Water Quality Monitoring and Protection Plan (WQMPP)

Point Hudson Breakwater Replacement Project

Port Townsend, Jefferson County, WA

Prepared for:
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Acronyms

ADA	Americans with Disabilities Act
BMP	Best Management Practice
CWA	Clean Water Act
CY	Cubic Yards
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
HPA	Hydraulic Project Approval
HTL	High Tide Line
MLLW	Mean Lower Low Water
NTU	Nephelometric Turbidity Unit
SF	Square Feet
TESC	Temporary Erosion and Sediment Control
USACE	United States Army Corps of Engineers
USDOC	United States Department of Commerce
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WQMP	Water Quality Monitoring Point
WQMPP	Water Quality Monitoring and Protection Plan

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1. Introduction

The Port of Port Townsend is proposing the to replace the north and south breakwaters projecting on either side of the entrance of the Point Hudson Marina (See Figures 1 and 2 for the project location). The proposed construction will reflect the original design concept from when the breakwaters were originally constructed in the 1930s with new materials to ensure functionality, environmental sustainability, and aesthetics. New materials will have more environmental benefits, be more structurally sound, and have a 30-year minimum useful life. This Water Quality Monitoring and Protection Plan (WQMPP) is necessary to ensure Washington State Water Quality Standards and 401 Water Quality Certification requirements are met during construction.

The procedures described, have been prepared to protect "Waters of the U.S." and document compliance during construction with the state water quality criteria described within Chapter 173A, Section 201A of the Washington Administrative Code (WAC), which have been approved by the Environmental Protection Agency (EPA), as required under Section 401 of the Clean Water Act (CWA) (40 CFR Part 121). The Washington State Department of Ecology (Ecology) shall approve, in writing, any changes or additions to this WQMPP prior to conducting the work. This report does not describe temporary erosion and sediment control measures in upland areas, as required under Section 402 of the CWA. For information pertaining to Section 402 of the CWA, refer to the project's Temporary Erosion and Sediment Control (TESC) plan which will be prepared as part of the upland work, all upland work will occur above the high tide line (HTL).

2. Project Information

The United States Fish and Wildlife Service (USFWS) and the United States Department of Commerce (USDOC) are providing funding to the Port of Port Townsend, to replace the north and south breakwaters projecting on either side of the entrance of the Point Hudson Marina. The new breakwaters will be a combined rock & steel pipe pile breakwater system. In addition, a bulkhead extending shoreward of the south breakwater leg will be replaced and select maintenance dredging of the navigation channel will occur after construction of the breakwaters. The in-water construction will consist of removal of existing outer and core materials, dredging, debris disposal, installation of a rock habitat feature using recovered materials, installation of replacement breakwater materials, and installation of the breakwater armoring. Out-of-water construction (above the HTL) will include excavation and backfilling behind the replacement bulkhead, placing rock, installing the top whaler above the water line, replacing pavement near the top of the southern breakwater and bulkhead, installing signage, and replacing handrails and navigation lights. New materials will have more environmental benefits, be more structurally sound, and have a 30-year minimum useful life. The proposed construction will reflect the original design concept from when the breakwaters were originally constructed in the 1930s with new materials to ensure functionality, environmental sustainability, and aesthetics. See Figure 3 for project Elements.

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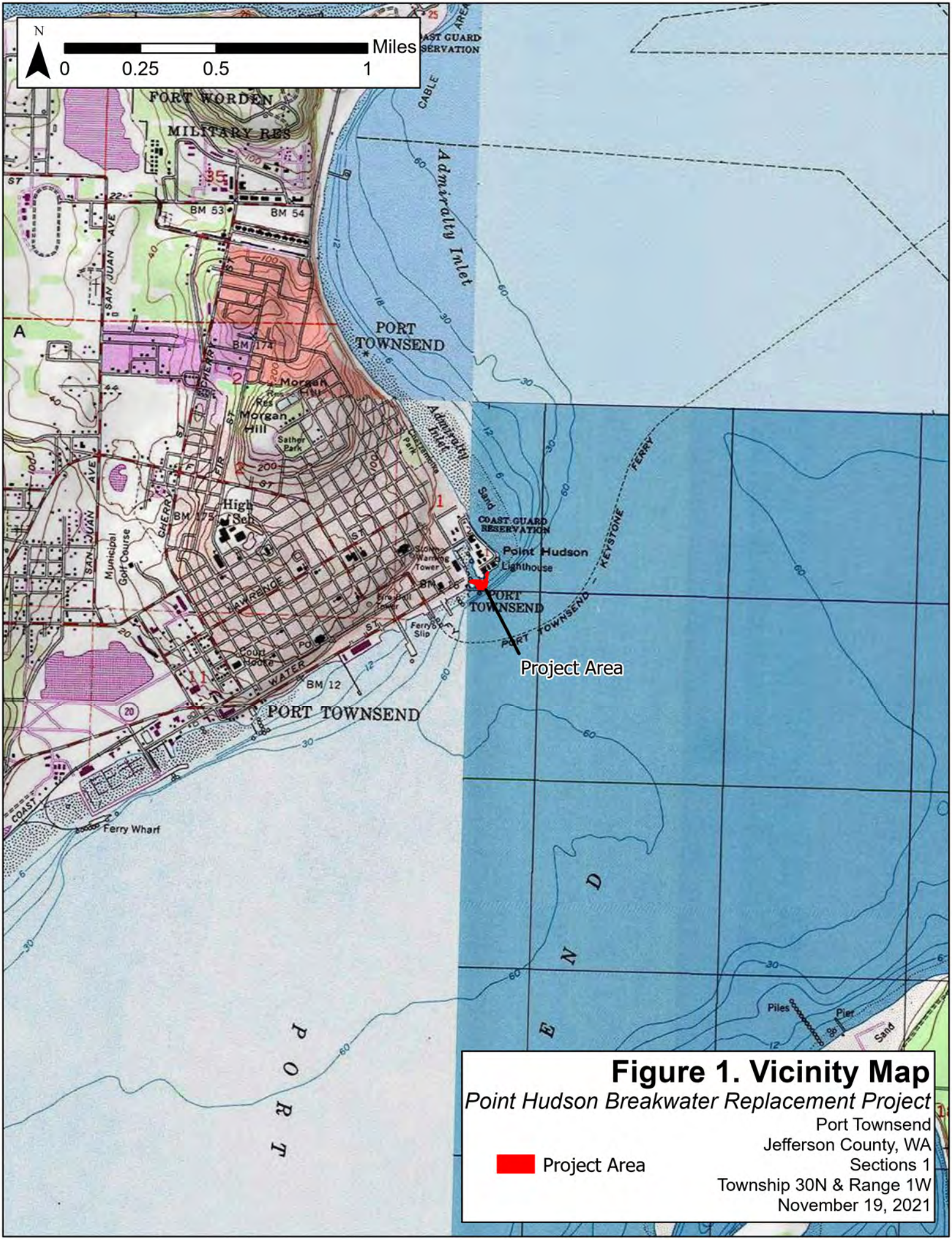

Figure 1. Vicinity Map

Point Hudson Breakwater Replacement Project

Port Townsend
Jefferson County, WA
Sections 1
Township 30N & Range 1W
November 19, 2021

Project Area

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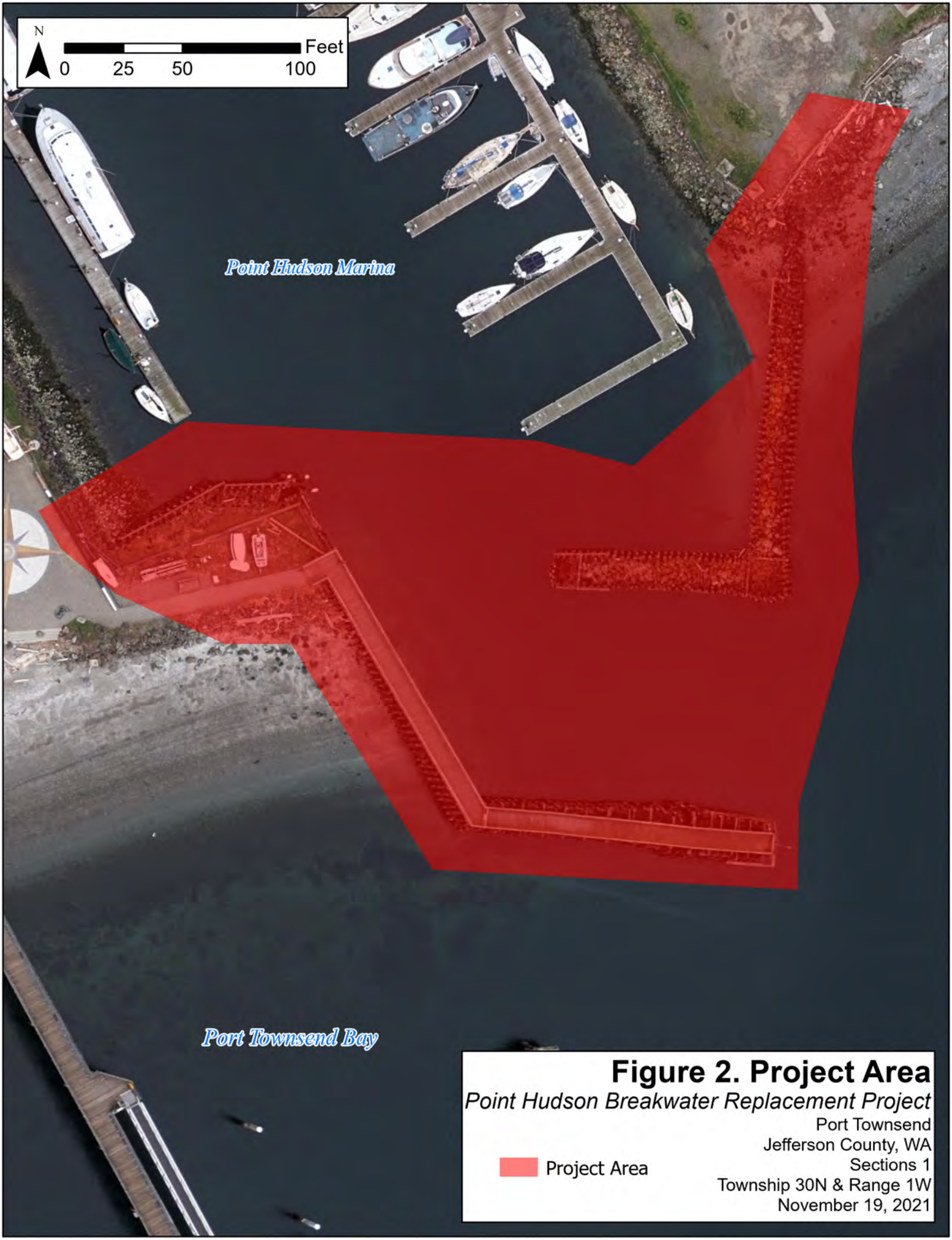

Figure 2. Project Area

Point Hudson Breakwater Replacement Project

Port Townsend
Jefferson County, WA
Sections 1
Township 30N & Range 1W
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Project Area

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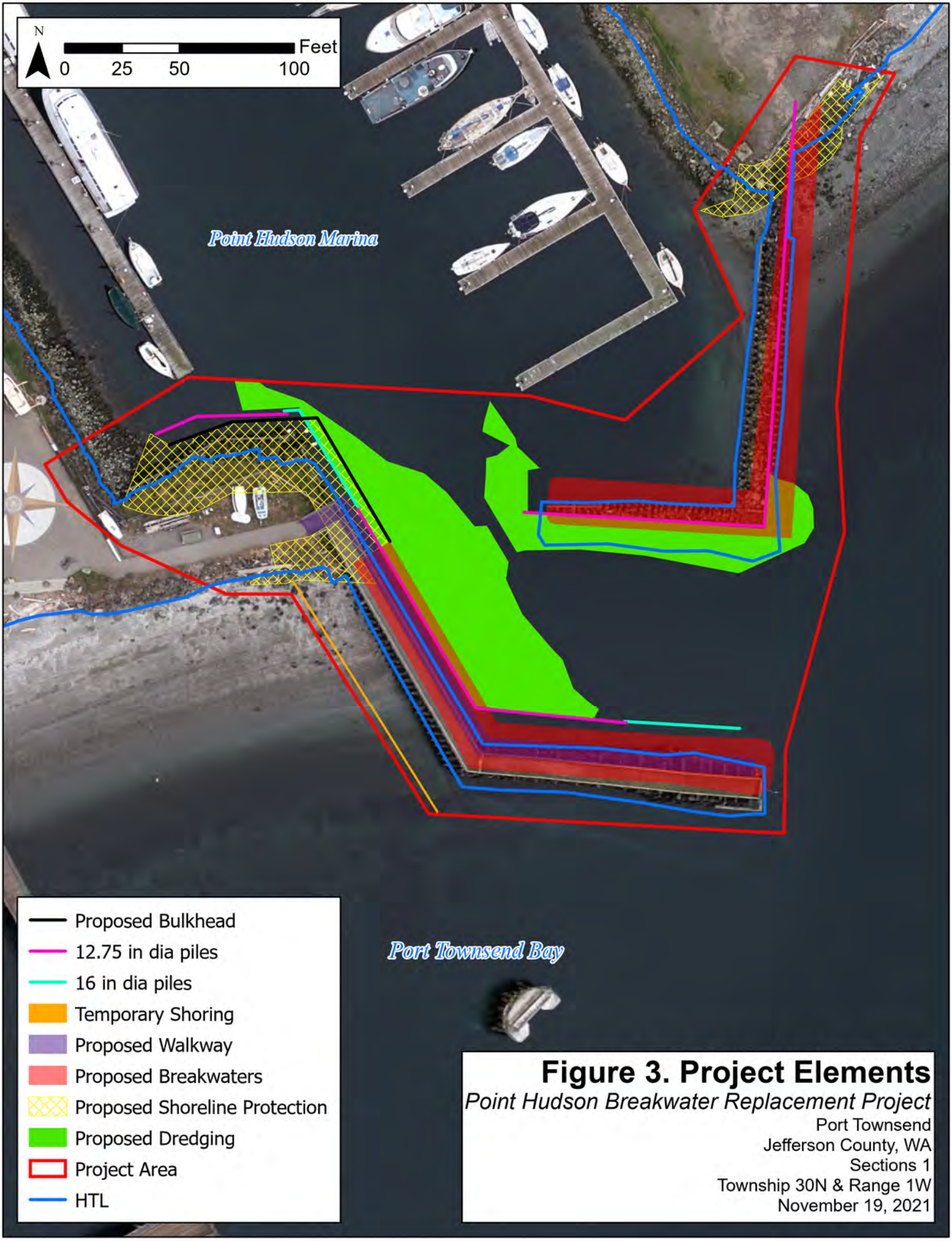

Figure 3. Project Elements

Point Hudson Breakwater Replacement Project

Port Townsend
Jefferson County, WA
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The majority of construction activities will take place in the water between September 15 and January 15, 2022, to 2024; equipment will be on a floating barge for dredging and removal/placement of structures. Construction will be conducted below and above the HTL and is anticipated to be completed in two seasons. Work below the HTL will be conducted during the in-water work window of September 15 to January 15 during both seasons.

2.1. Breakwater Replacement

Replacement of the existing 241-foot-long south breakwater and the 260-foot-long south bulkhead as well as the 255-footlong north breakwater will be completed. Activities include removal of:

- All existing armor stone within 10 feet of either side of the breakwaters
- All existing armor stone above the structure excavation depth for the bulkhead
- All existing creosote-treated timber piles and associated steel cabling
- The entire existing timber pedestrian walkway

Demolition will occur above and below HTL and may be conducted from upland areas and/or by barge with crane and clam bucket and excavator. Demolition materials will be placed on a material barge and transported and disposed of offsite.

2.2. Pile Removal

A total of 320 piles of the south breakwater, 151 piles of south bulkhead, and 356 piles of the north breakwater will be removed. All piles except 5 steel piles in the south bulkhead, are creosote-treated timber. Pile extraction will be performed by pulling with a crane or potentially a vibratory extractor. Full-length extraction of existing creosote timber piling will be attempted during demolition, and the remaining local depression in the seabed capped with approximately two feet of beach compatible material. If during extraction a pile breaks off at or below the mudline, the void will be capped with approximately two feet of beach compatible material. All areas around removed piles will be capped with approximately two feet of beach compatible material.

2.3. Armor Stone Removal

The existing armor stone material is made up of roughly 2 to 3-foot diameter basalt stone that has weathered and fractured into smaller pieces. The source of the existing armor rock was Mats Quarry. Removal for the south breakwater will commence after the piles on the marina side of the breakwater have been extracted. The existing stones located within 10 feet of the existing breakwater will then be removed using attachments such as rock grapples, clam buckets, and/or buckets with thumbs. A portion of the stone removed from the north breakwater will be recovered and installed a short distance off the south breakwater to serve as a surrogate habitat feature (see Section 2.7).

2.4. Structure Excavation

Structure excavation work will occur over the area surrounding the south breakwater and the area around the south bulkhead. This work will be performed prior to installing the piles and armor stone for the new south breakwater. The excavator will place the material into a temporary stockpile on a barge prior to loading into trucks for offsite disposal. Filter berms and a silt fence will be used to limit runoff from offloaded material.

While performing structure excavation, a turbidity curtain may be placed around the perimeter of the work area if needed for compliance with water quality certification turbidity requirements. Best Management Practices (BMPs) and water quality protection measures that will be implemented.

2.5. Debris Disposal

Demolished items will be removed and transported to approved upland facilities offsite. All timber removal will occur within a containment boom, a floating boom with absorbent pads will be installed at a sufficient distance from all sides of the structure being removed to ensure capture. The extracted piles will be transferred to a containment basin within a containment boom, which will remain in place until any sheen present has been absorbed or removed. Piles and excavated debris will be moved expeditiously to the containment area, where pilings will be cut into four-foot or less lengths for easier disposal transport.

Suitable rock from the north breakwater will be salvaged to be placed in an offshore location, in 30 feet of water or greater, near the south breakwater and the submarine net anchor to provide additional mitigation and habitat which is further described in the rock habitat feature section below.

2.6. Dredging

Maintenance dredging will be performed in the navigation channel. Dredging work will be conducted utilizing a mechanical dredge and/or excavator. Mechanical dredging operations will occur from land and from floating equipment, depending on the location of dredging and water levels present at the time of construction. In-water dredging equipment will operate atop a floating barge, or crawler crane mounted on a barge. The barge and excavator system will be moved around the dredging work area using a tug. Dredged material will be removed from the seabed using either an excavator or clamshell bucket. The bucket will place the material onto a flat top barge with sidewalls for containment and designs for decanting water on-site. No decanting will take place outside of the project footprint or during transit. The design dredging depth will be -12 feet mean lower low water (MLLW), with a 1-foot over dredge allowance. The design channel width will be a minimum of 62 feet between structures. Dredged materials will be disposed of at an approved upland facility. For the south breakwater navigation channel, 714 cubic yards (CY) (6510 square feet (SF)) will be removed and for the north breakwater navigation channel 331 CY (3381 SF) will be dredged, a total of 1,045 CY (9,891 SF).

2.7. Rock Habitat Feature

The rock feature has been developed as a habitat offset between the Port of Port Townsend and resource agencies have worked out a habitat offset plan. The plan involves salvaging larger rock from the north breakwater and placing that salvaged rock between the mooring buoy and the end of the south breakwater. The purpose of this work is to provide a habitat feature which would offset potential impacts from the early start to the work window to various species of rockfish and lingcod that the Washington Department of Fish and Wildlife (WDFW) have documented utilizing the south breakwater. Based on WDFW's research through the local dive community, it has been documented that juvenile rockfish and lingcod use the south breakwater for rearing up till the end of September. The intent of this work is to provide a nearby habitat feature free of creosote for those species to continue rearing with minimal impact from the project.
The rock will be salvaged from the north breakwater during the 2022 construction season. The rock will be conserved from an inundated section of the north breakwater starting around elevation zero to minus 10 feet. This provides rocks with the maximum algae and micro-invertebrate coating which will enhance the habitat value of the structure so it can function at year one of installation.

The feature will be constructed with approximately 1.5 to 1 slopes, starting at the sea floor elevation of -30 feet and ending around elevation -50 feet. This work would require about 900 CY of material and will remain in place as a permanent habitat feature to augment the habitat provided by the new breakwaters. The permanent footprint will be approximately 55 feet wide, 49 feet long, and 15 feet tall and would cover about 2,700 SF of seafloor. A pre-activity dive survey will be done of the location and if limited silty material is along the seafloor then the material will be placed with a bottom dump barge. If turbidity increases to 5 NTU above background or more at the Early Detection point, then placement methods will be changed, and the material will be placed with a barge mounted crane.

Also, to enhance the habitat value the Port of Port Townsend intends to enter a partnership with the Port Townsend Marine Science Center to relocate rock dwelling invertebrates and other species from the south breakwater to this new habitat feature. The work will occur after the 2022 work window and prior to the September 15th start of the 2023 work window.

2.8. Installation of Replacement Breakwater

Installation of the replacement structures will consist of a bedding layer, geotextile, steel sheet bulkhead, steel piles, armor stone, and a walkway. Installation will be conducted by crane barge. A minimum 3-foot-thick bedding layer will be installed for the both the southern and northern breakwaters, and a 2-foot-thick layer for the bulkhead will be installed. The bedding layer materials will consist of approximately 7-inch median diameter stone. To maintain stability of the bedding material, no bedding will be placed above -9 feet MLLW without a cover layer of armor stone or embedment of the bedding stone. For sections with bedding above -9 feet MLLW, a minimum 2-foot embedment of the bedding layer will be required for the breakwater. The embedment material will consist of beach compatible material or armor stone.

A total of 165 steel piles for the south breakwater, 54 steel piles for the south bulkhead, and 197 steel piles for the northern breakwater will be installed. The piles to be installed are steel pipe piles with a diameter of either 12.75 inches or 16 inches. Pile installation will be performed by vibratory hammer and if necessary, an impact hammer at a 5 vertical:1 horizontal batter to ensure proper embedment is achieved. No more than 10 percent of piles will be impact proofed. Pile spacing is 3 feet for the south breakwater, 2.5 feet for the south bulkhead, and 3 feet for the northern breakwater.

The first 16-foot section of the south bulkhead will be tied to anchor piles as it transitions from the south breakwater to the bulkhead design grade. Steel sheets welded to the piles will be installed between piles at the bulkhead to retain material. Bedding stone will be placed behind the sheets. The bedding stone is stable under wave attack in this location due to its protected location.

Once the piles for both sides of the breakwater are installed, the armor stone will be placed between the piles using special attachments such as rock grapples, clam buckets, and/or buckets with thumbs to minimize loss of stone and ensure a tightly interlocked mass of armor stone. The armor stone will be 3 feet to 5 feet granite or basalt stone to minimize the chance of any stone passing between the 3-foot spaced steel piles. The contractor will mechanically place the armor stone using an excavator to produce a well-keyed mass of stone with a maximum level of interlocking to ensure no stones pass between the steel piles. Rearranging of individual stone may be required to secure the well-keyed mass of armor stone. If armor stone should fall out between the piles, the contractor will be required to carefully extract it and put it back in between the piles so it will not fall out again or replace it with a larger stone.

After the armor stone is fully placed, the steel piles will be structurally connected with a steel beam at the top to the opposing row of piles. The structural connection will be installed using the crane barge above the HTL and bolted to the tops of the piles.

An 8-foot-wide walkway with steel or timber guardrails will be installed on the top of the south breakwater along its full length. The walkway will comply with Americans with Disabilities Act (ADA) accessibility regulations.

A new 4-foot-thick armor slope at 2 horizontal:1 vertical will be placed on the shoreline to provide protection against waves directly adjacent to the new breakwater. This armor slope will connect to the existing armor slope on the shoreline. The armor slope will use 2-foot diameter armor stone. Before the armor stone is placed, a 2-foot layer of bedding stone will be placed on top of geotextile fabric to prevent piping of native material through the shoreline protection structure. Upland work will be performed using excavators on the landside with barge support.

3. Site Inspections

Site inspections of the BMPs and water quality monitoring will occur daily during all in-water work. The onsite construction manager will conduct these inspections. The site inspector will record each site inspection. The project biologist will routinely monitor the sediment barges to ensure that the filtration media is working properly. If visual inspection indicates that filtration may not be effective, the media will be replaced. Turbidity will be measured through water quality monitoring as required by project permits. Water quality monitoring will occur twice daily as well as during significant visual changes. If exceedance occurs at the point of compliance actions will be taken to mitigate changes as described in Section 10.

4. Water Quality Monitoring

All monitoring will occur within the Port Townsend Bay and Admiralty Inlet which are "Waters of the U.S." WAC 173-201A-210 includes standard water quality categories for this aquatic life uses in designated marine waters. Port Townsend Bay is categorized as "excellent quality" and Admiralty Inlet is characterized as "extraordinary quality" in WAC 173-201A-610 and WAC 173-201A-612 based on the aquatic life use criteria stated in Table 1 below. Water quality of this use class must meet or exceed the requirements for all uses including, but not limited to, salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

For the purposes of this plan turbidity will be the only criteria monitored, as no concrete work will be completed within the water, pH does not need to be monitored. Turbidity will be monitoring as a surrogate for suspended contaminants within the dredge prism and creosote pile locations as detailed in Section 2. Example monitoring point locations are shown in Figure 4 and are described in Section 5. Descriptions of in-water work activities and associated BMPs can be found in Section 9.

Table 1. Marine water quality criteria for aquatic life

Parameter	Aquatic life category	Water quality criteria
Turbidity	Excellent/extraordinary	Turbidity must not exceed: • 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

5. Monitoring Locations

For estuaries or marine waters, the point of compliance for a temporary area of mixing is a radius of 150 feet from the activity causing the turbidity exceedance. Background level should be sampled outside the area of influence and beyond the point of compliance at a distance of 300 feet or as site conditions allow. The background sample location must be taken up current from the in-water work area. Compliance sample location will be located at the boundary of the one

hundred fifty-foot area of mixing from in-water activities. Early detection location will be at 100 feet from in water activities. The early detection sample location is a BMP and allows for adaptable accommodations to be made to ensure water quality criteria will not exceed standards or reach further radius of allowable mixing area to prevent work stoppages. Each monitoring sample will have multiple depth readings, dependent of water depth. When water depths are less than 5 feet, the monitoring depth will be mid-depth only, when water depth is between 5-10 feet, monitoring depths will include top and bottom and when water depth is more than 10 feet,
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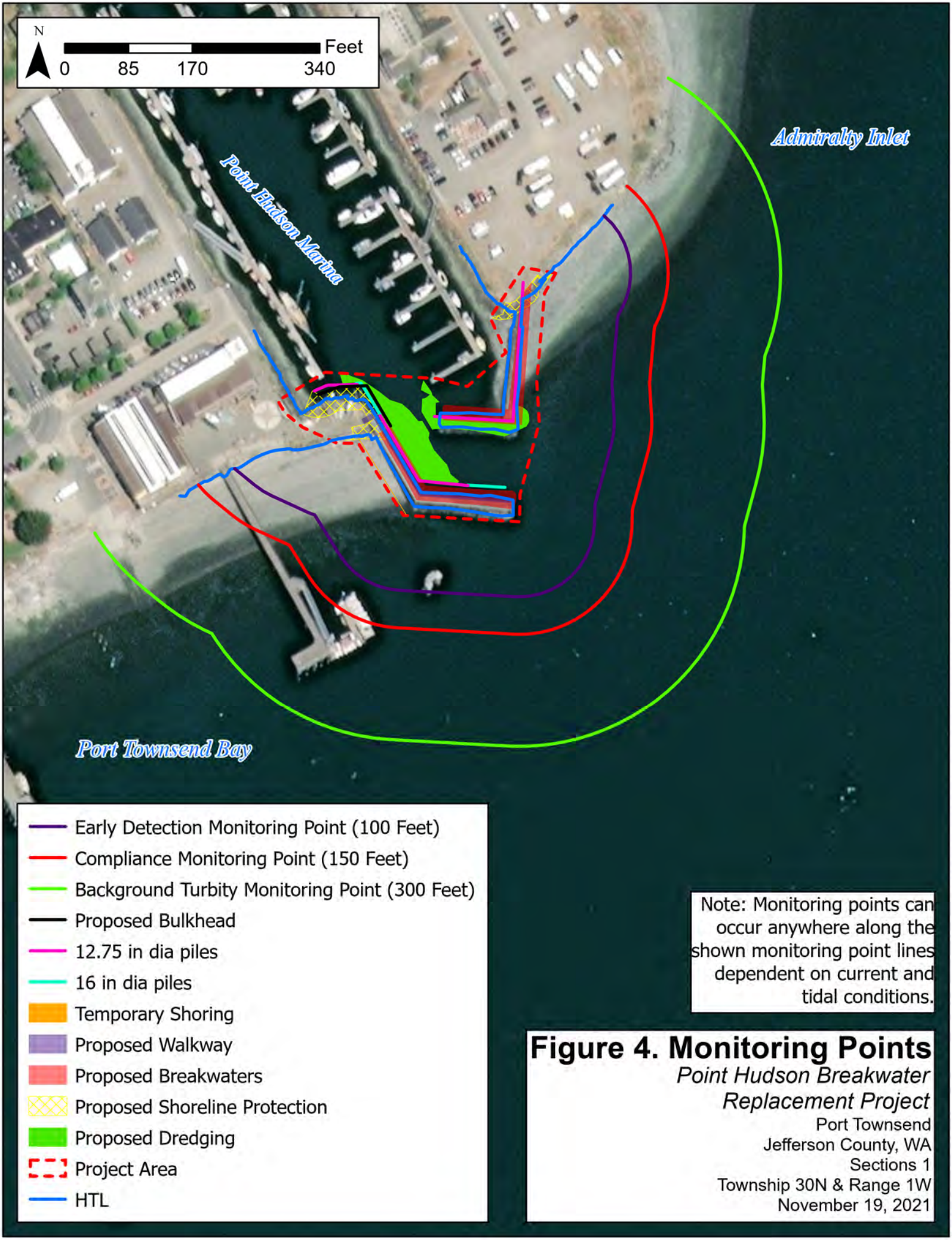

Figure 4. Monitoring Points

Point Hudson Breakwater Replacement Project

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monitoring depth shall include top, middle, and bottom of water column. Bottom will be taken approximately within 2 feet above the seabed to prevent resuspension of bottom sediments. During periods of in-water work the background, compliance and early detection sample location will be determined based on location of work and direction of current at that time. There will be no fixed location for sample points due to extent of work to be conducted, the bidirectional current, and tides. Figure 4 shows potential monitoring points. The figures are examples of placement of monitoring location based on work location and environmental factors.

Due to the tidal and current exchange within the work area, sample locations will vary but must be at the designated radius of three hundred feet for background, one hundred fifty feet for compliance, and one hundred feet for early detection. The farthest reach of the radius may be heavily influence by the bidirectional current within Admiralty Inlet. The sample locations will need to be accommodated based on tide and current patterns daily. During tidal change, sample at a location in which the tide is moving towards. During current change, sample at locations down current of the work area except for background, which should be up current.
Sample locations will be accessed by boat. If turbidity is detected above turbidity criteria at the early detection point, BMPs will be triggered, if exceedance occurs at the point of compliance work will be stopped. If changes need to be made to the in-water BMPs, Ecology will be notified and may email approval without amending this WQMPP.

Table 2. Proposed monitoring points for in-water work

Monitoring Point Location[1]	Monitoring type	Waterbody (distance)[2]	Frequency	In water activity
WQMP-1	Background	300 feet radius from in water activity	30-60 min after work begins, twice daily, morning and afternoon during in water work activities, when visible changes occur, and experience would dictate	Excavation/dredge, pile removal/ placement, backfill placement, all in-water work
WQMP-2	Compliance	150 feet radius from in water activity		
WQMP-3	Early detection	100 feet radius from in water activity		

1 These water quality monitoring points, depicted in Figure 4 are preliminary and may change as construction means and methods change and as conditions change.
2 Refer to Table 1 for specific water quality criteria requirements for turbidity.

Table 3. Monitoring point depth

Depth[1]	Depth Monitor in water column
Less than 5 ft	Mid-column
Between 5 feet and 10 feet	Top and Bottom (2 feet above seabed)
More than 10 feet	Top Middle and Bottom (2 feet above seabed)

1 Sample points are not a fixed location, best estimate should be used to determine the appropriate depth and monitoring points within the water column

6. Monitoring Frequency

Turbidity will be monitored within Admiralty Inlet and Port Townsend Bay during construction activities. Turbidity monitoring will be conducted 30 – 60 minutes after the start of in water

dredging and filling work. Background, compliance, and early detection locations will be sampled twice daily in the morning and afternoon during periods of in-water dredging and filling work and at corresponding depth with monitoring site. If turbidity is detected at the early detection location, BMPs will be implemented and adapted to prevent further elevated turbidity. There will be no testing-based monitoring conducted during pile driving or vibratory work and no monitoring for pH as no concrete work is proposed.

Visual monitoring of the clarity of the water within the one hundred fifty-foot radius during all in-water work will occur as well. If a visible change has occurred, samples should be taken at all points. If the samples at the early detection location are elevated (5 NTU over background of 10% background when background is more than 50 NTU), BMPs must be evaluated. If the samples exceed water quality standards at compliance locations, the contractor must stop the in-water, determine extent of the exceedance (plume chasing), and continue hourly monitoring until compliance is met. Turbidity must not be greater than 5 NTU over background or 10% over background if background is greater than 50 NTU at all sample locations. If necessary, work with the project manager and the contractor to discuss additional procedural or physical BMPs to ensure compliance.

7. Water Quality Sampling and Analysis Methods

The following sampling procedures will be used:

- Testing of background levels will occur outside of the area of mixing at three hundred feet from the area of in-water dredge and fill work. Compliance will be tested at one hundred fifty feet from in-water dredge and fill activities.
- Testing of samples will occur 30 to 60 minutes after in-water dredge and fill work has begun, dependent of work levels, to ensure compliance with area of mixing radius. Sampling location will be tested once in the morning and once in the afternoon when in water dredge and fill activities occur. Additional samples will be taken if a visual change in water quality is observed.
- Samples will be collected at various depths depending on sampling locations see Table 3 for water column sample depths.
- The collected water quality samples will be representative of the flow and characteristics of the water at the monitoring points.
- Sample bottles will be filled with water at the monitoring point at least once prior to collecting the sample to remove possible contaminants from the sampling container. The sample will be inverted to re-suspend material prior to turbidity testing.
- Samples will be collected using a bottle based on depth depicted in Table 3.
- Sample locations will not be a fixed location. Sample locations should be based on location of in-water work and direction of current.

Turbidity analysis will be performed with a calibrated turbidity meter and recorded in Nephelometric Turbidity Units (NTUs). The sampling equipment to be used for turbidity monitoring will be a LaMotte Model 2020 (or equivalent) portable turbidimeter.

The equipment will be calibrated and maintained in accordance with the manufacturer's instructions and specified schedules. Additional calibrations will be performed immediately if data appears suspect.
Visual monitoring for sheen indicating oil or grease as well as turbidity plumes will be done at the time of water quality sampling. Visual monitoring will also be done throughout the project, at the start of in-water activities, periodically during in-water work activity, and at the end of the in-water work activity each day.

8. Reporting

All sample results will be submitted to Ecology. If no exceedances occur, sample results will be submitted weekly. If sample results indicate an exceedance of water quality standards or if standards in this plan are not being met, contingency measures will be implemented as described in Section 10. This will include immediate notification of Ecology. Contact for Ecology is provided below:

Laura Inouye
Senior Toxicologist
Shorelands & Environmental Assistance Program
Washington State Department of Ecology
(360) 515-8213
laura.inouye@ecy.wa.gov

9. BMPs for In-Water Work

The following BMPs for in-water work described in this document are designed so the project is constructed in compliance with water quality standards. This section includes BMPs for general in-water work, equipment, and excavation/dredging. All in-water will take place during the proposed in-water work window for the project of September 15 to January 15.

9.1. In-Water Work BMPs

In-water work for this project will be necessary to complete this project. In water work activities excavation/dredging. Monitoring will occur during all in water work activities.

As previously mentioned, a turbidity curtain may be used as well as proper dredging methods will be conducted to ensure water quality standards. Dredging will consist of maintenance dredging in the navigation channel. All dredging will be performed with a mechanical dredge and/or an excavator. The mechanical dredge and/or excavator will be operated from an upland location whenever possible. When not possible, it will operate from a barge.

All dredging work will follow BMPs. All dredging will be tracked through contractor navigation and position system to ensure work remains within the dredge prism and full coverage of the area has been completed. The dredge material will be placed into the sediment barge which is moored beside the dredge. Each bucket will place both sediment and a volume of overlying water into the barge. The barges will be dewatered during dredging. Water drained on site will be passed

through a filer media and ponded water will be removed prior to transit. The barge is not allowed to passively (or activity) dewater in waters of the U.S. during transit or at the transload site.

A total of 827 creosote-treated piles will be removed within the project area. Piles will be extracted using a crane. A vibratory pile driver may be utilized if a crane is not sufficient to pull the piles out. Piles will be removed completely with the depression to be capped with two feet of compatible beach material. The contractor will attempt to remove all 827 piles complete, but should some break at or below the mudline, they will be capped with two feet of compatible beach material as well.

9.2. General Construction BMPs

- The work will limit migrating salmonid exposure to turbidity by performing dredging within the WDFW, USFW, and NOAA approved work window (September 15 to January 15) identified by said agencies. Allowable turbidity range and monitoring requirements will be defined in the Hydraulic Project Approval (HPA).
- Non-barge-based equipment will be refueled at a distance of at least 50 ft from the shore, or where applicable.

9.3. Bank and Shoreline Excavation BMPs

- Weather forecasts will be checked for wind or storm conditions that could create large waves. Work will be scheduled for for periods predicted to not have high wind or storm events. Weather conditions will be monitored during performance of work.
- Shorelines will not be used as a staging area for storing construction materials or stockpiling.
- Activities will be conducted to minimize siltation of the beach area.
- Intertidal backfill will be placed in a manner that will avoid erosion and siltation to the degree possible.
- Shore-based construction equipment will be kept out of the water at all times and the contractor will be required to have in place and follow all spill protection, fueling plans, and necessary emergency plans.
- Sheet piling or similar shoring shall be installed as shown on the Plans to support adjacent shoreline materials and contain the excavation.
- Properly anchored temporary erosion protection shall be placed over the exposed bank soil within disturbed area prior to inundation by tidal water in such a manner as to not trap fish.

9.4. Barge Operation BMPs

- The grounding of barges will be prohibited. Construction barges will be restricted to tide elevations adequate to prevent grounding of the barge.
- Dewatering of sediment barges while in transit is not allowed. All barges shall be dewatered to extent practicable prior to leaving the site.

9.5. Vessel Operations BMPs

- Vessel operation will be restricted to tidal elevations adequate to prevent prop scour or disturbance to the contaminated sediments.
- Limited, safe propulsion power will be used when maneuvering barges or other vessels to prevent prop scour disturbance to the contaminated sediments.
- Maneuvering tugs and barges will be kept to the minimum necessary for safe and efficient operation of the dredging and transloading activities to avoid resuspension of sediments due to prop wash.

9.6. Dredge Techniques

- A pre-dredge survey will be conducted to identify potential debris that may interfere with bucket operation.
- Identified large debris within the dredge area that will affect bucket closure will be removed to the extent practicable prior to dredging.
- Deliberate and consistent bucket speeds will be used while dredging to limit unnecessary sedimentation.
- The mechanical dredge and/or excavator operator will pause the bucket at the water surface to maintain sediment capture.
- Bucket descent will be slowed down at least 3 feet above sediment surface to limit disturbance.
- "Glory holing" will not be allowed.
- Dredge buckets will not be overfilled.
- No bottom stockpiling will be allowed.
- Leveling of the dredge surface by dragging/sweeping the bucket will not be allowed.
- The loaded bucket will be retrieved from the bed at a slow and continuous rate.
- The passage of the bucket over open water prior to release of sediment from the bucket into the haul barge will be limited.
- Once the bucket is above the water line it can only be opened above the barge. Buckets shall be released at or near the sediment surface within the barge to reduce splashing and sediment entrainment.
- Barges will not be overloaded; sediment and/or water will not spill over the edges of the barges at any time during transit.
- A standard clamshell bucket might be most effective at removing debris prior to or during dredging, if needed.

9.7. Pile Driving and Extraction BMPs

- 827 creosote-treated piles will be permanently removed from the project area.
- No more than 8 piles will be installed using a vibratory hammer per day, for 30 minutes each. One pile will be impact proofed per day.
- When possible, removal of treated wood piling should occur in the dry or during low water conditions. Doing so increases the chances that the piling won't be broken (greater visibility by the operator) and increases the chances of retrieval in the event that piling are broken.

- The crane operator shall remove piling slowly. This will minimize turbidity in the water column as well as sediment disturbance. The operator shall minimize overall damage to treated wood piling during removal. Treated wood piling must not be broken off intentionally by twisting, bending or other deformation. This will help reduce the release of wood-treating compounds (e.g., creosote) and wood debris to the water column and sediments.
- The piling shall not be shaken, hosed-off, stripped or scraped off, left hanging to drip or any other action intended to clean or remove adhering material from the piling. Any sediment associated with removed piling must not be returned to the waterway. Adhered sediments associated with treated piling are likely contaminated and may, along with piling, require special handling and disposal.
- Upon removal from the substrate and water column, the piling shall be moved expeditiously into the containment area for shipping, and disposal at an approved off-site, upland facility.
- The operator shall make multiple attempts to remove a pile before resorting to cutting. See Pile Removal BMP techniques listed below:

PILING REMOVAL - Vibratory Extraction Specific BMPs

Vibratory extraction is the preferred method of piling removal because it causes the least disturbance to the seabed, river or lakebed and it typically results in the complete removal of the piling from the aquatic environment.

- The operator should “wake up” piling by vibrating to break the skin friction bond between piling and sediment. This bond breaking avoids pulling out a large block of sediment and possibly breaking off the piling in the process.

PILING REMOVAL - Direct Pull Extraction Specific BMPs

Direct pull extraction refers to the removal of piling by grabbing or wrapping the piling and then directly pulling the piling from the sediment – using a crane or other large machinery. For example, piling are wrapped with a choker cable or chain and then removed by crane with a direct upward pull. Another method could involve an excavator with a pincer attachment that can grasp a pile and remove it with a direct upward pull. The use of direct pull can be combined with initial vibratory extraction.

- Excavation of sediment from around the base of a pile may be required to gain access to portions of the pile that are sound, and to allow for extraction using direct pull methods. Excavation may be performed in-the-dry at low tide or in the water using divers. Hydraulic jetting devices should not be used to move sediment away from piling, to minimize turbidity and releases to the water column and surrounding sediments.

PILING REMOVAL - Clamshell Bucket Extraction Specific BMPs

Clamshell removal of piling uses a barge-based or upland excavator-mounted clamshell bucket. The clamshell is lowered from a crane and the jaws grasp the piling stub as the crane pulls up. Clamshell bucket extraction has the potential to disturb sediments if deployed close to the sediment surface and increases the likelihood of damaging piling which can result in incomplete removal of a pile. However, a clamshell bucket may be needed when broken or damaged piling

cannot be removed using vibratory or direct pull extraction methods. Extraction with a clamshell might be the best way to remove piling that were cut at or below the mudline previously and have little or no stub accessible above the mudline.

- To the extent possible, clamshell extraction should be performed in the dry during low tide, low river flows, or reservoir draw-down. Under these conditions, the operator can see the removal site and piling, improving the chance for full removal of piling.
- Since sediment management is potentially a larger concern when using a bucket, every effort should be made to properly size the bucket to the job and operate it in ways that minimize sediment disturbance.
- Excavation of sediment from around the base of a pile may be needed to gain access to portions of the pile that are sound, and to allow for extraction using a clam shell. Excavation may be performed in-the-dry at low tide or in the water using divers. Hydraulic jetting devices should not be used to move sediment away from piling, to minimize turbidity and releases to the water column and surrounding sediments.
- Because clamshell extraction has a higher potential to generate debris, it is particularly important that an offshore boom be in place with this removal technique. If treated wood piling are being removed, extracted piles shall be transferred to the containment basin without leaving the boomed area to prevent loss of treated wood chemicals (e.g., creosote) and debris to the water column and sediments.
- The operator must minimize pinching of treated wood and overall damage to treated wood piling during removal. This will help reduce the potential for releasing treated wood chemicals (e.g., creosote) and debris to the water column and sediments.
- No grubbing for broken piling is allowed.

9.8. Placement of Fill BMPs

Backfill may be released above surface if water quality impacts do not result. In event of water quality impacts, placement shall be modified as follows to reduce water quality impacts to extent practicable.

- Lower bucket below water surface prior to opening
- Lower bucket within 5’ of sediment surface prior to opening
- Modify rate of material placement as needed
- Use tremie tube or similar for placement

PLACEMENT OF FILL – One-to-two-man rock

One-to-two-man rock may be released just above the surface from a barge dump if water quality impacts do not result. In event of water quality impacts, placement shall be modified as follows to reduce water quality impacts to extent practicable.

- Use a crane to grab large rock and lower bucket below water surface prior to opening
- Lower bucket within 5’ of sediment surface prior to opening
- Modify rate of material placement as needed

10. Emergency Contingency Measures

In the event of exceedance of water quality standards, the construction manager will immediately stop work and attempt to assess the source of the impact/exceedance. Once the source has been

identified, they will implement measures to prevent further occurrence and limit additional environmental impact.

Any work that results in exceedance of water quality standards at the point of compliance is prohibited. If these occur, the onsite construction manager shall immediately take the actions outlined below.

- Cease operations at the location of the violation.
- Assess the cause of the water quality problem and take appropriate measures including implementing alternative BMPs to correct the problem and prevent further environmental impact.
- The extent of exceedance will be determined by following the plume, to determine how far down current the plume has extended.
- If exceedance occurs at the point of compliance, hourly monitoring will occur until compliance is met before restarting work with additional BMPs. Ecology will not require monitoring after sunset due to safety reasons, but re-starting may not begin until compliance is shown.
- In the event of a discharge of oil, fuel, or chemicals into “Waters of the U.S.”, or onto land with a potential for entry into “Waters of the U.S.”, begin containment and cleanup efforts, which take precedence over normal work, and complete them as soon as possible. Cleanup shall include proper disposal of any spilled material and used cleanup materials.
- Within five days, submit a detailed written report to Laura Inouye, Ecology's Shorelands and Environmental Assistance Program Manager that describes the nature of the event, the corrective action taken or planned, any preventative steps, results of samples taken, and other pertinent information. For notification of the event call or email within 2 hours. A follow up report will be submitted as well.

11. References

Code of Federal Regulations (CFR), Title 40, Part 121, Revised July 1, 2018. Retrieved from: https://www.govinfo.gov/content/pkg/CFR-2018-title40-vol24/pdf/CFR-2018-title40-vol24-part121.pdf.

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Appendix A. Water Quality Sampling Monitoring Form

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Monitoring Form

Water Quality Sampling for In-water Work

Job Name: Point Hudson Breakwater Replacement Project

WQ Inspector: _____

Date/Time	Monitoring location	Coordinates (Lat/ Long)	Water column depth	Actual Depth	NTU	Notes (work activity, weather, currents etc.)
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			
			Top			
			Middle			
			Below			