CHAPTER 2

PROPOSED ACTIONS AND ALTERNATIVES

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2.0 PROPOSED ACTIONS AND ALTERNATIVES

This section describes the Proposed Actions and alternatives considered for implementing each Proposed Action. For each of the Land-Water Interface (LWI) and Service Pier Extension (SPE) Proposed Actions, the United States (U.S.) Department of the Navy (Navy) identified a range of alternatives to meet the action's purpose and need. After applying screening criteria, two action alternatives for each project are carried forward for detailed analysis in this environmental impact statement (EIS), along with the No Action Alternative for each project. These two projects are independent, and the decisions on whether to implement each of the projects will be independent. The two Proposed Actions, including alternatives considered, are described separately in the following sections.

2.1. LWI PROPOSED ACTION

Under the LWI Proposed Action, the Navy proposes to secure the perimeter of the Waterfront Restricted Area (WRA) at NAVBASE Kitsap Bangor by constructing and operating physical barriers through shallow waters and onto the immediate upland areas at the northern and southern extent of the WRA (Figure 2–1). These structures would tie into the existing Port Security Barrier (PSB) system and the on-land Waterfront Security Enclave (WSE) system, thereby securing the entire perimeter of the WRA. Construction would occur over a 2-year period, August 2016 through August 2018. Operations would consist of maintenance and periodic cleaning of the structures and the periodic opening and closing of sections for boat egress/ingress. The design life of the LWI Proposed Action is 50 years.

2.1.1. LWI Alternatives

2.1.1.1. ALTERNATIVES DEVELOPMENT AND SCREENING CRITERIA

The EIS must evaluate all reasonable alternatives in accordance with the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] Part 1502.14) and Navy regulations (32 CFR Part 775) that implement the National Environmental Policy Act (NEPA). The development of reasonable alternatives for analysis is dependent on the stated purpose and need for the Proposed Action. Screening criteria were developed to determine if alternatives meeting the purpose and need were reasonable and should be carried forward for detailed analysis in the EIS. The screening criteria listed below were used in the identification and evaluation of LWI action alternatives:

- Meets security and TRIDENT Fleet Ballistic Missile (TRIDENT) program requirements,
- Compatible with existing security features,
- Must be located within the WRA,
- Compatible with a dynamic intertidal environment,
- Supports master planning considerations and does not impact other operational missions on NAVBASE Kitsap, and
- Avoids or minimizes impacts on tribal usual and accustomed harvest areas.

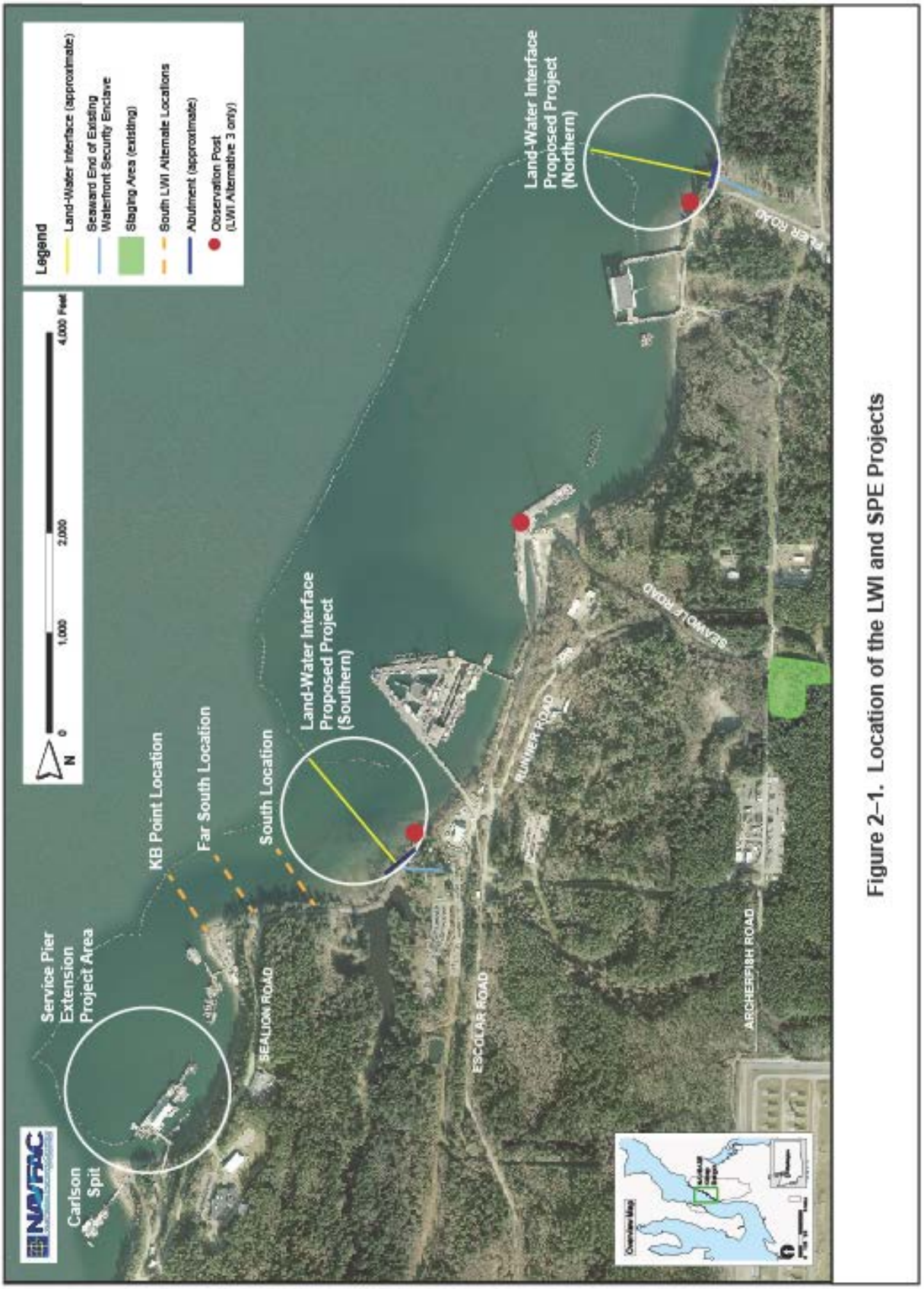

Figure 2–1. Location of the LWI and SPE Projects

2.1.1.2. ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Using the above screening criteria, the following LWI alternatives were considered but eliminated from further analysis in the EIS.

- *Constructing the structures at another location within the Bangor WRA.* The LWI must be constructed in the WRA to meet the purpose and need and the screening criteria, including the ability to connect the existing floating PSB system to the WSE. Alternative locations within the WRA were considered for the south and north LWIs. The Bangor waterfront has constrained development space for alternative LWI locations, as described below.
  - *South LWI Location.* The Navy considered alternative locations north and south of the proposed location of the south LWI. Alternative locations north of the proposed south LWI site would not meet security requirements. Three alternative locations for the south LWI structure were considered: South Location (south of Devil's Hole), Far South Location (near Keyport/Bangor [KB] Dock), and KB Point (Figure 2–1). These three south location alternatives were not carried forward for further analysis because they would require re-routing of the WSE, an action not compatible with existing security features. In addition, compared to the alternatives carried forward for detailed analysis, these three locations would result in greater adverse effects on tribal shellfishing and tribal beach access.
  - *North LWI Location.* Locations south of the proposed north LWI site would not meet security requirements. Locations north of the proposed site would have a greater impact (more excavation and larger abutment required) on bluffs that provide input of substrate material to the intertidal zone (greater environmental impact). In addition, locations north of the proposed site would require re-routing of the WSE, an action which is not compatible with existing security features.
- *Alternatives to structure design.* Alternatives with different designs for the LWI structures, such as a pile-supported pier structure with a solid pier deck, a pile-supported pier structure that required a dredge construction method, and an earthen berm, were considered. The pile-supported pier structure with a solid pier deck would have used a concrete deck. The pile- supported pier structure requiring dredging would have used a stiffer in-water mesh that would have consisted of metal grating resting on a concrete foundation buried into the seafloor. These alternative designs were eliminated from further consideration because they would have resulted in greater environmental impacts, particularly to marine habitats and species, compared to the alternatives carried forward. Dredging and foundation construction for the stiff metal grating would have resulted in much more disruption of marine habitat than the proposed flexible mesh alternative. The earthen berm would have displaced 2.6 acres (1 hectare) of seafloor compared to the pile-supported pier structures which would result in minimal seafloor displacement. Concerns for sediment transport and juvenile fish migration served to eliminate the berm from further consideration. An alternative consisting of PSB modifications with an in-water mesh was not carried forward because the mesh would have required a rigid, fixed structure for attachment.
- *Abutments extending waterward of mean higher high water*. A preliminary design concept for the PSB Modifications alternative included concrete abutments extending waterward of the MHHW. In evaluating this concept, the designers concluded that no functionality would

be lost by moving the abutments landward of MHHW. This was a design refinement in the development of Alternative 3, the Preferred Alternative.

2.1.1.3. LWI ALTERNATIVES EVALUATED IN EIS

Two action alternatives were identified as meeting the purpose and need and the screening criteria. These alternatives consist of pile-supported piers with associated PSB modifications, and PSB modifications alone. These action alternatives and the No Action Alternative are described below.

2.1.1.3.1. LWI ALTERNATIVE 1: NO ACTION

Under LWI Alternative 1, the No Action Alternative, the LWI structures would not be constructed and existing PSBs would not be relocated. This alternative would not meet security requirements and, therefore, would not meet the purpose and need for the Proposed Action. No environmental impacts would result from the No Action Alternative, as no construction or physical alteration to the waterfront would occur, and there would be no changes in operations. The No Action Alternative is carried forward for analysis because it is required by NEPA and constitutes baseline conditions for environmental analysis of the Proposed Action.

2.1.1.3.2. LWI ALTERNATIVE 2: PILE-SUPPORTED PIER

Under LWI Alternative 2, construction and operation of LWI structures would include pile-supported piers built from the base of the shoreline bluff out to a connection point with the existing PSB system (Figures 2–1, 2–2, and 2–3) at both the north and south ends of the WRA. The piers would connect to solid concrete abutments that would be built at the shoreline bluff, and an anchoring structure for the PSBs would be installed at the seaward end of each pier. Construction is expected to require one barge with a crane, one supply barge, a tugboat, and work skiffs. Table 2–1 (presented at the end of Section 2.1.1.3.3) summarizes LWI Alternative 2.[1] Best management practices (BMPs) and impact reduction measures that would be implemented to avoid or minimize potential environmental impacts associated with the LWI Proposed Action are discussed in Section 2.3.

Pier Structures

The LWI pier structures would be 13 feet (4 meters) wide and 280 feet (85 meters) long at the north location and 730 feet (223 meters) long at the south location. The last (seaward) 23 feet (7 meters) of each pier would be 20 feet (6 meters) wide. The piers would include a walkway for their entire length and 40-foot (12-meter) tall steel monopole towers supporting lights and security equipment; there would be 14 towers on the south pier and 6 towers on the north pier. A fence would be installed along the entire length of each pier. A mesh material would extend from the bottom of the walkway into the water and would be anchored to heavy steel plates placed on the seafloor. The steel plate anchors would occupy approximately 1,500 square feet (140 square meters) at the north LWI and 4,000 square feet (370 square meters) at the south LWI, for a total area of approximately 5,500 square feet (510 square meters). (Dimensions and numbers are based on preliminary design and are approximate and subject to change.)

[1] Under LWI Alternative 1, the No Action Alternative, there would be no change to the environment due to construction and operation of an LWI. Therefore, the No Action Alternative is not included in Table 2–1.

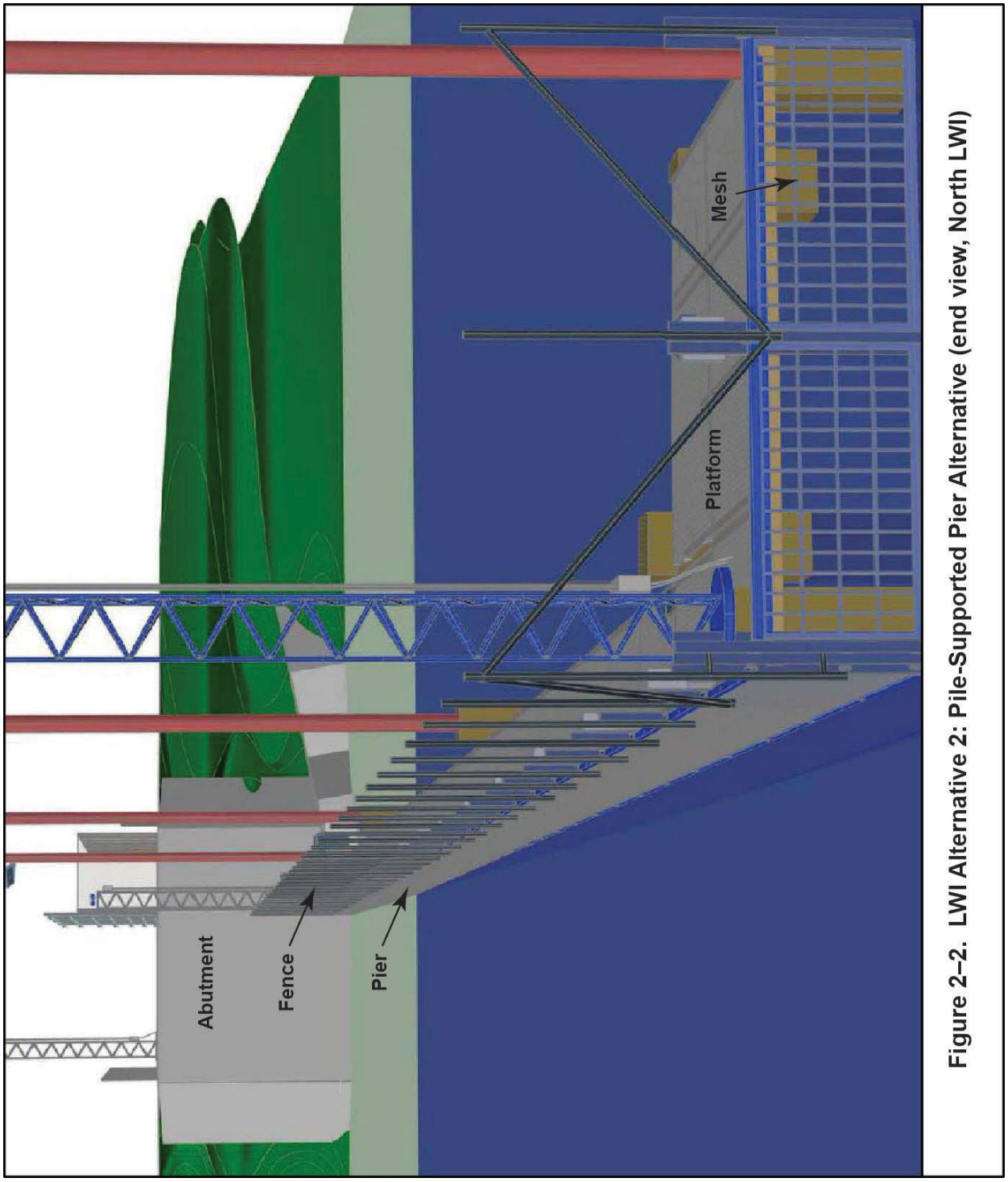

Figure 2–2. LWI Alternative 2: Pile-Supported Pier Alternative (end view, North LWI)

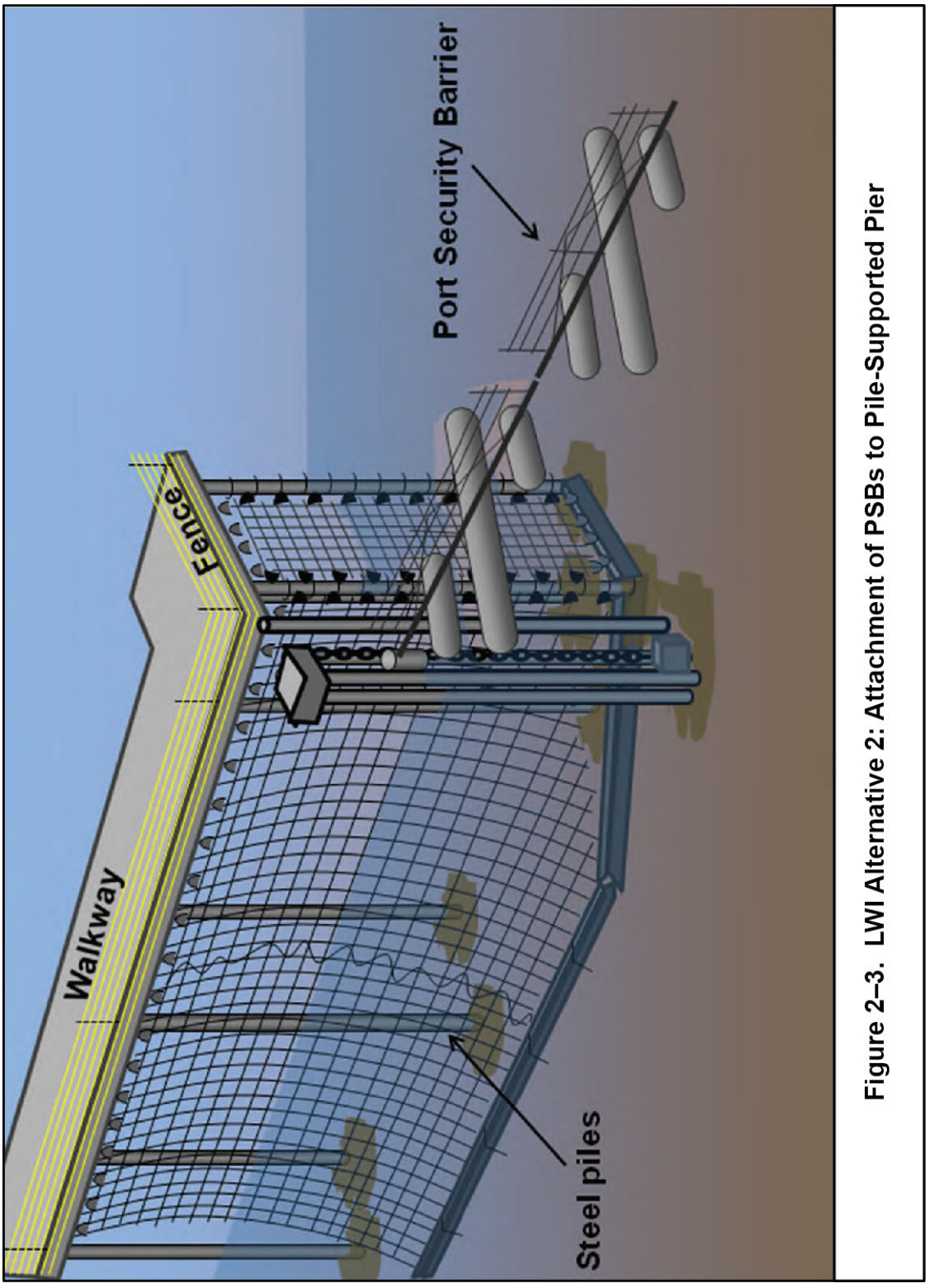

Figure 2–3. LWI Alternative 2: Attachment of PSBs to Pile-Supported Pier

The pier deck would consist of metal grating that allows 65 percent of the light to pass through. The elevation of the pier deck would be approximately 21.5 feet (6.6 meters) above mean lower low water (MLLW), and the elevation of the bottom of the pier structure would be approximately 17 feet (5.2 meters) above MLLW. There would be a floating dock for small boat access approximately 12 by 35 feet (4 by 11 meters) at the end of each pier, on the inside, or secure side, of the pier. This dock would be anchored with four piles (included in the 136 total number of permanent piles) and would have a metal grating deck. Access to the floating dock from the pier would be by means of a gangway 80 feet long by 3 feet wide (24 by 1 meter). The gangway deck would also consist of metal grating.

Pile Installation

The north LWI would require a maximum of 54 hollow steel piles, 24 inches (60 centimeters) in diameter. The south LWI would require a maximum of 82 hollow steel piles, 24 inches in diameter. This equates to an estimated 136 total number of number of permanent piles for the project. Piles primarily would be driven using vibratory methods. An impact hammer would be used to "proof" piles to ensure that they provide the required load-bearing capacity. Where geotechnical conditions do not allow piles to be driven to the required depth using vibratory methods, an impact hammer may be used to drive some piles for part or all of their length. Pile driving would be completed in no more than 80 days during the first in-water work season (August 1, 2016 through January 15, 2017).

Piles are expected to be installed primarily using a crane on a floating barge. Pile installation in shallow areas would be tidally dependent, such that the hull of the barge would not be permitted to ground or contact the seafloor at any time during the work. Therefore, the barge would move in and out with the tide as necessary to install the piles and decking. The barge would be positioned by means of spuds and anchors. Because the majority of the piles for the south LWI would be in shallow water that would make barge operations difficult, the analysis considered that the contractor would build a temporary trestle adjacent to the LWI structure to install the permanent piles and decking in this shallow area. This temporary trestle would be approximately 300 feet (90 meters) long and 20 feet (6 meters) wide; the deck would be of metal grating that allows 65 percent of light to pass through. Approximately 120 temporary 24-inch (60-centimeter) steel piles would be needed. These piles would be driven in the same manner as the permanent piles, within the same 80 days as the permanent piles. The piles would be extracted by vibratory means.

PSBs

Existing PSB systems close to the proposed LWIs would be relocated and attached to the end of the new piers. For the north LWI, approximately 1,000 feet (300 meters) of the existing PSBs would be relocated and approximately 200 feet (60 meters) would be removed. For the south LWI, approximately 650 feet (200 meters) of the existing PSBs would be relocated and 550 feet (170 meters) would be removed. Existing PSB units and anchors would be removed using a barge-mounted crane, stored on the barge, and then placed at new locations as needed using the same crane. Existing PSBs that are still serviceable would be configured into the new PSB alignment. When PSBs would be removed, they would be disassembled and recycled as scrap metal. The ends of the remaining PSB systems would be attached to a dolphin near the end of each pier; these dolphins would consist of eight closely spaced 24-inch (60-centimeter) diameter

steel piles supporting an 8 by 8-foot (2.5 by 2.5-meter) concrete platform. For each LWI, two existing PSB buoys and associated anchors would be relocated and one would be removed. Each buoy is attached to three anchor legs. Each leg consists of a 120-foot (40-meter) chain attached to a main 10-ton (9-metric ton) concrete anchor (11 feet long, 5.5 feet wide, 5 feet high [3.5 by 1.8 by 1.6 meters]) and two concrete clump anchors, each 3 by 3 feet (1 by 1 meter) and weighing 2 tons (1.8 metric tons) (Figure 2–4).

Shoreline and Upland Construction

The north abutment would be approximately 40 feet (12 meters) high and 72 feet (22 meters) long. It would extend from an approximate elevation of 13 feet (4 meters) above (landward of) MLLW to the top of the slope at elevation 50 feet (15 meters). The south abutment would be approximately 20 feet high by 72 feet long (6 by 22 meters). This abutment would extend from an elevation of approximately 11 feet (3.4 meters) above MLLW to the top of the slope at elevation 24 feet (7 meters). The upper limit of the intertidal zone is considered to be MHHW, approximately 11 feet (3.4 meters) above MLLW at NAVBASE Kitsap Bangor.

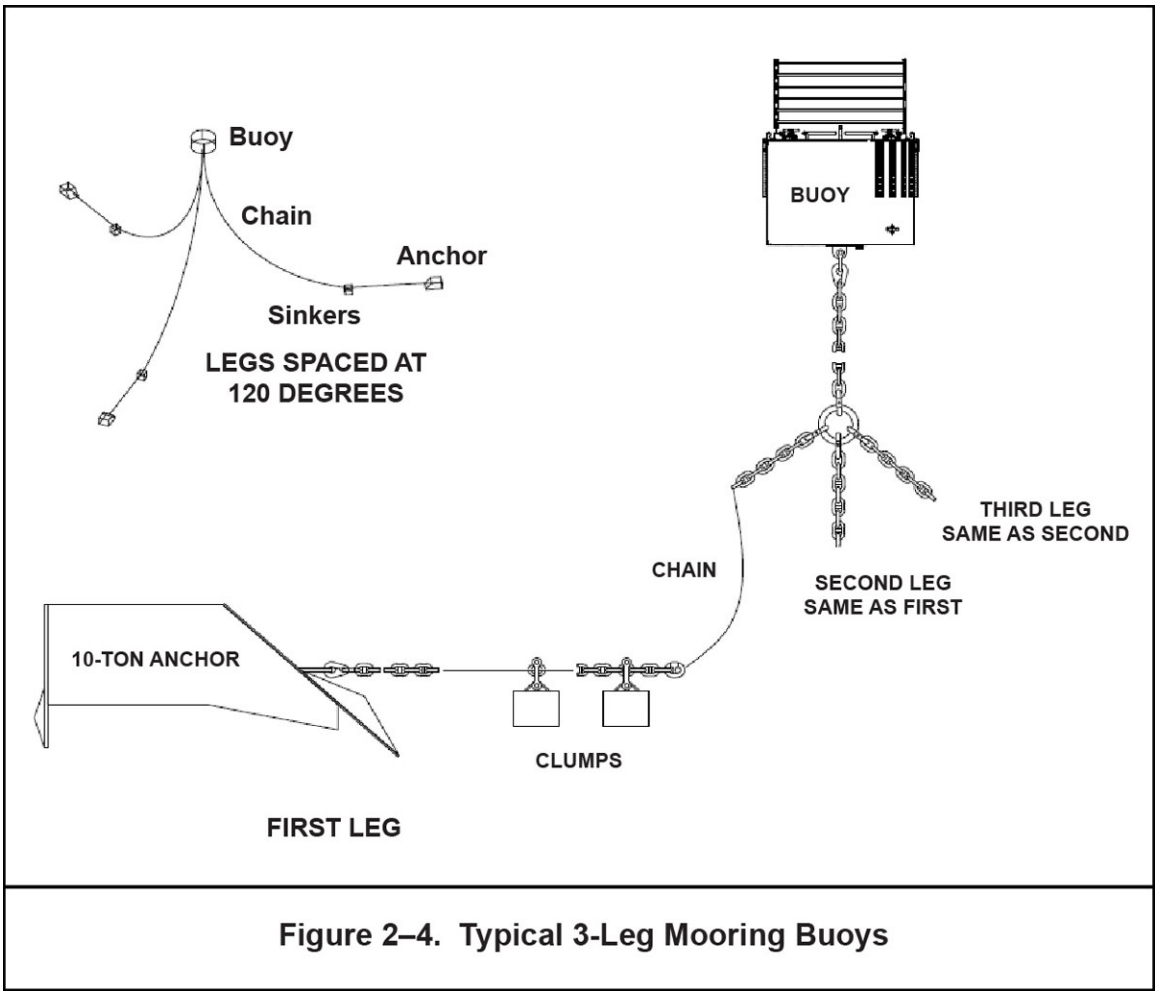

Figure 2–4. Typical 3-Leg Mooring Buoys

The north abutment would be supported on 15 36-inch (90-centimeter) piles driven on land using vibratory and impact methods. The south abutment would be supported on 16 piles of the same size and also driven on land. Each abutment would include a stairway on one end, from the top of the abutment to the LWI deck and base of the bluff. At each abutment the stairs would be attached to the abutment wall or supported on piles driven to grade and include a second stairway to the base of the bluff. The abutment stairways would be supported on five 24-inch (60-centimeter) piles each plus 6- by 2-foot (2- by 0.6-meter) concrete pads. The piles for the abutment stairways would be driven at low tide ("in the dry") using a crane mounted on top of the bluff.

The abutment stair landings would lie below (waterward of) MHHW; the area below MHHW occupied by these new structures would be approximately 12 square feet (1.1 square meters) at each LWI. The total area excavated below MHHW during abutment construction would be approximately 15,600 square feet (1,449 square meters). The total volume of material excavated below MHHW would be approximately 2,889 cubic yards (2,208 cubic meters). [2] Construction of the abutment at the south LWI would require removal of approximately 40 feet (12 meters) of creosoted timber anti-torpedo baulk at the base of the bluff. Similar to work for the stairway piles (see above), the abutment and stair work would also be conducted at low tide in the dry. Beach contours would be returned to pre-construction conditions following construction, except for the areas occupied by the new structures and riprap placed at base of abutment wall. All bluff slopes disturbed by construction of the abutment would be stabilized using riprap (see Table 2-1 for quantities). The riprap would be placed below the abutment walls to elevations just below MHHW, ending just above 10 feet (3 meters) above MLLW at the north LWI and just below 9 feet (2.7 meters) above MLLW at the south LWI. A temporary sheet pile cofferdam would be constructed to create a dry area to install piles for the abutment. The lengths of the proposed coffer dams are 140 feet (43 meters) for the north abutment, 160 feet (49 meters) for the north stairs, 190 feet (58 meters) for the south abutment, and 160 feet long for the south stairs. The LWI project would utilize the existing beach sediment that was removed for LWI construction and place that over the protective armor rock at grade to preserve the natural shoreline dynamics. Several tidal cycles would be required to sort the material, but it is expected that the beach sediment will mimic existing conditions when the project is completed. Although additional armoring should not be required, if toe protection is needed to prevent erosion at the base of the LWI abutments, the Navy will implement soft armoring techniques such as placement of large woody debris (tree trunks or root wads). The intent of this technique is to add structure and complexity to diminish wave erosion without placing large armor rocks for LWI toe protection. Construction of both abutments would clear a total of approximately 47,000 square feet (4,366 square meters) of upland area and would require excavation of approximately 6,245 cubic yards (4,775 cubic meters) of soil and fill of 6,966 cubic yards (5,326 cubic meters) including the concrete.

The staging area for both LWI construction sites would be 6,562 square feet (610 square meters) within a 5.4-acre (2.2-hectare) site near the intersection of Archerfish and Seawolf Roads (Figure 2–1). This site has been used for staging other construction projects and is highly disturbed.

[2] Areas and volumes excavated are the minimum needed to achieve the purpose of the abutment construction.

Construction Schedule

Upland construction would take approximately 540 days; equipment would include backhoes, bulldozers, loaders, graders, trucks, and a crane/pile driver. Project construction would begin in August 2016 and end in August 2018. All in-water pile driving and abutment construction would take place during one in-water work season, August 1, 2016 through January 15, 2017, and would minimize potential impacts on Endangered Species Act (ESA)-listed fish species. Other in-water activities such as installation of the mesh material and relocation of PSB units and anchors would begin in January 2017 and end by August 2018, and could occur either within or outside the in-water work season. Materials and equipment for the in-water work would be brought in by barge, while materials and equipment for abutment construction would be brought in by truck. The number of construction workers is estimated at 100.

2.1.1.3.3. LWI ALTERNATIVE 3: PSB MODIFICATIONS (PREFERRED)

LWI Alternative 3 is the Preferred Alternative, in part because it would have fewer environmental impacts than Alternative 2 and, therefore, it is also the environmentally Preferred Alternative and the Least Environmentally Damaging Practicable Alternative according to the Clean Water Act (CWA) Section 404 (b)(1) guidelines.

Under this alternative, the construction and operation of the LWI structures would consist of modifying the existing PSB system to extend across the intertidal zone to attach to concrete abutments at the shoreline that would be the same as the abutments described above for the Pile-Supported Pier Alternative (Figure 2–5). In addition, three observation posts would be installed: one at the north LWI, one at the south LWI, and one on Marginal Wharf (Alternative 2 would not require observations posts because it would include piers with full-length walkways and towers with lighting and security equipment, as described in Section 2.1.1.3.2). There would be no underwater mesh, which would require a rigid, fixed structure for attachment. As a security requirement, Alternative 3 would use a greater number of security personnel than Alternative 2. However, the frequency of security vessel operations would not increase.

Table 2–1 summarizes LWI Alternative 3. For the north LWI, approximately 1,200 feet (370 meters) of the existing PSB system would be relocated and 100 feet (30 meters) of new PSB would be added (Figure 2–6). Existing PSB units and anchors would be removed using a barge-mounted crane, stored on the barge, and then placed at new locations as needed using the same crane. New components would be brought in by a tug-towed barge and placed by a barge-mounted crane. Four existing buoys and associated anchors would be relocated. The mooring system for two of the four relocated buoys would be reduced from three anchor legs to two anchor legs, each with one 2-ton (1.8-metric ton) clump anchor (3 by 3 feet [1 by 1 meter]) and one 10-ton (9-metric ton) anchor (11 feet long, 5.5 feet wide, 5 feet high [3.5 by 1.8 by 1.6 meters]). For the south LWI, approximately 1,200 feet of the existing PSB system would be relocated and 200 feet (60 meters) of new PSB would be added (Figure 2–7). Three existing buoys and associated anchors would be relocated. One of these would have its anchor legs reduced from three to two, each with one clump anchor and one 10-ton anchor. One new buoy would be installed with two mooring legs (each with one clump anchor and one 10-ton anchor).

Each PSB unit would be 50 feet (15 meters) long and would support an 8-foot (2.5-meter) high fence on a metal frame (Figure 2–8). Each unit would be supported on three pontoons: a center

pontoon 18 feet (5 meters) long, and two end pontoons each 6 feet (2 meters) long. The pontoons would be 42 inches (107 centimeters) in diameter. A metal grating (guard panel) 42 inches high would be suspended below the metal frame, between the pontoons. Because the height of this guard panel would be the same as the diameter of the pontoons, it would extend into the water the same distance as the pontoons (less than 1 foot [30 centimeters]). Openings to allow vessel passage through the barrier system would be created by disconnecting adjacent PSB units at strategic locations and towing the barrier out of the way.

Table 2–1. Summary of the Action Alternatives for the LWI Project

LWI Facility Feature[1]	LWI Alternative 2: Pile-Supported Pier	LWI Alternative 3 (Preferred): PSB Modifications
Length of LWI structure (13 feet [4 meters] wide with last [seaward] 23 feet [7 meters] of each pier 20 feet [6 meters] wide)	North LWI: 280 feet (85 meters) South LWI: 730 feet (223 meters)	Included in total length of PSBs below
Size of floating docks and gangway	At both LWIs at the ends of the piers: 12- by 35-foot (4- by 11-meter) dock with 80- by 3-foot (24- by 1-meter) gangway	N/A
Dolphins	At both LWIs: one 8- by 8-foot (2.4- by 2.4-meter) concrete platform supported by 8 24-inch (60-cm) piles	N/A
On-pier towers	North LWI: 6 40-foot (12-meter) tall towers South LWI: 14 40-foot tall towers	N/A
Length of relocated PSBs	North LWI: 1,000 feet (300 meters) South LWI: 650 feet (200 meters)	North LWI: 1,200 feet (370 meters) [2] South LWI: 1,200 feet (370 meters) [2]
Length of PSBs removed	North LWI: 200 feet (60 meters) South LWI: 550 feet (170 meters)	N/A
Length of PSBs added	N/A	North LWI: 100 feet (30 meters) South LWI: 200 feet (60 meters)
Total number of permanent in-water piles (hollow steel)[3]	North LWI: up to 54 24-inch (60 cm) piles South LWI: up to 82 24-inch piles	North LWI: up to 12 30-inch (76 cm) piles South LWI: up to 12 30-inch piles
Area displaced by permanent piles (not including abutment piles)	North LWI: 170 sq ft (16 sq m) South LWI: 258 sq ft (24 sq m)	North LWI: 59 sq ft (5.5 sq m) South LWI: 59 sq ft (5.5 sq m)
Size of temporary trestle for pier	300 by 20 feet (90 by 6 meters)	N/A
Number of temporary trestle piles for pier (hollow steel)	North LWI: N/A South LWI: 120 24-inch	N/A
Size of temporary trestles for observation posts	N/A	At both LWIs: 20 by 50 feet (6 by 15 meters)
Number of temporary trestle piles for observation posts (hollow steel)	N/A	North LWI: 10 24-inch (60-cm) South LWI: 10 24-inch (60cm)
Area displaced by temporary piles	South LWI only: 380 sq ft (35 sq m)	North LWI: 32.3sq ft (3 sq m) South LWI: 32.3 sq ft (3 sq m)
Area of partial shading[4]	North LWI: 4,450 sq ft (413 sq m) South LWI: 10,300 sq ft (957 sq m)	North LWI: 980 sq ft (91 sq m) South LWI: 2,090 sq ft (194 sq m)
Area of full shading[5]	North LWI: 64 sq ft (6 sq m) South LWI: 64 sq ft (6sq m)	North LWI: 1,000 sq ft (93 sq m) South LWI: 1,000 sq ft (93 sq m)
LWI footprint (benthic habitat displaced by structures)[6]	North LWI: 1,682 sq ft (156 sq m) South LWI: 4,270 sq ft (397 sq m)	North LWI: 71 sq ft (6.6 sq m) South LWI: 71 sq ft (6.6 sq m)

Table 2–1. Summary of the Action Alternatives for the LWI Project (continued)

LWI Facility Feature[1]	LWI Alternative 2: Pile-Supported Pier	LWI Alternative 3 (Preferred): PSB Modifications
Area occupied by steel plates anchoring in-water mesh	North LWI: 1,500 sq ft (140 sq m) South LWI: 4,000 sq ft (370 sq m)	N/A
Area below MHHW excavated for abutment	North LWI: 6,800 sq ft (632 sq m) South LWI: 8,800 sq ft (818 sq m)	Same as Alternative 2
Cut volume below MHHW for two abutments and two stair landings	2,889 cu yd (2,209 cu m)	Same as Alternative 2
Fill volume below MHHW for two abutments and two stair landings excluding riprap cover	2,911 cu yd (2,226 cu m)	Same as Alternative 2
Temporary Sheet pile cofferdam dimensions	North Abutment: 140 feet (43 meters) North Stairs: 160 feet (49 meters) South Abutment: 190 feet (58 meters) South Stairs: 160 feet	Same as Alternative 2
Riprap length	North Abutment: 100 feet (30 meters) North Stairs: 80 feet (24 meters) South Abutment: 150 feet (46 meters) South Stairs: 80 feet (24 meters)	Same as Alternative 2
Riprap width	Approximately 10 feet (3 meters)	Same as Alternative 2
Riprap volume below MHHW (placed above natural beach contour)	303 cu yd (232 cu m)	Same as Alternative 2
Riprap area below MHHW	4,100 sq ft (381 sq m)	Same as Alternative 2
PSB anchors 10-ton (9-metric ton) anchors: 11 by 5.5 feet (3.5 by 1.8 meters) 2-ton (1.8-metric ton) clump anchors: 3 by 3 feet (1 by 1 meter)	Both LWIs: relocation of two existing mooring anchor systems and removal of one mooring anchor system; net reduction of three 10-ton anchors and six 2-ton anchors at each LWI	North LWI: relocation of four existing anchor systems with reconfiguration of two of these systems; net reduction of two 10-ton anchors and eight 2-ton anchors
		South LWIs: relocation of three existing mooring anchor systems plus addition of one mooring anchor system; net addition of one 10-ton anchor and reduction of two 2-ton anchors
Barge trips (total round trips)	16	3
Size of abutment	North LWI: 40 feet high by 72 feet long (12 by 23 meters) South LWI: 20 feet high by 72 feet long (4 by 26 meters)	Same as Alternative 2
Number of piles for abutment stairs (driven in the dry)	North LWI: 15 36-inch (90-cm) piles South LWI: 16 36-inch piles	Same as Alternative 2
Number of piles for stairs (driven in the dry)	North LWI: 5 24-inch (60 –cm) piles South LWI: 5 24-inch piles	Same as Alternative 2
Number of permanent piles for observation posts (driven in the dry)	N/A	North LWI: 12 30-inch (76-cm) South LWI: 12 30-inch
Upland area cleared for abutment	North LWI: 29,000 sq ft (2,694 sq m) South LWI: 18,000 sq ft (1,672 sq m)	Same as Alternative 2
Upland excavation volume for abutment	6,245 cubic yards (4,775 cu m)	Same as Alternative 2
Upland fill volume for abutment	6,966 cubic yards (including concrete) (5,326 cu m)	Same as Alternative 2

Table 2–1. Summary of the Action Alternatives for the LWI Project (continued)

LWI Facility Feature[1]	LWI Alternative 2: Pile-Supported Pier	LWI Alternative 3 (Preferred): PSB Modifications
On-land towers	N/A	One 30-foot (9-meter) tower on each abutment
New impervious surface	North LWI: 2,720 sq ft (253 sq m) South LWI: 2,466 sq ft (229 sq m)	Same as Alternative 2
Riprap volume above MHHW	North LWI: 205 cu yd (158 cu m) South LWI: 199 cu yd (153 cu m)	Same as Alternative 2
Upland staging area (already disturbed)	6,562 square feet (610 square meters)	Same as Alternative 2
Overall construction duration	24 months, including up to 80 days of pile driving; upland construction 540 days	24 months, including up to 30 days of pile driving; upland construction 540 days
Duration of in-water work[7]	In-water pile driving and abutment construction in one in-water work season; mesh installation and relocation of PSBs and anchors could occur up to 24 months. Two in-water work seasons would be needed for all in-water work.	One in-water work season would be needed for PSB modifications and in-water abutment construction.

cm = centimeter; cu m = cubic meter; cu yd = cubic yard; MHHW = mean higher high water; N/A = not applicable; sq ft = square feet; sq m = square meter

1. Numbers are based on preliminary design and are approximate and subject to change.
2. Total lengths (1,300 feet [400 meters] for the North LWI and 1,400 feet [430 meters] for the South LWI) are slightly greater than total length of LWI plus PSBs under Alternative 2 to allow for slack in the PSB systems.
3. Number includes the potential for a modest increase in the number of piles in the final design. All Alternative 3 piles would be driven in the dry at low tides.
4. Partial shading for Alternative 2 would be from the piers, floating docks, and gangways; partial shading for Alternative 3 would be from the nearshore PSB pontoons and observation post and abutment stairs.
5. Full shading for Alternative 2 would be from the dolphins; full shading for Alternative 3 would be from the observation posts.
6. Habitat displacement for Alternative 2 would be from permanent in-water piles, steel mesh anchors, and abutment stair landings. Habitat displacement for Alternative 3 would be from observation post piles and abutment stair landings.
7. The first in-water work season would be August 1, 2016 to January 15, 2017, and the second in-water work season would be July 15, 2017 through January 15, 2018. Installation of mesh and relocation of PSB units and anchors would occur in the range of January 2017 – August 2018 and could occur either within or outside of the in-water work seasons.

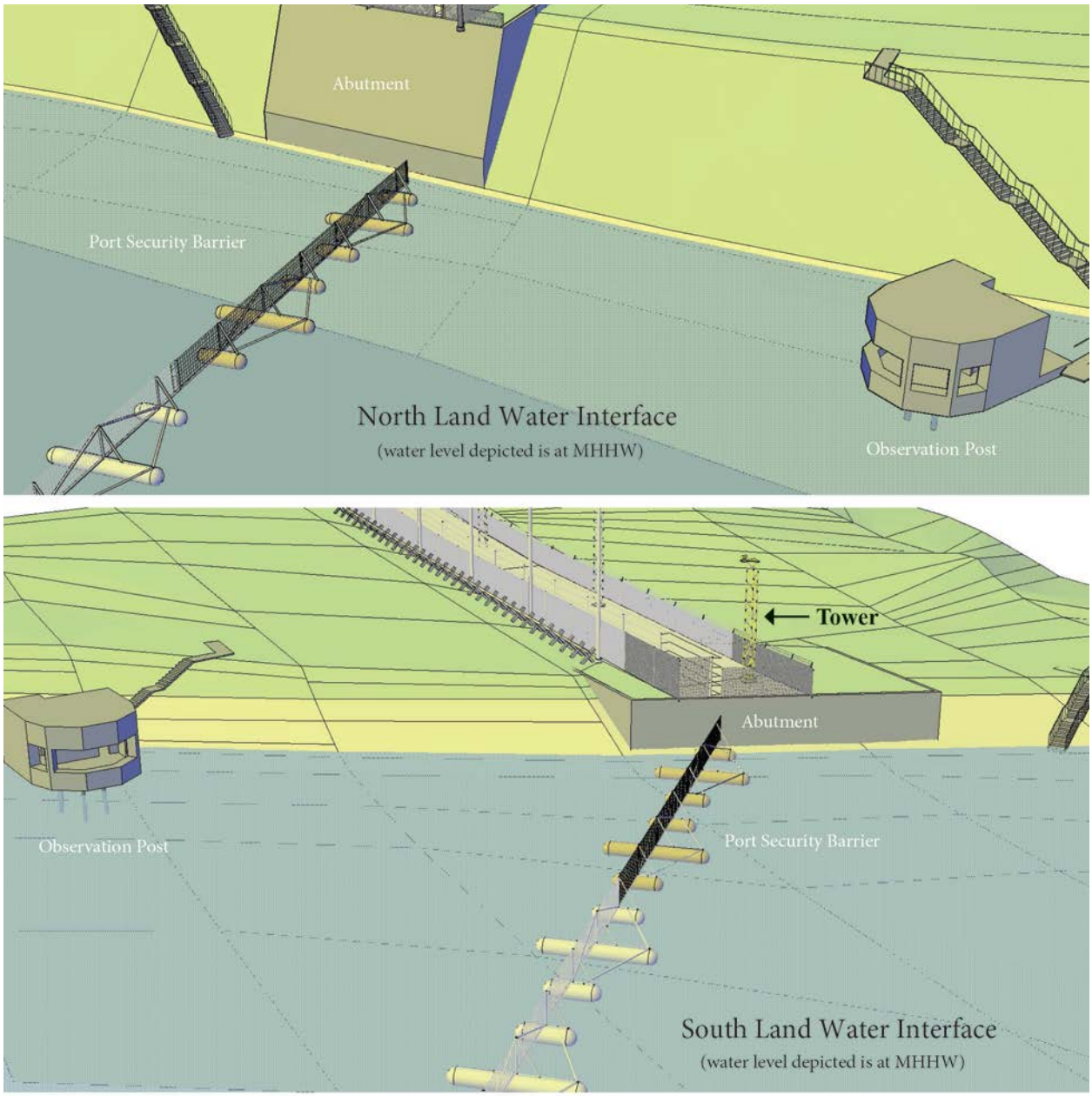

Figure 2-5. LWI Alternative 3: PSB Modifications

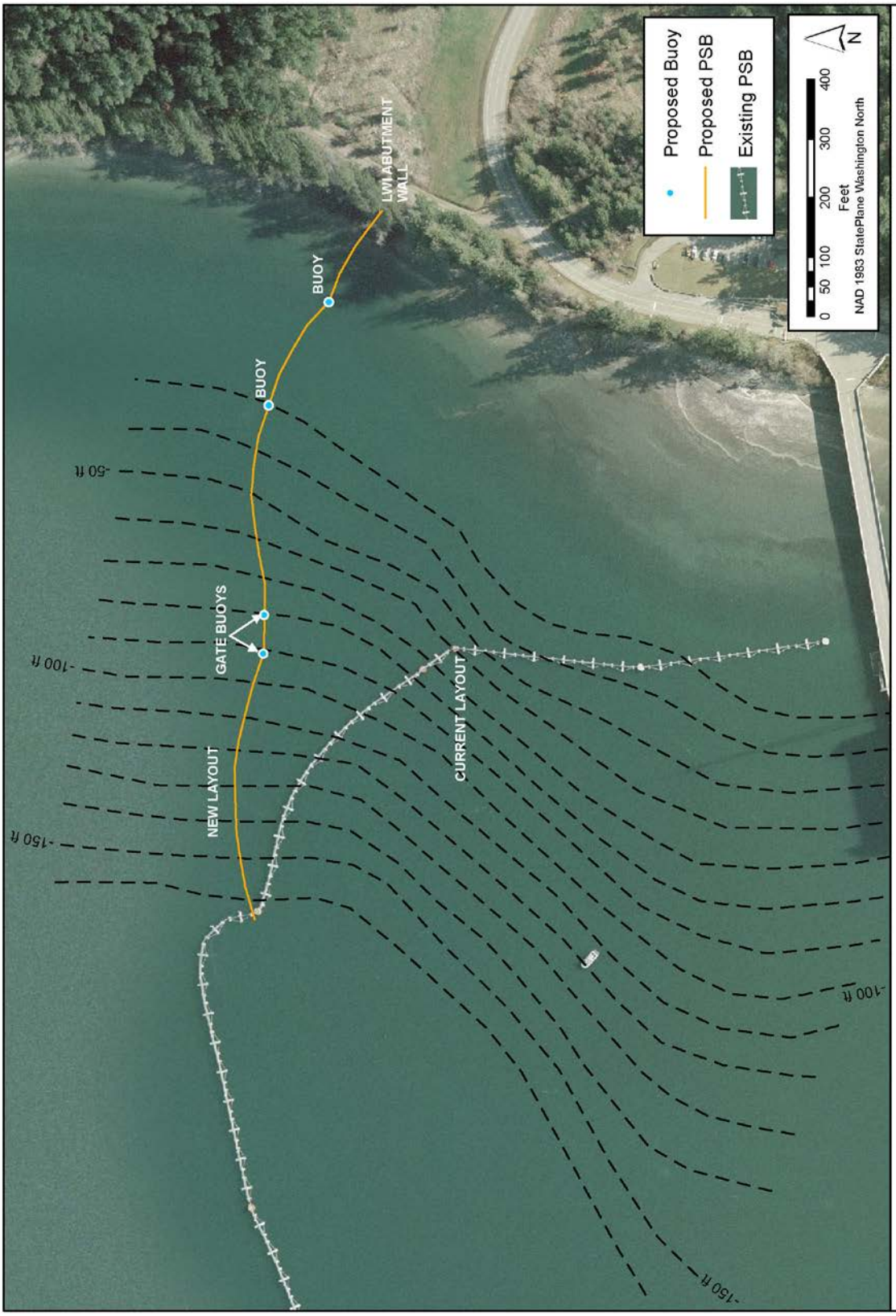

Figure 2-6. North LWI PSB Layout

Figure 2-7. South LWI PSB Layout

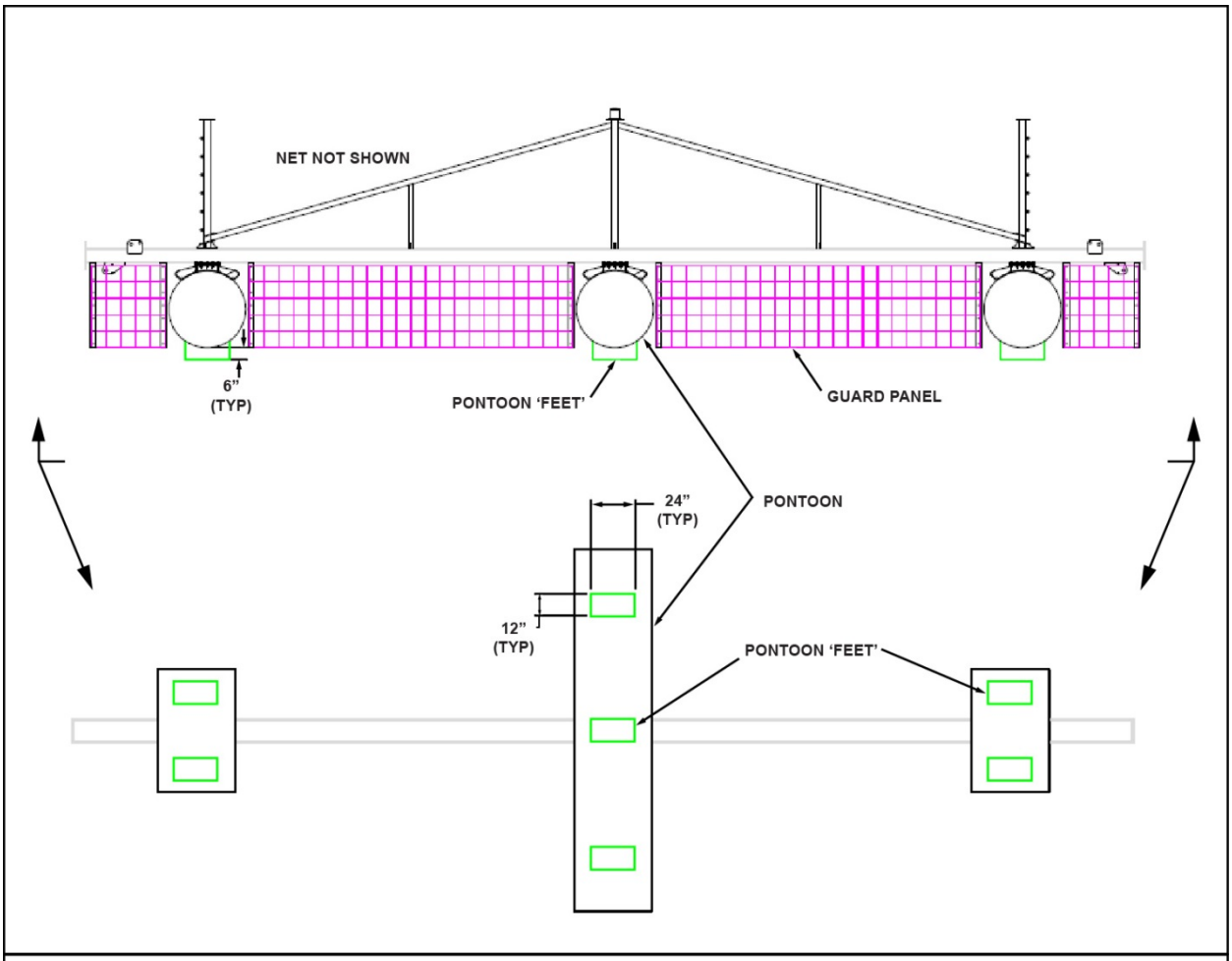

Figure 2–8. PSB Unit

PSBs at Low Tide

On an average low tide, approximately 11 PSB units including 33 pontoons (north and south LWI combined) would "ground out" in the intertidal zone. Over the long term, which would include extreme low tides, approximately 18 PSB units including 54 pontoons would ground out in the intertidal zone. Five of these PSB units would ground out at the north LWI and 13 would ground out at the south LWI. To minimize the resulting disturbance of the intertidal zone, each center pontoon would be fitted with three "feet" and the outer pontoons would be fitted with two feet that would prevent an entire pontoon from contacting the sediment surface (Figure 2–8). These feet would be 12 by 24 inches (30 by 60 centimeters) in size and constructed of high-density polyethylene, a durable, inert plastic often used for water mains and sewer systems. Considering a total of 126 such feet (18 intertidal PSBs with 7 feet each), and that these feet would not always ground out at the same location, it is estimated that approximately 2,520 square feet (234 square meters) of the intertidal zone would be disturbed over the long term (700 square feet [65 square meters] at the north LWI, and 1,820 square feet [169 square meters] at the south LWI). In addition, one buoy at the south LWI would ground out on an average low tide. Over the long term, including extreme low tides, three buoys (one at the north

LWI and two at the south LWI) would ground out at low tide. These buoys are 30 inches (76 centimeters) in diameter. Over the long term, grounding out by these buoys would disturb approximately 74 square feet (7 square meters) of seafloor.

Shoreline and Upland Construction

The abutments would be the same as described above under Alternative 2. In addition, an observation post would be installed at each LWI location. These posts would be approximately 25 by 45 feet (8 by 14 meters) and would include a separate stairway to the base of the bluff. Each post would require 12 30-inch (76-centimeter) piles that would be driven from land at low tide ("in the dry") using vibratory methods and impact methods as needed. The observation post stairways would be supported on 2 by 2 foot (0.6 by 0.6 meter) concrete pads. Each observation post would require a temporary construction trestle having dimensions of 20 by 50 feet (6 by 15 meters) at each LWI location, along with 10 24-inch (60-centimeter) diameter steel pipe piles supporting the temporary trestle at each LWI location. Driving of all piles for LWI Alternative 3 would require a maximum of 30 days of pile driving.

A third observation post 600 square feet (56 square meters) in area would be installed on the deck of Marginal Wharf, at the seaward apex of the wharf (Figure 2-1) and would include removal of an existing observation post. This new observation post would be similar in configuration, but smaller than the two shoreline observation posts (Figure 2-5). The post would be constructed of reinforced concrete. There would be no in-water construction, no part of this observation post would extend into the water, and no new over-water area would be created. Lighting would be similar to the existing post. Communication cables would be installed from an existing hub under an existing roadway to access the wharf, using standard construction methods that would include patching of the roadway after construction. The existing observation post is a small pre-engineered steel building that would be removed intact using a crane and truck. The roof has asbestos-containing material and would be handled and disposed of appropriately. The rest of the building would be sent to a metal recycler. Removal of the existing observation post and construction and operation of the replacement observation post would not affect vessel operations at the wharf. There would be no increase in airborne noise over existing conditions on this industrial wharf.

For Alternative 3, two 30-foot (9-meter) tall, on-land towers would be installed by bolting them to concrete foundations, one at the north LWI and one at the south LWI. These towers would be located within the extension of the WSE; no additional ground would be disturbed for the towers.

Construction Schedule

The construction schedule for LWI Alternative 3 would be the same as described above for LWI Alternative 2 except that only one in-water construction season would be needed.

2.1.1.3.4. LWI OPERATIONS

Operation of the LWI would consist primarily of maintenance of the in-water and upland structures, including routine inspections, cleaning, repair, and replacement of facility components (no pile replacement) as required. Operation would also include opening and closing of the PSBs for boat traffic, using small tug boats. The presence of the LWI would result

in changes in patterns of security vessel movements, but such movements would be within the WRA and would not increase in frequency. For both alternatives, cleaning and replacement of the PSB guard panels (unbolted and re-bolted out of the water) would occur as needed. Cleaning would be accomplished by power washing. Measures would be employed to prevent discharges of contaminants to the environment (see BMPs, Section 2.3.2). For Alternative 2 (Pile-Supported Pier), annual cleaning would include removal of fouling organisms from the in-water mesh. Maintenance would require infrequent visits by vehicles to the upland portions and by small boats to the LWI structures (tying up to the floating docks). Operational lighting at the abutments for both alternatives would not exceed one foot candle to a distance of 50 feet (15 meters) from the abutments; these lights would operate continuously. For Alternative 2, operational lighting levels would not exceed 10 foot candles along the immediate pier structure, 0.5 foot candle out to a distance of 50 feet (15 meters) from the LWI structure, and 0.05 foot candle to a distance of 100 feet (30 meters). These lights would operate only during security responses. For Alternative 3, there would be no lighting on the PSB units, only on the abutment towers.

2.2. SPE PROPOSED ACTION

The SPE Proposed Action is to extend the existing Service Pier at NAVBASE Kitsap Bangor and construct associated support facilities. The SPE would provide additional berthing for maintenance of existing homeported and visiting submarines. The associated support facilities would provide logistical support for SEAWOLF, LOS ANGELES, and VIRGINIA Class submarines at the Navy's SSN research, development, test, and evaluation hub, which is currently located on NAVBASE Kitsap Bangor. Two action alternatives and the No Action Alternative (Alternative 1) are evaluated in the EIS. Under the No Action Alternative, the SPE would not be constructed or operated. The action alternatives are the Short Pier (Alternative 2), which is the Preferred Alternative, and the Long Pier (Alternative 3). Alternative 2 would extend the existing 500-foot (152-meter) long Service Pier by 540 feet (165 meters); Alternative 3 would extend it by 975 feet (297 meters). After construction of the SPE, the Service Pier would be 1,040 feet (317 meters) or 1,475 feet (450 meters) long under Alternatives 2 and 3, respectively. Both alternatives would include construction of a 2,100 square foot (195-square meter) Pier Services and Compressor Building on the Service Pier and relocation of the existing PSB system to attach to the end of the pier extension. The upland portions of the two action alternatives would be the same. A new 50,000-square foot (4,645-square meter) Waterfront Ship Support Building would be built at the site of an existing parking lot. Additional new project elements including an approximately 420-space parking lot, utilities, and road improvements would occupy a total of approximately 7 acres (2.8 hectares). The design life of the SPE Proposed Action is 50 years.

Military Construction projects such as SPE must be authorized and funded by Congress. The SPE project is not currently funded or programmed for implementation, and therefore a future construction schedule has not been determined. This means that the SPE project might be scheduled for construction in the future, but with limited resources and competing priorities, the decision to fund and construct the SPE and associated support facilities has not been made and a time frame for doing so has not been determined. Because the passage of time has the potential to alter the affected environment and anticipated impacts, completion of the NEPA process through a Record of Decision, along with regulatory consultations and permit applications, will be deferred until such time as a decision is made to proceed with the SPE project, so that any

relevant supplemental information can be taken into account. However, because the SPE Proposed Action has already undergone significant analysis, and because the project authorization and scheduling modifications occurred during the EIS preparation process, the Navy continued to include the description and environmental impact analysis of the SPE project in this Final EIS to provide the most comprehensive environmental information and to support the cumulative effects analysis.

2.2.1. SPE Alternatives

2.2.1.1. ALTERNATIVES DEVELOPMENT AND SCREENING CRITERIA

Screening criteria were developed to determine if a potential alternative was reasonable, whether it met the purpose and need, and if it should be carried forward for detailed analysis in the EIS. The screening criteria listed below were used in the identification and evaluation of SPE action alternatives:

- Supports master planning considerations and does not impact other operational missions on NAVBASE Kitsap,
- Avoids or minimizes impacts on tribal usual and accustomed harvest areas,
- Integrates pier and support facilities into existing facilities and infrastructure to the extent practicable, and
- Provides unrestricted access to the ocean.

2.2.1.2. ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Using the above screening criteria, the following alternatives were considered but eliminated from further analysis in the EIS.

- *Pier placement on NAVBASE Kitsap Bangor separate from existing Service Pier.* Because of the requirements of other missions at Bangor, the waterfront is constrained from new pier development south of Carlson Spit and north of the Service Pier (Figure 2–1). This alternative was not carried forward for further analysis because it would impact other operational missions and could not be integrated into existing facilities and infrastructure.
- *Alternative building layouts for Service Pier Extension.* The Navy considered constructing a 19,000-square foot (1,765-square meter) pile-supported Waterfront Support Building on the south side of the pier extension. This alternative was eliminated because of the greater environmental impacts compared to the proposed on-land facility, particularly overwater shading impacts.

2.2.1.3. SPE ALTERNATIVES EVALUATED IN EIS

Two action alternatives were identified as meeting the purpose and need and the screening criteria. These alternatives consist of a short pier configuration and a long pier configuration. These action alternatives and the No Action Alternative are described below.

2.2.1.3.1. SPE ALTERNATIVE 1: NO ACTION

Under SPE Alternative 1, the No Action Alternative, no Service Pier extension or associated support facilities would be built at NAVBASE Kitsap Bangor. This alternative would not meet the purpose and need for the Proposed Action. It would not provide alternative opportunities for berthing to mitigate restrictions at NAVBASE Kitsap Bremerton on navigating SEAWOLF Class submarines through Rich Passage under certain tidal conditions, or improve long-term operational effectiveness for the three SEAWOLF Class submarines on NAVBASE Kitsap. The No Action Alternative would not provide berthing and logistical support for SEAWOLF, LOS ANGELES, and VIRGINIA submarine classes at the Navy's SSN research, development, test and evaluation hub, nor improve submarine crew training and readiness through co-location of command functions on the NAVBASE Kitsap Bangor submarine training center. No environmental impacts would result from the No Action Alternative, as no construction or physical alteration to the waterfront would occur, and there would be no changes in operations. The No Action Alternative is carried forward for analysis because it is required by NEPA and constitutes baseline conditions for environmental analysis of the Proposed Action.

2.2.1.3.2. SPE ALTERNATIVE 2: SHORT PIER CONFIGURATION (PREFERRED)

SPE Alternative 2 is the Preferred Alternative, in part because it would have fewer environmental impacts than Alternative 3 and, therefore, it is also the environmentally Preferred Alternative and the Least Environmentally Damaging Practicable Alternative according to the CWA Section 404 (b)(1) guidelines. Table 2–2 (presented at the end of Section 2.2.1.3.3) summarizes SPE Alternative 2.[3]

Under SPE Alternative 2, the Navy would construct and operate an approximately 540-foot (165-meter) long and 68 feet (21 meters) wide, 44,000-square foot (4,090-square meter) surface area extension to the existing Service Pier (Table 2–2) that would be capable of a double-breasted (side-by-side) berthing configuration for submarine maintenance. The new total length of the Service Pier would be 1,040 feet (317 meters). Proposed new facilities would include a pier crane on a 28- by 60-foot (9- by 18-meter) foundation, a 2,100-square foot (195-square meter) Pier Services and Compressor Building located on the Service Pier, an upland 50,000-square foot (4,645-square meter) Waterfront Ship Support Building, an approximately 420-car parking lot, and roadway and utility improvements (transmission line upgrades and a new substation) (Figure 2–9). The Waterfront Ship Support Building would be designed and constructed to be eligible to receive a minimum Leadership in Energy and Environmental Design (LEED) certification of Silver. LEED is a third-party certification program and nationally accepted benchmark for the design, construction, and operation of high-performance green buildings developed by the U.S. Green Building Council. BMPs and impact reduction measures that would be implemented to avoid or minimize potential environmental impacts associated with the SPE Proposed Action are discussed in Section 2.3.

The proposed Pier Services and Compressor Building would house the compressor and would be located at the south end of the existing Service Pier (Figure 2–9). The Pier Services and Compressor Building is needed to house sewage lift stations, and "high pressure" and "low

[3] Under SPE Alternative 1, the No Action Alternative, there would be no change to the environment due to construction and operation of an SPE. Therefore, the No Action Alternative is not included in Table 2–2.

pressure" compressors that would provide an off-hull source of air for charging submarine air banks, as well as breathing quality air needed for purging the ship's ballast tanks to allow entry for maintenance. The compressors need to be located as near to the ship as possible to minimize the accumulation of moisture in the air lines.

Pile Installation and Wave Screen

The existing Service Pier is approximately 500 feet long by 85 feet wide (152 by 26 meters). The proposed extension of the Service Pier would be approximately 68 by 540 feet (21 by 165 meters) and would require installation of approximately 230 36-inch (90-centimeter) diameter steel pipe support piles. After construction of the SPE, the pier would be 1,040 feet (317 meters) long. Approximately 50 24-inch (60-centimer) diameter steel pipe piles would be used for mooring of existing small craft and mooring camels for the SSNs. Approximately 105 18-inch (45-centimeter) square concrete fender piles would also be installed. Driving of the steel support piles would use a combination of vibratory (primary) and impact methods and would require pile driving on no more than 125 days during the first in-water work season. Driving of the concrete piles would use impact methods only and would require pile driving on no more than 36 days during the second in-water work season. The pier extension would extend to the southwest from the south end of the existing Service Pier and would parallel Carlson Spit in water depths of 30 to 50 feet (9 to 15 meters) below MLLW, such that the berthing areas for the new submarines would be in water depths of approximately 50 to 85 feet (15 to 26 meters) below MLLW. A concrete float 150 feet (46 meters) long and 15 feet (4.6 meters) wide would be attached to the south side of the SPE (Figure 2–10). The existing PSB system would be re-configured slightly to attach to the end of the new pier extension, with approximately 540 feet (165 meters) removed. Removal and disposal of existing PSBs would be done as described for the LWI project. Construction is expected to require one barge with a crane, one supply barge, a tugboat, and work skiffs.

Construction would be preceded by removal of an existing wave screen (including piles) and other existing piles from the Service Pier. A total of 36 existing creosote timber piles (19 18-inch [45-centimeter] and 17 15-inch [38-centimeter] piles) would be removed by using a clam shell or similar methods and would be cut at the mudline if splitting or breakage occurs. A floating boom and other measures would be used to protect water quality during this activity (Section 2.3.2). In addition, a new wave screen would be installed under the SPE (Figure 2–10). This screen would be about 200 feet (60 meters) long and 27 feet (8 meters) high (20 feet [6 meters] below to 7 feet [2 meters] above MLLW), made of concrete or steel, and attached to steel support piles for the SPE.

Upland Construction

The proposed Waterfront Ship Support Building would be located on an existing 36,000-square foot (330-square meter) parking lot on the east side of Wahoo Road which has 107 parking spaces. Based on the loss of this lot and the related relocation of existing personnel at NAVBASE Kitsap Bangor, a new 6-acre (2.4-hectare) parking lot of approximately 420 spaces would be needed. This parking lot would be located approximately 1,200 feet (370 meters) south of the proposed Waterfront Ship Support Building within a vegetated area. Road improvements to accommodate changes in traffic patterns along Wahoo and Sealion Roads, repairs to existing roads damaged from construction activity, and electrical utility upgrades would also be included under this alternative. The area permanently occupied by new project elements would be approximately 7 acres (2.8 hectares). Approximately 4 acres (1.6 hectares)

would be disturbed temporarily for a construction laydown area and other construction-related disturbance and revegetated with native species following construction. The parking lot, utilities, and laydown area would be located within the area between Sturgeon Street and Sealion Road, as shown on Figure 2–9.

Construction Schedule

The SPE project is currently unprogrammed, and the construction schedule has not been determined. Upland construction would take approximately 400 days; equipment would include backhoes, bulldozers, loaders, graders, trucks, and paving equipment. Construction of all proposed facilities is anticipated to take approximately 24 months. Pile driving would occur within the in-water work windows (July 15 to January 15) to minimize potential impacts on ESA-listed fish species. It is not expected that completion of pile driving would require two full 6-month in-water work seasons. Relocation of existing PSB units and anchors could occur outside the in-water work window. There would be no work in the intertidal zone. The number of construction workers is estimated at 225.

2.2.1.3.3. SPE ALTERNATIVE 3: LONG PIER CONFIGURATION

Under this alternative the pier extension would be approximately 975 feet (297 meters) long and 68 feet (21 meters) wide and would have a surface area of approximately 70,000 square feet (6,500 square meters) (Figure 2–11). The new total length of the Service Pier would be approximately 1,475 feet (450 meters). This design would allow two submarines to be berthed in an in-line configuration rather than breasted (side-by-side). Table 2–2 summarizes SPE Alternative 3. The total number of 24-inch (60-centimeter) diameter steel support piles would be approximately 500, including those for small craft and camel mooring; there would be approximately 160 18-inch (40-centimeter) square concrete fender piles. Driving of steel piles would require driving on no more than 155 days and would take place during the first in-water construction season. Driving of concrete piles would require driving on no more than an additional 50 days and would take place during the second in-water work season. The PSB relocation would differ from the relocation under SPE Alternative 2 so as to connect the PSBs to the end of the longer pier extension; approximately 975 feet (297 meters) of existing PSBs would be removed. All other aspects of SPE Alternative 3 would be the same as SPE Alternative 2, including upland features and overall construction schedule. It is expected that completion of in-water work would require two full in-water work seasons. Alternative 3 would meet the purpose and need and screening criteria, but would have greater environmental impacts (Section 2.4.2) and cost more than Alternative 2.

2.2.1.3.4. SPE OPERATIONS

Operation of the SPE that would occur following project completion would be similar to existing day-to-day operations that currently occur at NAVBASE Kitsap Bangor. All waste discharges from submarines moored at the SPE would be pumped ashore to the existing base waste treatment systems. Drainage water from the SPE would be collected in a trench drain on the pier, treated using an in-line canister system designed to meet the basic treatment requirements of the Washington Department of Ecology (WDOE) *Stormwater Management Manual for Western Washington*, and then discharged to Hood Canal in accordance with a National Pollutant Discharge Elimination System (NPDES) permit.

Table 2–2. Summary of the Action Alternatives for the SPE Project

SPE Facility Feature[1]	SPE Alternative 2 (Preferred): Short Pier Configuration	SPE Alternative 3: Long Pier Configuration
Length and width of pier extension	540 feet (165 meters) long 68 feet (21 meters) wide	975 feet (297 meters) long 68 feet (21 meters) wide
Number of steel support piles	230 36-inch (90-cm)	500 24-inch (60-cm)
Number of concrete fender piles	105 18-inch (45-cm)	160 18-inch (45-cm)
Number of small craft mooring steel piles	50 24-inch (60-cm)	50 24-inch (60-cm)[2]
Number of creosote-treated timber piles removed	19 18-inch (45-cm) 17 15-inch (38-cm)	Same as SPE Alternative 2
Total area displaced by piles[3]	1,965 sq ft (183 sq m)	1,876 sq ft (174 sq m)
Size of float	150 feet long by 15 feet wide (46 by 4.6 meters), 2,250 sq ft (209 sq m)	Same as SPE Alternative 2
Total over-water area	44,000 sq ft (4,090 sq m)	70,000 sq ft (6,500 sq m)
New wave screen	Approx. 200 feet (60 meters) long and 27 feet (8 meters) high, concrete or steel, attached to existing piles	Same as SPE Alternative 2
Barge trips (round trips)	6 per month on average	Same as SPE Alternative 2
Upland area permanently occupied by new structures (maximum)	7 acres (2.8 hectares)	Same as SPE Alternative 2
Upland area temporarily disturbed by construction (maximum)	4 acres (1.6 hectares)	Same as SPE Alternative 2
New facilities	• Pier crane • 2,100 sq ft (195 sq m) Pier Services & Compressor Building • 50,000 sq ft (4,645 sq m) Waterfront Support Building • Approx. 420-space parking lot	Same as SPE Alternative 2
Roadway and utilities improvements	Transmission line upgrades, switch gear, and new substation (included in upland area disturbed above)	Same as SPE Alternative 2
Overall construction duration	24 months	Same as SPE Alternative 2
Duration of in-water work[4]	Two in-water work seasons including up to 125 days of driving of steel support piles and 36 days of driving concrete fender piles	Two in-water work seasons including up to 155 days of driving of steel support piles and 50 days of driving concrete fender piles

cm = centimeter; cu yd = cubic yard; N/A = not applicable; sq ft = square feet; sq m = square meter

1. Numbers are based on preliminary design and are approximate and subject to change.
2. Included in the total number of 24-inch steel support piles.
3. Includes the area displaced by the proposed pier extension piles minus the area of piles being removed from the existing Service Pier.
4. In-water work season would be July 15 to January 15.

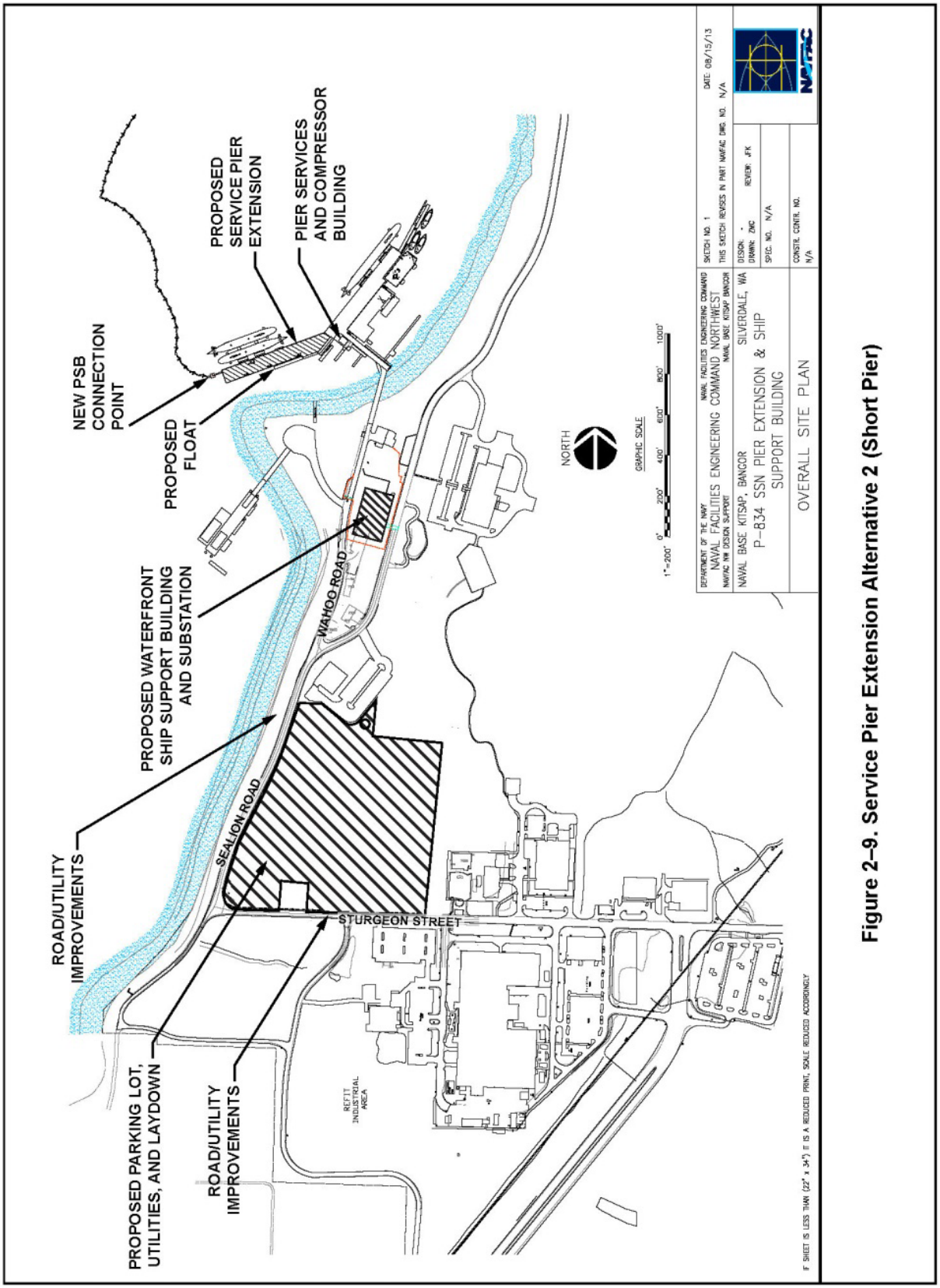

Figure 2–9. Service Pier Extension Alternative 2 (Short Pier)

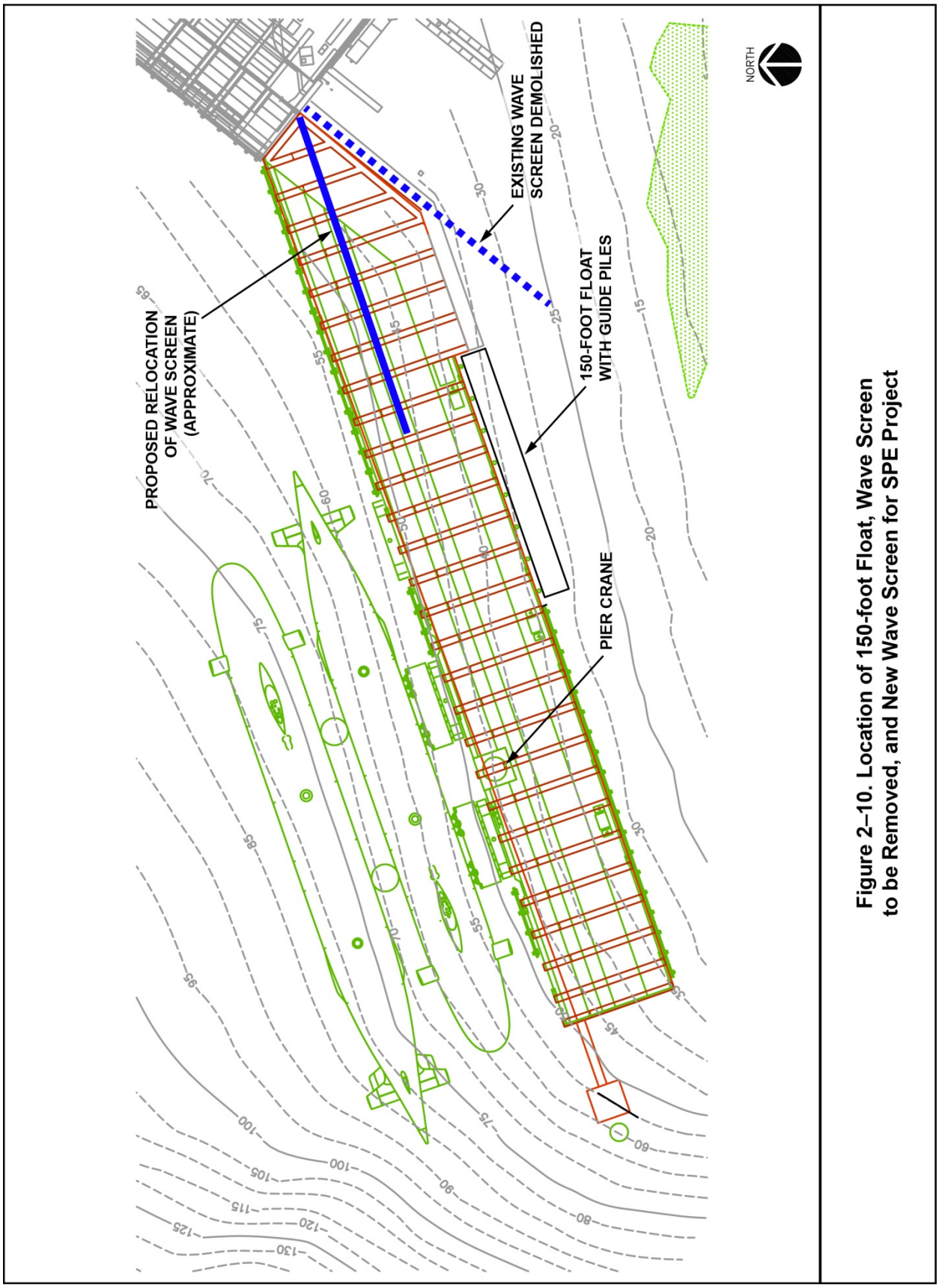

Figure 2–10. Location of 150-foot Float, Wave Screen to be Removed, and New Wave Screen for SPE Project

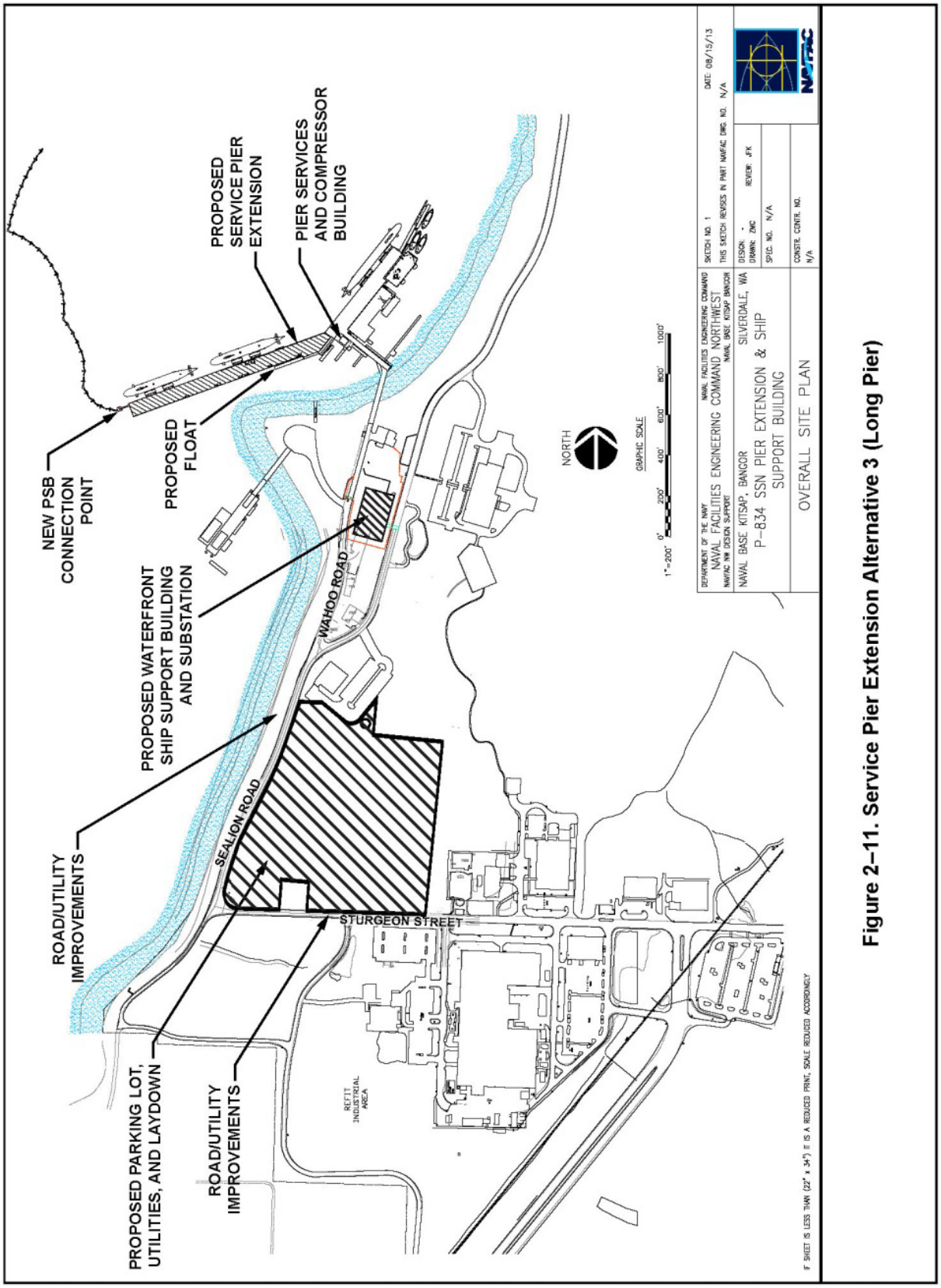

Figure 2–11. Service Pier Extension Alternative 3 (Long Pier)

The average number of one-way Hood Canal transits of SSN submarines to or from the Service Pier would increase from approximately 0.5 per month currently to 2 per month. These submarines are not escorted to and from NAVBASE Kitsap Bangor as are the TRIDENT Class submarines, but there would be an increase in small, existing support vessel traffic at the Service Pier.

Operational lighting levels would not exceed 10 foot candles on the pier deck, 0.5 foot candle from the pier deck to a distance of 50 feet (15 meters) from the pier deck, and 0.05 foot candle to a distance of 100 feet (30 meters).

2.3. DESIGN AVOIDANCE AND MINIMIZATION MEASURES, BMPS, AND CURRENT PRACTICES

The proposed projects would incorporate the following design avoidance and minimization measures, BMPs, and current practices as part of construction and operation to avoid or minimize potential environmental impacts.

2.3.1. Design Avoidance and Minimization Measures

For both the LWI and SPE, the Navy carefully analyzed all alternatives and modified their design to minimize environmental impacts to the extent feasible. For both projects, the preferred alternative was selected in part because it would have fewer environmental impacts than the other alternatives carried forward for detailed analysis in this EIS. Therefore, the two preferred alternatives are also the environmentally preferred alternatives. In addition, impact avoidance and minimization measures were included in the design of the various alternatives, as listed below:

- For both projects, the number of piles and anchors was minimized while still meeting structural, safety, and security requirements.
- For LWI Alternative 2, the piers were designed to minimize overwater coverage and maximize light transmittance. The pier was limited to pedestrian access, which allows it to be narrower and have a grated deck, as well as fewer, more widely spaced piles.
- For LWI Alternative 2, a mesh anchoring system was developed that did not require dredging.
- For LWI Alternative 2, the mesh size was maximized to facilitate fish passage while still meeting security requirements.
- For both LWI alternatives, the shoreline abutments are the minimum size, and located to minimize environmental impacts to the extent feasible, while still meeting the required security function.
- For LWI Alternative 3, the PSB pontoons would be fitted with “feet” to minimize disturbance of the seafloor when the pontoons bottom out at low tide.
- For both SPE alternatives, the pier extension was placed in deep water to minimize impacts on marine vegetation and habitat, and interference with nearshore fish migration.

- For both SPE alternatives, as many facilities as possible were sited on land versus on the pier to minimize the size of the pier.

2.3.2. BMPs and Current Practices

This section summarizes BMPs and current practices that would be implemented during the Proposed Actions to minimize environmental impacts. More detailed descriptions of these measures can be found in the various resource sections (Sections 3.1, 3.2, etc.) of Chapter 3 and in the Mitigation Action Plan (Appendix C).

2.3.2.1. CONSTRUCTION

- To reduce the likelihood of any petroleum products, chemicals, or other toxic or deleterious materials from entering the water, fuel hoses, oil or fuel transfer valves, and fittings will be checked regularly for drips or leaks and will be maintained and stored properly to prevent spills from construction and pile driving equipment into state waters.
- To limit soil erosion and potential pollutants contained in stormwater runoff, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared and implemented in conformance with the *Stormwater Management Manual for Western Washington* (WDOE 2014) (applies to Operations also).
- Oil booms will be deployed around in-water construction sites as required by a Clean Water Act (CWA) Section 401 Water Quality Certification for the projects, to minimize water quality impacts during construction.
- Debris will be prevented from entering the water during all demolition or new construction work. During in-water construction activities, floating booms will be deployed and maintained to collect and contain floatable materials released accidentally. Any accidental release of equipment or materials will be immediately retrieved and removed from the water. Following completion of in-water construction activities, an underwater survey will be conducted to remove any remaining construction materials that may have been missed previously. Retrieved debris will be disposed of at an upland disposal site.
- Removed creosote-treated piles and associated sediments (if any) will be contained on a barge or, if a barge is not utilized, stored in a containment area near the construction site. All creosote-treated material and associated sediments will be disposed of in a landfill that meets the liner and leachate standards of the Washington Administrative Code (WAC).
- Piles will be removed by using a clam shell or similar methods and will be cut at the mudline if splitting or breakage occurs.
- To minimize impacts on marine habitat, limitations will be placed on construction vessel operations, anchoring, and mooring line deployment. A mooring and anchoring plan will be developed and implemented to avoid dragging anchors and lines in special status areas. Spudding/anchoring in existing eelgrass habitat will be avoided whenever possible. Vessel operators will be provided with maps of the construction area with eelgrass beds clearly marked. Resulting seafloor disturbance will be confined to a 100-foot (30-meter) wide corridor on each side of the structure under construction.

- Barges and other construction vessels will not be allowed to run aground. Additionally, vessel operators will be instructed to avoid excess engine thrust in water depths shallower than 30 feet (9 meters) to the extent possible.
- To minimize impacts on ESA-listed fish species, in-water construction will be conducted within the in-water work window (July 15 through January 15). The exception is that mesh installation (LWI Alternative 2), relocation of PSBs, and placement of anchors could occur outside the work window.

2.3.2.2. OPERATIONS

- For LWI Alternative 2, the in-water mesh will be cleaned regularly by power washing to minimize impacts on migrating fish. For both alternatives, the guard panels between PSB pontoons will be cleaned regularly.
- Applicable measures described above for Construction (Section 2.3.2.1) to protect water quality and habitats will be implemented during operational procedures.
- Low impact development and integrated management practices will be developed and implemented.

2.3.3. Mitigation Measures

This section summarizes mitigation measures that would be implemented during the Proposed Actions to minimize environmental impacts. Although these measures are identified in this Final EIS, they remain discretionary until committed to in the Record of Decision. More detailed descriptions of these measures can be found in the various resource sections (Sections 3.1, 3.2, etc.) of Chapter 3 and in the Mitigation Action Plan (Appendix C).

- Pile driving of steel piles would be done using vibratory rather than impact methods whenever feasible, which would reduce noise levels by approximately 20 decibels root mean square (dB RMS) at 33 feet (10 meters) from the source.
- Bubble curtains would be used around steel piles being driven by impact methods to attenuate in-water sound pressure of the pile driving activity. The Navy would also consider other equally or more effective noise attenuation methods that may become available. Noise attenuation would not be used for driving concrete piles (SPE only), because of the much lower noise levels generated by driving of concrete piles compared to steel piles and the resulting much lower potential for impacts to biota.
- During impact pile driving, a soft-start approach would be used to induce marine mammals to leave the immediate area. This soft-start approach requires contractors to initiate noise from hammers at reduced energy, followed by a waiting period. Due to mechanical limitations, soft starts for vibratory driving would be conducted only with drivers equipped with variable moment features. Typically, this feature is not available on larger, high power drivers. The Navy would use the driver model most appropriate for the geologic conditions at the project location, and would perform soft starts if the hammer is equipped to conduct them safely.
- Construction activities would not be conducted during the hours of 10:00 p.m. and 7:00 a.m. Between July 15 and September 23, impact pile driving would only occur between 2 hours

after sunrise and 2 hours before sunset to protect foraging marbled murrelets during the breeding season. Between September 24 and January 15, in-water construction activities would occur during daylight hours (sunrise to sunset). The Navy would notify the public about upcoming construction activities and noise at the beginning of each construction season.

- Construction in the upper intertidal zone (LWI abutments and observation posts) would be conducted at low tide ("in the dry") to minimize impacts to marine water quality and underwater noise.
- To avoid impacts on marine mammals protected by ESA and Marine Mammal Protection Act (MMPA) and marine birds protected by ESA, monitoring of injury (shutdown) and buffer zones around in-water pile driving locations would be implemented. Pile driving would be stopped whenever a protected animal enters the shutdown zone. Detailed marine mammal and marbled murrelet monitoring plans would be developed and implemented in consultation with National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).
- To protect potential breeding marbled murrelets, tree removal for the SPE project would not be conducted during the marbled murrelet breeding season of April 1 through September 23. Tree removal would be conducted in a manner that is protective of all migratory birds.
- A revegetation plan would be developed with the objective of restoring native vegetation to the areas temporarily cleared for the construction laydown area and construction of new roads. A monitoring and maintenance program (such as once a month) would be implemented until the native plants are sufficiently established to minimize invasion by noxious weeds.
- The Navy would develop a local Notice to Mariners to establish uniform procedures to facilitate the safe transit of vessels operating in the project vicinity. Barge trips and associated bridge openings would be scheduled to avoid peak commuting hours. The Notice to Mariners would also serve to notify divers, including tribal divers, of potential underwater noise impacts.
- The Navy would, as part of the Proposed Actions, undertake Compensatory Mitigation to offset unavoidable adverse impacts on aquatic resources under the provisions of the CWA Compensatory Mitigation for Losses of Aquatic Resources, Final Rule (U.S. Army Corps of Engineers [USACE] and U.S. Environmental Protection Agency [USEPA] 2008). The Navy would purchase habitat credits from the Hood Canal In-Lieu Fee Program, which would implement appropriate mitigation in the Hood Canal watershed. The In-Lieu Fee Program is described in Section 6 of Appendix C, Mitigation Action Plan.
- The Navy would undertake mitigation projects proposed to address potential effects of the Proposed Actions on reserved Treaty rights and resources of the involved federally recognized American Indian Tribes. The Navy's proposed Treaty mitigation projects are described in Section 9 of Appendix C, Mitigation Action Plan.

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