Vanselow/Mason/Flyckt Bulkhead Repair

Habitat Assessment

August 21, 2024

For: Debbi & Larry Vanselow
1010 57th Street
Port Townsend, WA 98368

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1 Project Overview

1.1 Purpose

This Habitat Assessment (HA) has been prepared by Marine Surveys & Assessments (MSA) for the replacement of an existing 175-ft-long rock bulkhead that has reached the end of its service life. The proposed rock revetment will replace the existing rock armor slightly landward to protect private residences that are above the steep shoreline slope and would be subject to serious wave erosion were it to be left unarmored. The project location, along the shoreline of the Strait of Juan de Fuca near North Beach, Port Townsend, can be seen in Figure 1.

Since the proposed work is occurring along the shoreline of the Strait of Juan de Fuca, it falls under the jurisdiction of the Shoreline Management Act. The project is also within a part of the Strait that lies within a FEMA Flood Hazard Area (Zone AE). Therefore, this HA has been prepared to meet the requirements of the City of Port Townsend Municipal Code (PTMC) and the City's Shoreline Master Program (SMP).

The purpose of this HA is to demonstrate that the proposed project meets the criteria under PTMC 19.05.080(K) and (L) and the SMP, and to evaluate the potential effects of the proposed project on the adjoining FEMA floodplain, ESA-listed and priority wildlife, fish, and plant species, and designated or proposed critical habitats that are likely to occur in the vicinity of the project.

A geotechnical assessment was completed by Aspect Consulting for this property (dated May 7, 2024).

1.2 Applicant Information

Name: Debbi and Larry Vanselow
Mailing Address: 1010 57th Street, Port Townsend, WA 98368
Emails: djadebbi@aol.com and larry.vanselow@gmail.com
Phone Numbers: 206-354-0083 (Debbi's cell); 206-979-0033 (Larry's cell)

Name: Laura Mason and Keith Flyckt
Mailing Address: 1022 57th Street, Port Townsend, WA 98368
Emails: lauranmason@gmail.com and keith_flyckt@hotmail.com
Phone Number: 360-643-1556 (Laura's cell)

1.3 Contractor/Permit Agent Information

The permit agent and current contractor in place to perform the bulkhead replacement is:

Jenny Rotsten – Sealevel Bulkhead Builders, Inc.
P.O. Box 375
Kingston, WA 98346
(360) 297-2401 Office
Jenny@sealevelbb.com
www.sealevelbulkheadbuilders.com

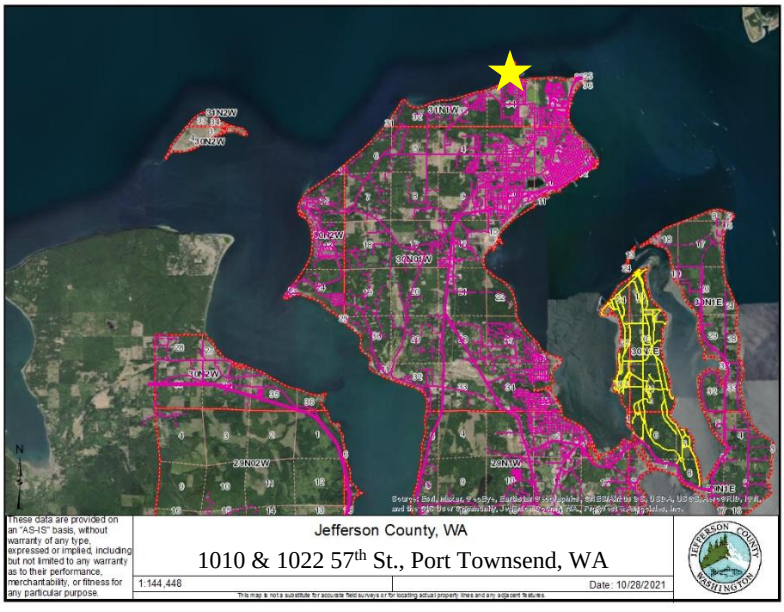
1.4 Biologist Information

Name: Kimberly McClurg – Marine Surveys & Assessments
Mailing Address: 2601 Washington St., Port Townsend, WA 98368
Phone: (360) 385-4073
Email: kimberly@msaenvironmental.com

1.5 Project Location

Section 34, Township 31N, Range 1W
Site Address: 1010 & 1022 57th Street, Port Townsend, WA
Jefferson County Parcels: 972905801, 972905105, 000000210
Latitude: 48.141935°, **Longitude**: -122.789369°
Waterbody: Strait of Juan de Fuca
WRIA: 17 Quilcene-Snow

Figure 1. Vicinity map (credit: Jefferson County)



1.6 Project Description

The project spans across three parcels, all of which are adjacent to each other (Figure 3). Two of the parcels contain two separate residences (1010 57th St. and 1022 57th St.), while the third parcel is east of the Vanselow residence (1010 57th St.) and owned by the City of Port Townsend. The Vanselow residential property consists of a 0.36-acre parcel on the southeastern shoreline of the Strait of Juan de Fuca. There is a two-story single-family residence that was built in 1967 that contains a deck on the north side of the residence and an attached garage. To the west, the Mason and Flyckt adjacent property consists of a 0.35-acre parcel containing a three-story single-family residence that was built in 2006 with an attached garage. To access the beach, each property has a set of timber stairs that join together to access the shoreline (Figure 6). These joint-use stairs are on a wooden pull-system so that the stairs do not permanently sit on the beach. Additionally, there is an existing 175-ft-long rock bulkhead that is approximately 4 feet tall at the highest point across the shoreline of the three parcels (Figures 3-8). The bulkhead connects to the neighboring rock bulkhead on the east side and runs the length of the parcels.

Aspect Consulting (2024) visited the properties and prepared a geotechnical assessment in which they noted:

> "The existing rockery bulkhead at the site is in poor condition and no longer functioning as intended. The rockery has been damaged by wave and tidal action. Gaps up to 10 feet wide were observed where rocks had been washed out from the base of the bulkhead and/or fully buried in the beach face. Where waves can directly impact the bluff, we observed erosion and landward retreat of up to 7 feet creating a 10- to 12-foot-tall vertical scarp of loose sand. If damage were to continue, the steep shoreline slope—and ultimately the residences—would be at risk. Replacement of the bulkhead with a gravity rock bulkhead will provide effective shore protection at the Site and long-term protection for the residences."

The purpose of the work is to replace the existing bulkhead with a rock bulkhead that will be built 3 ft landward of the existing footprint across the three parcels (Figures 9-10). On the Mason and Flyckt parcel (to the west) 55 ft of bulkhead will be replaced, while 100 ft will be replaced on the Vanselow parcel (to the east); another 20 ft will be replaced along the Wilson Street ROW parcel (1034 57th St.) that connects to the Vanselow parcel for additional erosion protection as recommended by Aspect (Figure 10). This will result in 175 linear ft of rock bulkhead being replaced. Additionally, the stair system between the two residences will be replaced with new stairs within the same footprint. Aspect noted:

> "The base of the stairs has been undermined as the bluff face has retreated landward. We observed that the timber stair support beams were unsupported and just hanging in the air about 10 feet above the beach surface."

Replacement of the existing bulkhead will provide the intended protection to the property and the replacement stairs will safely allow beach access. Aspect discussed alternative methods for stabilizing the shoreline and preventing erosion, and, of those methods, they recommended a rock bulkhead as other alternatives would not be feasible or would not be effective in preventing erosion that could endanger the homes on the bluff.

Since Aspect deemed hard shoreline stabilization necessary to protect the existing single-family homes from erosion, the proposed bulkhead replacement will use the minimum size necessary and incorporate conservation measures to ensure no net loss of ecological function.

Pending City approval, all materials and equipment for the bulkhead replacement will be accessed by land, via Gise Street (Figure 11). To allow heavy equipment access, an all-weather access road is proposed that is approximately 150-ft-long x 12 -ft-wide and a temporary 20 ft x 20 ft construction access ramp. Once the work at the applicants' parcels has concluded, precast concrete steps are proposed behind the existing bulkhead that will have a rock backwall to allow for easier public beach access than what currently exists.

To mitigate the potential impacts, in addition to building the replacement bulkhead 3 ft landward, mitigation is proposed in the form of removing from the beach all the dispersed non-native rocks that are from the existing bulkhead. Along the Mason and Flyckt 55 ft-long parcel, there is approximately a 16-ft- wide band of dispersed non-native rocks, that results in 884.5 ft^2. The Vanselow 100-ft-long parcel and the 20 ft along the City of Port Townsend parcel has, on average, a 24-ft-wide band of dispersed non-native rocks, that would result in 2,880 ft^2. Therefore, a conservative estimate of up to 3,764.5 ft^2 of area will be cleared of the scattered non-native rock that remains from the existing bulkhead (Figure 2).

Figure 2. Area where scattered non-native rock from the old bulkhead will be removed

Figure 3. Looking south at the existing single-family residences, stairs, and rock bulkhead on the property's shoreline.

Figure 4. Rock bulkhead along the shoreline looking west.

Figure 5. Rock bulkhead along the City of Port Townsend parcel, connecting to the eastern adjacent property's bulkhead.

Figure 6. Erosion behind the pull-system stairs that provide access to the shoreline.

Figure 7. Existing rock bulkhead east of the stairs.

Figure 8. Existing rock bulkhead west of the stairs.

Figure 9. Proposed site plans for the Mason and Flyckt parcel.

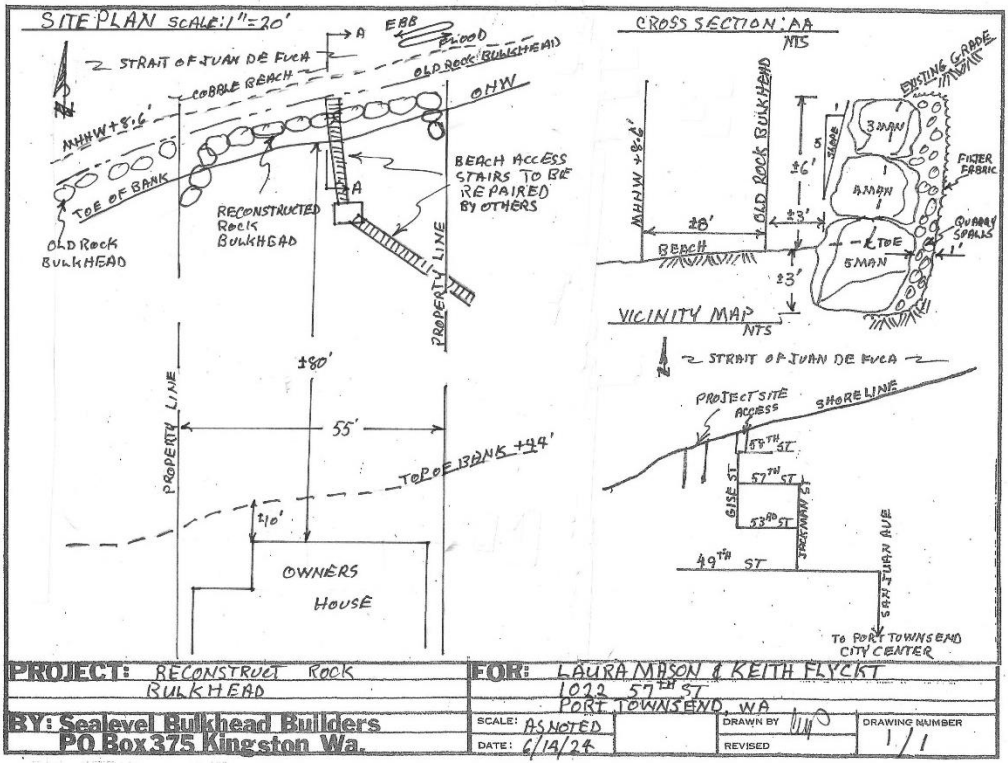


Figure 10. Proposed site plans for the Vanselow parcel.

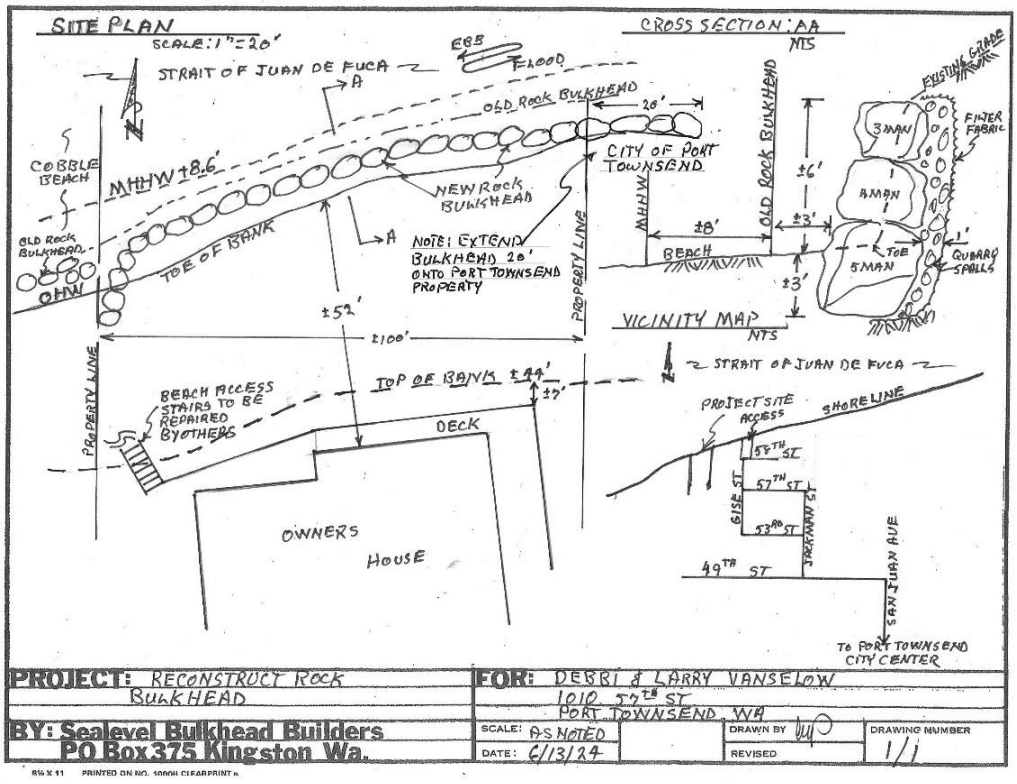
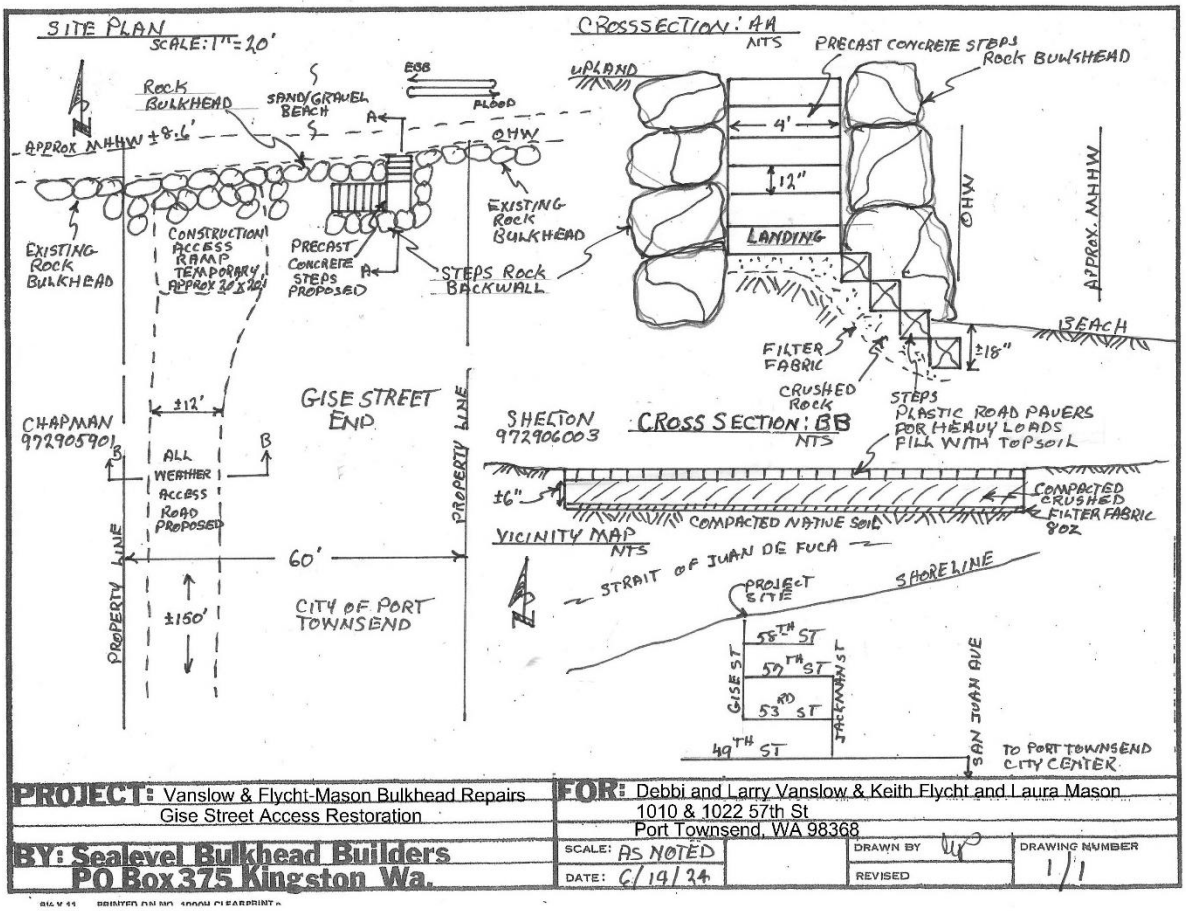


Figure 11. Proposed site plans for Gise Street access.



1.7 Construction Details

This proposal includes the replacement of the existing rock with a new rock bulkhead. Based on the recommendations in the geotechnical report provided, the revetment will be +/-6 ft above beach grade with a footing of +/-3 ft. Base rocks will be 5-man sized with top rocks ranging from 3- to 4-man. Total linear distance of the bulkhead will be +/-175 ft. Spalls will be placed behind the armor rock with filter fabric placed between the spalls and the bank. The replacement bulkhead will be moved landward approximately 3 ft and will be designed to be on a 5:1 batter.

Using an excavator, the base rocks will be dug into the substrate in short sections at a time along the shoreline. The base rocks will be placed into the footing, with the 3- and 4-man rocks stacked on top. The old bulkhead will be left intact while the footing is placed. All work will be done at low tides. This process will reduce discharge of material from the slope and prevent the trench from filling with water.

All material and equipment for the bulkhead will access the site by land, pending City approval for road end access via Gise Street. By moving the replacement bulkhead 3 ft landward, its

placement will be located above the currently established Ordinary High-Water Mark (OHWM) (Figures 9-10).

To reduce impacts to the access road at the end of Gise Street, a temporary 150 ft x 12 ft all-weather access road is proposed (Figure 11). This road will contain compacted native soil on the bottom most layer, topped with 8-ounce filter fabric, 6 inches of compacted and crushed gravel, and plastic road pavers for heavy loads that can then be covered with topsoil. This will prevent the heavy equipment from damaging this right-of-way area during construction. To allow for construction access, a temporary 20 ft x 20 ft access ramp will extend from the end of Gise Street to the beach for heavy equipment to use.

Additionally, precast concrete steps are proposed behind the existing Gise Street bulkhead. Each step will be approximately 4 ft by 1 ft and will be bordered by the existing bulkhead and a rock backwall. The step area will be excavated, and filter fabric and crushed rocks will be placed below the precast concrete (Figure 11). These stairs will create more accessible public beach access.

Once the bulkhead work is complete, the applicants' shared stairs to the beach will be replaced. The site will be accessed via upland and all materials will be stockpiled on driveway. The replacement stairs will be constructed with only hand tools and will not exceed the footprint of the previous stairs.

1.8 Action Area

The "project area" is the area where the work will occur. The project area also includes areas used for staging materials/equipment and accessing the site. The "action area" includes any areas with potential ecological effects from short-term construction activities or long-term habitat modification. This area includes potential turbidity and in-air noise effects from the use of large equipment during construction. The action area would likely extend no more than 0.25 mile to account for elevated noise from large equipment that will be used to move the boulders into position.

2 Baseline Environmental Conditions

2.1 Site survey description and findings

A biological habitat survey was performed from 13:30 to 16:30 PST at the project site by two MSA biologists, Madalyn Walker and Raquel Corniuk, on April 30, 2024. Four transects were surveyed perpendicular to a baseline along the failing bulkhead near the bluff toe. The transects, which spanned the length of the project area, were surveyed from the baseline to the water's edge, and were spaced 80 ft apart due to the uniformity of substrate and vegetative coverage across the entire survey area. During this site visit, the tidal elevation ranged from -0.3 ft to +0.1 ft MLLW. Data collected on site included: substrate, submerged aquatic vegetation coverage,

upland plant communities, potential on-site mitigation, and jurisdictional lines all within the survey area. GPS was taken on all property boundaries, at the baseline/OHWM, as well as at the water's edge.

The existing rock bulkhead was dilapidated with riprap pieces situated along the upper beach originating from the toe of the bluff. This high-energy beach has resulted in some driftwood on the beach amongst the riprap as well as some sloughing along the bluff toe. Dune grass had sloughed off and settled along the riprap pieces at the toe. The failing rock bulkhead spanned three parcels before transitioning to an unarmored feeder bluff to the west. A set of wooden stairs for beach access was shared by the two parcels. The wrack line from the previous +7.8 ft MLLW tide was approximately 7 ft waterward of the baseline.

The substrate on the beach consisted of a sand base with large pebbles and cobbles at the bulkhead and bluff toe (Figure 12). A berm comprised of small and large pebbles was noted at 8 ft and 40 ft from the baseline before transitioning to large pebbles and cobbles with some boulders amongst a sand base starting at 50 ft from the baseline to water's edge. Barnacles, anemones, and attached *Fucus sp.* were noted approximately 60 ft from the baseline; whelks and attached *Ulva sp.* were noted approximately 90 ft from the baseline. Attached kelp species and eelgrass beds were noted at water's edge, which was approximately 195 ft from the baseline at 15:10 PST. The substrate composition near the bulkhead base could be potentially suitable habitat for surf smelt spawning.

Directly behind the bulkhead was a steep upland slope with single-family residence structures located at the top of the slope near the bluff's edge. The upland slope was vegetated with dune grasses directly behind the bulkhead before transitioning to a variety of native and non-native plants along the upper slope including: miner's lettuce (*Claytonia perfoliata*), nettle (*Urtica dioica*), rose species, gorse (*Ulex europaeus*), English ivy (*Hedera helix*), red-flowering current (*Ribes sanguineum*), spruce trees, fern species, Western redcedar (*Thuja plicata*), red elderberry (*Sambucus racemosa*), cleavers (*Galium aparine*), snowberry (*Symphoricarpos albus*), false lily of the valley (*Maianthemum dilatatum*), salal (*Gaultheria shallon*), Douglas fir (*Pseudotsuga menziesii*), ocean spray (*Holodiscus discolor*), Indian plum (*Oemleria cerasiformis*), salmonberry (*Rubus spectabilis*), Pacific rhododendrons (*Rhododendron macrophyllum*). The upland portion around the single-family residential structures includes some landscaping but is also relatively forested with native evergreens and shrubs.

Figure 12. The substrate along the shoreline of the properties.

3 Fish & Wildlife Habitat Conservation Areas (FWHCAs)

The following are designated critical saltwater habitats, or FWHCAs, as defined under PTMC 19.05.080 and WAC 173-26-221(2)(c)(iii) that were identified, or are likely to be found, within the action area and will be discussed in the following sections:

- Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association. Federally designated endangered and threatened species are those fish and wildlife species identified by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service that are in danger of extinction or threatened to become endangered.
- Lands and waters containing documented habitats for plant and animal species listed in the Washington Department of Fish and Wildlife's Priority Habitats and Species Program List.
- All public and private tidelands or bed lands suitable for shellfish harvest as designated by the Washington Department of Health's classification system.
- Areas with kelp and eelgrass beds.
- Herring, smelt, sand lance and forage fish beach spawning areas.
- Waters of the state include lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction

of the state of Washington, as defined in RCW 90.48.020 and classified in WAC 222-16-030, Forest Practices Rules and Regulations.
- Feeder bluffs along marine shorelines
- Marine nearshore habitat areas (i.e., the area encompassing the extreme low tide limit to the ordinary high water mark) and associated vegetated marine riparian areas.

Direct and indirect effects to these FWHCAs and the species that utilize them will be discussed in Section 4.

3.1 Local Species & Habitat

The parcels are designated as "Natural" and "Shoreline Residential" under the City's SMP to accommodate residential development while also balancing the need to protect relatively undeveloped shoreline areas and maintain their ecological functions.

According to Washington State Department of Ecology's Coastal Atlas, the section of the shoreline on which the property is located features a "right to left" drift cell along the shoreline, which moves sediment from west to east (WECY 2024a). The Jefferson County *Geologically Hazardous Areas* shown on the parcel viewer (Jefferson County 2024) delineates the shoreline area for these properties, as well as neighboring sections to the east and west, as a seismic hazard area, meaning this coastline is at severe risk of damage resulting from earthquake-induced effects. The shoreline is deemed as "stable" according to the Jefferson County shoreline slope stability map (Jefferson County 2024), however both parcels are located within a feeder bluff (WECY 2024a). Therefore, sediments are actively eroding and delivering sediment to the beaches. Aspect Consulting (2024) indicated that the rock bulkhead needs to be replaced in order to provide adequate erosion control to maintain slope stability and keep the residences' foundations supported.

A query of the USFWS National Wetlands Inventory (NWI) mapper indicated that an estuarine and marine wetland (classified as M2AB/USN) is located on the shore adjacent to the project site (USFWS 2024). This marine, intertidal wetland consists of an aquatic bed that contains plants on or below the surface waters for most of the year. The marine system is associated with a high-energy coastline and the shoreline is determined by the ebb and flow of the tides. Waters of the state are of concern in the City's SMP. Within the action area, but not the project footprint, an estuarine and marine deepwater area (classified as M1UBL) encompasses the subtidal waters. The bulkhead replacement will be constructed in such a way as to avoid and minimize impacts to the estuarine and marine wetland: work will occur at low tide, equipment will be operated within a 25-ft-wide work corridor on the beach, and the replacement bulkhead will be installed approximately 3 ft landward, restoring up to 525 ft^2 of upper beach. As such, the estuarine and marine wetlands adjacent to the project site should not be adversely affected by this project in the long term.

During our site visit, MSA did not observe any waterways (creeks, streams, stormwater channels, or rivers) running through the property. Review of the NWI mapper data indicates that the closest riverine habitat (classified as R4SBC) is located approximately 0.39 miles east of the project site, outside of the action area (USFWS 2024). The Jefferson County fish presence map and the SalmonScape database do not document this riverine habitat as a fish habitat (WDFW 2024a). The closest fish-bearing stream is approximately 7.1 miles southwest near Cape George Colony Club that contains residential coastal cutthroat (WDFW 2024a). Conclusively, both the fish habitat and the riverine are outside of the action area and are not anticipated to be negatively impacted by the construction of a replacement bulkhead on the shoreline.

3.2 State Priority Habitat & Species

The Washington Department Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) mapper shows estuarine and marine wetland habitat, red sea urchin, and potential habitat for pinto abalone along the shoreline of the project site (WDFW 2024b). These PHS results can be seen in Figure 13 and are summarized in Table 1.

Figure 13. Priority Habitat & Species occurring within the 0.25-mile action area.

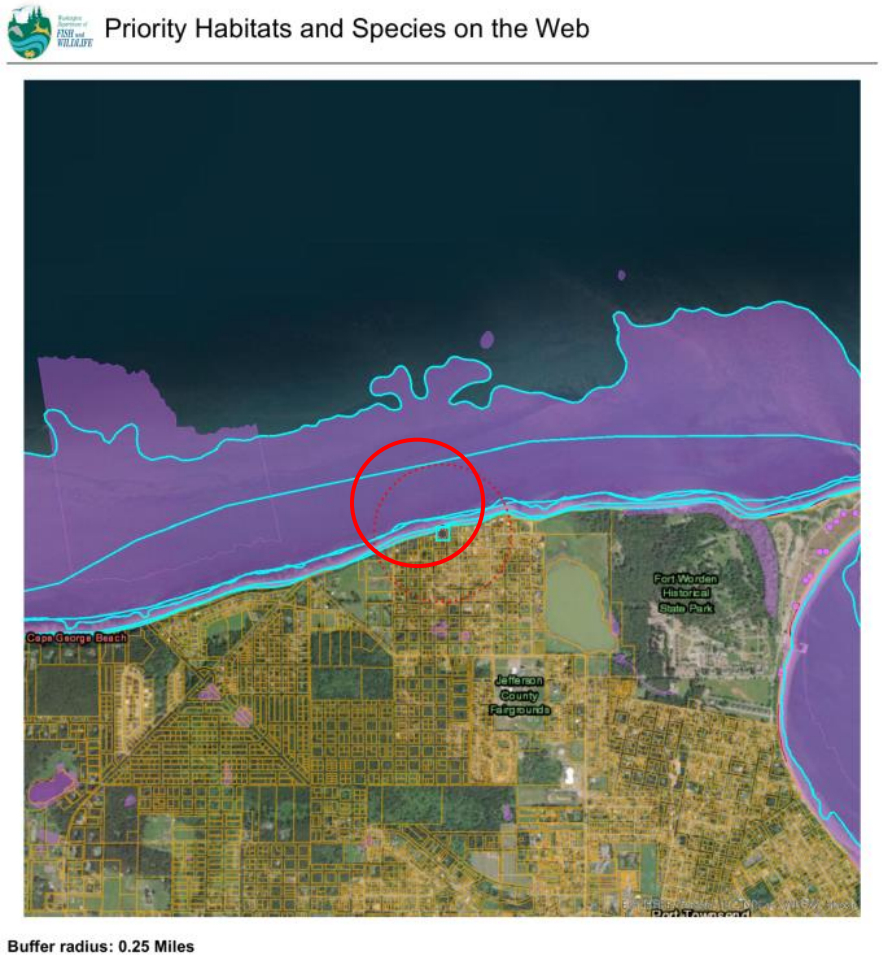


Table 1. WDFW PHS query results

Species or Habitat	Priority Area/Occurrence Type	Federal Status	State Status
Estuarine and Marine Wetland	Aquatic habitat (M2AB/USN)	N/A	N/A
Red sea urchin	Presence	N/A	N/A
Pinto abalone	Listed occurrence (township level)	N/A	Endangered

3.3 Forage Fish

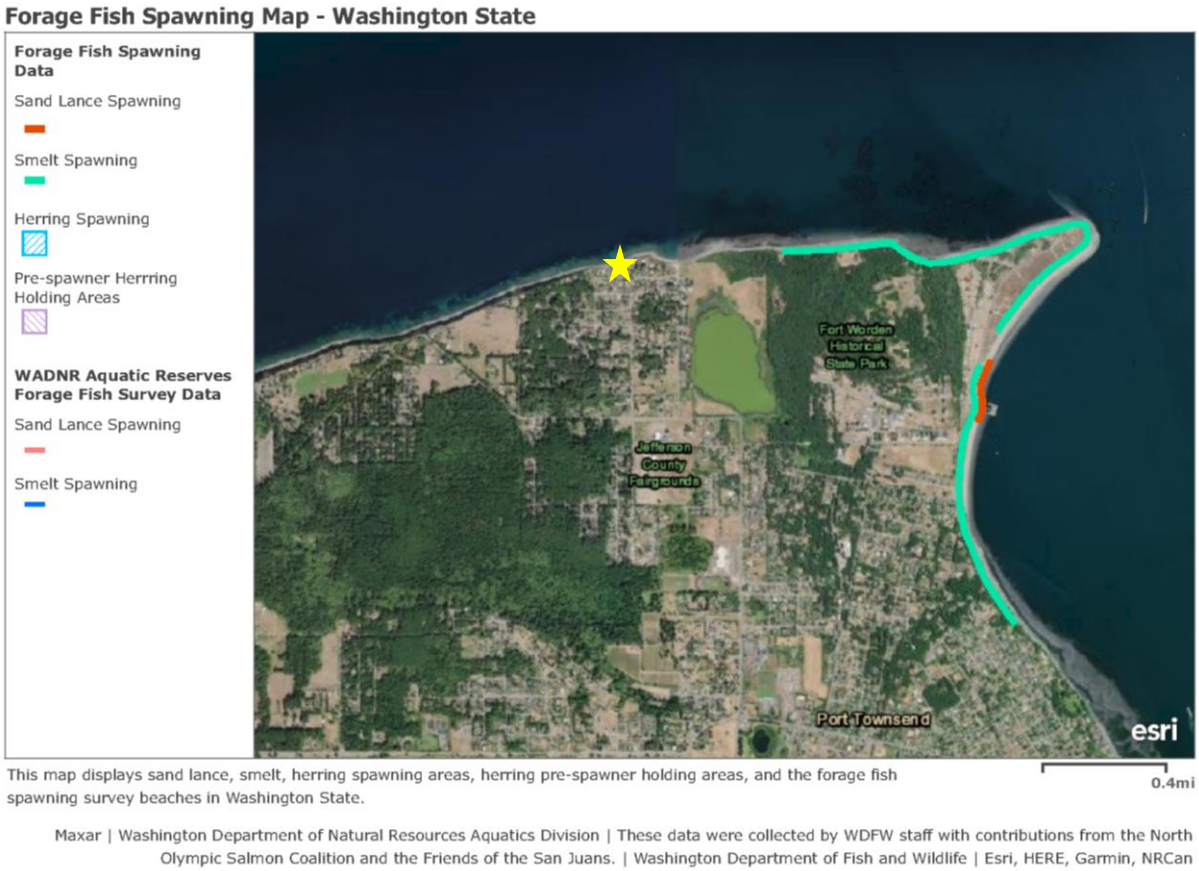
Migrating salmon utilize baitfish such as Pacific herring (*Clupea harengus pallasii*), sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) as prey resources. These forage fish form a very important trophic link between plankton resources and a wide variety of predatory marine organisms, as well as providing food for marbled murrelets and bald eagles. Sand lance and surf smelt do not have federal, or state concerned, threatened, or endangered status, while Pacific herring are a state Candidate species.

The beach substrate at the project site consists mostly of cobble and large pebbles with a sand base, with thin strips of sand and pea gravel that could be potentially suitable forage fish spawning habitat. WDFW's Forage Fish Spawning map depicts surf smelt spawning approximately 0.66 of a mile east of the project site, outside the action area (Figure 14). The closest recorded sand lance spawning is recorded outside of the action area, approximately 2.25 miles southeast of the project site in Fort Warden, and herring spawning is documented over 5.55 miles southwest of the project site within Discovery Bay (Figure 14) (WDFW 2024c).

Forage fish are not expected to be adversely affected by the proposed work because "Best Management Practices" (BMPs) will be utilized to avoid and minimize impacts that may occur from the proposed construction. In addition, the proposed bulkhead will be built 3 ft landward of the existing footprint which will restore up to 525 ft^2 of previously impervious shoreline which could improve potential forage fish spawning areas by allowing for more retention of fine-grained sediment.

Any guidelines concerning forage fish that are found within the HPA issued by WDFW should be followed.

Figure 14. WDFW documented forage fish spawning habitat



3.4 Eelgrass and Kelp

According to the Washington Department of Natural Resources (WDNR) Puget Sound Seagrass Monitoring Data Viewer, a sample site immediately east (starting in line with Jackman St. and continuing east into Fort Worden) has documented a mix of eelgrass (*Zostera marina*) and surfgrass (*Phyllospadix*), approximately 0.21 miles east of the project site (WDNR 2020). The Washington State Department of Ecology Coastal Atlas map has historically documented fringe (continuous) kelp, but no eelgrass, at the project site (WECY 2024a).

A site visit completed by MSA on April 30th, 2024, found no eelgrass, surfgrass, or kelp within 190 ft of the shoreline bluff. At water's edge, which was approximately 195 ft from the bulkhead, attached kelp and eelgrass beds were noted.

Since no attached submerged aquatic vegetation was found within the area where the work will take place and heavy equipment will access the site from the upland side, adverse impacts to eelgrass or kelp are not anticipated.

3.5 Commercial and Recreational Shellfish Areas

Washington State Department of Health's (WDOH) Commercial Shellfish Map Viewer shows the project site to be within an area designated as "prohibited" due to the wastewater treatment plant outfall (WDOH 2024). The area approximately 0.19 miles to the west is designated as "approved" for commercial shellfish growing; however, the closest commercial harvesting site is approximately 4.4 miles southwest of the project site, outside of the action area and there are no recreational shellfish beaches near the action area. The beaches from North Beach to North Point Hudson are closed due to biotoxins and/or pollution.

The commercial shellfish sites and recreational site outside of the action area are not anticipated to be adversely affected by the proposed project since any turbidity associated with the proposed bulkhead replacement work should be localized, brief, and unlikely to extend far enough to reach these shellfish sites.

3.6 Marine Nearshore Habitat within the FEMA Floodplain

The work will be completed within a zone by the Federal Emergency Management Agency (FEMA) as a special flood hazard area. The action area is designated as Zone AE (EL 14) (FEMA 2024). The proposed rock bulkhead will be installed at the toe of the shoreline bluff above the established OHWM, while the rock armor that is at or below the established OHWM will be removed, which places the project within marine nearshore habitat areas as designated under the SMP and within the adjoining FEMA floodplain.

Impacts to habitat associated with the proposed replacement may extend into the marine waters of the action area and, thus, would also impact the adjoining 100-year floodplain of the Strait of Juan de Fuca. Impacts to the adjoining floodplain would be limited to water quality effects – a possible temporary and localized increase in suspended sediments after the disturbance of sediment on the upper beach.

The proposed replacement bulkhead is not anticipated to affect the following floodplain-specific functions:

1. **Water quantity and quality:** These will be the same as current baseline conditions. Short-term impacts to water quality during construction are discussed in Section 4.
2. **Flood velocities and volumes:** These will not be increased from current baseline conditions since the work involves replacing a bulkhead landward of its current position.
3. **Flood storage capacity:** This will not be affected since the work involves the landward installation of a replacement of a bulkhead, which will restore 525 ft^2 of shoreline.
4. **Riparian vegetation:** No riparian vegetation is anticipated to be disturbed during construction. There were no large overhanging trees along the bulkhead. More details can be seen in Section 4.

5. **Measures to preserve habitat forming processes:** The existing rock bulkhead that is scattered along the shoreline will be removed to help restore this section of upper shoreline. Additionally, the by installing the replacement bulkhead 3 ft landward of the existing footprint, up to 525 ft^2 of upper shoreline will be restored.
6. **Refuge from higher velocity floodwaters:** This will not be affected from baseline conditions since the project consists of a rock bulkhead being installed slightly landward of the existing bulkhead in the nearshore environment and not near a functioning river system.
7. **Spawning substrate:** No forage fish spawning habitat is documented by WDFW at the project site or within the action area. Removing up to 3,764.5 ft^2 of non-native rock from the existing bulkhead will restore the habitat below the OHWM and potentially enhance potential forage fish spawning habitat. Additionally, the replacement bulkhead will be installed 3 ft landward of the existing bulkhead.
8. **Habitat isolation or channel straightening:** There will be no adverse effects resulting from habitat isolation or channel straightening. Any possible adverse direct and indirect effects resulting from construction and the proposed work itself are discussed in the sections below, as well as conservation and mitigation measures to avoid and minimize these effects to the nearshore habitat and the adjoining floodplain.

Effects to species and critical habitat that occur within this marine nearshore area are discussed in more detail in Sections 3.7 and 4 below.

3.7 Federal ESA-listed Species & Critical Habitat

A range of species listed under the Endangered Species Act (ESA) have critical habitat or may occur within the action area. The designated critical habitat within the action area (which includes the 100-year floodplain) is presented below in Table 2. The adjoining 100-year floodplain encompasses the shoreline along North Beach.

For each listed species with the *potential to be in the project action area*, the relevant life history traits, listing status, and distribution of species are presented in the sections below. Salmon species that may utilize streams in areas near the action area will also be included as they may migrate pass the project site.

Table 2. National Marine Fisheries Service (NMFS) and U.S. Fish & Wildlife Service (USFWS) Designated Critical Habitat

NMFS/USFWS Designated Critical Habitat	Action Area	Project Footprint
Bocaccio Rockfish (Puget Sound-Georgia Basin DPS) (NMFS, 2014)	**Y**	**Y**
Yelloweye Rockfish (Puget Sound-Georgia Basin DPS) (NMFS, 2014)	N	N
Marine Critical Habitat for Puget Sound Chinook Salmon (NMFS, 2005)	**Y**	**Y**
Freshwater Critical Habitat for Puget Sound Chinook Salmon (NMFS, 2005)	N	N
Puget Sound Steelhead (NMFS, 2016)	N	N
Marine Critical Habitat for Hood Canal Summer-run Chum Salmon (NMFS, 2005)	**Y**	**Y**
Freshwater Critical Habitat for Hood Canal Summer-run Chum Salmon (NMFS, 2005)	N	N
Bull Trout Final (USFWS, 2010)	N	N
Green Sturgeon (NMFS, 2009)	N	N
Marbled Murrelet (USFWS, 2016)	N	N
Leatherback Sea Turtle (NMFS, 2012)	N	N
Southern Eulachon (NMFS, 2011)	N	N
Southern Resident Killer Whale – Inland Critical Habitat (NMFS, 2006)	**Y**	N
Humpback Whale Critical Habitat (NMFS, 2021)	N	N

3.7.1 Puget Sound Chinook

Puget Sound Chinook (*Oncorhynchus tshawytscha*), also called the king salmon, are distinguished from all other Pacific salmon by their large size. The spatial distribution of the Puget Sound Chinook includes all spawning populations from rivers and streams that connect to the Puget Sound. Most Chinook in the Puget Sound are “ocean-type” and migrate to the marine environment during their first year (Myers et al. 1998). They may enter estuaries immediately after emergence as fry from March to May at a length of 40 mm or they may enter the estuaries as fingerling smolts during May and June of their first year at a length of 60-80 mm (Healey 1982). Chinook fry in Washington estuaries feed on emergent insects and epibenthic crustaceans (gammarid amphipods, mysids, and cumaceans). As they grow and move into neritic habitats, they primarily feed on fish such as Pacific herring and Pacific sand lance with the addition of crustaceans, insects, and worms (PSEMP 2023). These ocean-type Chinook use estuaries as rearing areas and are the most dependent of all salmon species on estuaries for survival.

The Puget Sound Chinook is listed under the ESA as threatened according to the National Marine Fisheries Service (NMFS) (70 FR 37160; June 28, 2005). In addition, NMFS has designated critical habitat for 12 Evolutionarily Significant Units (ESUs) of West Coast salmon, including the Puget Sound Chinook Salmon ESU. The portion of the project footprint and action area below the line of extreme high water are in an area designated as critical habitat for the Puget Sound Chinook ESU (70 FR 52685; September 2, 2005).

The project site and action area are within Puget Sound Chinook critical habitat. There are no streams within the action area with documented Chinook presence; the nearest stream with documented presence is the Dungeness River approximately 16 miles to the west (WDFW 2024a). Since juvenile Chinook are very shoreline oriented, Chinook that utilize streams to the south in the Hood Canal may migrate and forage along the shoreline at the project site. However, it is unlikely that this species would be adversely affected by the proposed work since all work will be performed in the dry and in such a way to minimize turbidity.

3.7.2 Hood Canal Summer-run Chum

In Puget Sound, chum spawning grounds are situated near coastal rivers and lowland streams. Puget Sound chum typically spawn from September to March (WSCC 2003). Chum (along with ocean-type Chinook) spend more time in the estuarine environment than other species of salmon (Healey 1982). Residence time in the Hood Canal ranges from 4 to 32 days with an average residence of 24 days (Simenstad et al. 1982). Simenstad et al. (1982) found that juvenile chum consume benthic organisms in and around eelgrass beds (harpacticoid copepods, gammarid amphipods, and isopods), but chum change their diet to drift insects and plankton such as calanoid copepods, larvaceans, and hyperiid amphipods as their size increases to 50 - 60 mm.

Chum move offshore and switch diets when presented with a lack of food supply (Simenstad et al. 1982). NMFS has listed the Hood Canal summer run chum ESU (*Oncorhynchus keta*) as threatened under the ESA (70 FR 37160; June 28, 2005). NMFS designated critical habitat for the Hood Canal summer-run chum ESU shortly after (70 FR 52739; September 2, 2005) and it includes the entire Hood Canal and contiguous shoreline north/northwest, ending past Dungeness Bay near Sequim.

The project site and action area are within Hood Canal summer-run chum critical habitat. There are no streams within the action area with documented summer chum presence; the nearest is Chimacum Creek over 8 miles to the south (WDFW 2024a). Since juvenile chum are dependent on nearshore habitats, it is likely this species may migrate and forage along the shoreline at the project site. However, it is unlikely that this species would be adversely affected by the project since all work will be performed in the dry and in such a way to minimize turbidity.

3.7.3 Bull Trout

Bull trout are members of the char subgroup within the salmonid family that live within both fresh and marine waters. In the United States, Coastal-Puget Sound bull trout (*Salvelinus confluentus*) are primarily distributed along the northwest from Oregon to Alaska as they are now extinct in California (Haas and McPhail 2001). Spawning typically occurs from August to November in streams where the temperature is <10°C (Fraley and Shepard 1989). Temperatures in excess of about 15°C are thought to limit bull trout distribution due to the cold water requirement for egg survival (Rieman and McIntyre 1993). Migration to the open sea (for anadromous populations) generally takes place in the spring. Some migrate to larger rivers

(fluvial), lakes (adfluvial), or saltwater (anadromous) before returning to smaller streams to spawn. Others (resident bull trout) spend their entire life in the streams where they were reared. Habitat degradation, dams and diversions, and predation by non-native fish threaten the Coastal Puget Sound population (64 FR 58910; November 1, 1999).

All populations of bull trout including the Coastal-Puget Sound populations, were listed as threatened by the United States Fish and Wildlife Service (USFWS) in 1999 (64 FR 58910; November 1, 1999). USFWS designated critical habitat for bull trout in 2010 (75 FR 63898; October 18, 2010).

The project site and action area are not within bull trout critical habitat. According to WDFW data, the nearest documented bull trout presence is in Bell Creek, approximately 13.1 miles west of the project site, outside of the action areas (WDFW 2024a). There are streams in the Hood Canal that are utilized by bull trout so it is possible this species may migrate past the project site; however, it is unlikely they would be adversely impacted by the proposed project.

3.7.4 Puget Sound Steelhead

Steelhead is the name given to the anadromous form of the species *Oncorhynchus mykiss*. The freshwater residents are called rainbow trout. Steelhead can return to the ocean after spawning and migrate to freshwater to spawn again, unlike Pacific salmon. Steelhead fry can spend one to three years in freshwater before heading to the open ocean, where they may stay for another one to three years before returning to Washington streams (Hard et al. 2007). Steelhead migrate quickly through Puget Sound and into the open sea as individuals or in small groups (PSEMP 2012) .Unlike Chinook, steelhead do not have a long-term feeding nor growth period in Puget Sound nearshore areas (PSEMP 2012).

NMFS has listed the Puget Sound steelhead (*O. mykiss*) as a threatened species under the ESA (72 FR 26722; May 11, 2007). Critical habitat has been finalized for the Puget Sound steelhead distinct population segment (81 FR 9252; February 24, 2016); however, there is no critical habitat for Puget Sound steelhead and no documented steelhead streams within the action area. The nearest designated critical habitat is approximately 10.6 miles southwest of the project site in Contractors Creek.

The project site and action area are not within Puget Sound steelhead critical habitat. According to WDFW data, winter steelhead presence is documented in Chimacum Creek, located over 8 miles south of the project site, outside of the action area (WDFW 2024a). Juvenile steelhead are less shoreline oriented than Chinook and chum and migrate rapidly to the Pacific Ocean (WDFW 2011), therefore, it does not seem likely that they will utilize the project shoreline.

3.7.5 Rockfish

Bocaccio (*Sebastes paucispinis*) and yelloweye (*Sebastes ruberrimus*) rockfish remain in the upper part of the water column as larvae and pelagic juveniles. Around 3 to 6 months old, bocaccio rockfish settle into intertidal, nearshore habitat; they are associated with settling in rocky reefs, kelp beds, low rock, and cobble (Love et al. 2002). Juvenile yelloweye rockfish are usually found in the upper extent of the adult depth range instead of in intertidal habitat (Studebaker et al. 2009). As both species grow larger, they move into deeper waters. Adults are found around rocky reefs and coarse habitats. Marine habitats high in complexity are associated with higher numbers of rockfish species (Young et al. 2010). Adult yelloweye and bocaccio rockfish generally inhabit depths from approximately 90 ft to 1,400 ft (Love et al. 2002). Both species are opportunistic feeders, wherein their prey is life stage dependent. Predators of adult rockfish include marine mammals, salmon, other rockfish, lingcod, and sharks.

NOAA has listed the Puget Sound-Georgia Basin distinct population segment (DPS) of yelloweye (*Sebastes ruberrimus*) as a threatened species under the ESA and listed the Puget Sound-Georgia Basin DPS of bocaccio rockfish (*Sebastes paucispinis*) as endangered (75 FR 22276 April 28, 2010). The Georgia Basin refers to all of Puget Sound, including the area around the San Juan Islands, and the Strait of Georgia, north to the mouth of the Campbell River in British Columbia. The western boundary of the Georgia Basin runs from east of Port Angeles to Victoria in the Strait of Juan de Fuca. Critical habitat for both species was designated in 2014 (79 FR 68042; November 13, 2014).

The proposed project and action area falls within the bocaccio rockfish critical habitat; yelloweye rockfish critical habitat is present in deeper areas outside of the action area. Although this species has the potential to be present within the action area, the effects of this project are expected to be minimal, if at all. Adult rockfish are commonly found in deeper water than what exists at the project site. Shallow, intertidal, nearshore waters in rocky, cobble and sand substrates (with or without kelp) can provide suitable substrate for juvenile (3-6 month old) bocaccio rockfish. The highest densities of juvenile rockfish are found in areas with floating or submerged kelp species which is present offshore. The proposed work is occurring high in the upper intertidal zone (which is devoid of any attached submerged aquatic vegetation) at low tide so it does not seem likely this species would be adversely affected in the long term.

3.7.6 Marbled Murrelets

Marbled murrelets (*Brachyramphus marmoratus*) are small marine birds in the Alcidae family that have a habitat-split strategy. They spend most of their time foraging at sea and will fly up to 50 km inland to nest only within old growth forests (Nelson 1997). Marbled murrelets do not make their own nests, and instead will use the large branches or platforms within large old growth forests (Nelson 1997; Piatt et al. 2007). In the critical nesting areas, fragmentation and loss of old growth forest has a significant impact on the survival and conservation of the species (WDW 1993; Miller et al. 2012). Adult birds are found within or adjacent to the marine

environment where they dive for sand lance, sea perch, Pacific herring, surf smelt, other small schooling fish, and invertebrates.

Marbled murrelets have been listed as threatened by the USFWS since 1992 (57 FR 45328; October 1, 1992). Critical habitat was designated by USFWS in 1996, revised in 2011, and reviewed again in 2016 to determine if the ESA definition of critical habitat was being met (81 FR 51348, August 4, 2016).

There is no marbled murrelet critical habitat within close range of the action area (81 FR 51348, August 4, 2016). The nearest designated critical habitat is located approximately 14.8 miles southwest of the project site. Data catalogued by eBird's citizen science survey documents recorded sightings of marbled murrelets as recently as May 2024 at North Beach, approximately 0.37 miles east of the project site (eBird 2024). This sighting is not within the project site or the action area.

It is possible that marbled murrelets may forage within the action area if forage fish are spawning. Since in-air noise will be elevated during the proposed work, any marbled murrelets in the area may avoid foraging near the construction site while work is occurring; however, marbled murrelets will not likely be affected long term by this project.

3.7.7 Humpback Whales

NMFS has listed the humpback whale (*Megaptera novaeangliae*) as an endangered species that may occur in Puget Sound (81 FR 62260; September 8, 2016). Critical habitat was designated by NMFS in 2021 but does not include the action area (86 FR 21082; April 21, 2021).

In the North Central Puget Sound sub-basin in the last two years, there have been 0-2 sightings in the summer with more sightings around the southern end of Whidbey Island in the fall (Orca Network 2024). Since the furthest waterward extent of the action area is to account for in-air noise from construction equipment, it seems unlikely humpback whales would be adversely affected by this project since the work will be done high in the upper intertidal zone at low tides, and, therefore, no elevated in-water noise will occur.

3.7.8 Southern Resident Killer Whales

The Southern Resident killer whale (SRKW) (*Orcinus orca*) population consists of three pods: J, K, and L. According to Wiles (2004), "while in inland waters during warmer months, all of the pods concentrate their activity in Haro Strait, Boundary Passage, the Southern Gulf Islands, the eastern end of the Strait of Juan de Fuca and several localities in the southern Georgia Strait". During early autumn, these pods, especially J pod, extend their movements into Puget Sound to take advantage of the chum and Chinook salmon runs. SRKW spend more time in deeper water and only occasionally enter water less than 5 meters deep (Baird 2001).

On November 15, 2005, NMFS listed the SRKW as endangered under the ESA (70 FR 69903; November 18, 2005). NOAA Fisheries has designated critical habitat for SRKW: "Critical habitat includes waters deeper than 20 ft relative to a contiguous shoreline delimited by the line of extreme high water." (71 FR 69054; November 29, 2006).

According to the map of compilation sightings from 1999-2022 (NOAA 2024), the area adjacent to the action area has a history of recorded sightings:

- January: 2
- February: 2
- March: 0
- April: 2
- May: 2
- June: 0
- July: 0
- August: 1
- September: 2
- October: 6
- November: 2
- December: 7

Since the farthest waterward extent of the action area is to account for in-air noise from construction equipment, it seems unlikely SRKW would be adversely affected by this project since the work will be done at low tides and there will be no elevated in-water noise. Any other effects from the project are unlikely to extend into SRKW habitat since the project is occurring high on the shoreline without elevating in-water noise levels.

3.7.10 Green Sturgeon

North American green sturgeon (*Acipenser medirostris*) occupy coastal bays and estuaries from Monterey Bay, CA to Puget Sound, WA. Observations of green sturgeon in Puget Sound are much less common compared to the other estuaries in Washington State. Green sturgeon have a complex anadromous reproductive cycle and do not reach reproductive age until 15 years for males and 17 years for females; female green sturgeon are thought to spawn every 5 years (Adams et al. 2002). Activities of concern in Puget Sound include dredging and capping, which could affect benthic habitats, alter water flow, and affect water quality.

On April 7, 2006, NMFS determined that the Southern DPS of North American green sturgeon is at risk of extinction in the foreseeable future throughout all or a significant portion of its range and listed the species as threatened under the ESA (71 FR 17757; April 7, 2006). Critical habitat

for the threatened Southern DPS was subsequently designated by NMFS in 2009 (74 FR 52; October 9, 2009).

There nearest designated critical habitat for green sturgeon is located approximately 0.31 miles west of the project site, outside of the action area. Since the proposed project would occur on the upper beach in the dry at low tides, which is much shallower than where green sturgeon usually occur, this project is not likely to adversely affect green sturgeon.

4 Effects of the Action

When reviewing all the data, the direct and indirect effects of the project on the listed species and their critical habitat should be considered. Impacts to ESA-listed species and critical habitats that may occur within the FEMA floodplain are based on current baseline conditions versus historic pre-development conditions, where existing structures are considered an element of the environmental baseline at the time of a proposed action.

4.1 Direct Effects

When considering the direct effects of the proposed project, one must determine if the proposed project will immediately reduce or destroy the listed species and/or their habitat. The potential direct effects caused by the construction process include noise and turbidity.

4.1.1 Water Quality

The action area encompasses an area of Puget Sound that already experiences degraded water quality. The Water Quality Atlas Map (WECY 2024) categorized the water within the action area as a Category 2 (water of concern) for bacteria.

Increased turbidity caused by the disturbance of loose sediment on the beach during construction could have adverse effects on salmonids. The impact level depends on duration of exposure, concentration of turbidity, the life stage during the increased exposure and the options available for the fish to avoid the plumes. The effects can be discussed in terms of lethal, sublethal or behavioral (Nightingale and Simenstad 2001). For this project, turbidity effects are expected to be localized and brief.

Variations in suspended sediment concentration can also negatively impact species composition, biomass, algal growth and can affect secondary production as well (Newcombe and Macdonald 1991; Kahler et al. 2000). Filter feeders can have blockages in feeding structures which affects their feeding efficiency, in turn reducing growth rates, increasing stress or in some cases can result in death (Newcombe and Macdonald 1991). Suspended sediments can also impact salmonid fishes by increasing mortality rate, reducing growth rate and/or reducing resistance to disease, modifying natural movements, interfering with development, reducing prey abundance and fish catch methods (Newcombe and Macdonald 1991).

For this project, since the work (e.g. excavation) will be done in the upper intertidal zone during low tide, turbidity effects are expected to be localized and brief, if at all. Any disturbed sediment that may become suspended on an incoming tide is not anticipated to stay suspended for more than one tidal cycle.

4.1.2 Noise

Work will occur in the dry at low tide so in-water noise levels are not expected to be affected. However, in-air noise levels will be increased during equipment use and may have temporary behavioral impacts to birds and other wildlife, such as avoidance of the area. These impacts are not anticipated to result in long-term, adverse effects. Unless restricted by the timing of low tides, work should occur only during daylight hours to comply with local noise ordinances.

4.2 Indirect Effects

When considering the indirect effects of the proposed project on the listed species and their habitat, one must determine the effects that might occur later in time, after completion of the project compared to the environmental baseline at the time of a proposed action.

4.2.1 Sediment Transport and Supply

Hard armoring, such as bulkheads, block sediment supply from entering the marine environment. Physical changes in beach structure, specifically beach narrowing and lowering, from reduced sediment input are also linked to biological effects. Most directly, forage fish spawning habitat in the upper intertidal zone may be degraded in both extent and quality (Penttila 2007). Surf smelt spawn in the intertidal zone of beaches comprised of mixed sand and gravel and spawning suitability can be impacted by nearshore development. Shoreline structures may reduce fine-grained spawning substrates, resulting in coarsening substrate that is unsuitable for spawning. During the site visit, MSA determined that the substrate was potentially suitable habitat for forage fish spawning in some areas. However, the bulkhead replacement will not result in any waterward expansion.

The project shoreline is along a feeder bluff and in a west to east drift cell, (WECY 2024a). Although, Aspect Consulting (2024) noted:

> "The shoreline about 50 feet east of the site's east property line is mapped as a transport zone for about 490 feet and then becomes a feeder bluff. A transport zone area does not contribute appreciable amounts of sediment. The shoreline for 0.3 miles east of the Site is armored... Based on our observations of the embedded toe of the bulkhead along the shoreline, the beach level at the site appears to be in equilibrium."

By installing the replacement bulkhead 3 ft landward of the current footprint, sediment transport should remain unaffected.

4.2.2 Riparian Vegetation

Surf smelt spawning habitat in the upper intertidal zone is impacted by the removal of riparian vegetation, which can reduce shade and result in increased egg mortality (Penttila 2007). Loss of riparian vegetation also alters allochthonous input (reduced inputs of leaf litter, woody debris, and terrestrial insects) and can result in a loss of large woody debris (LWD) in the marine environment (reducing complex intertidal habitat) (WDFW 2009).

The area directly behind the bulkhead consisted of mostly dune grass, with other native and non-native plants along the bluff of the property. No overhanging, riparian vegetation was observed along the bulkhead during MSA's visit. There was smaller riparian vegetation on the western adjacent parcel, however, this riparian vegetation should not be affected during the bulkhead replacement. Efforts will be made to avoid damaging any nearby roots during construction.

4.2.3 Benthic Communities

Some disturbance, crushing, or smothering of benthic meiofauna in the extreme upper intertidal zone may occur while operating equipment in the intertidal work corridor to complete the proposed bulkhead work. The impacts will be relatively short in duration and will occur within a 25-ft-wide work corridor in the upper intertidal zone. Equipment will be staged and delivered via land (as opposed to using a barge) to further minimize impacts to the intertidal zone.

Invertebrate benthic communities have been shown to recover quickly after more extensive sediment disturbances. For instance, most studies indicate that benthic prey resources are impacted temporarily by shellfish harvesting (Hall and Harding 1997; Hauton et al. 2003; Vanblaricom et al. 2015) but recovery of sediment structure and benthic invertebrate infaunal community is expected to occur rapidly (within 12 months) (Hall and Harding 1997; Spencer et al. 1998; Price 2011).

4.2.4 Wave energy impacts

Wave regime and local geology are the primary drivers of modern beach geomorphology. In addition, structures lower on the beach result in more frequent interaction with more energetic waves, increasing scour and even alongshore transport (Ruggiero 2009). Hydrodynamic effects such as active erosion caused by wave reflection from seawalls also impacts the amount and stability of appropriately sized spawning substrate for forage fish (Ruggiero 2009).

Within the Puget Sound watershed, bluff erosion is a significant source of beach sediment and armoring prevents the replacement of fine sediment that is naturally winnowed from beaches by waves over time (Shipman 2010). Many ecological functions, as well as recreational uses, decline as beaches get coarser (Dethier et al. 2016). For example, forage fish, which are a key link in food webs up to the iconic orca whales, require a mix of sand and gravel to spawn on the upper beach (Penttila 2007).

When waves reflect off the bulkhead, wave scour can accelerate the loss of sand and small sediments (Kraus and McDougal 1996). A study in Thurston County demonstrates the end effect of these physical processes: it compared beach structure between armored and unarmored shorelines and found that armored beaches were significantly narrower and had a smaller upper beach area. Physical changes in beach structure, specifically beach narrowing and lowering, are also linked to biological effects. Most directly, forage fish spawning habitat in the upper intertidal zone may be degraded in both extent and quality (Penttila 2007). The bulkhead replacement will occur 3 ft landward of the existing footprint; therefore, no new impacts are expected to occur. The proposed bulkhead replacement will be comprised of large rocks to help dissipate wave energy, and, in turn, help reduce erosion on the beach from waves and retain small, fine-grained sediment.

4.2.5 Habitat Alteration from Hard Armor

Many challenges arise in quantifying impacts of hard armoring due to the diverse mechanisms by which it alters shorelines (Dethier et al. 2017). Depending on regional context (wave energy and geomorphology), are likely to show alterations at different scales of space and time (Dethier et al. 2017). Even though some direct impacts are documented, indirect impacts have been difficult to demonstrate; they are commonly hypothesized (Dethier et al. 2017).

Recent reviews have summarized how armored shorelines can affect beach shape and hydrodynamic processes (Bernatchez and Fraser 2012; Nordstrom 2014), local biodiversity (Chapman and Underwood 2011; Gittman et al. 2016), and accumulation of beach wrack along with the primary and secondary consumers that depend on it (Dugan et al. 2011). In addition to forage fish habitat, upper intertidal invertebrate communities may be affected. Unarmored beaches have more large woody debris, significantly more wrack, a habitat for invertebrates which are prey for juvenile salmon (Heerhartz and Toft 2015; Heerhartz et al. 2016). Other mechanisms of impact include loss of connectivity across the land-sea ecotone (Heerhartz et al. 2014), as well as resilience to sea level rise and changes in groundwater filtering (Dethier et al. 2017).

In a Salish Sea study by Dethier et al. 2016, a threshold in the elevation of armoring (~0.5 m below local MHHW) was found, for the accumulation of natural debris. There is an abrupt drop in the number of beach logs and the amount of wrack that accumulates when having armoring that extends below ~0.5 m MHHW because of the lack of space for material to be retained between high tides, which in turn changes nutrient cycling at the site (Dethier et al. 2016). A properly graded intertidal and supratidal zone are crucial habitat elements for biota, as revetments can also affect the trophic support (or supply of crustaceans, insects and invertebrates) (Dethier 1990; Heerhartz and Toft 2015). Loss of habitat connectivity on marine shorelines can be compounded, especially in areas within Evolutionarily Significant Unit (ESU)

boundaries. The project and action areas are within designated bocaccio rockfish, Chinook, and summer-run chum Evolutionarily Significant Unit (ESU) boundaries.

The replacement bulkhead will be installed 3 ft landward of the established OHWM to avoid any further habitat alteration on the shoreline.

4.3 Cumulative Effects

Cumulative effects from future state, local, or private entities that are reasonably certain to occur in the action area are anticipated for this project. The action area includes residential shoreline properties, a public beach (North Beach and Fort Worden state park) within 0.25 mile of the project site. Within this action area, the shoreline west of North Beach is developed along the residential area while the shoreline to the east is unarmored. According to the Coastal Atlas Map, the project site is within approximately 0.30 miles of residential parcels along North Beach that contain shoreline armor (WECY 2024a).

The proposed project would facilitate continued habitat alteration along the shoreline and may promote future maintenance activities. However, the proposed replacement bulkhead will be located further landward than the existing bulkhead, restoring a portion of the upper beach, and sediment transport will remain unaffected. Additionally, an area totaling approximately 3,764.5 ft^2 will be cleared of the scattered non-native rock from the existing bulkhead to further enhance the nearshore habitat. The replacement bulkhead will also be made of large rocks as opposed to a vertical wall since stepped, rough, uneven, and inclined armoring structures can absorb or dissipate more wave energy than a vertical wall, thus reducing the potential for erosion.

The highest contributing activities to cumulative impacts are future new and expanded hard armor structures (i.e. bulkheads). For the reasons stated above, this proposed bulkhead replacement will not contribute to any additional cumulative impacts, like new hard armoring, or even replacement with a vertical bulkhead (which could increase erosion potential).

The full scope of cumulative impacts cannot be quantified in this assessment, but with appropriate regulations in place, it is unlikely that ESA-listed species, critical habitat, or human recreation will be greatly affected by the replacement of the existing bulkhead.

4.4 Interrelated/Interdependent Effects

Completion of this project is not anticipated to promote future construction or other activities that would not otherwise occur without its completion. The bulkhead at this project site is part of a longer stretch of shoreline armoring that extends along this feeder bluff to protect residential properties (WDFW 2019; WECY 2024a). Therefore, no additional interrelated or interdependent actions that could affect species regulated under ESA are anticipated to occur because of this project.

5 Conservation Measures to Avoid & Minimize Impacts

Conservation measures presented here include avoidance and minimization measures that are intended to address both City of Port Townsend SMP criteria and FEMA requirements. The FEMA requirements pertain to marine critical habitat and ESA-listed species within the adjoining floodplain.

All shoreline development must be located, designed, constructed, and maintained in a manner that protects ecological functions and ecosystem-wide processes. This section describes the steps taken during project planning and implementation to find the least environmentally damaging practicable alternative to achieve the project goal.

The following mitigation sequencing steps, as described in WAC 173-26-201(2)(e), were considered during project development and site selection:

- **No action:** To avoid the adverse impact altogether by not taking a certain action or parts of an action.
    - The project purpose and need are described in more detail in the Project Description section. "No Action" would not achieve the project goal of installing a replacement bulkhead and preventing damage to the single-family homes from future wave erosion. Aspect Consulting states: "Rapid erosion of the toe of the steep shoreline slope below the residences is occurring where the bulkhead has been damaged. We also observed evidence of significant erosion around the landing for the beach stairs; either there was not historically a bulkhead or the bulkhead has been completely demolished. If the bulkhead were to be removed, rapid erosion of the shoreline slope toe would compromise the soils between the bulkhead and the residence and eventually leave the residence foundations unsupported" (2024).
- **Minimizing impacts** by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts.
    - The existing non-native rocks from the failing bulkhead will be removed restoring up to 3,764.5 ft^2 of the upper beach.
    - The replacement rock bulkhead will be built 3 ft landward of the existing rock armor, restoring up to an additional 525 ft^2 of the upper beach.
    - The replacement rock bulkhead will be sloped and will consist of large rocks to help dissipate wave energy.
    - Equipment will access the site from the upland side; a barge will not be used.
    - Construction will occur at low tide in the dry and BMPs will be followed to avoid/minimize sediment disturbances.

    - Equipment will be operated within a 25-ft-wide work corridor on the beach.
- **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.
    - The existing non-native rocks from the failing bulkhead will be removed restoring up to 3,764.5 ft^2 of the upper beach.
    - The replacement rock bulkhead will be built landward of the existing rock armor (above the established OHWM), restoring up to an additional 525 ft^2 of the upper beach.
- **Reducing or eliminating** the impact over time by preservation and maintenance operations.
    - Installing the replacement bulkhead landward of the current footprint and reducing the footprint will reduce impacts to the nearshore environment over time.
    - The replacement sloped rock bulkhead will help dissipate wave energy and reduce erosion on the beach from waves.
- **Compensating** for the adverse impact by replacing, enhancing, or providing substitute resources or environments.
    - The existing non-native rocks from the failing bulkhead will be removed restoring up to 3,764.5 ft^2 of the upper beach.
    - Installation of the replacement bulkhead 3 ft landward of the current footprint and reducing the total footprint will restore at least an additional 525 ft^2 of upper intertidal habitat to ensure no net loss of ecological function.
- **Monitoring** the impact and the compensation project and taking appropriate corrective measures.
    - No monitoring is proposed.

In order to minimize potential impacts to listed species and habitat associated with this project, the following conservation measures are recommended by MSA for implementation at the site:

1. The following BMPs will be exercised throughout this project:
    a. Care will be taken to contain all construction debris.
    b. Training for all employees on emergency spill response and containment.
    c. Daily housekeeping to ensure debris does not enter the water/area adjacent to the work site.
    d. Equipment shall be operated in a way that minimizes turbidity, such as running equipment and stockpiling materials within a designated corridor on the beach.
    e. Construction should occur at low tide, in the dry to minimize turbidity.
    f. Normal workdays are recommended to be scheduled Monday through Friday from 7 am – 7 pm to comply with local noise ordinances; however, if the work occurs in fall or winter, it is likely these times will not coincide with the necessary low tides.
    g. Equipment will operate within a 25-ft-wide work corridor on the beach.

h. Project activities will occur in the dry, not when the work area is inundated by tidal waters.

2. Any large wood debris, such as drift logs, in the intertidal zone should remain in place or replaced once work is completed.
3. Erosion and sedimentation control measures shall be inspected after each storm event and daily during prolonged rainfall.
4. Work should occur during the in-water work window for Tidal Reference Area 10 (July 16 to February 15) for the protection of migrating salmonids.
5. All requirements listed in the HPA issued by WDFW should be followed, especially those regarding forage fish survey requirements.

6 Take Analysis

The ESA (Section 3) defines "take" as to "harass, harm, pursue, hunt, shoot, wound, trap, capture, collect or attempt to engage in any such conduct." The USFWS further defines "harm" as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering." It is likely that no "take" will result from this project.

7 Conclusion

7.1 No Net Loss

Short-term impacts from demolition and construction will be minimized through avoidance and minimization measures described in Section 5 above. The replacement bulkhead will comply with the developmental standards as required in the City's SMP for shoreline stabilization. The proposed replacement would limit the size of the shoreline stabilization to the minimum size necessary as well as incorporate ecological restoration to a portion of the shoreline that was previously disconnected from the estuarine environment.

Because this is the replacement of an existing bulkhead with a rock bulkhead that will be located 3 ft landward of the existing footprint, the project will perpetuate impacts to nearshore habitat but will not result in additional habitat or functional loss. Some ecological benefits will result from removing the dispersed non-native rocks along the upper shoreline that span across an area measuring approximately 3,764.5 ft^2, by reducing the footprint of the bulkhead, and to restore an additional 525 ft^2 of upper intertidal area to enhance the nearshore environment. Therefore, this project will result in no net loss to ecological function if the appropriate conservation and mitigation measures are followed.

7.2 Determination of Effect

ESA-listed species and critical habitat in the action area and FEMA Flood Hazard Area are evaluated below based on the following assessments:

- No effect (absolutely no effect whatsoever, either positive or negative);
- May affect, not likely to adversely affect (insignificant effects that never reach the level where take occurs, or effects are discountable and extremely unlikely to occur; or there would be an entirely beneficial effect); or,
- May affect, likely to adversely affect (measurable or significant effects are likely, and the project will require formal consultation).

This determination of effect for protected species is contingent upon implementation of the conservation and minimization measures and proposed compensatory mitigation described in Section 5. In general, direct adverse effects to ESA-listed species (avoidance, behavior modification) will be short-term, but would not result in take, and would not contribute to an increased risk of extinction.

After reviewing the appropriate data, the determination of effect to each ESA-listed species and their critical habitat within the action area is:

- **Puget Sound Chinook –** "May affect, not likely to adversely affect"
- **Hood Canal Summer-run chum –** "May affect, not likely to adversely affect"
- **Puget Sound Steelhead –** "No effect"
- **Bull trout –** "No effect"
- **Bocaccio Rockfish –** "May affect, not likely to adversely affect"
- **Yelloweye Rockfish –** "No effect"
- **Marbled Murrelet –** "No effect"
- **Green sturgeon –** "No effect"
- **Southern Eulachon** – "No effect"
- **Humpback whale** – "No effect"
- **Leatherback sea turtle** – "No effect"
- **Southern Resident Killer Whale** – "No effect"

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