPS/ Sebastes paucispinis	E (NMFS, 2010)	Possible, but uncertain.	In development
Puget Sound/Georgia Basin Canary Rockfish DPS/ S. pinniger	T (NMFS, 2010)	Possible, but uncertain.	In development
Puget Sound/Georgia Basin Yelloweye Rockfish DPS/ S. ruberrimus	T (NMFS, 2010)	Possible, but uncertain.	In development
Marine Mammals			
Humpback Whale/Megaptera novaeangliae	E (NMFS, 1970)	Rare.	Not designated
Birds			
Marbled Murrelet/ Brachyrhamphus marmoratus	T (USFWS, 1992) CH (USFWS, 1996)	Present	Not present

Notes:
CH = critical habitat, DPS = Distinct Population Segment, E = endangered, ESU = Evolutionary Significant Unit, T = threatened.

Additional information regarding all species distribution and likely presence within the vicinity of the Proposed Action is discussed in the following sections.

Puget Sound Chinook Salmon ESU

Puget Sound Chinook were federally listed as threatened under the ESA on March 24, 1999, with the threatened listing reaffirmed in 2005 (NMFS, 2005a). The ESU is composed of both naturally spawning populations and a number of hatchery stocks. There are currently 22 independent populations of Puget Sound DPS Chinook salmon which is drastically reduced from a believed historical number of 30 to 37 independent populations prior to federal protection (Fresh, 2006; NOAA, 2007). The two populations likely occurring near NAVBASE Kitsap Bangor are the Skokomish and the Mid-Hood Canal populations. These populations spawn in the Skokomish, Hamma Hamma, Dosewallips, and Duckabush River systems from September to October and typically return to Hood Canal in July.

A final designation of Puget Sound Chinook salmon critical habitat was published on September 2, 2005, with an effective date of January 2, 2006 (NMFS, 2005b). Nearshore marine waters within Hood Canal were included as part of this designation; however, NAVBASE Kitsap Bangor is excluded from critical habitat designation for ESA-listed Puget Sound Chinook salmon by federal law (70 FR 52630). As a result, no Puget Sound Chinook salmon critical habitat occurs in the immediate vicinity of the project area. The closest critical habitat occurs immediately beyond the northern and southern base boundaries.

Surveys have found that Chinook salmon out-migrating from streams and hatcheries occur most frequently along the Bangor waterfront at NAVBASE Kitsap from late May to early July (Schreiner et al., 1977; Prinslow et al., 1980; Bax, 1983; Salo, 1991; SAIC, 2006; Bhuthimethee et al., 2009). Emergent Chinook fry, like fry of other Pacific salmonids, depend on shaded, nearshore habitat, with slow-moving currents, where they forage on drift organisms, including insects and zooplankton (Healey, 1991).

Puget Sound Steelhead DPS

Puget Sound steelhead DPS was federally listed as threatened under the ESA on May 11, 2007 (NMFS, 2007). The Puget Sound DPS steelhead was listed in May 2007 under the ESA as a threatened DPS (72 FR 26722). The DPS includes all naturally spawned anadromous winter-run and summer-run O. mykiss (steelhead) populations in streams in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek (inclusive), as well as the Green River natural and Hamma Hamma winter-run steelhead hatchery stocks (NMFS, 2011). The Hamma Hamma River hatchery program and four other hatchery programs are not considered part of the DPS, with a number of hatchery supplementation programs terminated in the last 10 years. As a result, steelhead supplementation in the Hamma Hamma was discontinued, with the last returning adult steelhead arriving in 2010 (NMFS, 2011). Five new steelhead programs propagating native-origin fish for the purposes of preserving and recovering the populations also have been initiated. These programs support recovery of native winter-run steelhead in the White, Dewatto, Duckabush, North Fork Skokomish, and Elwha River watersheds. The new programs warrant consideration for inclusion in the DPS (NMFS, 2011).

Adult steelhead enter freshwater December through April with spawning taking place March through June (Hard et al., 2007). Steelhead leave freshwater usually as 2-year old smolts, typically from April to mid-May.

Critical habitat for Puget Sound steelhead DPS is proposed, but marine waters are not included in the proposal (NMFS, 2013a). In addition, streams on DoD lands have been excluded from proposed designation (NMFS, 2013a).

Steelhead do not occur in large numbers along the NAVBASE Kitsap Bangor waterfront. Very few steelhead were collected during fish surveys that took place along the waterfront from 2005 – 2008 and of the small numbers collected, peak catch was in late spring and summer months (SAIC, 2006; Bhuthimethee et al., 2009a).

Hood Canal Summer-run Chum Salmon ESU

Hood Canal summer-run chum salmon were listed as threatened on March 25, 1999 (NMFS, 1999) and the threatened listing was reaffirmed on June 28, 2005 (NMFS, 2005b). Historically, there were 16 stocks within the Hood Canal summer-run chum ESU, eight of which are extant (6 in Hood Canal and 2 in the eastern Strait of Juan de Fuca) with the remaining 8 extinct (71 FR 47180). The Hood Canal summer-run chum salmon ESU 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: Quilcene NFH, Hamma Hamma Fish Hatchery, Lilliwaup Creek Fish Hatchery, Union River/Tahuya, Big Beef Creek Fish Hatchery, Salmon Creek Fish Hatchery, Chimacum Creek Fish Hatchery, and the Jimmycomelately Creek Fish Hatchery summer-run chum hatchery programs (NMFS, 2011). However, five Hood Canal summer-run chum hatchery programs were terminated since the last status review, including Quilcene National Fish Hatchery, Union River/Tahuya River, Big Beef Creek, Salmon Creek, and Chimacum Creek programs. The last adult fish produced through these terminated programs returned in 2008 (NMFS, 2011). Summer-run chum salmon enter rivers from mid-August through mid-October (Johnson et al., 1997). Spawning peaks from mid-September to mid-October with fry emergence beginning in January. Fish immediately migrate to marine waters.

Critical habitat was designated for Hood Canal summer-run chum ESU on September 2, 2005 by the NMFS (70 FR 52630). Critical Habitat extends from extreme high tide to a depth of 30 m relative to MLLW. Although critical habitat occurs in northern Hood Canal waters adjacent to the base, NAVBASE Kitsap Bangor is excluded from critical habitat designation for ESA-listed Hood Canal summer-run chum salmon by federal law (70 FR 52630). As a result, no Hood Canal summer-run chum salmon critical habitat occurs in the immediate vicinity of the project.

Fish surveys conducted along the NAVBASE Kitsap Bangor waterfront collected high numbers of juvenile chum. Peak numbers were in March and April (SAIC, 2006; Bhuthimethee et al., 2009a). Because summer-run chum are not distinguishable from the large releases of hatchery fall-run chum, the peak timing is not representative of summer-run chum salmon.

Bull Trout DPS

Currently, all populations of bull trout in the lower 48 states are listed as threatened under the ESA. Bull trout are in the char subgroup of salmonids and have both resident and migratory life histories. Populations of bull trout that originate from Olympic Peninsula and Puget Sound

drainages are part of the Coastal-Puget Sound bull trout DPS. This DPS reportedly contains the only occurrence of anadromous bull trout in the contiguous United States (USFWS, 1999).

Critical habitat was designated for bull trout on September 26, 2005 (70 FR 56212) with a final revision to this habitat published in 2010 (USFWS, 2010). However, although both the original and revised final bull trout critical habitats occur in Hood Canal, neither designates waters north of Hazel Point, at the southeastern tip of Toandos Peninsula. Therefore, no bull trout critical habitat occurs at NAVBASE Kitsap Bangor.

The only drainage to Hood Canal with bull trout is the Skokomish River (WDFW, 2004). Bull trout require snow-fed glacial streams, and, since there are none on the Kitsap Peninsula, they would not be expected in any streams at NAVBASE Kitsap Bangor or in any other streams on the Kitsap Peninsula. Further, no bull trout were collected during nearshore fish surveys conducted along the NAVBASE Kitsap Bangor waterfront in 2005 through 2008 (SAIC, 2006; Bhuthimethee et al., 2009a).

Rockfish Species (DPS)

Three Puget Sound/Georgia Basin DPS populations of rockfish are listed under the ESA. These include Bocaccio (endangered status), canary rockfish (threatened status), and yelloweye rockfish (threatened status) (NMFS, 2010). The designation area for these populations encompasses inland marine waters east of the central Strait of Juan de Fuca and south of the northern Strait of Georgia. A summary of life history and occurrence of each DPS within the vicinity of the project area is described below. A more comprehensive review for each species can be found in Appendix C. Critical habitat is proposed for these species, but not within DOD boundaries.

Puget Sound/Georgia Basin Bocaccio DPS. Adult bocaccio inhabit waters at depths ranging from approximately 40 to 1,570 ft, but are most common at depths of 160 to 820 ft (i.e., greater than the project depth). Although bocaccio are typically associated with hard substrate, they may wander into mud flats presumably because they can be located as much as 98 ft off the bottom. Bocaccio release larvae in January, continuing through April off the coast of Washington. Larval and pelagic juvenile bocaccio drift into the nearshore, near the water surface, and are associated with drifting kelp mats (Love et al., 2002). The young bocaccio settle the nearshore environment at 3 to 4 months of age, where the species prefer shallow waters over algae-covered rocks, or in sandy areas where eelgrass beds or drift algae are present (Love et al., 2002). As juveniles, bocaccio rockfish inhabit relatively shallow water, compared to adults (NMFS, 2013b). Bocaccio have never been observed during WDFW bottom trawl, video, or dive surveys in Puget Sound (Palsson et al., 2009). However, Palsson et al. (2009) investigated historic fish catch records and reported 2 known instances of bocaccio captures in Hood Canal. It is important to note that recreational fishing records reflect observed frequencies, not observed densities. Although there have been no confirmed observations of bocaccio in Puget Sound for over a decade (74 FR 18516), Drake et al. (2008) concluded that it is likely that bocaccio occur in low densities.

No more than four juvenile rockfish were captured per year over a 4-year fish survey study along NAVBASE Kitsap Bangor Waterfront (SAIC, 2006; Bhuthimethee et al., 2009a). It is not known if they were juvenile bocaccio as those collected by seine were not identified to species.

Puget Sound/Georgia Basin Canary Rockfish DPS. Larvae and pelagic juveniles are found in the upper 330 ft of the water column from January until about March when they start to move into intertidal areas (tide pools, rocky reefs, kelp beds, cobble areas), although some juveniles remain pelagic in much deeper water until July (Love et al., 2002). Juveniles may occupy rock-sand interfaces near 50-65 ft during the day, and then move to sandy areas at night.

An approximate estimate of canary rockfish abundance in Puget Sound Proper was only 300 individuals during the 1980s (NMFS, 2010). Drake et al. (2008) concluded that canary rockfish occur in low and decreasing abundances in Puget Sound.

As noted in the prior section, no more than 4 juvenile rockfish were captured per year over a 4-year fish survey study along NAVBASE Kitsap Bangor waterfront (SAIC, 2006; Bhuthimethee et al., 2009a). It is not known if they were juvenile canary or bocaccio as those collected by seine were not identified to species.

Puget Sound/Georgia Basin Yelloweye Rockfish (DPS). Yelloweye rockfish are more common in northern Puget Sound compared with southern Puget Sound presumably because rockier habitat is available in northern Puget Sound. An approximate estimate of yelloweye rockfish abundance in Puget Sound Proper was only 1,200 individuals during the 1980s (NMFS, 2010).

Yelloweye rockfish is a deep-water species that is relatively sedentary living in association with high relief rocky habitats and often near steep slopes (Palsson et al., 2009; Love et al., 2002, Wang, 2005, as cited in NMFS, 2013b). Yelloweye move into deeper water as they grow into adults, continuing to associate with caves and crevices and spending large amounts of time lying on the substratum, sometimes at the base of rocky pinnacles and boulder fields (Love et al., 2002). Adult yelloweye rockfish inhabit waters from 80-1,560 ft, but they are most common at depths of 300 to 590 ft (i.e., greater than the project depth). They are typically solitary, but sometimes form aggregations near rocky substrate.

Hood Canal has the greatest frequency of yelloweye rockfish observed in both trawl and scuba surveys conducted by WDFW (Palsson et al., 2009). Juvenile rockfish were captured during fish surveys conducted along NAVBASE Kitsap Bangor waterfront in 2005 through 2008. No more than 4 fish total per-year were collected (SAIC, 2006; Bhuthimethee et al., 2009a). However, juvenile yelloweye rockfish are associated with deeper water, so these were unlikely to be yelloweye rockfish.

Humpback Whale

Humpback whales were listed as endangered under the Endangered Species Preservation Act of 1966 (35 FR 1222) due to commercial whaling and this protection threshold was transferred to the ESA in 1973. The recovery plan for humpback whales was finalized in November 1991 (NMFS, 1991). The California/ Oregon/Washington Stock is defined to include humpback whales that feed off the west coast of the continental United States and individuals potentially occurring within the vicinity of the project area would belong to this stock. Critical habitat is not designated for this species.

Humpback whales were one of the most common large cetaceans in the inland waters of Washington in the early 1900s (Scheffer and Slipp, 1948). Humpback whale sightings were infrequent in Puget Sound and the Georgia Basin through the late 1990s, and prior to 2003 the presence of only three individual humpback whales was confirmed (Falcone et al., 2005). However, in 2003 and 2004, 13 individuals were sighted in the inland waters of Washington,

mainly during the fall (Falcone et al., 2005). Records available for April 2001 to February 2012 include observations in the Strait of Juan de Fuca, the Gulf Islands and the vicinity of Victoria, British Columbia, Admiralty Inlet, the San Juan Islands, Hood Canal, and Puget Sound (Orca Network, 2012). For the areas listed above, Orca Network records shows humpback whale presence in one of the areas listed above in all months from May through November in 2009; in all months but January, March, April, May, and August in 2010; and from March through November in 2011.

In Hood Canal, humpback whale sightings occurred several times in January and February 2012 (Orca Network, 2012). Review of the sightings information indicated they were of one individual (Calambokidis pers. comm., 2012). Prior to these sightings, there were no confirmed reports of humpback whales entering Hood Canal (Calambokidis pers. comm., 2012). No other reports of humpback whales in the Hood Canal were found in the Orca Network database, the scientific literature, or agency reports. Construction of the Hood Canal Bridge occurred in 1961 and could have contributed to the lack of historical sightings (Calambokidis pers. comm., 2010). Only a few records of humpback whales near Hood Canal (but north of the Hood Canal Bridge) are in the Orca Network database. Two were from the northern tip of Kitsap Peninsula (Foulwater Bluff/Point No Point) and a few others from Port Madison Bay in Puget Sound. Therefore, it is unlikely that humpback whales would occur within the vicinity of the project area during relatively short duration of the project activities.

Marbled Murrelet

The Washington, Oregon, and California population of the marbled murrelet was federally listed as threatened on October 1, 1992 (USFWS, 1992). Marbled murrelets are seabirds that spend most of their life in the marine environment and nest in mature and old-growth forests (USFWS, 1997). They use the marine environment in Hood Canal for courtship, loafing, and foraging. Murrelets can occur year-round in Puget Sound and Hood Canal, although their flock size, density, and distribution vary by season (Nysewander et al., 2005; Falxa et al., 2008).

Critical habitat for nesting marbled murrelets was designated in 1996 (USFWS, 1996) and was proposed for revision in 2008 (USFWS, 2008). Only critical habitat in Oregon and California was revised in the final rule (USFWS, 2011). Designated critical habitat in Washington remains unchanged from the 1996 ruling and hence, the project area is not within designated critical habitat (USFWS, 1996, 2011). The closest designated critical habitat to Hood Canal includes forest lands west and south of Dabob Bay.

During the breeding season, murrelets tend to forage in well-defined areas along the shoreline in relatively shallow marine waters. Murrelets forage at all times of the day and in some cases at night (Strachan et al., 1995). During the pre-basic molt phase, flightless murrelets must select foraging sites that provide adequate prey resources within swimming distance (Carter and Stein, 1995). During the non-breeding season, murrelets typically disperse and are found farther from shore (Strachan et al., 1995).

Murrelet presence in Hood Canal has been documented through a number of sources and survey efforts. The most comprehensive information comes from the consistent sampling used to estimate population size and trends under the Northwest Forest Plan Murrelet Effectiveness Monitoring Program (Raphael et al., 2007). Other survey data were generated through the Puget Sound Ambient Monitoring Program (PSAMP), conducted by WDFW (Nysewander et al., 2005).

WDFW conducted at-sea surveys for two years beginning in 2012 to obtain fall/winter density estimates for areas of Puget Sound near Navy Installations (Pearson and Lance, 2013 and 2014). Marbled murrelets have been documented in the nearshore and deeper waters adjacent to NAVBASE Kitsap Bangor since 2001. The Kitsap Audubon Society reported marbled murrelets in three annual Christmas Bird Count surveys from the shoreline south of the Bangor waterfront between 2001 and 2007 (Kitsap Audubon Society, 2008). Marbled murrelets were observed opportunistically during the course of shoreline fish and sediment surveys conducted from March to September 2007 for a total of 22 days of observations (Agness and Tannenbaum, 2009b). Survey locations and sampling frequency were determined by the sampling design for the fish and sediment surveys, and not all survey locations were scanned in each sampling day. During these observations, eight marbled murrelet pairs were recorded during April and May 2007. No single birds were observed. In all instances, marbled murrelets sighted were in breeding plumage. The breeding season (nesting to fledging) generally extends from April 1 to September 23, but is asynchronous, i.e., pairs do not start nesting at the same time. Marbled murrelets were observed actively diving and foraging off of Carlson Spit on four occasions. Murrelets were observed eating a fish at the water surface (May 1, 2007) and holding a fish cross-wise in the bill, a behavior called fish-holding that is indicative of the chick-rearing stage of breeding (May 25, 2007). During the 2007 surveys, marbled murrelets were not sighted near pier structures but were detected in all nearshore scan areas with the exception of one area.

From July to November 2008, 12 boat-based systematic surveys for marine birds were conducted along transects in the nearshore and deeper waters of the Bangor waterfront (Tannenbaum et al., 2009b) The surveys covered the entire 4.3-mile (6.9-kilometer) waterfront from the shoreline to approximately 1,800 feet (550 meters) from shore (approximately 3.4 sq km [2.1 miles]). Twelve additional transect-based surveys were conducted in the same area from November 2009 to May 2010 (Tannenbaum et al., 2011). These surveys were used to document the presence, location, and habitat use of marine birds in nearshore and deeper water habitats that might be potentially affected by proposed construction projects on the Bangor waterfront. Murrelets were observed in nearshore and deeper waters, including one individual in immature plumage that was observed swimming under EHW-1 in September 2008, and other pairs and individuals observed in deeper water habitats in November 2009 and April 2010.

In January 2009, the Navy conducted marbled murrelet monitoring during the installation of five steel piles for the Carderock Research Facility Wave Deflection System adjacent to Carlson Spit on the Bangor waterfront. During each of the five pile driving days, one to eight marbled murrelets were frequently observed within the 3,280-foot (1,000-meter) zone known as the “area of potential behavioral effect,” with intermittent sightings of 12 to 31 murrelets recorded. No marbled murrelet sightings occurred within the 1,000-foot (305-meter) zone known as the “area of potential injury” for this project (Navy, 2009).

Marbled murrelet surveys conducted during the Test Pile Program (late September to late October 2011) did not detect any murrelets within or in close proximity to the Port Security Barrier, although murrelets were detected elsewhere in Hood Canal (HDR, 2012). Marbled murrelet monitoring during the first in-water work season of the EHW-2 construction project detected one individual on three consecutive days in January within the Port Security Barrier between EHW-1 and Marginal Wharf outside the project’s 168-meter shut-down zone (Hart Crowser, 2013). These were the only marbled murrelet sightings in the construction area during the 19-week monitoring period (September 28, 2012, to February 14, 2013). No marbled

murrelets were detected within the Port Security area during the second year of construction monitoring of the EHW-2 project (July 16, 2013 to February 15, 2014) (Hart Crowser, 2014).

Marbled murrelets nest solitarily in trees with features typical of coniferous old-growth (stand age from 200 to 250 years 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 and Nelson, 1995). WDFW Priority Habitat Species maps do not indicate the presence of marbled murrelet nests in the upland areas including and adjacent to NAVBASE Kitsap Bangor (WDFW, 2010). 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 has been located at the northern portion of the base (International Forestry Consultants, 2001; Jones, 2010, personal communication). The Navy and USFWS have identified potential marbled murrelet nesting habitat, defined by the presence of suitable nest platforms, in the conifer forest stand upland from Carderock Pier. Eight trees with a total of 10 platforms appear to be marginally suitable for nesting within this stand (Harke, 2013, personal communication).

Bald Eagle

Bald eagles are regularly observed at NAVBASE Kitsap Bangor. They are likely to be present flying over the project area either to forage or to nesting sites. Bald eagle nesting period is from January 1 through August 31. The closest documented bald eagle nesting site was located approximately 2.5 miles south of the project area, near Devils Hole, however this nest blew down in November 2013 (Yasenak, 2014). A new nest appears to be developing near K/B spit (Leicht, 2014).

Marine Mammals

Five species of marine mammals have a reasonable potential to occur within the waters surrounding Naval Base Kitsap Bangor: the Steller sea lion (*Eumetopias jubatus*), the California sea lion (*Zalophus californianus*), the harbor seal (*Phoca vitulina*), the transient killer whale (*Orcinus orca*), and the harbor porpoise (*Phocoena phocoena*). None of these species are listed under the federal Endangered Species Act. These species are included in the analysis of this application based on the potential for exposure to behavioral harassment from noise associated with vibratory and impact pile driving during project construction. Four additional species previously documented in Hood Canal are not carried forward in the analysis because they are unlikely to be present during project construction; the humpback whale (*Megaptera novaeangliae*), the gray whale (*Eschrichtius robustus*), Southern Resident killer whale, and the Dall's porpoise (*Phocoenoides dalli)* (Navy, 2014a). Distribution and occurrence of California sea lions, Steller sea lions and harbor seals, and harbor porpoise as well as rare occurrences of transient killer whales are discussed below.

California Sea Lion

California sea lions breed on islands located in southern California, western Baja California, and the Gulf of California during the summertime. Large numbers of adult and sub adult male and juvenile sea lions migrate north post-breeding and winter from central California to Washington State (Jeffries et al., 2000). California sea lions feed on a variety of fish and shellfish, including salmon, steelhead, herring, mackerel, and squid.

Jeffries et al. (2000) and Jeffries (pers. comm., 2012) identified dedicated, regular haulouts used by adult and subadult California sea lions in Washington inland waters. Main haulouts occur at NAVBASE Kitsap Bangor, NAVBASE Kitsap Bremerton, and NAVSTA Everett, as well as in Rich Passage near Manchester, Seattle (Shilshole Bay), south Puget Sound (Commencement Bay, Budd Inlet), and numerous navigation buoys south of Whidbey Island to Olympia in south Puget Sound (Jeffries et al., 2000; Jeffries pers. comm., 2012). Additionally, Race Rocks, British Columbia, Canada (Canadian side of the Strait of Juan de Fuca) has been identified as a major winter haulout for California sea lions (Edgell and Demarchi, 2012).

The Navy conducts surveys at its installations with sea lions in Puget Sound (see Appendix C for additional information). Haulouts are located at NAVBASE Kitsap Bangor where up to 122 California sea lions, respectively, have been observed hauled out on the Port Security Barrier floats and on docked submarines (Navy, 2014b). Numbers of animals typically peak in October or November.

During summer months and associated breeding periods, the inland waters would not be considered a high-use area by California sea lions, as they would be returning to rookeries in California waters. However, surveys at Bangor indicate that a few individuals are present through mid-June and have arrived as early as August with at least one individual remaining in July (Navy, 2014b).

Eastern Steller Sea Lion DPS

The Eastern Steller sea lion was removed from protection under the ESA in October 2013, but is still protected under the MMPA.

The eastern stock of Steller sea lions are found along the coasts of southeast Alaska to northern California where they occur at rookeries and haulout locations along the coastline (Jeffries et al., 2000; Scordino, 2006). Male Steller sea lions often disperse widely outside of the breeding season from breeding rookeries in northern California (St. George Reef) and southern Oregon (Rogue Reef), (Scordino, 2006; Wright et al., 2010). Based on mark recapture sighting studies, males migrate back into these Oregon and California locations from winter feeding areas in Washington, British Columbia, and Alaska (Scordino, 2006).

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 and Demarchi, 2012). Numbers vary seasonally in Washington with peak numbers present during the fall and winter months and a decline in the summer months that corresponds to the breeding season at coastal rookeries (approximately late May to early June) (Jeffries et al., 2000). In the Puget Sound, Jeffries (pers. comm., 2012) identified five winter haulout sites used by adult and subadult (immature or pre-breeding animals) Steller sea lions, ranging from immediately south of Port Townsend (near Admiralty Inlet) to Olympia in southern Puget Sound. Numbers of animals observed at these sites ranged from a few to less than 100. In addition, Steller sea lions opportunistically haul out on various navigational buoys in Admiralty Inlet south through southern Puget Sound near Olympia (Jeffries pers. comm., 2012). One or two animals occur on these buoys.

Steller sea lions have been seasonally documented at NAVBASE Kitsap Bangor in Hood Canal since 2008 with up to 11 individuals observed hauled out on submarines at Delta Pier south of the project site (Navy, 2014b). Surveys at NAVBASE Kitsap Bangor indicate Steller sea lions typically arrive in October and depart by the end of May, although two Steller sea lions were seen in September in two different survey years (Navy, 2014b).

Harbor Seal

Harbor seals inhabit coastal and estuarine waters off Baja California, north along the western coasts of the continental United States, British Columbia, and Southeast Alaska west through the Gulf of Alaska and Aleutian Islands (Carretta et al., 2011). They are generally non-migratory and remain local with changes in the tides, weather, season, reproduction, and food availability as the primary factors for movement. Harbor seals generally haul-out on rocks, reefs, and beaches during the day and forage in marine and estuarine waters during the morning and evenings. They haul out at low and high tide (in Hood Canal) to digest food, rest, give birth, or nurse young. Harbor seals eat crustaceans, squid, mollusks, and a variety of fish (Carretta et al., 2011).

Harbor seals occur year-round throughout the nearshore waters of Puget Sound. Haulouts occur throughout Hood Canal primarily on the west side. The nearest haulout identified by Jeffries is at the mouth of the Dosewallips River 10 miles southwest of the NAVBASE Kitsap Bangor waterfront. Surveys conducted from 2007 to 2010 at NAVBASE Kitsap Bangor, observed harbor seals in the water every month of surveys (Agness and Tannenbaum, 2009a; Tannenbaum et al., 2009a, 2011). Harbor seals were routinely seen during marine mammal monitoring for construction projects, at or near EHW-1 (Test Pile Project, EHW-2 construction, and prior EHW-1 repairs (HDR, 2012: Hart Crowser, 2013). Small numbers of harbor seals have been documented hauling out on the PSB floats, the wavescreen at Carderock Pier, buoys, barges, marine vessels, and logs (Agness and Tanenbaum, 2009a; Tannenbaum et al., 2009a, 2011). Most documented occurrences of harbor seals hauling out along the Bangor waterfront were on the Port Security Barrier floats and on manmade floating structures near KB Dock and Delta Pier. On two occasions, four to six individuals were observed hauled out near Delta Pier.

Harbor seals are known to reproduce at Bangor. Known harbor seal births include one on the Carderock wave screen in August 2011 and at least one on a small 10 ft x10 ft floating dock at EHW-2 in fall 2013, as reported by the EHW-2 construction crew, and afterbirth on a float at Magnetic Silencing Facility with an unknown date. Harbor seal pupping has occurred on a section of the Service Pier for the past 13 years according to the Port Operations vessel crews.

Harbor Porpoise

NMFS conservatively recognizes two stocks of harbor porpoise 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.

Sightings of harbor porpoises in Hood Canal north of the Hood Canal Bridge have increased in recent years (Calambokidis pers. comm., 2010). During line transect surveys conducted in the Hood Canal in 2011 for the Test Pile Program near NAVBASE Kitsap Bangor and Dabob Bay (HDR, 2012), an average of six harbor porpoises were sighted per day in the deeper waters.

West Coast Transient Killer Whale

The geographical range of the West Coast Transient stock of killer whales includes waters from California through southeastern Alaska with a preference for coastal waters of southern Alaska and British Columbia (Krahn et al., 2002). 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 prey. Transients may occur in inland waters in any month (Orca Network, 2012), but several studies have shown peaks in occurrences: Morton (1990) found bimodal peaks in spring (March) and fall (September to November) for transients on the northeastern coast of British Columbia, and Baird and Dill (1995) found some transient groups frequenting the vicinity of harbor seal haulouts around southern Vancouver Island during August and September, which is the peak period for pupping through post-weaning of harbor seal pups. However, not all transient groups were seasonal in these studies and their movements appear to be unpredictable.

The number of West Coast Transient killer whales in Washington inland waters at any one time was considered likely to be fewer than 20 individuals (Wiles, 2004). Transient killer whales were observed in Hood Canal in 2003 and 2005, but have not been observed since. In 2003, 11 transients spent almost two months in Hood Canal feeding on harbor seals primarily in the area between the Skokomish River and Quilcene Bay (London, 2006). In 2005, six transient killer whales were in Hood Canal for 172 days between January and June. Killer whales were historically documented in Hood Canal by sound recordings in 1958 (Ford, 1991), a photograph from 1973, sound recordings in 1995 (Unger, 1997), and also anecdotal accounts of historical use.

3.4.2.4 Essential Fish Habitat

The PFMC has designated EFH for each of the four primary fisheries that they manage within their FMPs: Pacific Coast groundfish, Pacific Coast salmon, coastal pelagic species, and West Coast highly migratory species (PFMC, 2007, 2011, 2012, 2014). Of these fisheries, only three (Pacific Coast groundfish, coastal pelagic species, and Pacific Coast Salmon) contain species for which EFH has been designated within Hood Canal or in the vicinity of NAVBASE Kitsap Bangor. A summary of the designated EFH within the vicinity of NAVBASE Kitsap Bangor and the conclusions regarding potential impacts to EFH are described below. A detailed discussion is located in Appendix C.

Pacific Coast Groundfish

Pacific coast groundfish species are considered sensitive to over-fishing, the loss of habitat, and water and sediment quality (PFMC, 2014). 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, 2014). The PFMC (2014) 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 m [~ 11,500 ft] to mean higher high water level (MHHW) or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 ppt during the period of average annual low flow.” Furthermore, the PMFC (2014) has also designated EFH for each individual groundfish species by life stage. These designations are contained within Appendix C of the Pacific Groundfish FMP (PFMC, 2014). Using the Pacific Habitat Use Relational Database (HUD) developed by the PFMC, it was determined which groundfish species and life

stages have EFH designated within the vicinity of the EHW-1 Pile Replacement Project area. The management unit in the Pacific Coast Groundfish FMP includes 83 groundfish species (PFMC, 2014). Of these, 32 were identified through the analysis of the HUD as having EFH designated in the vicinity of NAVBASE Kitsap Bangor. Based on the analysis, the primary habitats designated as EFH for these species include:

- The entire water column, including macrophyte canopies and drift algae;
- Unconsolidated sediments consisting of mud, sand, or mixed mud/sand;
- Hard bottom habitats composed of boulders, bedrock, cobble, gravel, or mixed gravel/cobble;
- Mixed sediments composed of sand and rocks; and
- Vegetated bottoms consisting of algal beds, macrophytes, or rooted vascular plants.

Pacific Salmon

The salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters of Washington, Oregon, and California north of Point Conception out to the exclusive economic zone (200 miles) offshore (PFMC, 2012). In addition to the 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, 2012), including the waters of NAVBASE Kitsap Bangor. For the Pacific salmon fishery, EFH (which includes Hood Canal), is identified using U.S. Geological Survey (USGS) hydrologic units, as well as habitat association tables and life history descriptions of each life stage (PFMC, 2012). Pacific salmon species 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, 2012).

Coastal Pelagic Species

The EFH designations for coastal pelagic species are based on the geographic range and in-water temperatures where these species are present during a particular life stage (PFMC, 2011). Specific EFH boundaries (i.e., the habitat necessary to provide sufficient fishery production) are based on best available scientific information and described in the Coastal Pelagics Fishery Management Plan (PFMC, 2011). These boundaries include the waters of NAVBASE Kitsap Bangor. Two species identified as coastal pelagic species are known to occur in Hood Canal waters: northern anchovy and market squid (SAIC, 2006; Bhuthimethee et al., 2009). Aside from their value to commercial Pacific fisheries, coastal pelagic species are also recognized for their importance as food for other fish, marine mammals, and birds (63 FR 13833). Coastal pelagic species are considered sensitive to overfishing, the loss of habitat, reduction in water and sediment quality, and changes in marine hydrology, including entrainment through water intakes (PFMC, 2011).

Habitat Areas of Particular Concern Designations

In addition to designating EFH, the PMFC is also responsible for identifying Habitat Areas of Particular Concern (HAPC) for federally managed species. Out of the four fisheries managed by the PFMC, HAPC have only been identified for groundfish. The four HAPC designated for these species include seagrass, canopy kelp, rocky reef, and estuarine habitats along the Pacific

coast, including Puget Sound. Two of these HAPC, estuarine habitats and seagrass, are located within the vicinity of the EHW-1 proposed project area.

3.4.3 Environmental Consequences

Impacts to biological resources would be considered significant if there was a loss of high value habitat for fish and wildlife and/or injury to special-status species would result from the Proposed Action. The threshold of significance is defined as impacts to biological resources causing the loss of high value habitat for fish and wildlife and population of species, including injury impacts as the result of the Proposed Action.

The evaluation of impacts to biological resources and their habitats considers whether the species is listed under the ESA or afforded federal protection under other regulations (i.e., MMPA, Bald and Golden Eagle Protection Act, and MBTA). Also considered is whether the species has a particular sensitivity to stressors of the Proposed Action and/or a substantial or important component of the species' habitat would be lost as a result of the Proposed Action. A primary construction element of the Proposed Action would be installing four 30-inch steel piles using both a vibratory and impact pile driver. Before all environmental consequences of this alternative are discussed for biological resources, a summary of underwater noise and evaluation criteria for marine birds, fish, and marine mammals is introduced below.

Noise level Criteria for Evaluation of Impacts

In addition to human noise-sensitive receptors (discussed in Section 3.3), habitat for certain wildlife or aquatic species is also considered. It's important to understand the criteria currently in place for terrestrial and aquatic species before evaluating impacts from the Proposed Action.

Both airborne and underwater noise would be generated from pile driving activities. As described in Section 3.3 Airborne Noise, levels measured in the air are typically used to assess impacts on humans and are A-weighted to reduce the contribution of low and high frequencies and correspond to how humans hear. While noise pressures in air are weighted and measured in dB re 20 µPa (approximate threshold of human audibility), the reference pressure for water is 1 µPa. Noise levels underwater are not weighted and therefore measure unaltered frequency ranges that may extend above and below the audible range of many organisms (WSDOT, 2014).

Fish

The degree to which an individual fish exposed to underwater sound would be affected depends on a number of variables, including:

- species of fish;
- size of fish;
- presence of a swim bladder;
- physical condition of the fish;
- maximum sustained sound pressure and frequency;
- shape of the sound wave (rise time),
- depth of the water;
- depth of the fish in the water column;
- amount of air in the water;
- size and number of waves on the water surface;
- bottom substrate composition and texture;

- effectiveness of bubble curtain sound/pressure attenuation technology; and
- tidal currents.

Depending on these factors, effects on fish can range from changes in behavior to immediate mortality. There has been no documented injury or mortality resulting from the use of vibratory pile drivers; however, fish injury from impact hammers has been documented.

Three metrics are commonly used to evaluate noise impacts to fish (WSDOT, 2014):

- *Peak Sound Pressure level (Lpeak)* – Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 to 20,000 Hz; pressure is unweighted and measured as dB re 1µPa;
- *Root Mean Square (rms)* – rms level is the square root of the energy divided by a defined time period; and
- *Sound Exposure Level (SEL)* – Constant level over 1 second that has the same amount of acoustic energy, as indicated by the square of the sound pressure, as the original sound.

NMFS and USFWS currently use a dual threshold for evaluating injury using both peak SPLs and cumulative SEL. The underwater noise threshold criterion for fish injury from a single impact hammer pile strike is at an SPL of 206 dB peak (Fisheries Hydroacoustic Working Group (FHWG), 2008). Cumulative SEL is a measure of the risk of injury from exposure to multiple pile strikes. The number of pile strikes is estimated per continuous work period which is considered one day. The cumulative SEL criterion for injury to fish is 187 dB SEL for fish greater than or equal to 2 grams in weight, and 183 dB SEL for fish less than 2 grams in weight (FHWG, 2008). As reference points of total fish length at 2 grams weight in Puget Sound, juvenile chum salmon are approximately 2.7 to 2.8 inches (68 to 70 millimeters) (Tynan, 2013, personal communication).

The method used to calculate distances to the cumulative SEL thresholds involves limiting the maximum affected distance to a point ("effective quiet") at which the acoustic energy from a single strike attenuates to 150 dB SEL re 1 µPa2•sec (WSDOT, 2014). No physical injury is expected beyond this distance.

In addition to the injury thresholds, Hastings (2002) recommended an underwater noise guideline for behavioral impacts on fish, including startle response, at a level of 150 dB RMS.

Marine Mammals

The NMFS has used generic sound exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts to a marine mammal such that a take by harassment might occur (70 FR 1871). These thresholds are used to determine compliance with the MMPA (16 USC § 1362 Sec. 3 (13)) and the ESA (7 USC § 36 and 16 USC § 1531 et seq.), but the effects determinations and language used to report exposure to harmful noise levels are different for the two statutes. As described previously, the MMPA imposes a moratorium on the taking of marine mammals, where "take" means to harass, among other actions. The MMPA defines two levels of harassment, each of which has been assigned a noise exposure threshold:

- Cetaceans and pinnipeds exposed to impulsive sounds of 180 and 190 dB rms or above, respectively (i.e., injury threshold levels, and higher than impact or vibratory pile driving sounds), are considered to have been taken by injury (Level A harassment). Injury

thresholds are applied to a situation where the noise has the potential to injure a marine mammal or marine mammal stock in the wild (16 USC §1362 Sec. 3 (18) (A) (i)).

- Marine mammals exposed to sounds at or above 160 dB rms for impulse sounds (e.g., impact pile driving) and 120 dB rms for continuous noise (e.g., vibratory pile driving), but below injurious thresholds are considered to have been taken by behavioral/disturbance (Level B harassment).
- Behavioral disturbance thresholds are applied to situations where the noise "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavior patterns, including, but not limited to, migration, breathing, nursing, breeding, or sheltering (16 USC §1362 Sec. 3 (18)(A)(ii)). The application of the 120 dB rms threshold can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. As a result, these levels are considered precautionary (74 FR 41684). NMFS has proposed new science-based thresholds to improve and replace the current exposure level thresholds, but the criteria have not been finalized (NOAA, 2013).

Marine Birds

Little is known about the general airborne hearing or underwater hearing capabilities of birds but research is ongoing. What has been determined is that there are three classes of potential effects identified for birds from noise (i.e., traffic or construction). These are:

- physiological and behavioral effects;
- damage to hearing from acoustic over-exposure; and
- masking of important bioacoustics and communication signals (Dooling and Popper, 2007).

Based on a Science Panel recommendation (SAIC, 2011), guidance currently used by USFWS for evaluation of auditory injury to marbled murrelets is 202 dB SEL re 1µPa-sec cumulative of all strikes over a 24-hour period. The threshold for the extent of where pile driving noise could mask airborne communication between birds is 42 meters for 30-inch diameter piles or less (USFWS, 2014). There is currently no underwater threshold for vibratory installation of piles.

Airborne and underwater noise injury and disturbance thresholds for fish, marine mammals, and marbled murrelet are presented in Table 3-8.

Table 3-8. Airborne and Underwater Noise Injury and Disturbance Thresholds for Marine Mammals, Fish, and Marbled Murrelets

Airborne Noise Thresholds (Impact and Vibratory Pile Driving) (dB re 20 µPa unweighted)		***Underwater Noise Thresholds for Vibratory Pile Driving (dB re 1 µPa)***		***Underwater Noise Thresholds for Impact Pile Driving (dB re 1 µPa)***	
Hearing Group	***Airborne Sound Pressure Level***	***Injury Threshold***	***Behavioral Harassment Threshold***	***Injury Threshold***	***Behavioral Harassment Threshold***
Cetaceans (whales, dolphins, porpoises)	NA	180 dB rms	120 dB rms	180 dB rms	160 dB rms
Pinnipeds (sea lions)	100 dB rms	190 dB rms	120 dB rms	190 dB rms	160 dB rms
Harbor seal	90 dB rms				
Fish ≥ 2 grams	NA	150 dB rms	150 dB rms	187 dB Cumulative SEL	150 dB rms

Airborne Noise Thresholds (Impact and Vibratory Pile Driving) (dB re 20 µPa unweighted)		***Underwater Noise Thresholds for Vibratory Pile Driving (dB re 1 µPa)***		***Underwater Noise Thresholds for Impact Pile Driving (dB re 1 µPa)***	
Hearing Group	***Airborne Sound Pressure Level***	***Injury Threshold***	***Behavioral Harassment Threshold***	***Injury Threshold***	***Behavioral Harassment Threshold***
Fish < 2 grams				183 dB Cumulative SEL	
Fish all sizes				Peak 206 dB	
Foraging Marbled Murrelets	Masking: variable depending on spectrum level ambient levels.	NA	NA	202 dB SEL	150 dB rms (guideline)

Notes: NA = not applicable, no established threshold;
Source: FHWG, 2008; WSDOT 2014.

Estimated Extent of Underwater Noise Levels

The extent of noise produced from pile driving over each underwater threshold was modeled using a propagation loss formula and estimated pile driving noise levels from review of pile driving studies (vibratory and impact) including past projects at NAVBASE Kitsap Bangor (Appendix C). A bubble curtain or other attenuation device would be used to minimize the noise generated by impact pile driving. Bubble curtains emit a series of bubbles around a pile through which pile driving noise is attenuated. Because a bubble curtain would be used to minimize the noise generated by driving steel pipe piles, the expected attenuation from a bubble curtain was first subtracted from the source levels prior to modeling the extent of noise from pile driving. Bubble curtain performance is discussed in Appendix C.

The results of the modeled and estimated extent of underwater noise above the marine mammal, fish and marbled murrelet thresholds and guidance is discussed in the sections for those species.

3.4.3.1 Proposed Action

Terrestrial Wildlife

As discussed in Section 3.3, the highest airborne noise levels at the base are produced along the waterfront and at the ordnance handling areas with an estimated noise level range from 70 to 90 dBA and potentially peaking intermittently at 99 dBA. Proposed pile driving would result in increased airborne noise in the vicinity of the construction site. Maximum peak levels would be generated during impact pile driving using an impact hammer, estimated to be 110 dBA re 20 µPa at a distance of 50 feet (15 meters) from an impact driven pile (WSDOT, 2014) and vibratory pile driving could create noise level of approximately 95 dBA re 20 µPa at 50 feet (15 meters) (WSDOT, 2014). Other construction activities or equipment, such as cranes, heavy trucks, and generators would also cause noise; however, this noise level would be much lower compared to noise produced by the impact hammer (WSDOT, 2014). In the absence of pile driving noise, maximum construction noise would be 94 dBA re 20 µPa at a distance of 50 feet (15 meters) from the activity, computed as the summation of noise of all equipment operating simultaneously (WSDOT, 2014). Terrestrial wildlife along Hood Canal adjacent to the project site could be affected by construction noise. Airborne noise due to impact pile driving would be the most noticeable to terrestrial wildlife. Noise impacts due to other construction activities would be minimal.

Birds are observed within the nearshore marine area. Since noise levels decrease by approximately 6 dBA with each doubling of distance (WSDOT, 2014), the average sound levels at a distance of 500 ft would be estimated at 95 dBA re 20 µPa for impact pile driving. Wildlife species occurring within the industrial areas of NAVBASE Kitsap Bangor waterfront have likely acclimated to the ambient noise levels that occur on a daily basis and are not expected to be impacted during pile driving operations, particularly marine birds occurring within the Port Security Barrier where ongoing Navy vessel noise and general operational activity occurs.

Construction noise can possibly deter birds from nesting. Following the 6 dBA per doubled distance decrease, noise would be expected to attenuate to approximately 85 dBA which is within the range of baseline noise levels generated on a day-to-day basis. Therefore, no significant impacts to nesting sites or nesting activity would result.

Construction could occur 6 days per week, with additional restrictions to minimize disturbance to foraging marbled murrelets during their breeding season. From July 16 to September 23, no in-water work would occur 2 hours before sunrise and/or 2 hours after sunset.. The in-water work window restriction would be adjusted from September 24th to January 15th to allow construction from sunrise to sunset. Non-pile driving construction activities could last until 10:00 p.m. in accordance with the WAC noise guidelines. Impact pile driving activities would not exceed 4 days. Temporary and short-term noise disturbance to terrestrial birds would like occur but would not be significant as these species are likely acclimated to the elevated noise levels typically produced along the industrial waterfront on a daily basis. No significant impacts to terrestrial species would occur with implementation of the Proposed Action.

Aquatic Species

Marine Vegetation

Implementation of the Proposed Action would include installation of four 30-inch diameter concrete filled steel pipe piles. In addition, four existing, 24-inch diameter concrete piles would be removed at the mudline by a pneumatic chipping hammer. Additionally, the construction of pile caps, installation of sled mounted passive cathodic protection systems, repair of the concrete wetwell, and recoating of the tops piles and mooring fittings would occur.

Marine vegetation could potentially be affected by the proposed action due to deterioration of water quality and by direct removal during construction. As indicated in Section 3.2, Water Quality, pile driving-related impacts to water quality from the proposed action would be limited to temporary and localized changes associated with resuspension of bottom sediments during construction. The Proposed Action would result in no measurable change to existing DO levels at the NAVBASE Kitsap Bangor waterfront or in Hood Canal in general. The proposed action would not result in violations of water quality standards for DO and would, therefore, maintain water quality in the vicinity of the project area. Similarly, pile driving activities would not discharge contaminants or otherwise appreciably alter the concentrations of trace metal or organic contaminants in bottom sediments. NAVBASE Kitsap Bangor has an approved Spill Management Plan and a regional Integrated Spill Contingency Plan is in place. These plans outline procedures designed to reduce the likelihood of fuel spills, and increase the response time and efficiency of clean up. As a result, accidental spills or discharges of deleterious materials would not be expected to adversely impact marine water quality at the project area. Increases in turbidity and suspended solids during pile driving, placement of anchors, and mobilization of tugs, barges, and monitoring vessels would be minimal, temporary, and localized.

Marine surveys at NAVBASE Kitsap Bangor have shown that eelgrass is only present in water down to 20 ft (6 m) MLLW, which is shallower than the project area. The pile replacement activity would occur in water depths of 50 to 60 ft (15.2 to 18.3 m) relative to MLLW. Red and green algae are present nearby the pile locations, but in low densities due to the inherent light limitation at the deepwater depths at the project area, limiting potential impacts. Brown algae, including understory kelp, are also distributed outside of the project area. Therefore, effects to macroalgae and eelgrass from changes in water quality during construction would be minimal and would not affect the overall health or distribution of marine vegetation near the project area.

Direct impacts to marine vegetation during the proposed action include direct removal through anchor drag, spuds, and removal of deteriorating wharf components. Any vegetative growth found on existing piles would be removed when those piles are extracted from the water. However, because marine vegetation is distributed outside of the project area, the overall health and abundance of macroalgae and eelgrass would not be compromised. The Navy concludes no significant impacts to marine vegetation would occur with the implementation of the Proposed Action.

Benthic Invertebrates

Implementation of the Proposed Action would include installation of four 30-inch diameter concrete filled steel pipe piles. In addition, four existing, 24-inch diameter concrete piles would be removed at the mudline by a pneumatic chipping hammer. Additionally, the construction of pile caps, installation of sled mounted passive cathodic protection systems, repair of the concrete wetwell, and recoating of the tops piles and mooring fittings would occur.

There would be some direct mortality of less motile benthic organisms from substrate disturbance and removal of piles colonized by invertebrates. Minimal impacts to habitat and benthic organisms are likely to result from turbidity caused by driving and removing barge anchors, spuds, and removal and installation of the 4 piles. Impacts would be minor in scale and temporary in nature. Benthic organisms, particularly annelids, are very resilient to habitat disturbance and are likely to recover to pre-disturbance levels within two years or less (CH2M Hill, 1995; Parametrix, 1994 & 1999; Anchor Environmental, 2002; Romberg, 2005).

Along with the pile removal and installation, work above water would be conducted on the wharf. This work would require the use of heavy machinery such as concrete saws. All materials removed from the existing wharf would be collected with a debris curtain/shield and disposed of. As a result, the bottom sediment and the benthic invertebrates living within that sediment would not be adversely impacted from these activities.

Overall, the removal and the installation of piles result in a negligible change to the existing benthic invertebrate habitat beneath the existing EHW-1 wharf and superstructure. The Navy concludes no significant impacts to benthic invertebrates would occur with the implementation of the Proposed Action.

Non-ESA Listed Marine Fish

Construction activity associated with the project 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 extraction and installation. Noise levels from all activities except pile driving would typically not exceed underwater sound levels resulting from

existing routine waterfront operations in the vicinity of EHW-1. The most significant underwater noise potentially affecting listed species would be from impact pile driving of the 4 steel piles. To reduce potential impacts to ESA-listed species, the piles would first be driven using a vibratory pile driver until either the pile hits refusal, necessitating an impact hammer to reach required depth, or depth is achieved with only impact proofing necessary to verify the structural capacity of the piles. Since vibratory pile drivers typically generate noise levels from 10 to 30 dB lower than impact pile driving and do not produce waveforms with sharp rise times like impact pile driving, impacts on fish are typically not observed in association with vibratory pile driving (WSDOT, 2012). With the use of vibratory driver as the primary means of installation, estimates of impact driving durations would range from several minutes to proof piles to up to approximately 45 minutes to fully drive a pile. Steel impact pile driving is estimated to occur from approximately 36 minutes to a maximum of 3 hours over the entire project duration. Because piles have been installed with vibratory installation during prior repair projects at the EHW-1 structure, fully driving piles with an impact hammer is not anticipated. Thus, 3-hours of impact driving are unlikely. Impact driving could be conducted all in one day or over a four day period (one pile proofed per day) with no more than 8 days of pile installation (vibratory and impact driving) anticipated.

To determine how far project noise would exceed the thresholds for fish, noise levels anticipated from installation of 30-inch steel piles were estimated and the Practical Spreading Loss model was used to calculate the expected noise propagation from both impact and vibratory pile driving (See Biological Assessment in Appendix C for detailed analysis). Table 3-9 lists calculated distances where pile driving noise is expected to exceed the thresholds or guidance values for fish from pile driving. Figures 3-1 and 3-2 illustrate representative views of the calculated extent and area of underwater noise propagation that exceeds the thresholds.

Fish would be expected to be exposed differently to elevated noise levels and they could behave differently in their reaction to noise. Some fish are migrating through the area and likely to have minimal exposure to elevated noise levels. Other fish are resident to the area may not move away and thus would be exposed to the noise levels for the duration of the pile driving activity (Hastings and Popper, 2005).

During impact pile driving, a bubble curtain would be used to attenuate noise. In addition, the bubble curtain would be turned on prior to initiation of pile strikes in an effort to flush fish away from the injury zone near the pile where sound pressure levels are loudest. All pile driving activities would be conducted from July 16 through January 15 to reduce potential impacts to juvenile salmon and steelhead. NAVBASE Kitsap Bangor fish surveys in the 1970s and 2005 to 2008 indicate that greater than 95 percent of the juvenile salmonids along the NAVBASE Bangor shoreline occur from February 16 through July (Schreiner et al., 1977; Salo et al., 1980; Bax, 1983; SAIC, 2006; Bhuthimethee et al., 2009a/2009b).

Sediment and turbidity in the water column would occur during pile driving and anchoring of barges creating temporary and localized disturbance to water quality from resuspension of sediments. Suspended sediments are anticipated to settle back down to the seafloor shortly after pile driving commences. Water quality impacts would be short-term and localized and would not result in significant long-term impacts to fish that may be present in the area at the time of construction.

With implementation of BMPs and minimization measures described in Section 2.4, no significant impacts to marine fish are anticipated with implementation of the Proposed Action.

Table 3-9. Distances From Piles Where Noise Exceeds Fish Thresholds and Guidance

Type of Pile Driving	Distance to Injury Threshold (meters) Area Encompassed (square km)			Distance to Behavioral Disturbance Threshold (meters)
	206 dB peak re 1 µPa	187 dB Cumulative SEL re 1 µPa^2 sec[1] for a fish ≥ 2 g	183 dB Cumulative SEL re 1 µPa^2 sec for fish < 2 g	150 dB re 1 µPa rms
Impact	14	399	736	2,929
Vibratory	n/a	n/a	n/a	117

[1]Cumulative Sound Exposure Level (SEL) assumes 2,000 impact pile strikes per day

Notes: Practical spreading loss model (15 log R) used for calculations and 8 dB of attenuation assumed from bubble curtain. Effective quiet range for SEL impact with noise attenuator is 736 meters. Underwater noise thresholds are taken from Fisheries Hydroacoustic Working Group (2008); The underwater noise guideline for behavior is taken from Hastings (2002)

dB = decibel; g = gram; RMS = root-mean-square; SEL = Sound Exposure Level; n/a = not applicable

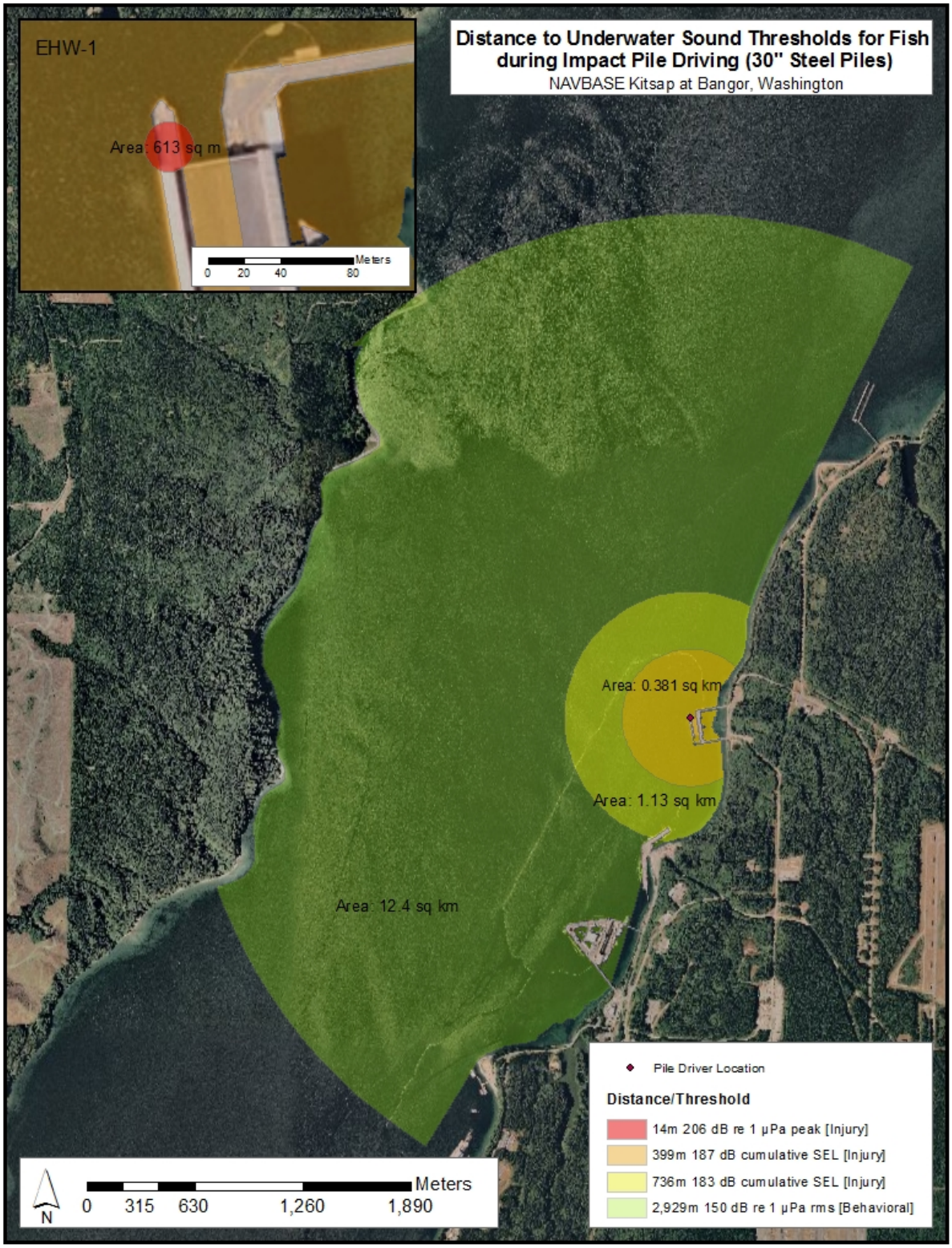

Figure 3-1. Distance to Underwater Sound Thresholds for Fish during Impact Pile Driving (30-inch steel piles)

Figure 3-2. Distance to Underwater Sound Threshold for Fish during Vibratory Pile Driving (30-inch steel piles)

Special-Status Species

ESA-Listed Species and Critical Habitat

Puget Sound Chinook Salmon ESU, Puget Sound Steelhead DPS, and Hood Canal Summer-run Chum Salmon ESU

Pile installation would be conducted during the in-water work window when juvenile salmon are least likely to be present; so exposure of juvenile salmon and steelhead to all in-water work would be minimized. Some juvenile salmon, resident Chinook salmon and returning adult ESA-listed salmon could potentially be present when pile driving would occur. Because larger juvenile salmon, adult salmon, and steelhead are not obligated to the nearshore and the fish are migratory, effects would be unlikely to result in injury levels from sound energy accumulation. Exposure of salmon or steelhead to temporary, sporadic and spatially limited increases in sediment and turbidity for brief periods of time during project repairs would be unlikely to affect salmon or steelhead that could be present. Therefore, the Navy concludes that the appropriate ESA effects determination for ESA-listed salmon and steelhead is "may affect, not likely to adversely affect". The Navy concludes no significant impacts to ESA-listed salmon or steelhead would occur with the implementation of the Proposed Action.

Only Puget Sound Chinook and Hood Canal Summer-run chum salmon have critical habitat designated within northern Hood Canal where NAVBASE Kitsap Bangor is located. However, NAVBASE Kitsap Bangor is excluded from critical habitat designation for these two species by federal law (70 FR 52630). As a result, no Puget Sound Chinook salmon or Hood Canal summer-run chum salmon critical habitat occurs in the immediate vicinity of the project area. However, the closest critical habitat occurs on the west side of Hood Canal, to the north of the base boundary, and to the south of the base boundary (approximately 1,100 m) where noise generated from impact pile driving (most noise-producing activity) may cause temporary behavioral disturbance to these species using those critical habitat areas. Because the in-water work would be conducted when these ESA-listed species are least likely to be present, and the noise that would reach critical habitat would be at a level to only result in behavioral disturbance, the Navy concludes that an effects determination of "may affect, not likely to adversely affect" Puget Sound Chinook salmon and Hood Canal summer-run chum salmon critical habitat is appropriate.

The Navy concludes no significant impacts to designated critical habitat would occur with the implementation of the Proposed Action.

Bull Trout

Bull trout from the Skokomish River have not been documented migrating into marine waters. Multiple surveys along the NAVBASE Bangor waterfront have not documented bull trout. If bull trout were to occur in Hood Canal (from other river systems outside Hood Canal), project in-water work would occur during the July 16 through January 15 period when bull trout are least likely to be present. Therefore, exposure of bull trout to temporary, sporadic and spatially limited increases in sediment and turbidity for brief periods of time or temporary increases in noise levels during project repairs would be unlikely. Therefore, the Navy concludes that the appropriate ESA effects determination for bull trout is "may affect, not likely to adversely affect". The Navy concludes no significant impacts to bull trout would occur with the implementation of the Proposed Action.

Puget Sound Boccacio Rockfish DPS, Puget Sound Canary Rockfish DPS, and Puget Sound Yelloweye Rockfish DPS

Juvenile rockfish could potentially be present in the project area because there is eelgrass and some kelp present in the project vicinity. Deepwater habitats with structural complexity used by adult rockfish do not occur near the injury zone calculated for impact pile driving. Based on the intermittent nature of impact pile driving and short-duration (3hours or less), the Navy concludes that the appropriate ESA effects determination for ESA-listed rockfish is "may affect, not likely to adversely affect". The Navy concludes no significant impacts to ESA-listed rockfish would occur with the implementation of the Proposed Action.

Humpback Whale

Humpback whales only occasionally occur in Puget Sound and have only been documented in Hood Canal once; therefore, exposure during the time when pile driving would occur is considered extremely unlikely. Therefore, based on their lack of presence and the limited amount of pile driving, exposure of humpback whales to project activities is highly unlikely to occur. Additionally, if humpback whales were present they would be unlikely to be within the range of water quality changes or construction disturbance, which would occur within the Port Security Barrier, where cetaceans have never been documented. Due to the absence of any regular occurrence of humpbacks adjacent to or within the vicinity of the project site, no more than 8 days estimated for pile driving, and implementation of marine mammal monitoring, no impacts to humpback whales are anticipated with implementation of the Proposed Action. The Navy concludes that the appropriate ESA effects determination for humpback whale is "may affect, not likely to adversely affect."

Marbled Murrelet

Like the fish injury thresholds, underwater onset of injury thresholds for marbled murrelets only apply to impact pile driving, and the distance to the injury criterion is dependent upon the number of strikes of the impact hammer that are carried out within a 24-hour period. The USFWS uses thresholds for two general forms of injury: (1) auditory injury (generally damage to sensory hair cells of the ear) beginning at 202 dB SEL cumulative, and (2) non-auditory injury (trauma to non-auditory body tissues/organs) 208 dB SEL cumulative. The onset of auditory injury is defined as the loss of hair cells due to impulsive acoustic overexposure. Since the underwater criterion for auditory injury was the lower of the two thresholds, this is the criterion used for assessing injurious impacts to the marbled murrelet in this analysis.

The distances to the auditory threshold were calculated using the same methods previously described for fish (for a detailed analysis also see Appendix C). To be conservative, the Navy carried out the noise exposure analysis assuming that pile driving would occur over 4 days and each day would require the maximum number of pile driving strikes (e.g., 2,000). Based on the analysis, it is estimated that marbled murrelets could be exposed to injurious sound pressure levels if they were within 40 meters of a 30-inch pile during impact pile driving. Since the cumulative SEL formula takes into account all impact pile strikes within a 24-hour period, this areas is the size of the injury zone as it has increased to its maximum extent through the course of the pile driving day. As a result, during the early portion of the construction day, the injury zone would be smaller and would only gradually increase out to a distance of 40 meters after all strikes have been completed. In order to ensure marbled murrelets would not be exposed to injurious sound pressure levels, the Navy intends to visually monitor a 50 meter radius from

impact driven piles (see Appendix C for the monitoring plan). Should marbled murrelets approach or enter the injury zone, all impact pile driving would cease until they have left the area. Additionally, the wharf is located within the Port Security Barrier, which experiences frequent routine vessel traffic. To further protect marbled murrelets, all pile driving would begin two hours after sunrise and cease two hours before sunset to minimize effects to foraging marbled murrelets during the nesting season. All impact pile driving would occur with the use of a noise attenuation device.

Airborne noise generated by pile driving could potentially disturb marbled murrelets or affect foraging behavior and efficiency through masking of vocalizations between birds because murrelets forage in pairs (SAIC, 2012). The USFWS has issued guidance for marbled murrelet communication masking as a result of impact pile driving. The distance to the marbled murrelet airborne masking threshold is set at 42 meters for impact driving of piles 30-inches (Figure 3-3). All other construction noise associated with the project is anticipated to be at the level of existing waterfront operations and not expected to result in masking. As noted above, the U-shaped configuration of the covered structure limits the area where marbled murrelets would be expected to occur, so the area is effectively smaller than 42 meters.

Because visual monitoring of marbled murrelets would occur out to 50 meters during impact pile driving and impact pile driving would cease if marbled murrelets are observed at or within this distance, measureable effects to foraging due to potential masking effects are not anticipated. The Navy concludes that the appropriate ESA effects determination for marbled murrelets is "may affect, not likely to adversely affect." With the implementation of minimization measures listed, no significant impacts to marbled murrelets would occur with the implementation of the Proposed Action.

Bald Eagle

The only project activity identified that would affect bald eagles was noise produced from impact pile driving. Noise levels from pile driving would be above background levels that occur along the waterfront on a daily basis, which could disturb foraging birds. However, because there are no bald eagle nests near the project, forage concentration areas, or communal roosts, the proposed action would not have a significant impact on bald eagles. If an active nest is discovered prior to project construction that would be impacted from project construction, the Navy will consult with the USFWS to ensure compliance with the Bald and Golden Eagle Protection Act. With the lack of the nests, communal roosts, or forage concentration areas near the project site and the only 8 day duration of pile driving, no significant impacts to bald eagles would occur with the implementation of the Proposed Action.

Figure 3-3. Distance Masking Thresholds for Marbled Murrelet during Impact Pile Driving (30-inch steel piles)

Marine Mammals (Non-ESA Listed Marine Mammals)

The effects of pile driving noise on marine mammals are dependent on several factors, including the species, size of the animal, and proximity to the source; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. In general, sound exposure should be less intense farther away from the source.

In order to minimize underwater noise impacts on marine species, vibratory pile driving will be the primary method used to install new steel piles. An impact hammer may be used if substrate conditions prevent the advancement of piles to the required depth or to verify the load bearing capacity. An air bubble curtain or other noise attenuating device will be used to reduce noise levels during impact driving. Marine mammal monitoring will be conducted during all pile driving, and work will shut down if marine mammals come within distances (10 meters for pinnipeds and 29 meters for cetaceans) where injury could potentially occur. A maximum of 8 days of pile driving during one in-water work season (July 16, 2015 through January 15, 2016) will be required for pile installation. Table 3-10 presents the calculated distance to and areas encompassed by the underwater marine mammal thresholds during pile driving 30-inch piles under the Proposed Action. The predicted area exceeding the threshold assumes a field free of obstruction, which is unrealistic, however, because Hood Canal does not represent open water conditions (free field) and therefore, sounds would attenuate as they encountered land masses or bends in the canal. The actual distance to the behavioral disturbance thresholds for pile driving may be shorter than the calculated distance due to the irregular contour of the waterfront, the narrowness of the canal, and the maximum fetch (furthest distance sound waves travel without obstruction [i.e., line of site]) at the project area. These distances are presented in Table 3-10. Figure 3-4 graphically depicts the representative areas of each underwater sound threshold for marine mammals (seals and sea lions [pinnipeds], porpoises and whales [cetaceans]) in the vicinity of the project area.

Table 3-10. Calculated Radial Distance(s) to Underwater Marine Mammal Pile Driving Noise Thresholds and Area Encompassed within Threshold Distance

Pile Size	***Type of Pile Driving***				
		Injury Sea Lions and Seals	***Injury Porpoises and Whales***	***Behavioral Disturbance from Impulse Noise***	***Behavioral Disturbance from Continuous Noise***
		190 dB rms	***180 dB rms***	***160 dB rms***	***120 dB rms***
30-inch	Impact	6 m 113 sq m	29 m 2,630 sq m	631 m 0.9 sq km	N/A
	Vibratory	N/A	N/A	N/A	6.3 km adjusted max* 32.4 sq km

Notes:
dB = decibel; All sound levels expressed in dB re 1 µPa rms.
Practical spreading loss (15 log, or 4.5 dB per doubling of distanced) used for calculations. Sound pressure levels used for calculations were: 195 dB rms re 1 µPa @ 10m for impact and 166 dB rms re1 µPa @ 10 meters for vibratory.
8 db of attenuation was applied to source sound pressure levels.

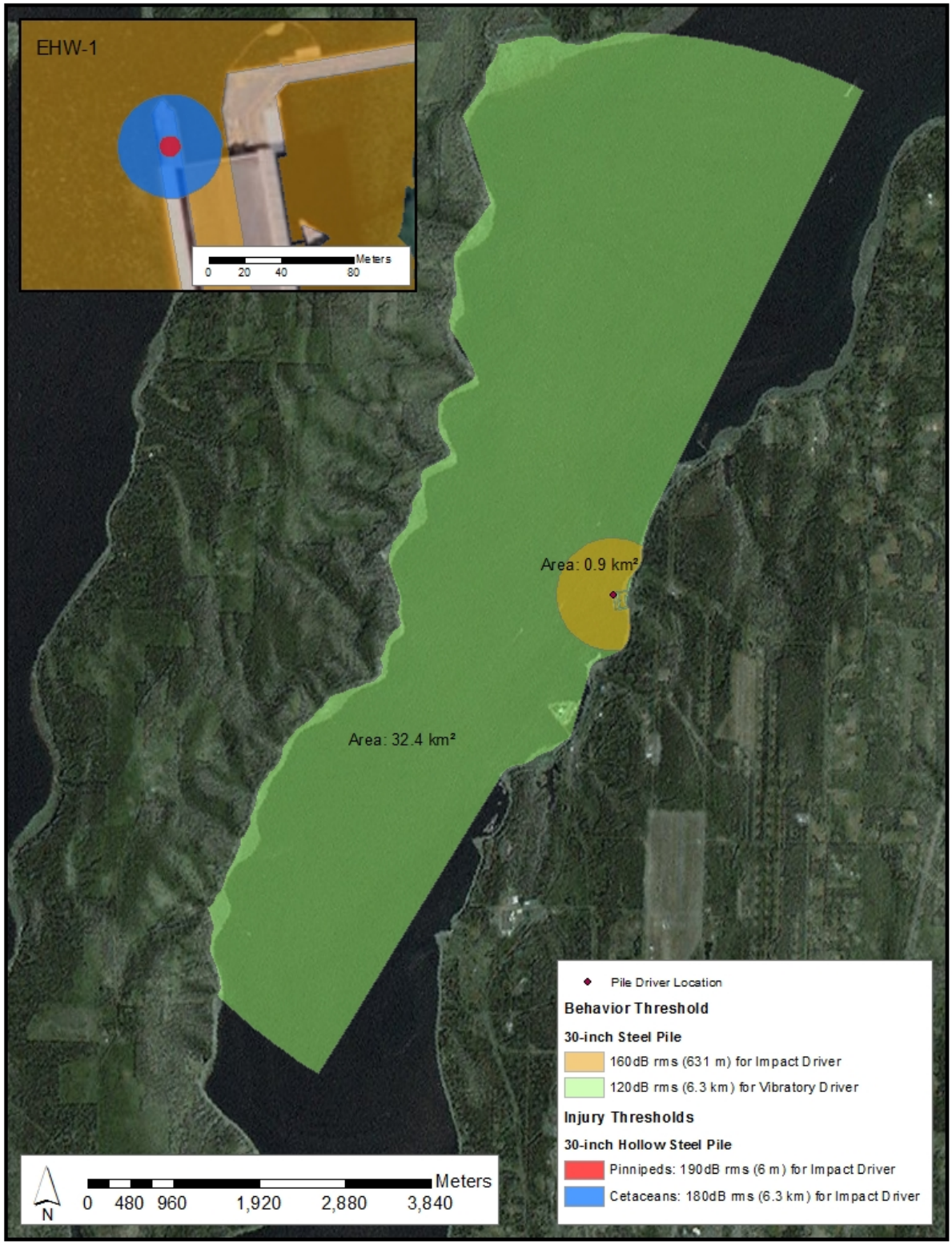

Figure 3-4. Representative View of Affected Areas for Marine Mammals due to Underwater Pile Driving Noise

The Navy is applying for an Incidental Harassment Authorization under the MMPA (Navy 2014). A required element of the application is prediction of the number of potential exposures of marine mammals to noise levels above the thresholds presented in Section 3.4.3. Predicted exposures are summarized in Table 3-11 (Navy 2014). A final Incidental Harassment Authorization is anticipated from NMFS prior to the commencement of in-water pile driving. The authorization is anticipated to span the July 16, 2015 through January 15, 2016 in water work period for pile driving.

Table 3–11. Number of Potential Exposures of Marine Mammals to Behavioral Harassment Thresholds

Species	Total
Transient killer whale	12
Harbor porpoise	20
Steller sea lion	48
California sea lion	568
Harbor seal	272
Total	920

Potential impacts to marine species can be caused by physiological responses to both the type and strength of the acoustic signature (Southall et al., 2007). Behavioral impacts may also occur, though the type and severity of these effects are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impact pile driving can range from brief behavioral disturbance, tactile perception, and physical discomfort, to slight injury of the internal organs and the auditory system, and possible death of the animal (Yelverton et al., 1973; O'Keefe and Young, 1984; Ketten, 1995; U.S. Department of the Navy, 2001).

To avoid any injurious effects, the Navy would visually monitor zones where injurious effects have been modeled and would shut-down impact pile driving if marine mammals are swimming toward or within the zones. A discussion of the anticipated project effects to each species follows.

California Sea Lion, Steller Sea Lion, and Harbor Seal

The Navy analyzed the potential for seals and sea lions hauled out or swimming at the surface to be exposed to airborne sound pressure levels that could result in behavioral harassment. The appropriate airborne noise thresholds for behavioral harassment for all pinnipeds, except harbor seals, is 100 dB rms re 20 µPa (unweighted) and for harbor seals is 90 dB rms re 20 µPa (unweighted) (see Table 3-10). Construction noise behaves as point-source and, thus, propagates in a spherical manner with a 6 dB decrease in sound pressure level over water ("hard-site" condition) per doubling of distance (WSDOT, 2014). A spherical spreading loss model was used to estimate the distance to the 100 dB and 90 dB rms re 20 µPa (unweighted) airborne

thresholds. The calculated and measured distances to the pinniped airborne noise thresholds are shown in Table 3-12. Measured distances to the pinniped thresholds were also available for 30-inch piles from monitoring during the Test Pile Program (Illingworth & Rodkin, 2012). These distances are also presented in Table 3-10. The extent of airborne noise from impact pile driving extends the farthest. Because these distances are smaller than those to the behavioral threshold, a separate analysis of Level B take was not conducted for animals in the airborne zone. Animals in the airborne zone would already have been exposed within behavioral disturbance underwater zone.

If present in the affected area during installation of the 4 piles, California sea lions, Steller sea lions, and harbor seals may be exposed to noise from pile driving that could result in disturbance. Because marine mammal monitoring would occur, they would not be exposed to injurious levels of noise from impact pile driving. Additionally, impact installation is only anticipated to occur for the final few feet of driving for the 4 replacement piles. No effects to sea lions or their prey base are anticipated from the short duration, temporary changes to water quality. Therefore, the proposed action would not have a significant impact on sea lions or harbor seals.

Table 3-12. Calculated and Measured Distances to Pinniped Behavioral Airborne Noise Thresholds

Installation Method	Harbor Seal Threshold Distance Threshold = 90 dB rms	Steller Sea lions and California Sea Lions Threshold Distance Thresholds = 100 dB RMS
Impact	189 m	60 m
Vibratory	Calculated= 27 m Measured mean = 33 m (51 m max)	Calculated = 8 m Measured mean = 10 m (16 m max)

Notes: Calculated values from Appendix C. Measured values reported in HDR, 2012 from Bangor Test Pile Program.

Harbor Porpoise

In Washington inland waters, harbor porpoises are most abundant in the Strait of Juan de Fuca, San Juan Island area, and Admiralty Inlet. However, harbor porpoises may be present in Puget Sound year-round typically in groups of 1 to 5 individuals. Harbor porpoises are not likely to be within the Port Security Barrier where most of the 631 m zone above the behavioral threshold for impact pile driving would occur. If harbor porpoises are present during pile driving, only very limited exposure of harbor porpoises to behavioral disturbance from pile driving noise is anticipated as animals transit the area. Harbor porpoise are not expected within injurious exposure distances to pile driving because this area is primarily within the Port Security Barrier and marine mammal monitoring would occur. With implementation of a noise attenuation device, marine mammal monitoring and shut down zones, and the short duration of in-water work (8 days of pile driving), no significant impacts to harbor porpoise would result with implementation of the Proposed Action.

Transient Killer Whale

Transient killer whales have occurred twice in Hood Canal since 2003 with the last occurrence 9 years ago in 2005. Because the extent of noise from impact pile driving is calculated to only

extend 631 m from pile driving, most of which is within the Waterfront Restricted Area, and impact pile driving is likely to occur for less than 3 hours, it is unlikely killer whales would be exposed to impact pile driving noise. If transient killer whales were present, they could encounter noise levels above the behavioral disturbance threshold. No impacts to killer whales or their prey based are anticipated from the short duration, temporary changes to water quality. The Navy is applying for an incidental harassment authorization for potential behavioral harassment of this species. Therefore, no significant impacts to West Coast transient killer whales would result with implementation of the Proposed Action.

Essential Fish Habitat

As was discussed for marine fish in general and ESA-listed fish, the primary impact during the proposed EHW-1 pile replacement and maintenance project would be the level of increased sound energy in marine fish habitat. This increased sound would affect the water column, which has been designated as EFH for numerous species (see Appendix C for EFH assessment for in depth species list and noise analysis). This impact to the water column EFH in turn may result in disturbance, avoidance depending on fish species, size, orientation, received noise level and type of noise. As was discussed above for marine fish and ESA-listed species, impact pile driving has resulted in injurious effects and fish kills. To avoid injurious effects and fish kills from impact pile driving, the Navy has adopted minimization measures to reduce the level of noise in the water column. The primary minimization measure is to install piles with a vibratory drive and only use an impact hammer the last few feet to verify the load bearing capacity of the structure. To dampen the amplitude of the sound pressure produced by impact pile driving, a sound attenuation device, such as a bubble curtain would be utilized during all impact hammering. Prior to initiation of the impact hammer, the bubble curtain would be turned on to help flush fish from the immediate area surrounding the pile where sound pressure levels are highest. Furthermore, the use of impact hammers is anticipated to be used for a few minutes to less than 45 minutes per pile. The longer duration of pile installation time would only be necessary if a hard substrate is encountered during vibratory driving. Based on past projects at EHW-1, impact driving to advance piles through difficult substrate has not been necessary. In addition to these measures, all work would be limited to the period from July 16 through January 15 when juvenile salmon are not typically present within the vicinity of the proposed project area. These measures should greatly reduce the impact of the noise levels as a result of the pile driving.

The removal and installation of the piles and anchoring would have a localized impact on marine vegetation and the benthic epifauna/infauna within the immediate vicinity of each pile or anchoring site. While some disruption to marine vegetation and benthic communities is unavoidable as a result of the replacement of the piles, these impacts would be temporary in duration, with a minimal and localized zone of influence. Areas of disruption are expected to recover to pre-disruption levels within a few growing seasons.

Because of the relatively high water quality and low levels of contaminants contained within the sediments at NAVBASE Kitsap Bangor near the project site, no impact to water quality or sediment quality is expected beyond minor, temporary disturbance during ground disturbing activities.

Overall, due to the temporary nature of the activities and the minimal level of impact, and the proposed mitigation measures for the project, the activities associated with the proposed EHW-1 pile replacement and maintenance project would not permanently or significantly affect EFH.

However, because sound levels from pile driving would ensonify the water column at levels high enough to injure or kill fish, the Navy has determined the project may adversely affect designated EFH. Adverse effects would be temporary and would be expected only during impact pile installation of the four replacement piles in the area where noise is above the onset of injury threshold.

Overall, due to the temporary nature of the activities and the minimal level of impact to water column noise levels, benthic flora and fauna, water quality, and sediment quality, no significant impacts, to EFH would occur from with the Proposed Action for pile replacement and maintenance.

3.4.3.2 No-Action Alternative

Under the No-Action Alternative, the proposed pile replacement and maintenance activities would not occur and there would be no change to baseline biological resources. Therefore, there would be no significant impacts to biological resources from implementation of the No-Action Alternative.

3.5 CULTURAL RESOURCES

Cultural resources consist of prehistoric and historic districts, sites, buildings, landscapes, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources, architectural resources, and traditional cultural properties.

Archaeological Resources (prehistoric and historic), are locations where human activity measurably altered the earth or left deposits of physical remains (e.g. stone flakes, arrowheads, or bottles). Archaeological resources can include campsites, trails, dumps, habitation sites, logging camps, cooking hearths, tool fragments, trash piles, and a variety of other features.

Architectural Resources include standing buildings, dams, canals, bridges, cemeteries, landscapes, and other built-environment resources of historic or aesthetic significance.

Traditional Cultural Properties can include archaeological resources, buildings, neighborhoods, prominent topographic features, and natural resources that Native Americans and other ethnic groups consider essential for the continuance of traditional cultures.

Regulatory Overview

Per Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, federal agencies must consider what affects its undertakings may have on historic properties that fall within their undertaking's area of potential effects. Guidance to assist federal agencies in meeting its Section 106 obligations is set forth in 36 CFR Part 800, *Procedures for Protection of Historic Properties,* and OPNAVINST 5090.1D. Under the NHPA, only historic properties, known or unknown, warrant consideration under Section 106. To be considered a historic property, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion on the National Register of Historic Places (NRHP). These criteria include association with an important event, association with a famous person, properties that embody the distinctive characteristics of a type, period, or method of construction, or that have yielded, or may be likely to yield, information important in prehistory or history. Resources must also possess integrity (i.e., their important historic features must still be present and

recognizable). Cultural resources generally must be more than 50 years old to be considered for eligibility for listing in the NRHP. However, more recent structures, such as Cold War-era military buildings, may warrant protection if they have achieved "exceptionally important" within the past 50 years.

3.5.1 Affected Environment

The Area of Potential Effects (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 different kinds of effects caused by the undertaking. The APE for Proposed Action is the project work area, as shown in Figure 2-1.

Archaeological Resources

An archaeological survey conducted in 2010 of the portion of the NAVBASE Kitsap Bangor waterfront in the area of EHW-1 and EHW-2 identified no prehistoric or ethno historic cultural materials or sites (Grant et al, 2010). Because of the nature and extent of modern marine activity within the APE, it is unlikely that unrecorded submerged resources exist along the shoreline. No submerged properties or anomalies have been encountered by diver, remotely operated vehicle, or remote sensing surveys near NAVBASE Kitsap Bangor. NOAA nautical charts show no submerged ships or shipwrecks in the vicinity of NAVBASE Kitsap Bangor (NOAA, 2007).

Architectural Resources

The Navy conducted an architectural survey in 2010 of the portion of NAVBASE Kitsap Bangor waterfront within the APE of the proposed EHW-2. Based on that survey, the Navy determined that EHW-1, built in 1978, is eligible for listing on the NRHP based on its cold war context. This determination was based on the facility meeting Criteria A, properties that are associated with events that have made a significant contribution to the broad patterns of our history; and, Criteria C, properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Sackett, 2010). No other architectural resources determined eligible for inclusion in the NRHP were identified in the APE.

Traditional Cultural Properties

Cultural resources may also include TCPs (National Park Service, 1998) and Properties of Traditional Religious and Cultural Importance to an Indian Tribe (PTRCI) (NHPA Section 101(d)(6)(A) and 36 CFR 800.4). TCPs are eligible for listing in the NRHP owing to their "association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining and continuing cultural identity of the community." TCPs may be identified by American Indians or other living communities. PTRCIs may be eligible for the NRHP if they meet NRHP criteria (36 CFR 800.16(l); even if not eligible for the NRHP, this resource type may be afforded protection by other laws, regulations, or executive orders. For any cultural resource to be NRHP eligible, it must be a property (i.e., a physical place) in addition to meeting other eligibility criteria. To date no TCPs or PTRCIs have been identified in or adjacent to the APE for the Proposed Action.

3.5.2 Environmental Consequences

In accordance with 36 CFR 800.5 an action results in an adverse effect to a NRHP-eligible resource when it alters the resource characteristics that qualify it for inclusion in the NRHP. An adverse effect occurs when the undertaking directly or indirectly alters any of these characteristics in a manner that would diminish the property's integrity. Examples of direct impacts can include physical destruction, damage, or alteration of a resource; alteration of the character of the surrounding environment that contributes to the resource's eligibility; introduction of visual, audible, or atmospheric intrusions out of character with the resource or its setting; and neglect of the resource resulting in its deterioration or destruction; or sale of the property.

Impacts to cultural resources would be considered significant if the Proposed Action resulted in adverse effects to NRHP eligible resources that could not be addressed through stipulations contained in a memorandum of agreement with the State Historic Preservation Office (SHPO). Potential impacts to cultural resources as a result of the Proposed Action or alternatives are described below.

3.5.2.1 Proposed Action

Implementation of the Proposed Action would not adversely affect any known NRHP-eligible archaeological sites. Construction activities would take place in previously disturbed underwater areas. Although there are no known or expected underwater cultural resources, if there were a discovery of archaeological resources during construction, the Navy would stop work in the area of discovery and evaluate the eligibility and effects to the discovered resources through consultation with the SHPO, the Tribes, and other interested parties in accordance with 36 CFR Part 800. Similarly, if American Indian human remains, funerary items, sacred objects, or items of cultural patrimony are encountered, the Navy would stop work in the immediate area of discovery and comply with the Native American Graves and Repatriation Act.

EHW-1, which is an architectural resource eligible for inclusion in the NRHP, is an imposing structure located along the NAVBASE Kitsap Bangor waterfront. Its public view is from Hood Canal and the main defining features of the structure are its wharf and super-structure. Pilings that form its foundation for the most part are below waterline and not visible to the public, with the exception when small portions exposed at low-tide. Implementation of the Proposed Action would replace four deteriorated 24-inch concrete piles with four 30-inch concrete filled steel piles and conduct necessary maintenance including deck repair, wetwell repair, and pilings and mooring fittings recoating. Although the pattern of the proposed pile replacements change from the original footprint of the extant piles, it does not adversely affect the overall characteristics that makes the property eligible for inclusion in the NRHP.

The Navy has determined that implementation of the Proposed Action would not adversely affect properties eligible for inclusion on the NRHP. The Navy initiated consultation with the Skokomish Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, and Suquamish Tribe on August 22, 2014, requesting concurrence with the APE and determination of effects under Section 106 of the NHPA (Appendix A).

The Navy initiated consultation with the SHPO on August 22, 2014 (Appendix A). On September 10, 2014, the SHPO concurred with the Navy's determination that the project, as proposed, would not adversely affect properties eligible for inclusion on the NRHP (Appendix A).

There are no known NRHP-eligible archaeological resources or TCPs within the APE, and the Proposed Action would not adversely affect the NRHP-eligible EHW-1. Therefore, no significant impacts to cultural resources would occur with implementation of the Proposed Action.

3.5.2.2 No-Action Alternative

Under the No-Action Alternative, the proposed pile replacement and maintenance activities would not occur and there would be no change to cultural resources. Therefore, no significant impacts to cultural resources would occur with implementation of the No-Action Alternative.

3.6 AMERICAN INDIAN TRADITIONAL RESOURCES

3.6.1 Regulatory Overview

As required by EO 13175, *Consultation and Coordination with Indian Tribal Governments,* the Navy has implemented a policy for consultation with federally recognized Indian Tribes, on actions with the potential to significantly impact protected tribal resources, tribal rights, or Indian lands. This policy, included in Secretary of the Navy Instruction 11010.14A and Commander, Navy Region Northwest Instruction 11010.14, describes the Navy's process and responsibilities during consultation. Federally recognized American Indian Tribes that have adjudicated tribal treaty rights in Hood Canal that include the project area are: Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes.

The Skokomish, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam, and Suquamish Tribes are signatories to treaties with the United States. Treaties between American Indians and the United States are part of the supreme law of the land that the states and their officials are bound to observe. The Skokomish and S'Klallam Tribes are signatories to the Treaty of Point No Point signed on January 26, 1855. The Suquamish Tribe is a signatory to the Treaty of Point Elliot, signed on January 22, 1855. Both treaties provide:

> The right of taking fish at usual and accustomed grounds and stations is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purposes of curing, together with the privilege of hunting and gathering roots and berries on open and unclaimed lands. Provided, however, that they shall not take shell-fish from any beds staked or cultivated by citizens.

A federal court ruling in United States v. Washington (aka the Boldt Decision) established that Western Washington tribes who were parties to various treaties with the United States have a right of access to their "usual and accustomed fishing grounds and stations" and up to 50 percent of the fin and shellfish in the treaty area. The Skokomish have primary U&A rights in the project area. Under the Hood Canal Agreement between the Skokomish and S'Klallam Tribes, the S'Klallam Tribes also have fishing rights in the Hood Canal that include the project area. The Suquamish Tribe has secondary U&A in the project area. Secondary U&A means that the tribe cannot exercise their tribal treaty rights south of the Hood Canal Bridge (that includes the project area) without the express permission of the Skokomish Tribe. To date, that permission has not been granted.

3.6.2 Affected Environment

The Tribes have identified shellfish as resources located at NAVBASE Kitsap Bangor that are of particular traditional importance. In a cooperative agreement of 1997, signed between the Navy

and the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes, the parties agreed the signatory Tribes would have exclusive access to one Bangor beach for the purposes of shellfishing and the Navy would have the other beaches. This tribal beach (also known as Bangor Beach) is located approximately one mile south of the project area, and is separated from the project area by Marginal Wharf and Delta Pier. There are two commercial geoduck tracts located outside of the Naval Restricted Area in Hood Canal to the west of the Service Pier and north to K/B Dock, located at depths of 250 to 300 feet. The geoduck tracts along the portions of the waterfront and west of Bangor Beach are currently listed as inactive by the Department of Fish and Wildlife. Inactive is only an indication that the tracts are not being harvested in the current management year. Known fishing and shellfish harvest seasons within Hood Canal, as of March 2014, include:

- Dungeness Crab – Late July and March
- Commercial Geoduck – Mid-July through March
- Ling Cod – May through September

No tribal finfishing is permitted within the Naval Restricted Area.

3.6.3 Environmental Consequences

Impacts to Native American resources would be considered significant if there was a loss of access to exercise tribal treaty rights secured under treaties or a substantial reduction or degradation of harvestable marine resources.

3.6.3.1 Proposed Action

In accordance with Executive Order 13175 and DOD and Navy instructions, the Navy initiated government-to-government consultation regarding the Proposed Action and potential impacts to tribal treaty rights with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes in July 2012. Government-to-government consultations with the tribes are ongoing and the Navy will complete these consultations prior to completing the Final EA.

Under the Proposed Action, access to the waterfront area would remain unchanged. Access to Bangor Beach (tribal fishing beach), commercial geoduck tracts located outside of the Naval Restricted Areas, and Dungeness crab fishing and finfishing located outside of the Naval Restricted Areas would not be impeded. The quantity of geoduck, finfish, and shellfish inventories would not be significantly impacted by project construction or indirect impacts of increased turbidity and sediment transport. Accordingly, impacts to American Indian traditional resources and tribal treaty rights would not be significant.

3.6.3.2 No-Action Alternative

Under the No-Action Alternative, the proposed pile replacement and maintenance activities would not occur and there would be no change to tribal resources, tribal rights, or Indian lands as a result of the Proposed Action. Therefore, no significant impacts to American Indian traditional resources would occur with implementation of the No-Action Alternative.

4 CUMULATIVE IMPACTS

CEQ regulations implementing the procedural provisions of NEPA define cumulative impacts as:

"…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." *(40 CFR 1508.7).*

Each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters. Therefore, cumulative effects analysis normally will encompass a Region of Influence (ROI) or geographic boundaries beyond the immediate area of the proposed action, and a time frame including past actions and foreseeable future actions, to capture these additional effects.

For the proposed action to have a cumulatively significant impact to an environmental resource, two conditions must be met. First, the combined effects of all identified past, present, and reasonably foreseeable projects, activities, and processes on a resource, including the effects of the proposed action, must be significant. Second, the proposed action must make a substantial contribution to that significant cumulative impact. In order to analyze cumulative effects, a cumulative effects region must be identified for which effects of the proposed action and other past, present, and reasonably foreseeable actions would occur.

4.1 Past, Present, and Reasonably Foreseeable Projects

For purposes of this cumulative effects analysis, the ROI is NAVBASE Kitsap Bangor for all resources, except cultural resources and American Indian traditional resources (which use the NAVBASE Kitsap Bangor waterfront as the ROI). NAVBASE Kitsap Bangor is restricted from public access. The impacts associated with the Proposed Action are localized and would generally only contribute to cumulative impacts in the immediate vicinity of the project.

The Proposed Action consists of in-water work. Although nearby actions with only terrestrial impacts are noted in the past, present, future projects, they are included to establish the general baseline and are not discussed in the resource sections, as there is no cumulative effect related to the Proposed Action.

This cumulative impacts analysis depends on the availability of data and the relevance of effects of past, present, and future actions. Although certain data may be available for extensive periods in the past, other data (e.g., water quality) may be available for much shorter periods. Because specific information and data on past projects and action are usually scarce, the analysis of past effects is often qualitative (CEQ, 1997).

Table 4-1 lists the past, present, and reasonably foreseeable future actions within the ROI that have had, continue to have, or would be expected to have some impact to the natural and human environment. The projects in this table are limited to those implemented in the last 5 years or those with ongoing contributions to environmental effects. Projects with measureable contributions to impacts within the ROI for a resource area were included in the cumulative analysis.

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	*Project Description*	*Project Timeframe*		
		Past	*Present*	*Future*
Waterfront Operations	Waterfront operations include the overall integration of all port operations at the Bangor waterfront. Activities include vessel traffic movement and management, personnel clearance and tracking, and ingress/egress within the restricted areas. This is an ongoing action.	X	X	X
Waterfront Facilities Maintenance	Common maintenance activities include pressure washing of waterfront piers to remove bird fecal material, marine debris (i.e., clam and mussel shells) and foreign materials (i.e., dirt and algae). Maintenance area includes walkways and approaches to the piers. Other maintenance activities may involve repair of structures or facilities, as needed.	X	X	X
Navy Surface Warfare Center Carderock Division Detachment Bremerton Command Consolidation	Construction of in-water facilities included a new access pier (8,800 ft^2), pontoon (21,600 ft^2), associated pier mooring components and 102 new steel piles. Project components also included road improvements to Carlson Spit Access Road, a 23,000 ft^2 building, and the addition of 100 workers. The Pier provides location support to the Carderock Division for its missions.	X		
CSDS-5 Support Facilities	The Navy maintains and operates waterfront and shore-based support facilities for its Submarine Development Squadron Five Detachment on NAVBASE Kitsap Bangor. At the existing Service Pier, the Navy improved barge mooring capacity by replacing an existing research barge with a new research barge and installing new mooring piles to anchor the new research barge. This work occurred in summer of 2013 and involved installation of 16 new piles over a 3-week period.	X	X	X
Explosive Handling Wharf 1 (EHW-1) Maintenance	Maintenance over multiple years to replace deteriorated piles; the most recent phase installed 29 30-inch steel piles and was completed in 2012. Phased repair of this structure is expected to continue until 2024.	X		
Waterfront Restricted Area and Security Barriers	This project includes construction of enclave fencing for the entire NAVBASE Kitsap Bangor Waterfront Restricted Area and an associated parking lot. Project entails the removal of 55 acres of forest stands, 9 acres of non-forest vegetation, fill 1.8 acres of wetlands, and create 23 acres of impervious surfaces. Mitigation action would restore tidal influence to Cattail Lake, thereby increasing intertidal habitat and providing a benefit to the natural environment.		X	X
K/B Docks Pile Replacement	Replacement of 5 deteriorated timber piles with new timber piles at the K/B Docks is planned for 2015.			X
Relocate Floats to Delta Pier	Project would relocate existing floats from the Marginal Wharf to the Delta Pier at NAVBASE Kitsap Bangor. Project would replace an existing float at Delta Pier with two existing floats from Marginal Wharf. Additionally, eight new 30-inch concrete piles would be installed at Delta Pier, while six creosote piles would be removed and one 30-inch concrete pile would be installed at Marginal Wharf. Project is planned for 2015.			X

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	***Project Description***	***Project Timeframe***		
		Past	***Present***	***Future***
Electromagnetic Measurement Range (EMMR)	The proposed project includes installation of sensor equipment, including an underwater instrument array, data/power cables, a pile-supported platform, an on shore navigation aid, and an upland monitoring system at the north end of NAVBASE Kitsap Bangor.			X
Service Pier Extension	Homeporting of two additional Seawolf-class Submarines at Bangor. Construction of an extension to the Service Pier at (33,000 ft^2), a new Pier Services and Compressor Building (2,100 ft^2) on the existing pier, upland Maintenance Support Facility (50,000 ft), and a 421-car parking lot with associated outdoor storage (4,000 ft^2). The project will be addressed in an EIS.			X
Waterfront Restricted Area Land-Water Interface	Objective is to provide security upgrades for the Waterfront Restricted Area by constructing two Waterfront Restricted Area Land-Water Interface barriers, which would connect both ends of the onshore Waterfront Restricted Area enclave to the existing floating barriers. The Land-Water Interface barriers would extend from the high water mark to the terminations of the Port Security Barriers. This project will be addressed in an EIS.			X
Pile Repair and Replacement Program	Under the Pile Repair and Replacement Program, the Navy plans to repair or replace structurally unsound piles at various Navy installations in the Puget Sound areas over a five year period beginning July 2017. Pile repair and maintenance at NAVBASE Kitsap Bangor would include Service Pier, K/B Dock, Delta Pier, Marginal Wharf, EHW-1, EHW-2, and Magnetic Silencing Facility.			X

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	***Project Description***	***Project Timeframe***		
		Past	***Present***	***Future***
Explosives Handling Wharf (EHW-2)	Construction and operation of a second EHW adjacent to the existing EHW. The main wharf will lie approximately 600 ft offshore with piles at a depth of 60-100 ft and would include an operations support building and facility support equipment such as heavy duty cranes, power utility booms, six lightning protection towers, and camels. Pile supported entrance and exit trestles connecting the wharf to shore will also be constructed. The first of three years of in-water construction began in the fall of 2012. The Navy has received the third IHA from NMFS and the final year of in-water construction will begin in July 2014. <u>EHW-2 Mitigation</u> To compensate for unavoidable impacts to aquatic resources and ensure no net loss of these resources, the Navy purchased credits from the Hood Canal In-Lieu Fee Program. To restore construction areas, the Navy will implement a re-vegetation 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 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, 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 at Port Gamble; and 5) geoduck surveys and a geoduck pilot research study. In addition, the Navy will fund acquisition and preservation of upland habitat at Port Gamble.	X	X	X

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	***Project Description***	***Project Timeframe***		
		Past	***Present***	***Future***
Hood Canal Bedlands Restrictive Easement	The Navy has completed the purchase of a Restrictive Easement over State-owned aquatic bedlands from the Washington State Department of Natural Resources to ensure mission protection and viability of operations on Ranges and Military Operating Areas (MOAs) in Hood Canal associated with commands at Naval Base Kitsap. The restrictive easement extends along the west shore of Hood Canal from the Hood Canal Bridge south to the Hamma Hamma Delta and encompasses depths from -18 feet Mean Low Low Water (MLLW) to -70 feet MLLW for a total of 4804 acres. In addition to protecting the Navy's mission on MOAs, the easement provides new protections for sensitive marine ecosystems. Many high-value habitat areas occur in the area including eelgrass communities and geoduck tracts. All of the 4,804 acres of the easement area are designated critical habitat for ESA listed Salmonid species.		X	X
Modification of Magnetic Silencing Facility Pier	Construction of a berth for U.S. Coast Guard Blocking Vessels (BVs) at the existing Magnetic Silencing Facility Pier. The project includes: a. Installation of steel support structure in two locations, The support structure will be for two 10' x 40' open deck mooring camels, b. Installation of four double-bitts (mooring fittings) on the pier deck, c. Repair of approximately 25 piles: the tops of the piles would be replaced. No new piles would be installed, and no structure would be installed on the sea bottom.			X
Northwest Training Range Complex	A wide variety of military training activities are conducted in the W-237 operating area west of Washington, including training exercises in anti-air, anti-surface, and anti-submarine warfare; electronic combat exercises; mine countermeasures training; naval special warfare training; and various support operations. The Navy has developed policies and procedures to avoid harm and to minimize the effects of Navy training on terrestrial and marine species and habitats. This action involves activities at Floral Point, which is within the ROI for this cumulative analysis. The Navy prepared an EIS for this action; the Record of Decision was signed in October 2011.	X	X	X

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	*Project Description*	*Project Timeframe*		
		Past	*Present*	*Future*
Northwest Training and Testing (NWTT)	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 Puget Sound Naval Shipyard in Bremerton, NAVBASE Kitsap Bangor and Naval Station Everett. Action will also reassess the environmental analyses of Navy at-sea training and testing activities contained in two previous EISs/OEISs and various environmental planning documents, and consolidate these analyses into a single environmental planning document. This reassessment will support reauthorization of permits under the Marine Mammal Protection Act and the Endangered Species Act. The two EIS/OEIS documents being consolidated are: • Northwest Training Range Complex EIS/OEIS, completed with community input in 2010. • Naval Sea Systems Command Naval Undersea Warfare Center Keyport Range Complex Extension EIS/OEIS, completed with community input in 2010.			X

Non-Navy Shoreline Development Projects

The shoreline of Hood Canal has been, and continues to be, subject to development by property owners. Over the past 5 years, an average of 15 shoreline development permit applications (i.e., Joint Aquatic Resources Permit Applications [JARPAs]) per year have been submitted by property owners along the shoreline of Hood Canal. The permitted actions, such as pier/dock construction, shoreline stabilization, stairways/beach access, shoreline construction, and submarine cable installation, are likely to continue within this region at the same pace (i.e., approximately 15 per year) over the next several years. Future general development in the Hood Canal watershed would increase impervious surface and affect vegetation and soils, with potential impacts to water quality of streams and Hood Canal. Non-Navy projects including Olympic View Marina, Kitsap Memorial State Park, Pleasant Harbor Marina and Golf Resort, and Misery Point Boat Launch were considered but eliminated from the cumulative impacts analysis because they are outside of the ROI.

Agency Plans for Improving Environmental Conditions in Hood Canal

Several governmental entities and community groups have joined together to plan and develop programs to improve environmental conditions in Hood Canal because of water quality problems, concern for salmon, and the overall environmental health of Hood Canal. Hood Canal Coordinating Council (HCCC) is a consortium of county governments, tribes, and other groups that was formed to help recover summer-run chum salmon populations in Hood Canal and the eastern Strait of Juan de Fuca and restore native plant communities along adjacent shorelines.

A primary action plan for Hood Canal was developed by the HCCC to assist in counteracting the adverse effects of past actions and improve environmental conditions in Hood Canal in the future. This is accomplished by the governments and groups of the HCCC working together to educate and help landowners restore the nearshore area, control septic runoff into Hood Canal, remove invasive plants and weeds, and identify properties for conservation acquisition.

The HCCC, under its Marine Riparian Initiative, is working with several entities and programs to develop a coordinated approach to re-vegetating marine shorelines (HCCC, undated). Under this initiative, Master Gardeners, Water Watchers, and other volunteer groups are trained to provide site-specific planting plans for landowners that address soil and slope stability, sediment control, wildlife, microclimate, shade, nutrient input for detrital food webs, fish prey production, habitat/large woody debris structure, water quality, human health and safety, and aesthetics.

The HCCC's primary action plan includes updating Kitsap County's Shoreline Master Plan and critical areas ordinances, conducting a nearshore assessment, adopting the Kitsap County draft shoreline environmental designations, and continued monitoring of the Big Beef Creek summer-run chum salmon reintroduction project as recommended key actions (HCCC, 2005; Kitsap County, 2013).

A portion of the Upper Hood Canal has been identified by the Kitsap County Health District as a restoration area (Kitsap County 2005; Banagan, 2008). The goals of the Upper Hood Canal Restoration Project are to protect public health and the environment by identifying and correcting sources of fecal coliform contamination from failing onsite sewage systems and inadequate animal waste management, obtaining water quality data, and educating Upper Hood Canal residents about the low DO problem and actions they can take to reduce bacteria and nutrient concentrations in Hood Canal.

The restoration area extends approximately 20 miles (32 km) along the eastern shore of Hood Canal from Olympic View Road in the north to the Kitsap County/Mason County line in the south. Most of this area lies directly south of NAVBASE Kitsap Bangor, but a portion lies along the western edge of the southern part of the base. Low DO levels are of particular concern, resulting from algal blooms, which are triggered by increases in nutrients from failing onsite sewage systems, inadequate animal waste management (i.e., hobby farms), and stormwater flowing into Hood Canal. The area of concern for low DO levels is south of the Bangor waterfront at NAVBASE Kitsap.

Commercial and Recreational Fishing

Tribal, recreational and commercial fishing occurs throughout Hood Canal. These fisheries are co-managed by Washington Department of Fish and Wildlife and tribes to minimize impacts to ESA-listed species through Fishery Management and Evaluation Plans submitted for approval to NMFS under Section 4(d) of the ESA. These fisheries will likely affect the listed fish species addressed by this evaluation; however, it is impossible to quantify the number of individual fish that will be affected, exact extent of the area of effect, or the timing and duration of the effect. Additionally, derelict fishing gear is a concern for fish, marine mammals, and marine birds.

4.2 Assessment of Cumulative Impacts by Resource

4.2.1 Sediment

Past and present actions involving in-water construction (i.e., pile driving and dredging) in Hood Canal have caused or are causing short-term disturbances to sediment. In-water structures create accretion of sediments in some locations and erosion of sediments on the down-drift side of these structures. As a result of some of these in-water projects, the assumption has been made that some slight changes in sedimentation have occurred over time.

Projects with future in-water construction elements include the Waterfront Restricted Area and Security Barriers, Electromagnetic Measurement Range, Service Pier Extension, K/B Docks, EHW-2, Transit Protection System, Land-Water Interface, and the Pile Repair and Replacement Program. All of these projects would have impacts to marine sediments similar to those discussed for the Proposed Action, and all would implement sediment controlling BMPs. With implementation of BMPs, any disturbance to marine sediments would be local and temporary. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to marine sediments.

4.2.2 Water Quality

Water quality in Hood Canal and its tributaries has been and is being impacted by past and present upland actions. Upland development has caused localized deterioration in the water quality, mainly from uncontrolled stormwater runoff, failing septic systems, and mismanagement of animal wastes. Stormwater runoff can carry contaminants, such as heavy metals and oils from hard surfaces such as roads, and nitrogen and phosphorus from lawn fertilizers into streams that empty into Hood Canal. While irregular in nature, stormwater-related inputs to water quality may be relatively intense during storm events. Contaminants in the stormwater runoff can adversely impact DO, temperature, pH, and other water quality parameters in localized areas. Past, present, and reasonably future events have impacted and will impact water quality in the ROI, as described above. However, due to the temporary and localized extent of the Proposed Action, including implementation of BMPs to avoid or minimize any potential water quality impacts, it would not make an appreciable contribution to cumulative adverse impacts to water quality.

4.2.3 Airborne Noise

For the Proposed Action to make a cumulative contribution to the airborne noise environment with other projects, these projects must occur concurrently or overlap temporally with the Proposed Action. As discussed in Chapter 2, the Proposed Action is planned to begin in July 2015 and be completed in January 2016. Past and present projects on Table 4-1 would be completed prior to the planned implementation of the Proposed Action. Pile driving construction at EHW-2 would also be completed by July 2015. Additionally, future projects such as EMMR, Service Pier Extension, Transit Protection System, Land Water Interface, and the Pile Repair and Replacement Program are all planned to begin after construction of the Proposed Action is planned to be completed.

Future projects, including, K/B Docks Pile Replacement, Relocation of Floats to Delta Pier and Modification of Magnetic Silencing Facility could overlap with the Proposed Action and contribute to the cumulative airborne noise environment. The highest noise levels would be

generated by pile driving during construction at K/B Docks and Delta Pier (no pile driving is proposed for the Modification of Magnetic Silencing Facility). As discussed in Section 3.3, Airborne Noise, impact hammer pile-driving of steel piles would generate average (i.e., root mean square [RMS]) noise levels of 110 A-weighted decibel (dBA) re 20 μPa at a distance of 50 feet (15 meters), while vibratory pile driving would generate RMS noise levels of 95 dBA re 20 μPa at 50 feet (15 meters). These levels attenuate by 6 dB per doubling of distance from the noise source (WSDOT, 2014). However, it is possible that airborne noise from these other proposed project sites could add a cumulative 3 to 4 dB to the sound environment when combined with noise from the Proposed Action (WSDOT, 2014). As such, while noise levels from the Proposed Action would not exceed 60 dBA levels at the nearest residences north of NAVBASE Kitsap Bangor (Section 3.3); when combined with other planned, future pile driving projects, these levels noise levels would not be expected to exceed typical residential noise levels of 65 dBA (Cavanaugh and Tocci,1998). Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative adverse airborne noise impacts.

4.2.4 Biological Resources

4.2.4.1 Marine Vegetation and Benthic Invertebrates

Marine vegetation and benthic invertebrates in Hood Canal has been or could potentially be disturbed by past and present placement of in-water structures such as pilings and anchors, dredging, underwater fills, and construction of overwater structures. These impacts to marine vegetation include temporary and/or permanent loss of marine vegetation, reduced productivity, and changes in the type or abundance. Shading can impact the abundance of some benthic organisms and lighting can increase predation rates on benthic invertebrates and likely increase foraging rates of others. Shading and loss/alteration of soft-bottom habitat has impacted the type and abundance of marine vegetation that occurs in the vicinity of these structures. In addition, in-water structures have resulted in accretion of sediments in some areas and possibly erosion in others. Areas of erosion could result in adverse impacts to sediment-dwelling species if severe enough. These changes would adversely affect foraging by juvenile salmon, which forage in eelgrass beds and rearing areas for juvenile fish, as well as food for marine mammals, fish, birds and humans. Important marine habitat, such as eelgrass, has decreased over time in Hood Canal as indicated by trend data. Hard surfaces create sites for colonization by species adapted to these surfaces such as some marine vegetation, mussels and sea anemones. Thus, the impact of in-water structures has been to replace native soft-bottom habitat with hard-surface habitat over time. This has changed species composition on and nearby these structures.

Past and present Navy and non-Navy actions, including marinas, residential docks, boat ramps, and piers involving placement of pilings and anchors have resulted in the direct loss of the natural benthic soft-bottom habitat. As described above, this habitat is replaced by the hard surfaces of pilings and anchors, and as a result, the types of marine vegetation and benthic organisms have changed and are changing in these localized areas. Future in-water structures would similarly result in the same changes to marine vegetation and benthic organisms.

The Proposed Action is temporary and would not contribute to any permanent cumulative losses to marine vegetation or benthic communities.

4.2.4.2 Fish

Past actions have adversely impacted populations of salmon, steelhead, cutthroat, and bull trout, including federally 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, interfering with migration, adverse impacts to forage fish habitat and spawning, contamination of water and sediments, and addition of nutrients that contribute to algal blooms, which can deplete DO in part of the water column. Other factors that have resulted in adverse impacts to native salmon and steelhead abundance are overharvest by fisheries and the influence of hatchery stock on native stocks. Existing Navy structures have affected fish habitat, and have probably impeded and continue to impede juvenile salmon migration to some degree. Current and future waterfront projects at NAVBASE Kitsap Bangor would incorporate best management practices to minimize impacts to juvenile salmon habitat and migration, and to forage fish.

The placement of in-water structures by the Navy and from non-Navy actions has changed and would continue to change fish habitat in and around these structures. Water quality has been and is being impacted by past and present actions and could be impacted by potential future development. Nutrients can cause algal blooms that deplete DO and result in fish kills. Many of the other types of past and ongoing impacts described above for fish also apply to other marine species. Trend data have shown a decrease in some fish species such as rockfish, spiny dogfish, Pacific cod, and hake, as well as increased toxins in the tissues of some species such as Chinook salmon (PSAT, 2007).

Future Navy and non-Navy actions have the potential to 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, MSA, MMPA, and NEPA, was enacted have been considering and are required to consider environmental impacts to special status species and essential fish habitat, prepare analysis (including a biological assessment), and consult with federal oversight agencies to minimize project impacts. Future actions are also required to go through this same process. Future actions at NAVBASE Kitsap Bangor would be designed and implemented to minimize impacts to fish.

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. Efforts to reduce construction impacts to fish have resulted in a schedule of in-water work periods that all projects must adhere to if authorized by state (WDFW) or federal (USACE) regulatory authorities. The work windows help minimize adverse impacts to migrating and spawning fish in freshwater and juvenile salmon in marine waters.

Future actions, including Navy actions, would be designed and implemented to minimize impacts to fish and their habitat. The protective measures taken to minimize impacts during construction activities, and the design elements that reduce long-term impacts to nearby habitats, as well as strengthened environmental review of recent and future actions, is expected to reduce impacts to fish populations. In addition, many of the habitat restoration projects discussed above for salmonids would also benefit non-salmonid fish species.

Implementation of the proposed pile replacement activities would have insignificant effects on fish. Past, present, and future development projects have had, have, and would have the potential to result in many of the impacts to salmonids, and add to declining population trends. Although there are ongoing and future actions and plans intended to improve conditions for fish in Hood Canal (described above), the impacts of the proposed action would result in short-term increases in underwater noise and turbidity therefore potentially contributing to past and ongoing cumulative impacts to these species. However, because impacts are short-term and localized, and BMPs and minimization measures would be in place, cumulative impacts would not significantly affect fish populations in the proposed project area.

4.2.4.3 Marine Mammals

Construction and operation of past and present waterfront projects, as well as non-Navy actions, have resulted in increased human presence, underwater and airborne noise, boat movement, fishing, and other activities, which has likely impacted marine mammals in the area. Increased anthropogenic noise in the marine environment has the potential to cause behavioral reactions in marine mammals including avoidance of certain areas. Population trend data indicate that most of the marine mammal species expected to be in the project area are either stable or increasing in recent years based on NMFS stock assessment reports despite past and present actions (Carretta et al., 2013; Allen and Angliss, 2013). For instance, the U.S. stock of California sea lions is nearly at its carrying capacity, harbor seals within the inland waters of WA are at their optimum sustainable population level, and the Eastern stock of Steller sea lions was removed from listing under the federal ESA based on an increase in population size of ~3.0% per year since 1970 (NMFS, 2008). Continued regulation of marine mammal exposures to anthropogenic disturbance by NMFS under the MMPA, coupled with stock assessments, documentation of mortality causes, and research into acoustic effects, ensure that cumulative effects would be minimized. The regulatory process also ensures that each project that may result in exposure of marine mammals is assessed in light of the status of the species and other actions affecting it in the same region.

Future Navy and non-Navy waterfront projects may have similar impacts to past and present actions including increased anthropogenic sound (both airborne and underwater), increased human presence, increased boat movements and other associated activities. These actions could result in behavioral impacts to local populations of marine mammals, such as temporary avoidance of habitat, decreased time spent foraging, increased or decreased time spent hauled out (depending on the activity), and other minor behavioral impacts. Most impacts would likely be short-term and temporary in nature and unlikely to affect the overall fitness of the animals. However, some projects such as the construction of a second EHW facility at NAVBASE Kitsap Bangor may result in more moderate impacts due to longer construction timelines (3-5 years). Impacts to marine mammals from the second EHW facility are still expected to primarily result from behavioral disturbance from underwater sound pressure levels; however indirect impacts to marine mammals may occur as a result of impacts to their prey base (fish) during construction and the ultimate operation of the wharf. Potential impacts to their prey base could include habitat disturbance during construction and overwater shading from the completed structure during its operational life. Impacts during construction are expected to be temporary. Overwater shading would be a long-term impact, but the effect to marine mammal populations would be minimal. Overwater shading may result in a reduction in the amount or quality of submerged aquatic vegetation (SAV) which may in turn affect forage fish due to a reduction in quality

habitat. To compensate for unavoidable impacts on aquatic resources, including SAV, from construction and operation of EHW-2, the Navy purchased aquatic habitat credits from the Hood Canal in-Lieu Fee Program. Other future non-Navy actions involving the placement of piles and anchors and resultant shading would also reduce the amount of eelgrass and macroalgae. Future actions impacting eelgrass would require mitigation (in compliance with the USACE rule on compensatory mitigation for losses of aquatic resources) such that there would be no net loss of these resources. Therefore, any reduction in forage fish populations would not be expected to have an adverse impact to marine mammals or their overall fitness. Additionally, proposed projects along the NAVBASE Kitsap Bangor waterfront would occur in an area that already has industrial uses with higher than normal activity and noise levels. Thus, marine mammals in the area may be habituated to these higher levels of ongoing activity and less impacted by ongoing waterfront development.

Implementation of pile driving activities (including pneumatic chipping) would have insignificant effects on marine mammals, and would not adversely affect the ESA-listed humpback whale. The proposed action may result in behavioral disturbance to marine mammals from underwater sounds associated with pile driving; however, these effects would be limited to localized, temporary disturbances to marine mammals within the project area.

Past, present, and future development projects have had, are having, and would have the potential to result in many of the impacts to mammals described above, and could also have additional impacts to the species, their habitat, and prey. For instance, fishing operations in the area could reduce local abundance of forage fish or result in by-catch of marine mammals. Because marine mammals are highly mobile, the noise impacts of the proposed action could combine with underwater and airborne noise impacts to marine mammals from other actions and activities in Hood Canal region. However, because the expected impacts of the proposed action on marine mammals in general would be temporary and short in duration, cumulative impacts to marine mammals associated with pile driving noise are considered unlikely. Continued adherence to the requirements of the ESA and MMPA by NAVBASE Kitsap Bangor would limit disturbance to marine mammals and ensure that important habitats do not become degraded. Furthermore, existing regulatory mechanisms and minimization measures would protect marine mammals (i.e., sound attenuation devices, visual surveillance, the use of shutdown zones (see Sections 2.4 and 3.4)) and further decrease the likelihood of potential cumulative impacts to these species.

4.2.4.4 Birds

Construction and operation of past and present waterfront projects, as well as non-Navy actions, has resulted in increased human presence, underwater and airborne noise, boat movement, and other activities, which has likely deterred some water-dependent wildlife such as marine birds from these areas. Marine birds typically avoid areas with continuous activity or that produce periodic impacts such as loud noises. Often, birds would return to these areas when human presence is lower or there is less activity. There may also be some benefits as some birds may use these in-water structures for roosting or nesting.

Trend data for Hood Canal indicate that marine bird species have been on the decline. Of the 30 most common marine birds, 19 have experienced declining populations of 20 percent or more over the past 20 years. It is unknown what is causing this decline, 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, 2007). The marbled murrelet, listed as threatened under the ESA, declined more than 20 percent in population in the Puget Sound region from the 1970s through the 1990s (PSAT, 2007). The principal reason for the earlier decline was loss of nesting habitat (old-growth forest).

Future Navy and non-Navy waterfront projects may have similar impacts to those of the past and present actions including increased anthropogenic sound (both airborne and underwater), increased human presence, increased boat movements, and other associated activities. These actions could result in behavioral impacts to local populations of marbled murrelets and other birds, such as temporary avoidance of habitat, decreased time spent foraging, increased or decreased time spent resting (depending on the activity), and other minor behavioral impacts. Most impacts would be unlikely to affect the overall fitness of the animals. However, some projects such as the construction of a second EHW facility at NAVBASE Kitsap Bangor may result in more moderate impacts due to longer construction timelines (3-5 years). Impacts to marbled murrelets and other birds are still expected to primarily result from behavioral disturbance from underwater sound pressure levels; however indirect impacts to marbled murrelets may occur as a result of impacts to their prey base (fish) during construction and the ultimate operation of the second wharf. Potential impacts to their prey base could include habitat disturbance during construction and overwater shading from the completed structure during its operational life. Impacts during construction are expected to be temporary. Overwater shading would be a long-term impact to the forage base. Additionally, proposed projects along the Bangor waterfront, such as the EHW-1 Pile Replacement and Maintenance Project, would occur in an area that already has industrial uses with higher than normal activity and noise levels. Thus, marine birds in the area could be habituated to these higher levels of activity and less impacted by ongoing waterfront development.

As described in Section 3.4 (Biological Resources), implementation of pile driving and pile removal at the project area would have no significant effect on migratory bird populations and, with sound attenuation devices, visual surveillance, the use of shutdown zones, significant impacts to marbled murrelets will be avoided. The proposed action would likely have underwater and airborne noise impacts to birds, but most effects would be limited to localized, temporary disturbances to birds in the project area.

Past, present, and future development projects have had, are having, and would have the potential to result in many of the impacts to marine birds described above, and add to past or current declining population trends. Because marine birds are highly mobile, the noise impacts of the proposed action could combine with underwater and airborne noise impacts to marine birds from other actions and activities in Hood Canal region. However, because the expected impacts of the Proposed Action on marine birds in general would be temporary, cumulative impacts to marine birds associated with pile driving noise from the Proposed Action are considered unlikely.

Continued adherence to the requirements of EO 13186 and the Bald and Golden Eagle Protection Act (16 U.S.C. 668a-d dated 8 June, 1940 as twice amended) by NAVBASE Kitsap Bangor would limit disturbance to the bald eagle and other migratory birds. Furthermore, existing regulatory mechanisms and minimization measures would protect the ESA-listed marbled murrelet (see Section 3.4, Biological Resources) and further decrease the likelihood of potential cumulative impacts to these species.

4.2.5 Cultural Resources

Cultural resources are unique as well as finite in nature, so an adverse effect to a single historic property may affect the context of adjacent historic properties within NAVBASE Kitsap Bangor. Past, present, and future construction projects and modifications to facilities have the potential to adversely affect cultural resources such as prehistoric and historic archaeological sites and historic districts, buildings, or structures meeting NRHP-eligibility criteria.

The mitigation associated with Waterfront Restricted Area and Security Barriers affected historic properties. As a result, an MOA was executed between the Navy and the SHPO to address an unanticipated archaeological discovery and appropriate data collection. The Proposed Action will have no cumulative adverse effects to the archaeological resources addressed in the Cattail Lake MOA.

EHW-1 is a pile supported structure comprised of 961 piles, which has been determined eligible for inclusion in the NRHP. Previous repairs conducted in 2011 and 2012 removed 138 piles (including steel and concrete piles) and the fragmentation barrier. As part of this work, 29 new steel piles were installed. The Navy determined that the repair work conducted in 2011 and 2012, as well as construction of EHW-2, did not have an adverse effect on the eligibility of this historic structure. As discussed in Section 3.5, the Navy has determined that the Proposed Action would not have an adverse effect on properties eligible for inclusion in the NRHP. The SHPO concurred with this determination on September 10, 2014. As such, implementation of the Proposed Action, when combined with past and present actions would not result in cumulative adverse effects to EHW-1.

Though no future pile replacement requirements have been identified at EHW-1, future waterfront inspections could identify degraded piles that must be replaced. The regional Pile Repair and Replacement Program addresses these contingency requirements and estimates a maximum of 15 replacement piles per year for all structures along the NAVBASE Kitsap Bangor waterfront, beginning in 2017. The Navy would comply with Section 106 of the NHPA for all pile replacements planned under the Pile Repair and Replacement Program, as well as all other reasonably foreseeable future actions included in Table 4-1. This by includes identifying the presence of historic properties, evaluating their NRHP eligibility, assessing impacts, and consulting with the SHPO on the mitigation of any adverse impacts could not be avoided or minimized, thereby addressing the cumulative impact of those undertakings. With these procedures in place, the Proposed Action would not contribute to cumulative impacts to cultural resources.

4.2.6 American Indian Traditional Resources

The ROI for evaluating cumulative impacts on American Indian traditional resources consists of the NAVBASE Kitsap Bangor waterfront. The Navy has an active consultation process in place to insure tribal input on resources found on and off the installation, as well as potential access issues. Because of this ongoing process, traditional resources on NAVBASE Kitsap Bangor will continue to be protected and accessible.

Regionally, tribes have expressed a concern over the loss of access to traditional fishing and foraging areas in Puget Sound, especially as a result of incremental habitat loss through construction of piers, bulkheads and docks. Tribes have also expressed concern over lost fishing opportunity, including time and gear lost due to increased vessel traffic in their usual and accustomed areas. The Navy consults with tribes on all Navy proposed actions that may have

the potential to significantly affect protected tribal resources and/or tribal access to those resources, as well as any potential cumulative effects. With respect to these issues, the Navy has initiated Government to Government consultation with the tribes on the EHW-1 Pile Replacement and Maintenance Project and will continue to consult with the tribes on future Navy projects that may have cumulative effects to American Indian traditional resources.

Past, present, and future Navy activities have the potential to significantly affect protected tribal treaty rights and traditional resources. The Proposed Action would not contribute impacts on the designated tribal shellfish harvest beach (Bangor Beach) to the south of the project area, nor would it affect current or future access to Usual and Accustomed fishing grounds and stations. Therefore, the Proposed Action would not contribute to significant cumulative impacts on tribal treaty rights and traditional resources.

4.2.7 Greenhouse Gas (GHG) Cumulative Effects

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when proposed GHG emissions combine with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions. Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. In the absence of an adopted or science-based NEPA significance threshold for GHGs, this analysis compares GHG emissions that would occur due to implementation of the Proposed Action to the permitting threshold identified in the Greenhouse Gas Mandatory Reporting Rule (40 CFR Part 98).

An appreciable impact on global climate change would, if currently accepted predictions are accurate, only occur when proposed GHG emissions combine with other GHG emissions from other man-made activities on a global scale. However, individual sources of GHG emissions related to the proposed actions or nearby projects are not large enough to have an appreciable effect on climate change.

Emissions of GHGs from the proposed action alone would not cause appreciable global warming that would lead to climate changes. However, these emissions would increase the atmosphere's concentration of GHGs, and, in combination with past and future emissions from all other sources, contribute incrementally to the global warming that produces the adverse effects of climate change. At present, no methodology exists that would enable estimating the specific impacts (if any) that this increment of warming would produce locally or globally.

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5 OTHER CONSIDERATIONS REQUIRED BY NEPA

In accordance with 40 CFR Section 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the proposed action and the objectives of Federal, regional, State and local land use plans, policies, and controls. Table 5-1 identifies the principal federal 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. Principal Federal Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	Status of Compliance
National Environmental Policy Act (NEPA); CEQ NEPA implementing regulations; Navy procedures for Implementing NEPA; and OPNAV M-5090.1, Chapter 10	Preparation of this EA has been conducted in compliance with NEPA and in accordance with CEQ regulations and the Navy's NEPA procedures.
Clean Air Act	The USEPA has established NAAQS for seven pollutants. NAVBASE Kitsap Bangor is located in Kitsap County which is an attainment area. A formal conformity determination is not required. Emissions for the Proposed Action would come from temporary, mobile sources and would be well below applicable thresholds. As a result, the project would comply with the requirements of the Clean Air Act, as amended.
Endangered Species Act(ESA)	In accordance with ESA Section 7 requirements, the Navy prepared a Biological Assessment (BA) that concludes the Proposed Action may affect, but is not likely to adversely affect listed species potentially present or designated critical habitats. The Navy is informally consulting with USFWS and NMFS regarding potential effects to ESA-listed species and critical habitat. At the conclusion of the consultation, NMFS and USFWS would issue Letters of Concurrence completing informal consultation.
Marine Mammal Protection Act (MMPA)	Based on potential impacts to marine mammals, the Navy prepared an Incidental Harassment Authorization (IHA) application to request take for level "B" harassment. The IHA application will be submitted to NMFS. At the conclusion of the consultation, NMFS would issue an incidental harassment authorization.
Magnuson-Stevens Fishery Conservation and Management Act (MSA)	The Navy prepared an EFH Assessment that concluded the Proposed Action may adversely affect designated EFH, but the affect would be minor and temporary. The Navy is consulting with NMFS. At the conclusion of the consultation, NMFS would issue conservation recommendations.
Migratory Bird Treaty Act (MBTA)	The Proposed Action is not likely to adversely affect migratory bird populations and would be in compliance with the MBTA.
Bald and Golden Eagle Protection Act	The Proposed Action would not take, possess, or transport bald or golden eagles, their nests or eggs and would therefore be in compliance with the Bald and Golden Eagle Protection Act.
Clean Water Act (CWA) (Sections 401 and 404)	A permit under Section 404 of the CWA is required for the discharge of fill into Waters of the U.S. The USACE has determined that pouring concrete into steel piles constitutes a discharge of fill material. The Proposed Action meets the requirements of a Nationwide Permit 3 for Maintenance in accordance with the User's Guide for Nationwide

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

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	Status of Compliance
	Permits in Washington State (USACE, 2012). The Proposed Action also meets the WDOE 401 General Conditions contained in the User's Guide and is therefore certified in compliance with Section 401 of the CWA. The Navy would submit a preconstruction notification to the USACE and receive written concurrence prior to starting in-water construction.
Rivers and Harbors Act (RHA)	A permit under Section 10 of the Rivers and Harbors Act is required for the removal and replacement of pilings in navigable waters. The Proposed Action, which would replace deteriorated piles in the Hood Canal, meets the requirements of a Nationwide Permit 3 for Maintenance in accordance with the User's Guide for Nationwide Permits in Washington State (USACE, 2012). The Navy would submit a preconstruction notification to the USACE and receive written concurrence prior to starting in-water construction.
Coastal Zone Management Act (CZMA)	The proposed action is not expected to result in any impacts related to coastal zone management. The proposed action would be consistent with Shoreline Management Act and Kitsap County Shoreline Management Master Program. The proposed action would have no direct impact to recreational uses or access in the surrounding community nor would it impact the residences on the west side of Hood Canal, on – base residences or the nearest residences to the north. Pile replacement activities occurring at EHW-1 would not represent a change from the existing developed military character and would not be discernable from public vantage points and/or affect views of scenic vistas. The Proposed Action meets the Nationwide Permit 3 and WDOE has certified that this type of action is consistent with Washington's Coastal Zone Management Program's Enforceable Policies (USACE, 2012).
National Historic Preservation Act (NHPA)	The NHPA requires federal agencies to identify, evaluate, inventory, and protect NRHP resources (or resources that are potentially eligible for listing in the NRHP on properties that they control (16 USC 470h-2). The Navy determined that the Proposed Action would not adversely affect properties eligible for inclusion in the NRHP. In accordance with Section 106 of the NHPA, the Navy initiated consultation with the Washington SHPO on August 22, 2014, requesting concurrence on the Area of Potential Effect (APE) and the determination of no adverse effects to properties eligible for inclusion in the NRHP. On September 10, 2014 the SHPO concurred with the APE and the Navy's determination of no adverse effects to properties eligible for inclusion in the NRHP.
Consultation and Coordination with Indian Tribal Governments (EO 13175) and Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes (SECNAV Instruction 11010.14A)	As required under Secretary of the Navy Instruction 11010.14A, *Department of the Navy Policy for Consultation with Federally Recognized Tribes*; DoD Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes*; and DoD Policy, *American Indian and Alaska Native Policy Alaska Implementation Guidance,* the Navy initiated consultation with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes regarding potential impacts to Tribal U&A fishing grounds and stations in July 2012. Consultations with the Tribes are ongoing.

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

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	Status of Compliance
EO 12088, Federal Compliance with Pollution Control Standards	EO 12088 requires federal facilities to comply with all applicable pollution control standards. The Proposed Action would contribute only minor amounts of pollution, during construction and maintenance activities. Moreover, only minimal amounts of solid waste requiring disposal would be generated during construction and would be disposed of in an environmentally safe manner.
EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-income Populations	No disproportionately high or adverse impacts to minority and low-income populations would be expected from the Proposed Action.
EO 13045, Protection of Children from Environmental Health Risks and Safety Risks	The Proposed Action is located entirely within the NAVBASE Kitsap Bangor. Access to the site is restricted. The nearest school is 2.5 miles away, which is out of range of harmful noises from the project site. Implementation of 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.

5.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF NATURAL OR DEPLETABLE RESOURCES

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

Implementation of the Proposed Action would involve commitment of a range of natural, physical, human, and fiscal resources. Raw materials, such as steel for pilings, fossil fuel, and labor would be expended in pile replacement activities. Natural resources and labor would also be used to fabricate the new piles to be installed. 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 implementation of the Proposed Action would not result in significant irreversible or irretrievable commitment of resources.

5.2 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 the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

In the short-term, effects to the human environment with implementation of the Proposed Action would primarily relate to the in-water construction activity itself. Air quality, water quality and marine sediment, and airborne noise would all expect to be impacted in the short-term. In the long-term, productivity of the area would remain the same, as replacement of piles and other maintenance activities at EHW-1would not change the overall productivity of the area. The Proposed Action would not result in any impacts that would reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

5.3 Means to Mitigate and/or Monitor Adverse Environmental Impacts (40 CFR Section 1502.16(h))

The Proposed Action would not result in any significant adverse environmental impacts with implementation of best management practices and minimization measures identified in Section 2.4.

For vibratory pile driving, the contractor will initiate noise from vibratory hammers for 15 seconds at reduced energy followed by a 30-second waiting period. The procedure shall be repeated two additional times.

5.4 Any Probable Adverse Environmental Effects That Cannot Be Avoided and Are Not Amenable To Mitigation

This EA has determined that the proposed action would not result in any significant impacts; therefore, there are no probable adverse environmental effects that cannot be avoided or are not amenable to mitigation.

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7 LIST OF PREPARERS

In accordance with OPNAVINST 5090.1C, CH-1, this section lists the names and qualifications (expertise/experience, professional disciplines) of the persons who were primarily responsible for preparing the EA.

NAVFAC ATLANTIC

Cory Zahm, AICP
Community Planner
M.U.P., Urban and Regional Planning, State University of New York at Buffalo
B.A., Political Science, Lehigh University
Years of experience: 9

NAVFAC NORTHWEST

Ben Keasler
Environmental Planner
B.S., Natural Resources Management, California Polytechnic State University
Years of experience: 15

Sharon Rainsberry
Fish Biologist
M.S., Fisheries Science, University of Washington
B.S., Biological Science, California State Polytechnic University
Years of experience: 9

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APPENDICES

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APPENDIX A

AGENCY CORRESPONDENCE

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September 10, 2014

Capt. T.A. Zwolfer
Commanding Officer
U.S. Navy, Naval Base Kitsap Bremerton
120 South Dewey St
Bremerton, WA 98134-5020

In future correspondence please refer to:
Log: 091014-15-USN
Property: EHW-1 Piling Replacement and Wharf Maintenance
Re: NO Adverse Effect

Dear Capt. Zwolfer:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP). The above referenced project has been reviewed on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. My review is based upon documentation contained in your communication.

First, I agree with the Area of Potential Effect (APE) as mapped in the consultant's report. I also concur that the current project as proposed will have "NO ADVERSE EFFECT" on National Register eligible or listed historic and cultural resources. If additional information on the project becomes available, or if any archaeological resources are uncovered during construction, please halt work in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. If you have any questions, please contact me.

Sincerely,

Russell Holter
Project Compliance Reviewer
(360) 586-3533
russell.holter@dahp.wa.gov

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/ 01430
22 Aug 14

Allyson Brooks, PhD
State Historic Preservation Officer
Department of Archaeology & Historic Preservation
P.O. Box 48343
Olympia, WA 98504-8343

Dear Dr. Brooks:

SUBJECT: EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

In accordance with Section 106 of the National Historic Preservation Act, the Navy would like to initiate consultation regarding the proposed undertaking to replace deteriorating piling beneath the Explosive Handling Wharf #1 (EHW-1) - Facility 7501 at Naval Base (NAVBASE) Kitsap Bangor (Enclosure 1). The Navy has determined the EHW-1 structure is eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria A and C with SHPO concurrence, March 25, 2011.

The site of the proposed undertaking is along the eastern shore of Hood Canal towards NAVBASE Kitsap Bangor's northern border. The proposed project would demolish four 24-inch hollow prestressed octagonal concrete piles and install four 30-inch concrete filled steel piles adjacent to the demolished piles at Bent 27 of the outboard support of the EHW-1 (Enclosure 2). Additionally the project would: demolish and replace four 6'-0" by 4'-3" sections of deck in order to install new piles; construct four cast-in-place concrete pile caps to function as load transfer mechanisms between the superstructure and the new piles; install four sled mounted passive cathodic protection systems; repair deteriorated concrete of the wetwell (encasement for a sanitary sewer lift station pump) on the Wharf Apron; and, recoat top portions of 183 steel pipe fender piles and 27 steel mooring fittings on the deck of the Wharf.

The Area of Potential Effect (APE) is defined as the footprint of the proposed project work area at the existing Wharf. Please refer to Enclosure 3.

SUBJECT: EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

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The Navy requests your concurrence with our defining of the APE and finding of No Historic Properties Adversely Affected. Please direct additional inquiries to Ms. Amanda Bennett. She can be reached by telephone at (360) 476-6613, or by e-mail at amanda.j.bennett@navy.mil.

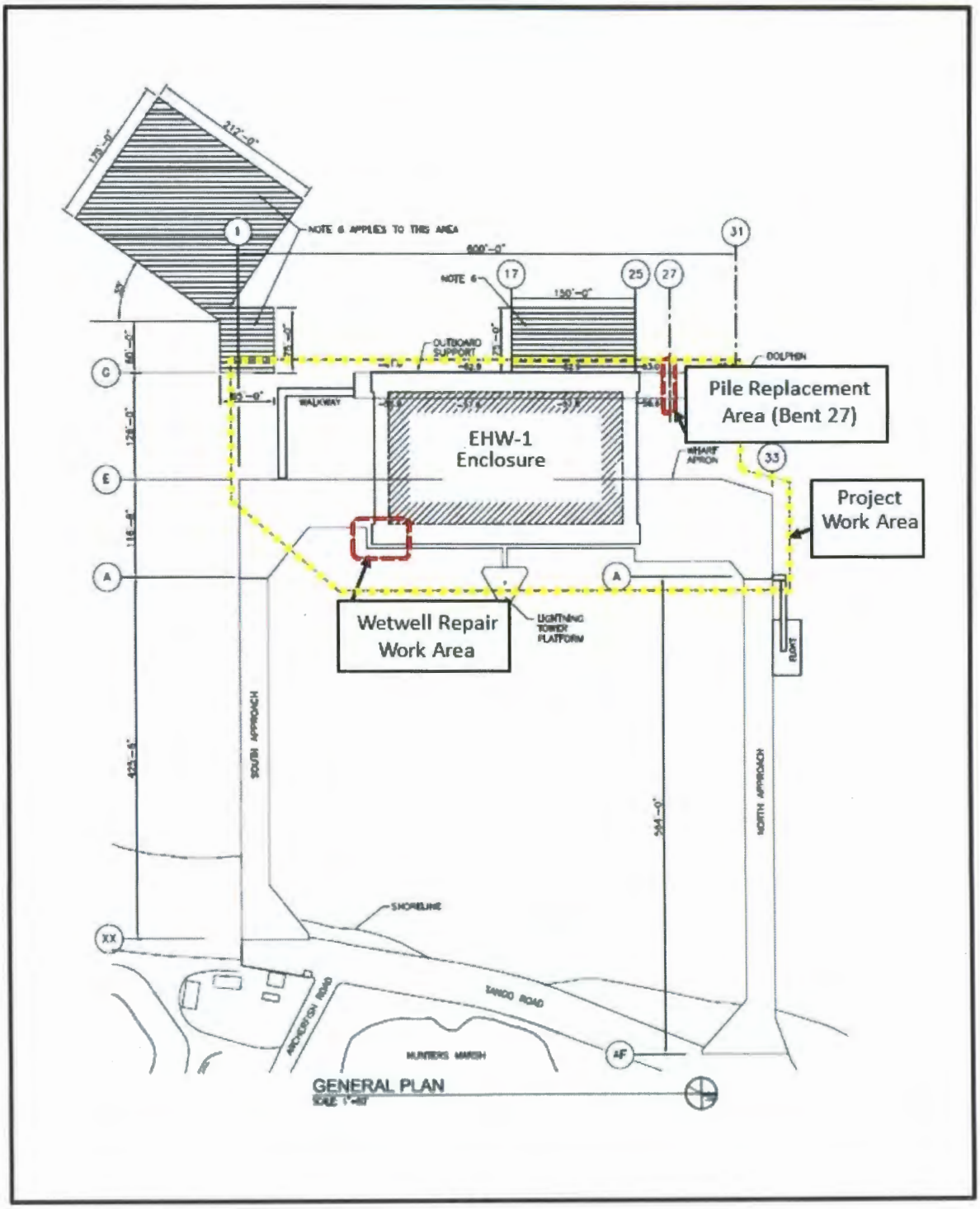
Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

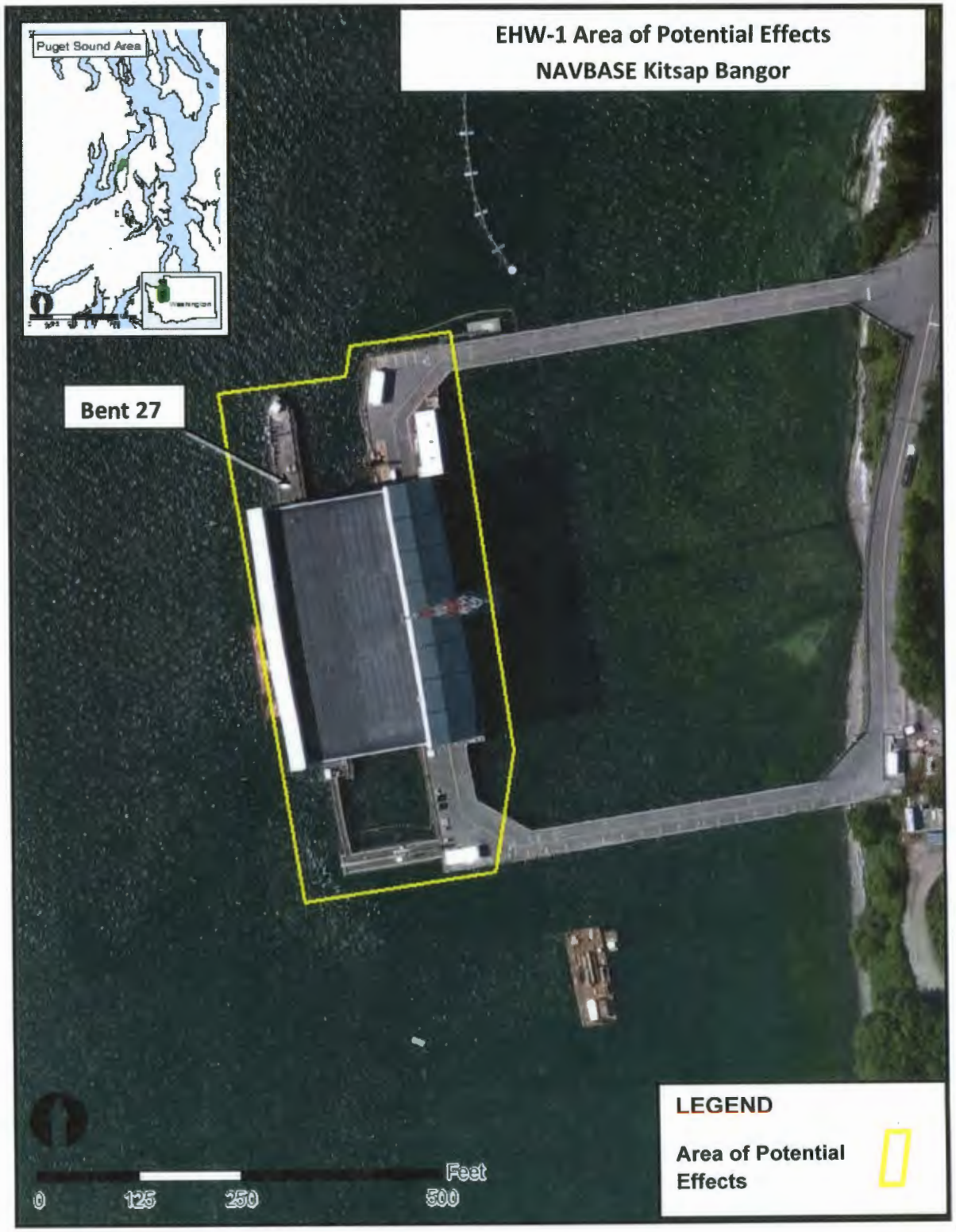
Enclosures:
1. Explosive Handling Wharf-1
2. EHW-1 Project Work Area
3. EHW-1 Area of Potential Effects

Explosive Handling Wharf-1

SUBJECT: REQUEST FOR CONCURRENCE WITH THE AREA OF POTENTIAL EFFECT AND FINDING OF NO HISTORIC PROPERTIES ADVERSELY AFFECTED FOR THE EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT



EHW-1 Project Work Area



EHW-1 Area of Potential Effects

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/01433
22 Aug 14

Jamestown S'Klallam Tribe
The Honorable W. Ron Allen
1033 Old Blyn Hwy
Sequim, WA 98382

Dear Chairman Allen:

SUBJECT: REQUEST FOR CONCURRENCE WITH THE AREA OF POTENTIAL EFFECT AND FINDING OF NO HISTORIC PROPERTIES ADVERSELY AFFECTED FOR THE EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

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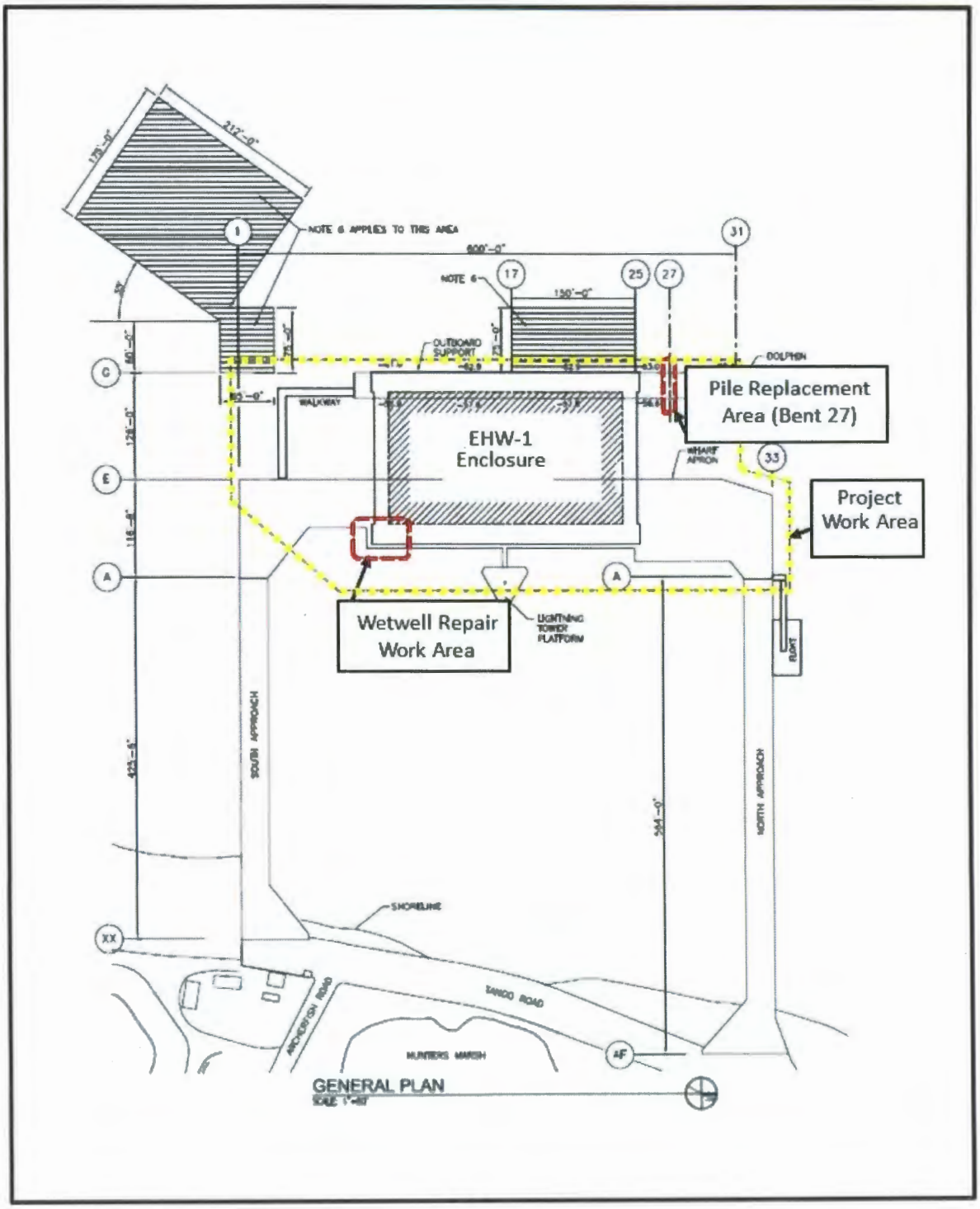

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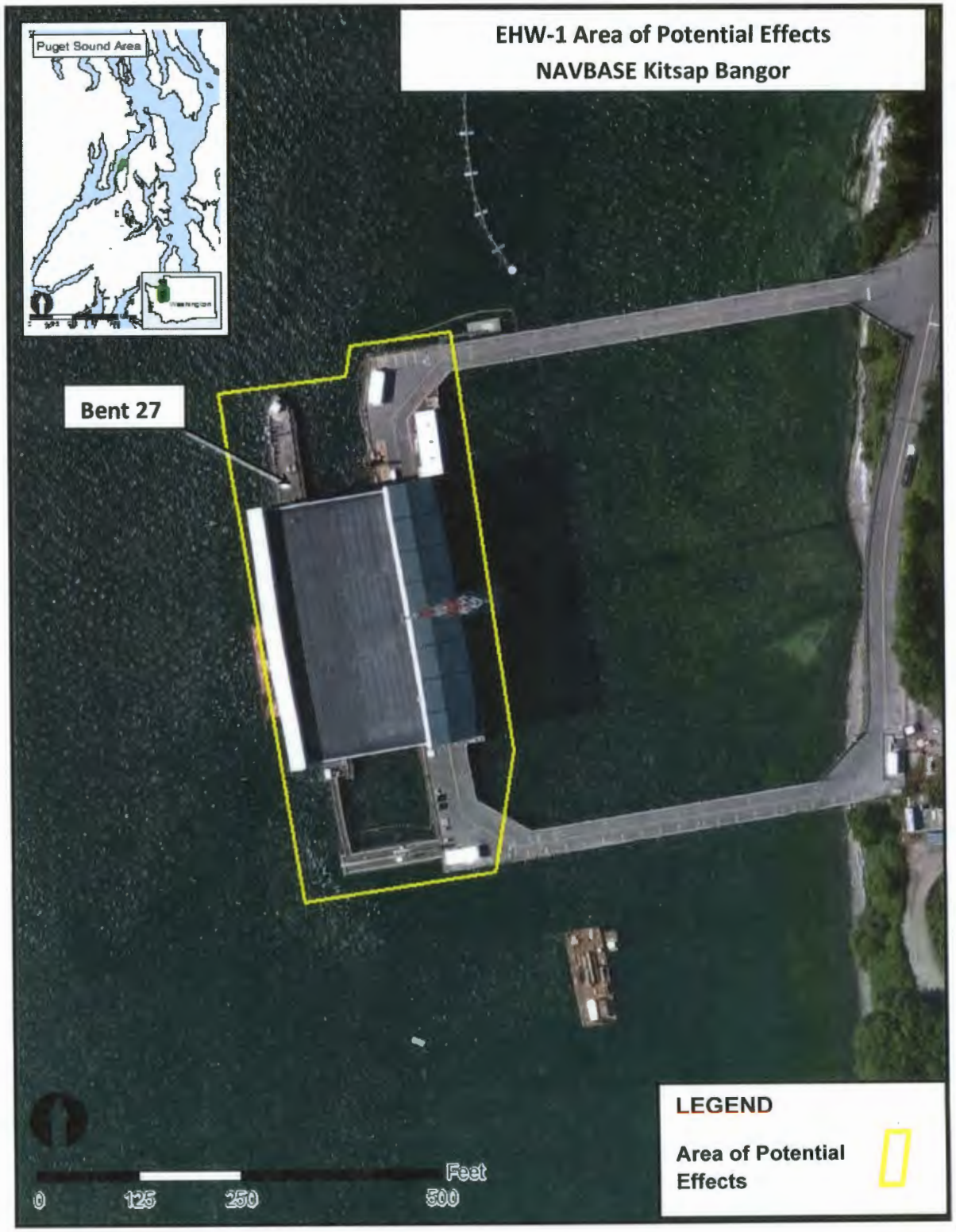

EHW-1 Area of Potential Effects

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/01432
22 Aug 14

The Lower Elwha Klallam Tribe
The Honorable Frances Charles
2851 Lower Elwha Road
Port Angeles WA 98362

Dear Chairwoman Charles:

SUBJECT: REQUEST FOR CONCURRENCE WITH THE AREA OF POTENTIAL EFFECT AND FINDING OF NO HISTORIC PROPERTIES ADVERSELY AFFECTED FOR THE EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosures:
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Explosive Handling Wharf-1

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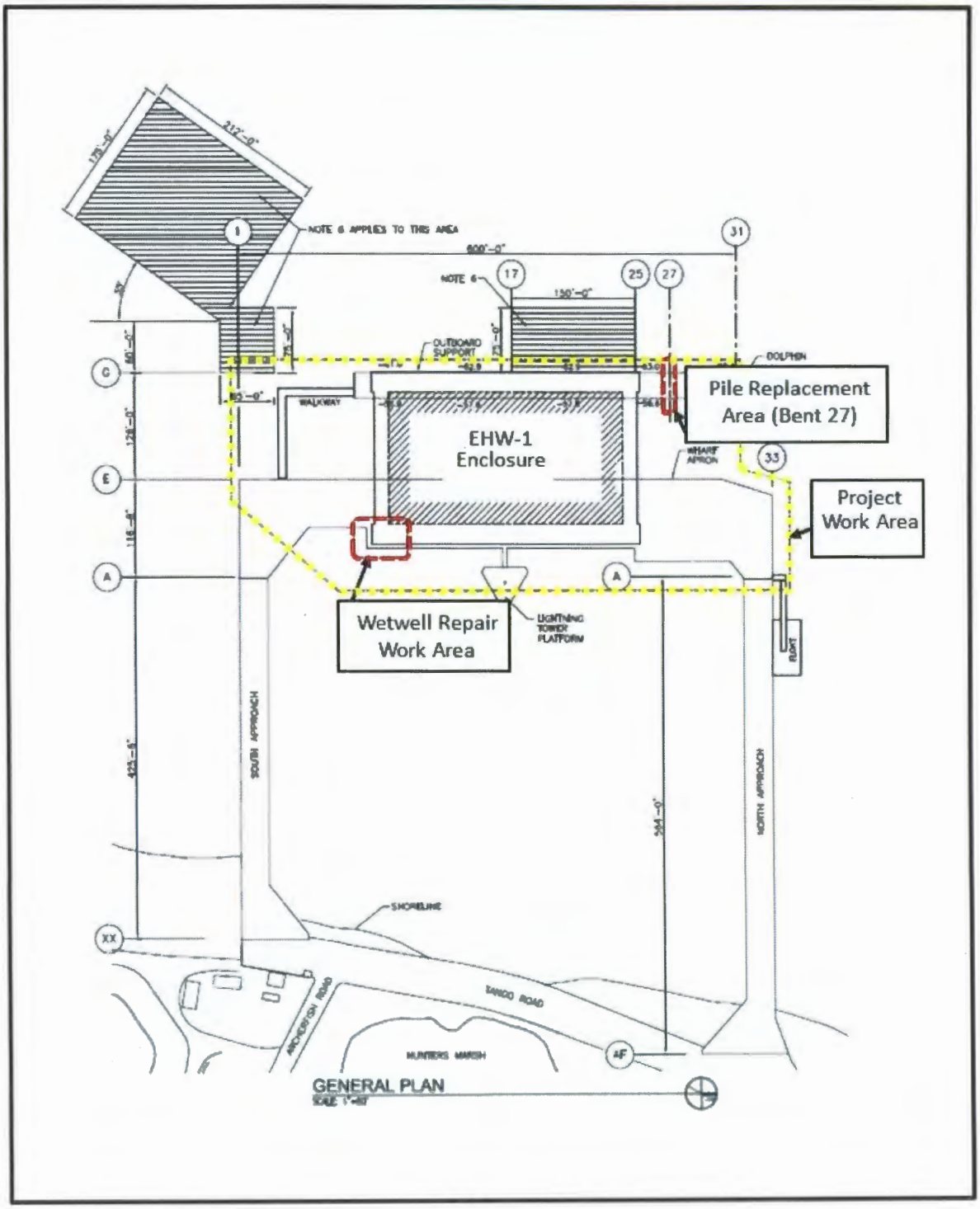

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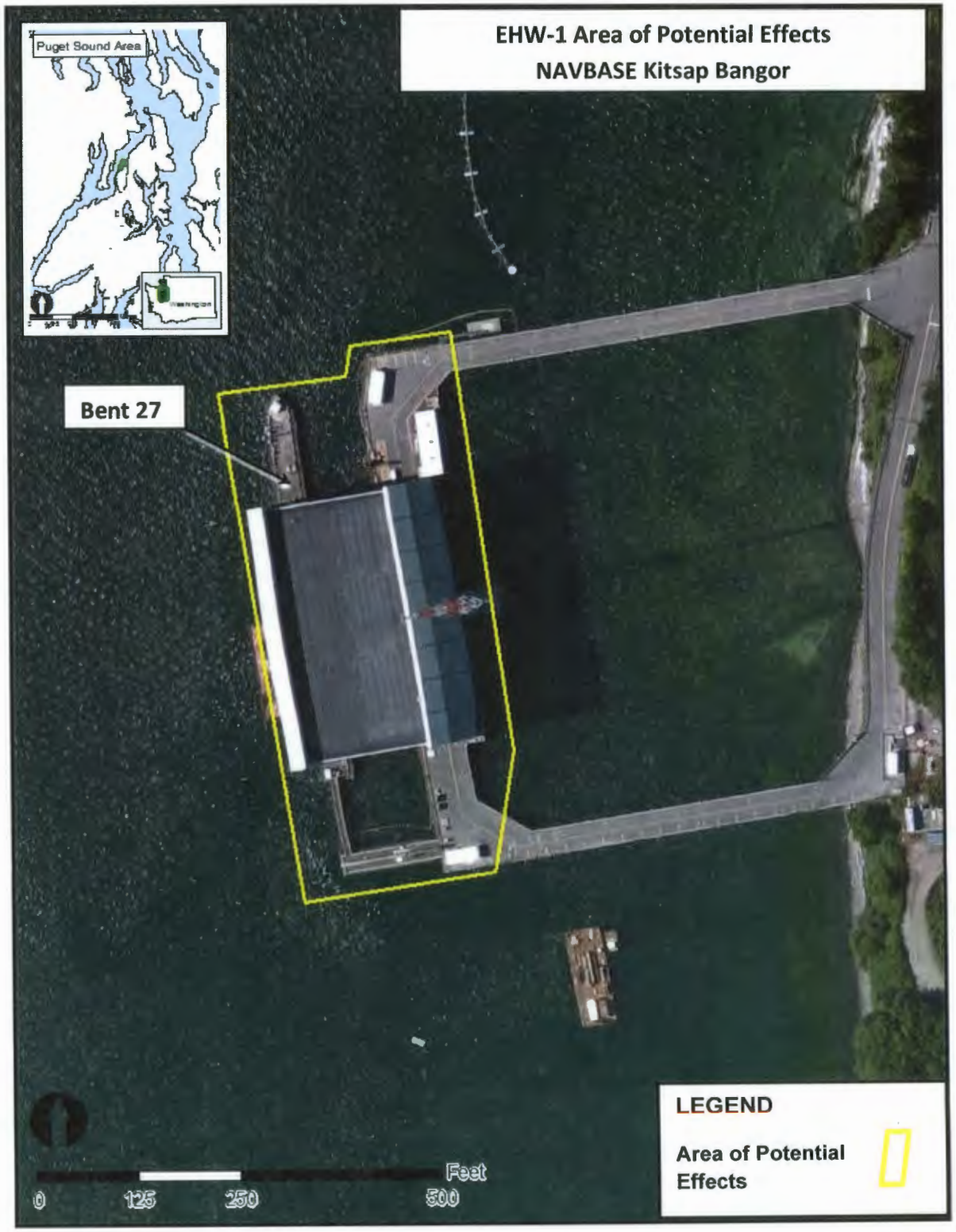

EHW-1 Area of Potential Effects

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/01431
22 Aug 14

The Honorable Jeromy Sullivan
Chairman, Port Gamble S'Klallam Tribe
31912 Little Boston Road NE
Kingston, WA 98346

Dear Chairman Sullivan:

SUBJECT: REQUEST FOR CONCURRENCE WITH THE AREA OF POTENTIAL EFFECT AND FINDING OF NO HISTORIC PROPERTIES ADVERSELY AFFECTED FOR THE EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

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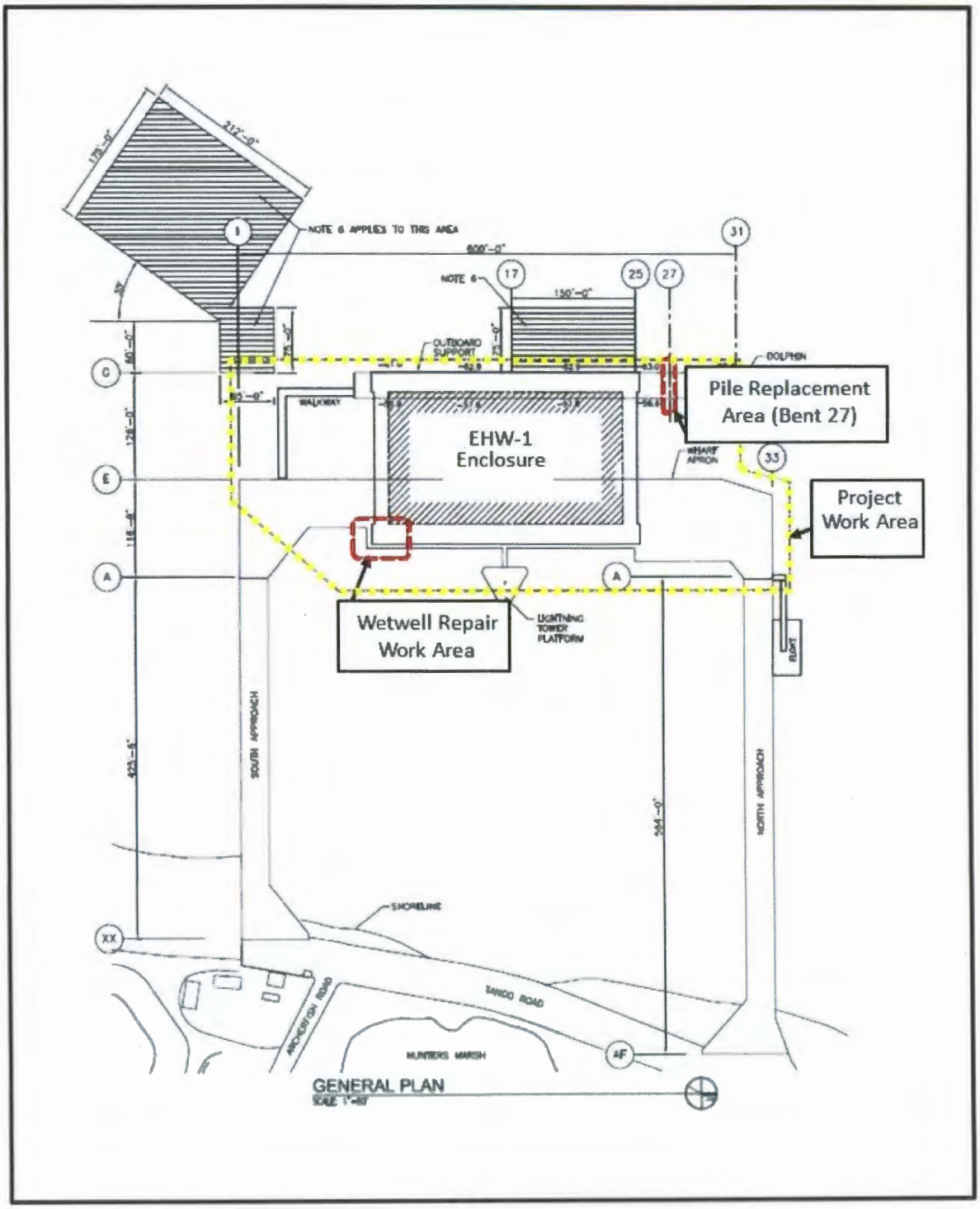

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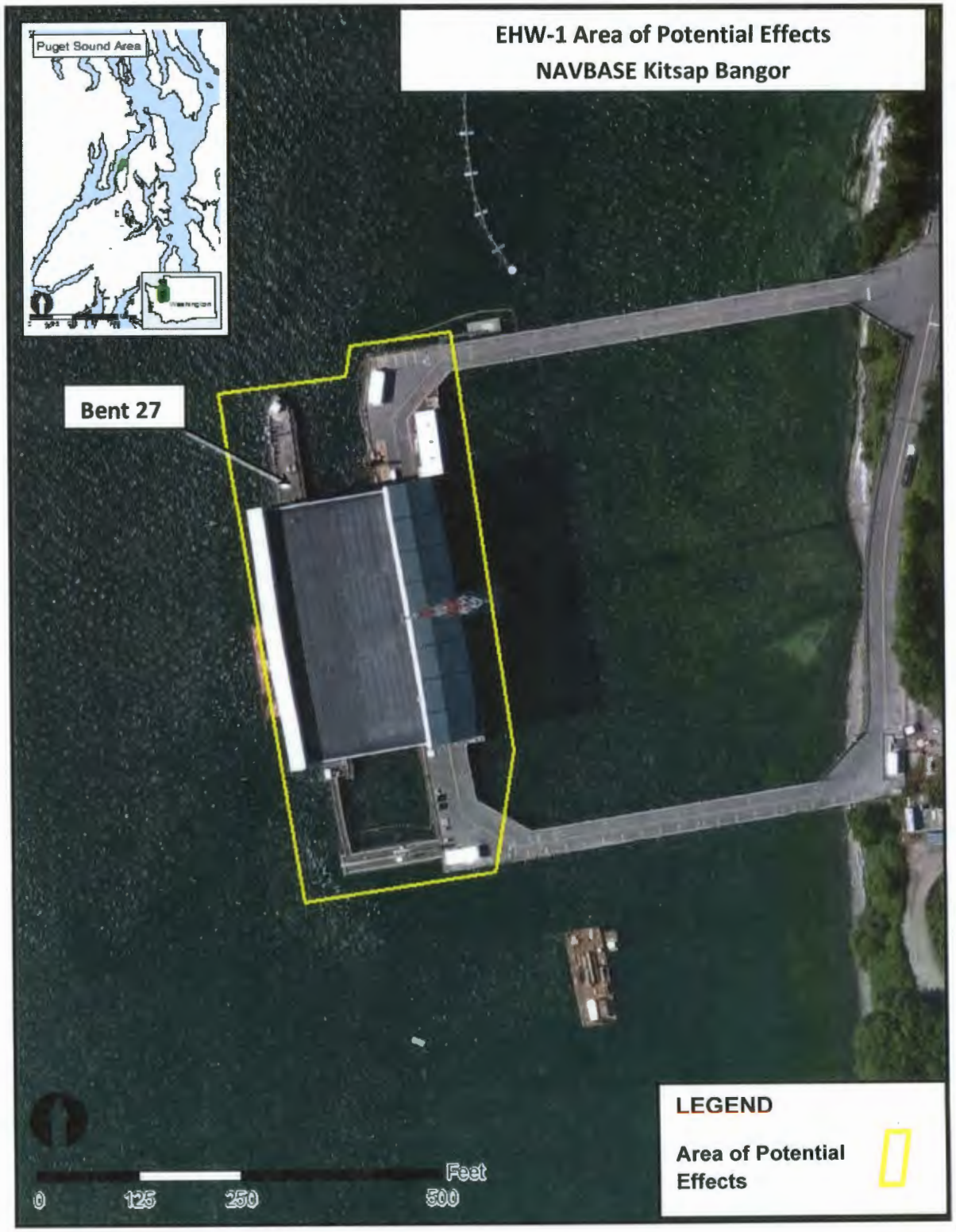

EHW-1 Area of Potential Effects

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/01434
22 Aug 14

The Skokomish Tribe
The Honorable Guy Miller
North 80 Tribal Center Road
Skokomish WA 98584

Dear Chairman Miller:

SUBJECT: REQUEST FOR CONCURRENCE WITH THE AREA OF POTENTIAL EFFECT AND FINDING OF NO HISTORIC PROPERTIES ADVERSELY AFFECTED FOR THE EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

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Explosive Handling Wharf-1

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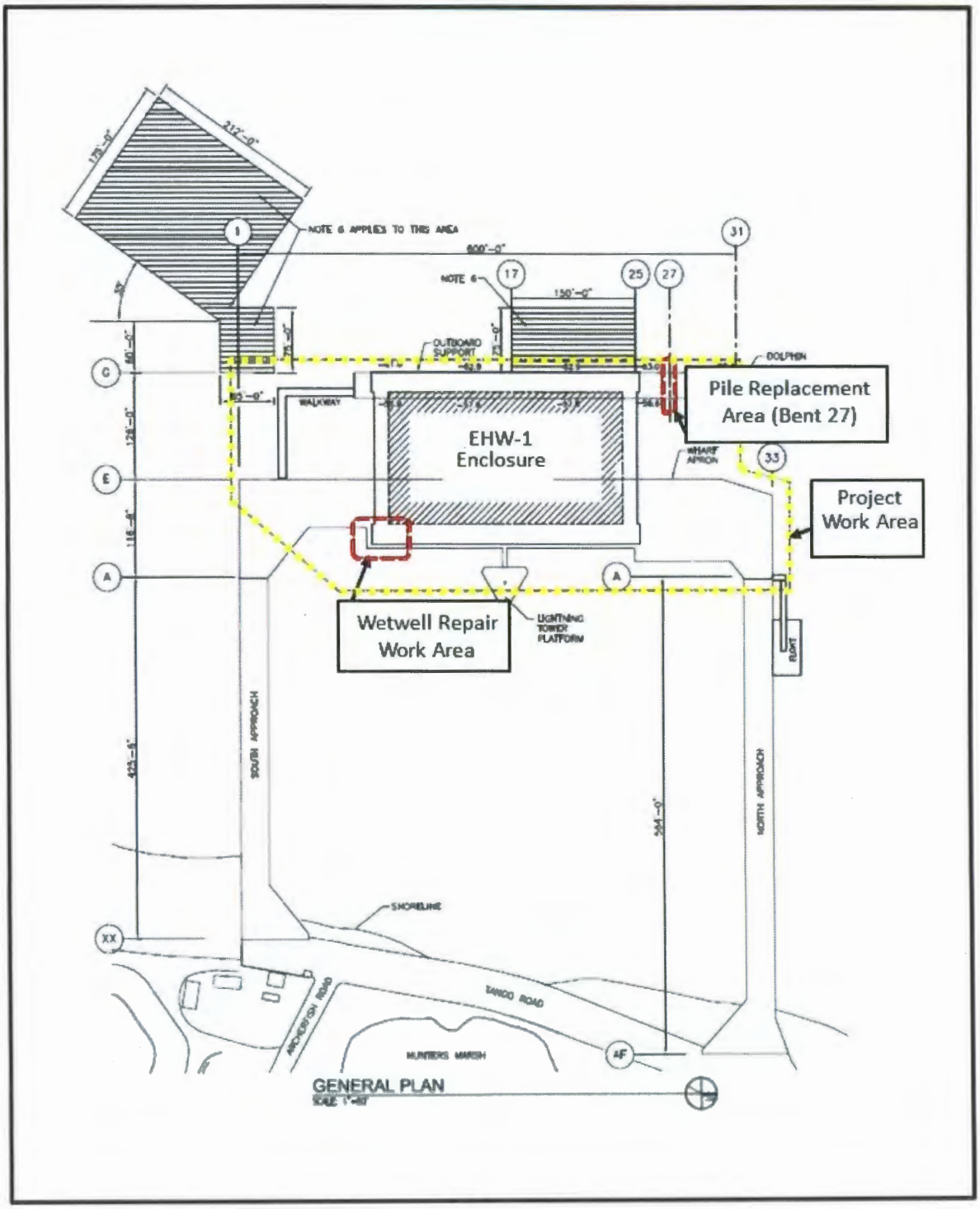
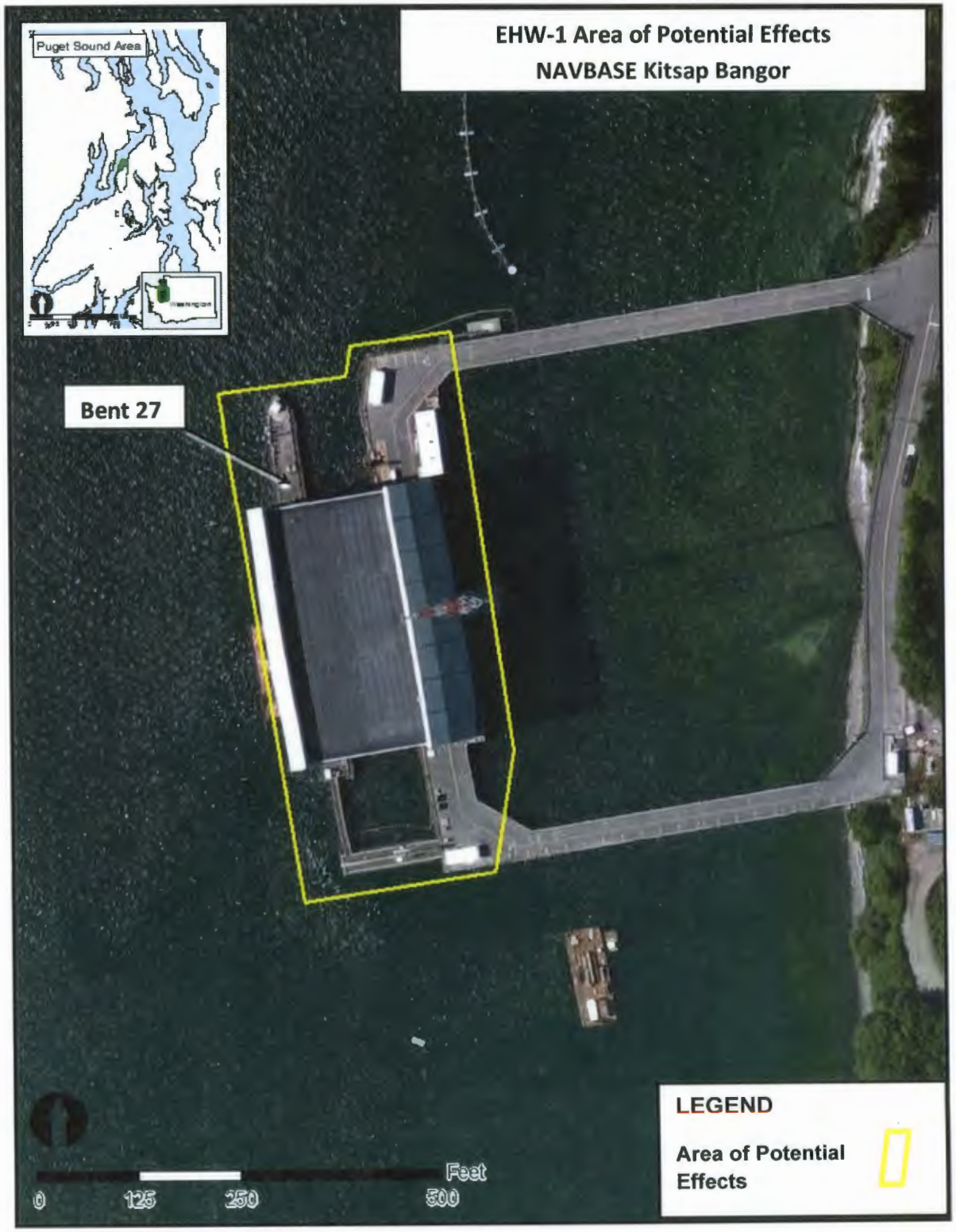


EHW-1 Project Work Area



EHW-1 Area of Potential Effects

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY STREET
BREMERTON, WA 98314-5020

5090
Ser PRB4/01435
22 Aug 14

The Honorable Leonard Forsman
The Suquamish Tribe
PO Box 498
Suquamish, WA 98392

Dear Chairman Forsman:

SUBJECT: REQUEST FOR CONCURRENCE WITH THE AREA OF POTENTIAL EFFECT AND FINDING OF NO HISTORIC PROPERTIES ADVERSELY AFFECTED FOR THE EXPLOSIVE HANDLING WHARF-1 PILING REPLACEMENT AND WHARF MAINTENANCE PROJECT

In accordance with Section 106 of the National Historic Preservation Act, the Navy would like to initiate consultation regarding the proposed undertaking to replace deteriorating piling beneath the Explosive Handling Wharf #1 (EHW-1) - Facility 7501 at Naval Base (NAVBASE) Kitsap Bangor (Enclosure 1). The Navy has determined the EHW-1 structure is eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria A and C.

The site of the proposed undertaking is along the eastern shore of Hood Canal towards NAVBASE Kitsap Bangor's northern border. The proposed project would demolish four 24-inch hollow prestressed octagonal concrete piles and install four 30-inch concrete filled steel piles adjacent to the demolished piles at Bent 27 of the outboard support of the EHW-1 (Enclosure 2). Additionally the project would: demolish and replace four 6'-0" by 4'-3" sections of deck in order to install new piles; construct four cast-in-place concrete pile caps to function as load transfer mechanisms between the superstructure and the new piles; install four sled mounted passive cathodic protection systems; repair deteriorated concrete of the wetwell (encasement for a sanitary sewer lift station pump) on the Wharf Apron; and, recoat top portions of 183 steel pipe fender piles and 27 steel mooring fittings on the deck of the Wharf.

The Area of Potential Effect (APE) is defined as the footprint of the proposed project work area at the existing Wharf. Please refer to Enclosure 3.

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EHW-1 is an imposing structure on the east shore of Hood Canal. Its public view is from Hood Canal. The main defining features of the structure are its wharf and super-structure. Pilings that form its foundation for the most part are below waterline and not visible to the public except small portions are visible at low-tide. The proposed work would replace four piles, which are largely below water and not part of the public view. The maintenance of the wetwell and recoating of pilings and mooring fittings will sustain the integrity of the facility and retain the overall appearance of the present structure. The Navy has determined that the proposed work does not adversely affect the characteristics that make the property eligible for listing in the NRHP.

The Navy requests your concurrence with our defining of the APE and finding of No Historic Properties Adversely Affected. Please direct additional inquiries to Ms. Amanda Bennett. She can be reached by telephone at (360) 476-6613, or by e-mail at amanda.j.bennett@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosures:
1. Explosive Handling Wharf-1
2. EHW-1 Project Work Area
3. EHW-1 Area of Potential Effects

Explosive Handling Wharf-1

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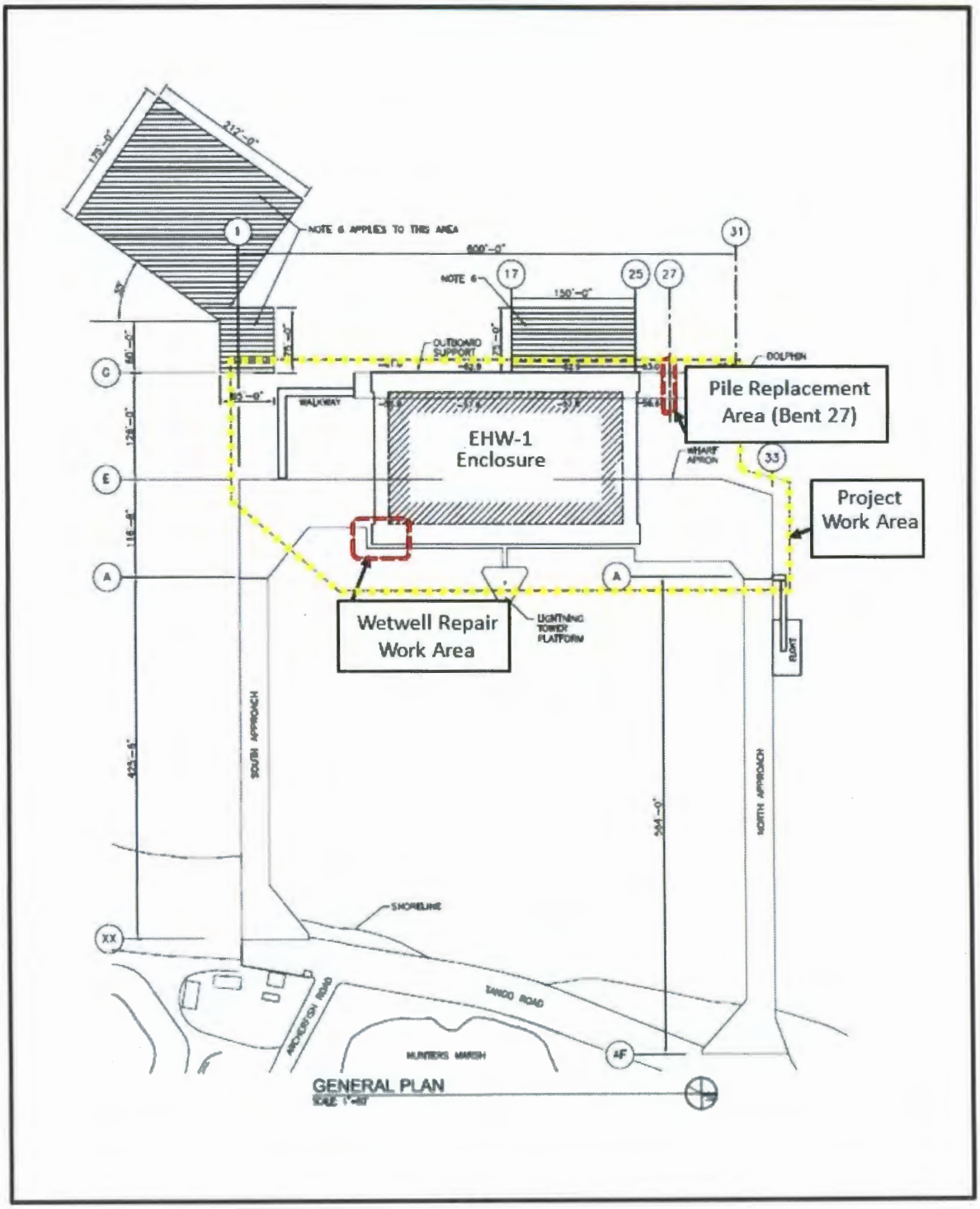
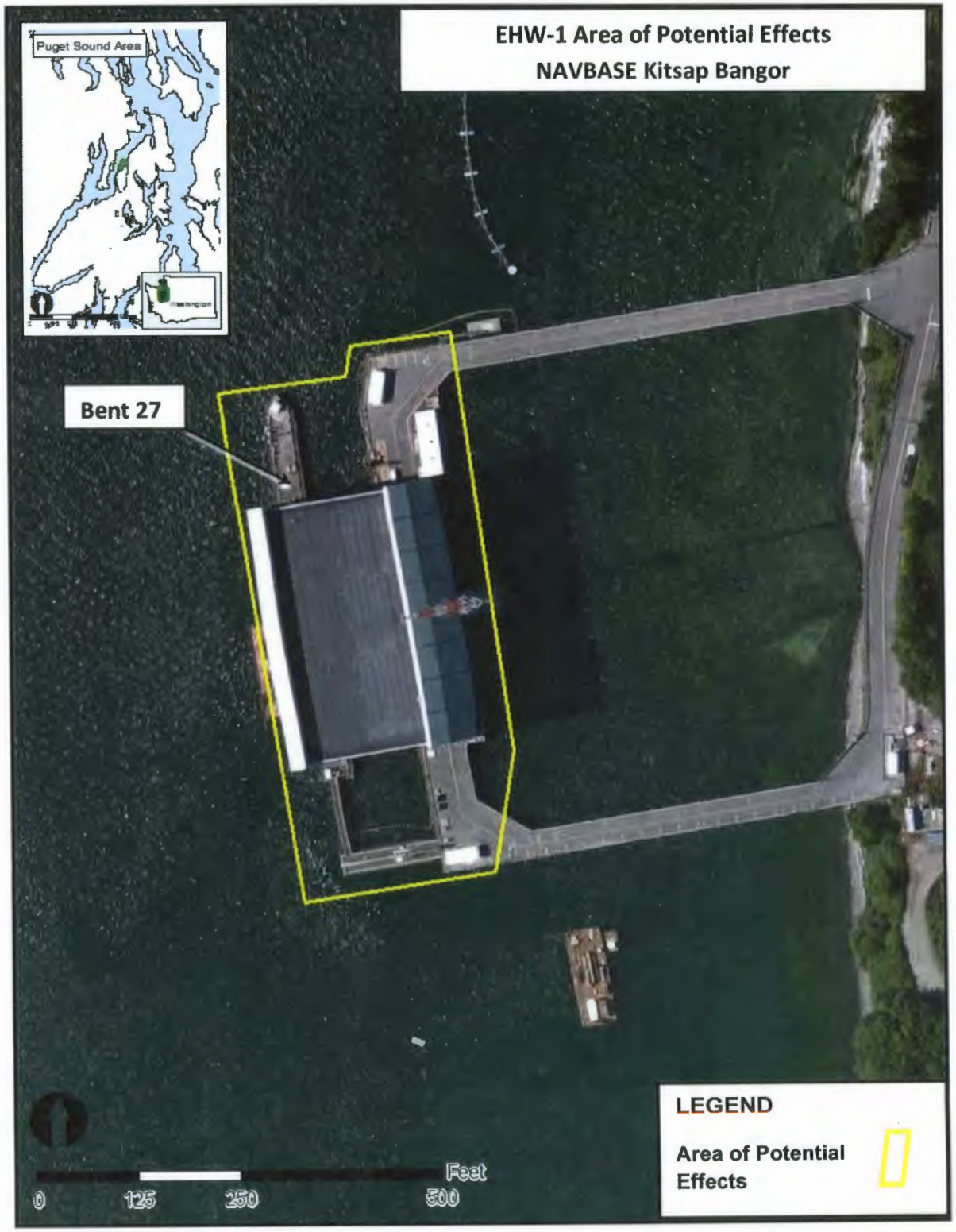


EHW-1 Project Work Area



EHW-1 Area of Potential Effects

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APPENDIX B

PUBLIC INVOLVEMENT

(To be provided following Draft EA Public Comment Period)

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APPENDIX C

BIOLOGICAL ASSESSMENT AND ESSENTIAL FISH HABITAT EVALUATION

(To be provided at the completion of consultation with USFWS and NMFS)

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